

# Package ‘waterquality’

May 8, 2026

**Title** Satellite Derived Water Quality Detection Algorithms

**Version** 1.0.0

**Description** The main purpose of waterquality is to quickly and easily convert satellite-based reflectance imagery into one or many well-known water quality algorithms designed for the detection of harmful algal blooms or the following pigment proxies: chlorophyll-a, blue-green algae (phycocyanin), and turbidity. Johansen et al. (2019) <[doi:10.21079/11681/35053](https://doi.org/10.21079/11681/35053)>.

**Depends** R (>= 3.4.0)

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**Encoding** UTF-8

**LazyData** true

**Imports** methods, terra, purrr, caret, magrittr, dplyr

**RoxygenNote** 7.2.3

**Suggests** testthat, knitr, tibble, rmarkdown, covr, tmap, tmaptools, sf

**URL** <https://github.com/RAJohansen/waterquality>

**BugReports** <https://github.com/RAJohansen/waterquality/issues>

**VignetteBuilder** knitr

**NeedsCompilation** no

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**Repository** CRAN

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| A110SABI | <i>A110SABI algorithm</i> |
|----------|---------------------------|

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**Description**

Applies the A110SABI algorithm

**Usage**

A110SABI(w857, w644, w458, w529)

**Arguments**

- w857            numeric. Value at wavelength of 857 nm
- w644            numeric. Value at wavelength of 644 nm
- w458            numeric. Value at wavelength of 458 nm
- w529            numeric. Value at wavelength of 529 nm

**Value**

SpatRaster or numeric

## References

Alawadi, F. Detection of surface algal blooms using the newly developed algorithm surface algal bloom index (SABI). Proc. SPIE 2010, 7825.

## See Also

Other algorithms: [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Am092Bsub

*Am092Bsub algorithm*

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## Description

Applies the Am092Bsub algorithm

## Usage

`Am092Bsub(w681, w665)`

## Arguments

|      |  |
|------|--|
| w681 | numeric. Value at wavelength of 681 nm |
| w665 | numeric. Value at wavelength of 665 nm |

## Value

SpatRaster or numeric

## References

Amin, R.; Zhou, J.; Gilerson, A.; Gross, B.; Moshary, F.; Ahmed, S. Novel optical techniques for detecting and classifying toxic dinoflagellate *Karenia brevis* blooms using satellite imagery. Opt. Express 2009, 17, 9126–9144.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

Am09KBBI

*Am09KBBI algorithm***Description**

Applies the Am09KBBI algorithm

**Usage**

```
Am09KBBI(w686, w658)
```

**Arguments**

|      |  |
|------|--|
| w686 | numeric. Value at wavelength of 686 nm |
| w658 | numeric. Value at wavelength of 658 nm |

**Value**

SpatRaster or numeric

**References**

Amin, R.; Zhou, J.; Gilerson, A.; Gross, B.; Moshary, F.; Ahmed, S.; Novel optical techniques for detecting and classifying toxic dinoflagellate *Karenia brevis* blooms using satellite imagery, *Optics Express*, 2009, 17, 11, 1-13.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be162B643sub629

*Be162B643sub629 algorithm*


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**Description**

Applies the Be162B643sub629 algorithm

**Usage**

Be162B643sub629(w644, w629)

**Arguments**

|      |  |
|------|--|
| w644 | numeric. Value at wavelength of 644 nm |
| w629 | numeric. Value at wavelength of 729 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be162B700sub601

*Be162B700sub601 algorithm*


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**Description**

Applies the Be162B700sub601 algorithm

**Usage**

Be162B700sub601(w700, w601)

**Arguments**

|      |  |
|------|--|
| w700 | numeric. Value at wavelength of 700 nm |
| w601 | numeric. Value at wavelength of 601 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be162BsubPhy

*Be162BsubPhy algorithm*


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**Description**

Applies the Be162BsubPhy algorithm

**Usage**

Be162BsubPhy(w715, w615)

**Arguments**

|      |  |
|------|--|
| w715 | numeric. Value at wavelength of 715 nm |
| w615 | numeric. Value at wavelength of 615 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHBlueRedNIR\_LS8 *Be16FLHBlueRedNIR\_LS8 algorithm*

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**Description**

Applies the Be16FLHBlueRedNIR\_LS8 algorithm

**Usage**

`Be16FLHBlueRedNIR_LS8(w658, w857, w458)`

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHBlueRedNIR\_MERIS

*Be16FLHBlueRedNIR\_MERIS algorithm*

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**Description**

Applies the Be16FLHBlueRedNIR\_MERIS algorithm

**Usage**

Be16FLHBlueRedNIR\_MERIS(w658, w857, w458)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHBlueRedNIR\_OLCI

*Be16FLHBlueRedNIR\_OLCI algorithm*

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**Description**

Applies the Be16FLHBlueRedNIR\_OLCI algorithm

**Usage**

Be16FLHBlueRedNIR\_OLCI(w658, w857, w458)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHBlueRedNIR\_S2    *Be16FLHBlueRedNIR\_S2 algorithm*

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**Description**

Applies the Be16FLHBlueRedNIR\_S2 algorithm

**Usage**

Be16FLHBlueRedNIR\_S2(w658, w857, w458)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHBlueRedNIR\_WV2 *Be16FLHBlueRedNIR\_WV2 algorithm*

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**Description**

Applies the Be16FLHBlueRedNIR\_WV2 algorithm

**Usage**

Be16FLHBlueRedNIR\_WV2(w658, w857, w458)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHblue\_LS8

*Be16FLHblue\_LS8 algorithm*


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**Description**

Applies the Be16FLHblue\_LS8 algorithm

**Usage**

```
Be16FLHblue_LS8(w529, w644, w458)
```

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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|                   |                                    |
|-------------------|------------------------------------|
| Be16FLHblue_MERIS | <i>Be16FLHblue_MERIS algorithm</i> |
|-------------------|------------------------------------|

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**Description**

Applies the Be16FLHblue\_MERIS algorithm

**Usage**

Be16FLHblue\_MERIS(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be16FLHblue\_OLCI

*Be16FLHblue\_OLCI algorithm*


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**Description**

Applies the Be16FLHblue\_OLCI algorithm

**Usage**

Be16FLHblue\_OLCI(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

Be16FLHblue\_S2

*Be16FLHblue\_S2 algorithm***Description**

Applies the Be16FLHblue\_S2 algorithm

**Usage**

```
Be16FLHblue_S2(w529, w644, w458)
```

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIR0verGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHblue\_WV2

*Be16FLHblue\_WV2 algorithm*


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**Description**

Applies the Be16FLHblue\_WV2 algorithm

**Usage**

Be16FLHblue\_WV2(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHGreenRedNIR\_LS8

*Be16FLHGreenRedNIR\_LS8 algorithm*

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**Description**

Applies the Be16FLHGreenRedNIR\_LS8 algorithm

**Usage**

Be16FLHGreenRedNIR\_LS8(w658, w857, w558)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHGreenRedNIR\_MERIS

*Be16FLHGreenRedNIR\_MERIS algorithm*

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**Description**

Applies the Be16FLHGreenRedNIR\_MERIS algorithm

**Usage**

Be16FLHGreenRedNIR\_MERIS(w658, w857, w558)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHGreenRedNIR\_OLCI

*Be16FLHGreenRedNIR\_OLCI algorithm*

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**Description**

Applies the Be16FLHGreenRedNIR\_OLCI algorithm

**Usage**

Be16FLHGreenRedNIR\_OLCI(w658, w857, w558)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHGreenRedNIR\_S2 *Be16FLHGreenRedNIR\_S2 algorithm*

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**Description**

Applies the Be16FLHGreenRedNIR\_S2 algorithm

**Usage**

Be16FLHGreenRedNIR\_S2(w658, w857, w558)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHGreenRedNIR\_WV2

*Be16FLHGreenRedNIR\_WV2 algorithm*

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**Description**

Applies the Be16FLHGreenRedNIR\_WV2 algorithm

**Usage**

Be16FLHGreenRedNIR\_WV2(w658, w857, w558)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHVioletRedNIR\_LS8

*Be16FLHVioletRedNIR\_LS8 algorithm*

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**Description**

Applies the Be16FLHVioletRedNIR\_LS8 algorithm

**Usage**

Be16FLHVioletRedNIR\_LS8(w658, w857, w444)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHVioletRedNIR\_MERIS

*Be16FLHVioletRedNIR\_MERIS algorithm*

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**Description**

Applies the Be16FLHVioletRedNIR\_MERIS algorithm

**Usage**

Be16FLHVioletRedNIR\_MERIS(w658, w857, w444)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHVioletRedNIR\_OLCI

*Be16FLHVioletRedNIR\_OLCI algorithm*

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**Description**

Applies the Be16FLHVioletRedNIR\_OLCI algorithm

**Usage**

Be16FLHVioletRedNIR\_OLCI(w658, w857, w444)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTblue\(\)](#), [Be16NDTiviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHVioletRedNIR\_S2

*Be16FLHVioletRedNIR\_S2 algorithm*

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**Description**

Applies the Be16FLHVioletRedNIR\_S2 algorithm

**Usage**

Be16FLHVioletRedNIR\_S2(w658, w857, w444)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTblue\(\)](#), [Be16NDTiviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHVioletRedNIR\_WV2

*Be16FLHVioletRedNIR\_WV2 algorithm*

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**Description**

Applies the Be16FLHVioletRedNIR\_WV2 algorithm

**Usage**

Be16FLHVioletRedNIR\_WV2(w658, w857, w444)

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w857 | numeric. Value at wavelength of 857 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be16FLHviolet\_LS8

*Be16FLHviolet\_LS8 algorithm*


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**Description**

Applies the Be16FLHviolet\_LS8 algorithm

**Usage**

Be16FLHviolet\_LS8(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 429 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHvioletRedNIR\\_LS8\(\)](#), [Be16FLHvioletRedNIR\\_MERIS\(\)](#), [Be16FLHvioletRedNIR\\_OLCI\(\)](#), [Be16FLHvioletRedNIR\\_S2\(\)](#), [Be16FLHvioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHviolet\_MERIS    *Be16FLHviolet\_MERIS algorithm*

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**Description**

Applies the Be16FLHviolet\_MERIS algorithm

**Usage**

Be16FLHviolet\_MERIS(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 429 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [Turblath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16FLHviolet\_OLCI      *Be16FLHviolet\_OLCI algorithm*

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**Description**

Applies the Be16FLHviolet\_OLCI algorithm

**Usage**

Be16FLHviolet\_OLCI(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 429 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be16FLHviolet\_S2

*Be16FLHviolet\_S2 algorithm*


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**Description**

Applies the Be16FLHviolet\_S2 algorithm

**Usage**

Be16FLHviolet\_S2(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 429 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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|                   |                                    |
|-------------------|------------------------------------|
| Be16FLHviolet_WV2 | <i>Be16FLHviolet_WV2 algorithm</i> |
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**Description**

Applies the Be16FLHviolet\_WV2 algorithm

**Usage**

Be16FLHviolet\_WV2(w529, w644, w458)

**Arguments**

|      |  |
|------|--|
| w529 | numeric. Value at wavelength of 529 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w458 | numeric. Value at wavelength of 429 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.A. and 22 others; Comparison of satellite reflectance algorithms for estimating chlorophyll-a in a temperate reservoir using coincident hyperspectral aircraft imagery and dense coincident surface observations, *Remote Sens. Environ.*, 2016, 178, 15-30.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 Be16NDPhyI

*Be16NDPhyI algorithm*


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**Description**

Applies the Be16NDPhyI algorithm

**Usage**

Be16NDPhyI(w700, w622)

**Arguments**

|      |  |
|------|--|
| w700 | numeric. Value at wavelength of 700 nm |
| w622 | numeric. Value at wavelength of 622 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [Turblath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wyo08CI\(\)](#)

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Be16NDPhyI644over615    *Be16NDPhyI644over615 algorithm*

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**Description**

Applies the Be16NDPhyI644over615 algorithm

**Usage**

```
Be16NDPhyI644over615(w644, w615)
```

**Arguments**

|      |  |
|------|--|
| w644 | numeric. Value at wavelength of 644 nm |
| w615 | numeric. Value at wavelength of 615 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16NDPhyI644over629    *Be16NDPhyI644over629 algorithm*

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**Description**

Applies the Be16NDPhyI644over629 algorithm

**Usage**

Be16NDPhyI644over629(w644, w629)

**Arguments**

|      |  |
|------|--|
| w644 | numeric. Value at wavelength of 644 nm |
| w629 | numeric. Value at wavelength of 629 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

Be16NDTIblue

*Be16NDTIblue algorithm***Description**

Applies the Be16NDTIblue algorithm

**Usage**

```
Be16NDTIblue(w658, w458)
```

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w458 | numeric. Value at wavelength of 458 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [Turblath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16NDTIviolet

*Be16NDTIviolet algorithm*


---

**Description**

Applies the Be16NDTIviolet algorithm

**Usage**

```
Be16NDTIviolet(w658, w444)
```

**Arguments**

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w444 | numeric. Value at wavelength of 444 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [Turblath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Be16Phy2BDA644over629 *Be16Phy2BDA644over629 algorithm*

---

**Description**

Applies the Be16Phy2BDA644over629 algorithm

**Usage**

Be16Phy2BDA644over629(w644, w629)

**Arguments**

|      |  |
|------|--|
| w644 | numeric. Value at wavelength of 644 nm |
| w629 | numeric. Value at wavelength of 629 nm |

**Value**

SpatRaster or numeric

**References**

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIR0verGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

Da052BDA

*Da052BDA algorithm***Description**

Applies the Da052BDA algorithm

**Usage**

Da052BDA(w714, w672)

**Arguments**

|      |  |
|------|--|
| w714 | numeric. Value at wavelength of 714 nm |
| w672 | numeric. Value at wavelength of 672 nm |

**Value**

SpatRaster or numeric

**References**

Wynne, T. T., Stumpf, R. P., Tomlinson, M. C., Warner, R. A., Tester, P. A., Dyble, J.; Relating spectral shape to cyanobacterial blooms in the Laurentian Great Lakes. *Int. J. Remote Sens.*, 2008, 29, 3665–3672.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIR0verGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

De933BDA

*De933BDA algorithm***Description**

Applies the De933BDA algorithm

**Usage**

```
De933BDA(w600, w648, w625)
```

**Arguments**

|      |  |
|------|--|
| w600 | numeric. Value at wavelength of 600 nm |
| w648 | numeric. Value at wavelength of 648 nm |
| w625 | numeric. Value at wavelength of 625 nm |

**Value**

SpatRaster or numeric

**References**

Dekker, A.; Detection of the optical water quality parameters for eutrophic waters by high resolution remote sensing, Ph.D. thesis, 1993, Free University, Amsterdam.

**See Also**

Other algorithms: `Al10SABI()`, `Am092Bsub()`, `Am09KBBI()`, `Be162B643sub629()`, `Be162B700sub601()`, `Be162BsubPhy()`, `Be16FLHBlueRedNIR_LS8()`, `Be16FLHBlueRedNIR_MERIS()`, `Be16FLHBlueRedNIR_OLCI()`, `Be16FLHBlueRedNIR_S2()`, `Be16FLHBlueRedNIR_WV2()`, `Be16FLHGreenRedNIR_LS8()`, `Be16FLHGreenRedNIR_MERIS()`, `Be16FLHGreenRedNIR_OLCI()`, `Be16FLHGreenRedNIR_S2()`, `Be16FLHGreenRedNIR_WV2()`, `Be16FLHVioletRedNIR_LS8()`, `Be16FLHVioletRedNIR_MERIS()`, `Be16FLHVioletRedNIR_OLCI()`, `Be16FLHVioletRedNIR_S2()`, `Be16FLHVioletRedNIR_WV2()`, `Be16FLHblue_LS8()`, `Be16FLHblue_MERIS()`, `Be16FLHblue_OLCI()`, `Be16FLHblue_S2()`, `Be16FLHblue_WV2()`, `Be16FLHviolet_LS8()`, `Be16FLHviolet_MERIS()`, `Be16FLHviolet_OLCI()`, `Be16FLHviolet_S2()`, `Be16FLHviolet_WV2()`, `Be16NDPhyI644over615()`, `Be16NDPhyI644over629()`, `Be16NDPhyI()`, `Be16NDTIblue()`, `Be16NDTIviolet()`, `Be16Phy2BDA644over629()`, `Da052BDA()`, `Gi033BDA()`, `Go04MCI()`, `HU103BDA()`, `Kn07KIVU()`, `MI092BDA()`, `MM092BDA()`, `MM12NDCIalt()`, `MM12NDCI()`, `MM143BDAopt()`, `SI052BDA()`, `SM122BDA()`, `SY002BDA()`, `TurbBe16GreenPlusRedBothOverViolet()`, `TurbBe16RedOverViolet()`, `TurbBow06RedOverGreen()`, `TurbChip09NIROverGreen()`, `TurbDox02NIRoverRed()`, `TurbFrohn09GreenPlusRedBothOverBlue()`, `TurbHarr92NIR()`, `TurbLath91RedOverBlue()`, `TurbMoore80Red()`, `Wy08CI()`

---

extract\_lm

*Run linear model (lm)*

---

**Description**

The function runs a linear model on a single water quality parameter and a water quality algorithm and returns a data frame containing the following:  $r^2$ , p-value, slope, and intercept of the model

**Usage**

```
extract_lm(parameter, algorithm, df)
```

**Arguments**

|           |  |
|-----------|--|
| parameter | A string specifying water quality parameter                            |
| algorithm | A string specifying water quality algorithm                            |
| df        | data frame containing the values for parameter and algorithm arguments |

**Value**

A data frame of the model results

**References**

Johansen, Richard; et al. (2018). Evaluating the portability of satellite derived chlorophyll-a algorithms for temperate inland lakes using airborne hyperspectral imagery and dense surface observations. *Harmful Algae*. 76. 10.1016/j.hal.2018.05.001.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

**See Also**

Other extract\_lm: [extract\\_lm\\_cv\\_all\(\)](#), [extract\\_lm\\_cv\\_multi\(\)](#), [extract\\_lm\\_cv\(\)](#)

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 extract\_lm\_cv

*Run linear model with crossvalidation*


---

**Description**

The function runs a linear model on a single water quality parameter and a water quality algorithm and conducts a k-folds cross validation, which returns a data frame containing the following: The  $r^2$ , p-value, slope, intercept of the global lm model & average  $r^2$ , average RMSE, average MAE from the crossvalidated model

**Usage**

```
extract_lm_cv(
  parameter,
  algorithm,
  df,
  train_method = "lm",
  control_method = "repeatedcv",
  folds = 3,
  nrepeats = 5
)
```

**Arguments**

|                |   |
|----------------|---|
| parameter      | water quality parameter   |
| algorithm      | water quality algorithm   |
| df             | data frame containing the values for parameter and algorithm arguments  |
| train_method   | A string specifying which classification or regression model to use (Default = "lm"). See <code>?caret::train</code> for more details |
| control_method | A string specifying the resampling method (Default = "repeatedcv"). See <code>?caret::trainControl</code> for more details            |
| folds          | the number of folds to be used in the cross validation model  |
| nrepeats       | the number of iterations to be used in the cross validation model   |

**Value**

A data frame of the model results

## References

Johansen, Richard; et al. (2018). Evaluating the portability of satellite derived chlorophyll-a algorithms for temperate inland lakes using airborne hyperspectral imagery and dense surface observations. *Harmful Algae*. 76. 10.1016/j.hal.2018.05.001.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Max Kuhn. Contributions from Jed Wing, Steve Weston, Andre Williams, Chris Keefer, Allan Engelhardt, Tony Cooper, Zachary Mayer, Brenton Kenkel, the R Core Team, Michael Benesty, Reynald Lescarbeau, Andrew Ziem, Luca Scrucca, Yuan Tang, Can Candan and Tyler Hunt. (2018). caret: Classification and Regression Training. R package version 6.0-81. <https://CRAN.R-project.org/package=caret>

## See Also

Other extract\_lm: [extract\\_lm\\_cv\\_all\(\)](#), [extract\\_lm\\_cv\\_multi\(\)](#), [extract\\_lm\(\)](#)

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|                   |  |
|-------------------|--|
| extract_lm_cv_all | <i>Run linear model with crossvalidation over multiple dependent and all numeric independent variables in a data frame</i> |
|-------------------|--|

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## Description

The function runs a linear model on a list of x and list of y variables and conducts a k-folds cross validation, which returns a data frame containing the following: The  $r^2$ , p-value, slope, intercept of the global lm model & average  $r^2$ , average RMSE, average MAE from the crossvalidated model

## Usage

```
extract_lm_cv_all(
  parameters,
  df,
  train_method = "lm",
  control_method = "repeatedcv",
  folds = 3,
  nrepeats = 5
)
```

## Arguments

|                |   |
|----------------|---|
| parameters     | the list of dependent variables to be evaluated   |
| df             | data frame containing the values for parameter and algorithm arguments  |
| train_method   | A string specifying which classification or regression model to use (Default = "lm"). See <code>?caret::train</code> for more details |
| control_method | A string specifying the resampling method (Default = "repeatedcv"). See <code>?caret::trainControl</code> for more details            |
| folds          | the number of folds to be used in the cross validation model  |
| nrepeats       | the number of iterations to be used in the cross validation model   |

**Value**

A data frame of the model results

**References**

Johansen, Richard; et al. (2018). Evaluating the portability of satellite derived chlorophyll-a algorithms for temperate inland lakes using airborne hyperspectral imagery and dense surface observations. *Harmful Algae*. 76. 10.1016/j.hal.2018.05.001.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Max Kuhn. Contributions from Jed Wing, Steve Weston, Andre Williams, Chris Keefer, Allan Engelhardt, Tony Cooper, Zachary Mayer, Brenton Kenkel, the R Core Team, Michael Benesty, Reynald Lescarbeau, Andrew Ziem, Luca Scrucca, Yuan Tang, Can Candan and Tyler Hunt. (2018). caret: Classification and Regression Training. R package version 6.0-81. <https://CRAN.R-project.org/package=caret>

**See Also**

Other extract\_lm: [extract\\_lm\\_cv\\_multi\(\)](#), [extract\\_lm\\_cv\(\)](#), [extract\\_lm\(\)](#)

---

|                     |  |
|---------------------|--|
| extract_lm_cv_multi | <i>Run linear model with crossvalidation over multiple independent and dependent variables</i> |
|---------------------|--|

---

**Description**

The function runs a linear model on a list of x and list of y variables and conducts a k-folds cross validation, which returns a data frame containing the following: The  $r^2$ , p-value, slope, intercept of the global lm model & average  $r^2$ , average RMSE, average MAE from the crossvalidated model

**Usage**

```
extract_lm_cv_multi(  
  parameters,  
  algorithms,  
  df,  
  train_method = "lm",  
  control_method = "repeatedcv",  
  folds = 3,  
  nrepeats = 5  
)
```

**Arguments**

|                |   |
|----------------|---|
| parameters     | the list of a water quality parameters to be evaluated  |
| algorithms     | the list of water quality algorithms to be evaluated  |
| df             | data frame containing the values for parameters and algorithms arguments  |
| train_method   | A string specifying which classification or regression model to use (Default = "lm"). See <code>?caret::train</code> for more details |
| control_method | A string specifying the resampling method (Default = "repeatedcv"). See <code>?caret::trainControl</code> for more details            |
| folds          | the number of folds to be used in the cross validation model  |
| nrepeats       | the number of iterations to be used in the cross validation model   |

**Value**

A data frame of the model results

**References**

Johansen, Richard; et al. (2018). Evaluating the portability of satellite derived chlorophyll-a algorithms for temperate inland lakes using airborne hyperspectral imagery and dense surface observations. *Harmful Algae*. 76. 10.1016/j.hal.2018.05.001.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Max Kuhn. Contributions from Jed Wing, Steve Weston, Andre Williams, Chris Keefer, Allan Engelhardt, Tony Cooper, Zachary Mayer, Brenton Kenkel, the R Core Team, Michael Benesty, Reynald Lescarbeau, Andrew Ziem, Luca Scrucca, Yuan Tang, Can Candan and Tyler Hunt. (2018). *caret: Classification and Regression Training*. R package version 6.0-81. <https://CRAN.R-project.org/package=caret>

**See Also**

Other `extract_lm`: [extract\\_lm\\_cv\\_all\(\)](#), [extract\\_lm\\_cv\(\)](#), [extract\\_lm\(\)](#)

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Gi033BDA

*Gi033BDA algorithm*

---

**Description**

Applies the Gi033BDA algorithm

**Usage**

`Gi033BDA(w672, w715, w757)`

**Arguments**

|      |  |
|------|--|
| w672 | numeric. Value at wavelength of 672 nm |
| w715 | numeric. Value at wavelength of 715 nm |
| w757 | numeric. Value at wavelength of 757 nm |

**Value**

SpatRaster or numeric

**References**

Gitelson, A.A.; U. Gritz, and M. N. Merzlyak.; Relationships between leaf chlorophyll content and spectral reflectance and algorithms for non-destructive chlorophyll assessment in higher plant leaves. J. Plant Phys. 2003, 160, 271-282.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Go04MCI

*Go04MCI algorithm*

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**Description**

Applies the Go04MCI algorithm

**Usage**

`Go04MCI(w709, w681, w753)`

**Arguments**

|      |  |
|------|--|
| w709 | numeric. Value at wavelength of 709 nm |
| w681 | numeric. Value at wavelength of 681 nm |
| w753 | numeric. Value at wavelength of 753 nm |

**Value**

SpatRaster or numeric

**References**

Gower, J.F.R.; Brown, L.; Borstad, G.A.; Observation of chlorophyll fluorescence in west coast waters of Canada using the MODIS satellite sensor. *Can. J. Remote Sens.*, 2004, 30 (1), 17–25.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHvioletRedNIR\\_LS8\(\)](#), [Be16FLHvioletRedNIR\\_MERIS\(\)](#), [Be16FLHvioletRedNIR\\_OLCI\(\)](#), [Be16FLHvioletRedNIR\\_S2\(\)](#), [Be16FLHvioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIR0verGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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HU103BDA

*HU103BDA algorithm*

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**Description**

Applies the HU103BDA algorithm

**Usage**

HU103BDA(w615, w600, w725)

**Arguments**

|      |  |
|------|--|
| w615 | numeric. Value at wavelength of 615 nm |
| w600 | numeric. Value at wavelength of 600 nm |
| w725 | numeric. Value at wavelength of 725 nm |

**Value**

SpatRaster or numeric

## References

Hunter, P.D.; Tyler, A.N.; Willby, N.J.; Gilvear, D.J.; The spatial dynamics of vertical migration by *Microcystis aeruginosa* in a eutrophic shallow lake: A case study using high spatial resolution time-series airborne remote sensing. *Limn. Oceanogr.* 2008, 53, 2391-2406.

## See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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Kn07KIVU

*Kn07KIVU algorithm*

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## Description

Applies the Kn07KIVU algorithm

## Usage

Kn07KIVU(w458, w644, w529)

## Arguments

|      |  |
|------|--|
| w458 | numeric. Value at wavelength of 458 nm |
| w644 | numeric. Value at wavelength of 644 nm |
| w529 | numeric. Value at wavelength of 529 nm |

## Value

SpatRaster or numeric

## References

Kneubuhler, M.; Frank T.; Kellenberger, T.W; Pasche N.; Schmid M.; Mapping chlorophyll-a in Lake Kivu with remote sensing methods. 2007, Proceedings of the Envisat Symposium 2007, Montreux, Switzerland 23–27 April 2007 (ESA SP-636, July 2007).

**See Also**

Other algorithms: `Al10SABI()`, `Am092Bsub()`, `Am09KBBI()`, `Be162B643sub629()`, `Be162B700sub601()`, `Be162BsubPhy()`, `Be16FLHBlueRedNIR_LS8()`, `Be16FLHBlueRedNIR_MERIS()`, `Be16FLHBlueRedNIR_OLCI()`, `Be16FLHBlueRedNIR_S2()`, `Be16FLHBlueRedNIR_WV2()`, `Be16FLHGreenRedNIR_LS8()`, `Be16FLHGreenRedNIR_MERIS()`, `Be16FLHGreenRedNIR_OLCI()`, `Be16FLHGreenRedNIR_S2()`, `Be16FLHGreenRedNIR_WV2()`, `Be16FLHVioletRedNIR_LS8()`, `Be16FLHVioletRedNIR_MERIS()`, `Be16FLHVioletRedNIR_OLCI()`, `Be16FLHVioletRedNIR_S2()`, `Be16FLHVioletRedNIR_WV2()`, `Be16FLHblue_LS8()`, `Be16FLHblue_MERIS()`, `Be16FLHblue_OLCI()`, `Be16FLHblue_S2()`, `Be16FLHblue_WV2()`, `Be16FLHviolet_LS8()`, `Be16FLHviolet_MERIS()`, `Be16FLHviolet_OLCI()`, `Be16FLHviolet_S2()`, `Be16FLHviolet_WV2()`, `Be16NDPhyI644over615()`, `Be16NDPhyI644over629()`, `Be16NDPhyI()`, `Be16NDTIblue()`, `Be16NDTIviolet()`, `Be16Phy2BDA644over629()`, `Da052BDA()`, `De933BDA()`, `Gi033BDA()`, `Go04MCI()`, `HU103BDA()`, `MI092BDA()`, `MM092BDA()`, `MM12NDCIalt()`, `MM12NDCI()`, `MM143BDAopt()`, `SI052BDA()`, `SM122BDA()`, `SY002BDA()`, `TurbBe16GreenPlusRedBothOverViolet()`, `TurbBe16RedOverViolet()`, `TurbBow06RedOverGreen()`, `TurbChip09NIROverGreen()`, `TurbDox02NIRoverRed()`, `TurbFrohn09GreenPlusRedBothOverBlue()`, `TurbHarr92NIR()`, `TurbLath91RedOverBlue()`, `TurbMoore80Red()`, `Wy08CI()`

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Map\_WQ\_raster

*Create waterquality Map with sampling points and optional histogram*


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**Description**

This function wraps the `tmap` package to help users generate fast and simple data visualization of their `WQ_calc` raster output along with optional geospatial objects and histogram

**Usage**

```
Map_WQ_raster(
  WQ_raster,
  sample_points,
  map_title,
  raster_style = "quantile",
  histogram = TRUE
)
```

**Arguments**

|                            |   |
|----------------------------|---|
| <code>WQ_raster</code>     | Raster file generated from <code>wq_calc</code> or other GeoTiff file   |
| <code>sample_points</code> | geospatial file (.shp or .gpkg) containing sampling locations   |
| <code>map_title</code>     | text used to generate title of map  |
| <code>raster_style</code>  | method to process the color scale when <code>col</code> is a numeric variable. Please refer to the style argument in the <code>?tmap::tm_raster()</code> function for more details (Default is "quantile"). |
| <code>histogram</code>     | Option to add or remove a histogram of the data values. (Default is TRUE)   |

**Value**

A data visualization of the results

MI092BDA

*MI092BDA algorithm***Description**

Applies the MI092BDA algorithm

**Usage**

MI092BDA(w700, w600)

**Arguments**

|      |  |
|------|--|
| w700 | numeric. Value at wavelength of 700 nm |
| w600 | numeric. Value at wavelength of 600 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S.; Mishra, D.R.; Schluchter, W. M., A novel algorithm for predicting PC concentrations in cyanobacteria: A proximal hyperspectral remote sensing approach. *Remote Sens.*, 2009, 1, 758–775.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

MM092BDA

*MM092BDA algorithm***Description**

Applies the MM092BDA algorithm

**Usage**

MM092BDA(w724, w600)

**Arguments**

|      |  |
|------|--|
| w724 | numeric. Value at wavelength of 724 nm |
| w600 | numeric. Value at wavelength of 600 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S.; Mishra, D.R.; Schluchter, W. M., A novel algorithm for predicting PC concentrations in cyanobacteria: A proximal hyperspectral remote sensing approach. *Remote Sens.*, 2009, 1, 758–775.

**See Also**

Other algorithms: A110SABI(), Am092Bsub(), Am09KBBI(), Be162B643sub629(), Be162B700sub601(), Be162BsubPhy(), Be16FLHBlueRedNIR\_LS8(), Be16FLHBlueRedNIR\_MERIS(), Be16FLHBlueRedNIR\_OLCI(), Be16FLHBlueRedNIR\_S2(), Be16FLHBlueRedNIR\_WV2(), Be16FLHGreenRedNIR\_LS8(), Be16FLHGreenRedNIR\_MERIS(), Be16FLHGreenRedNIR\_OLCI(), Be16FLHGreenRedNIR\_S2(), Be16FLHGreenRedNIR\_WV2(), Be16FLHVioletRedNIR\_LS8(), Be16FLHVioletRedNIR\_MERIS(), Be16FLHVioletRedNIR\_OLCI(), Be16FLHVioletRedNIR\_S2(), Be16FLHVioletRedNIR\_WV2(), Be16FLHblue\_LS8(), Be16FLHblue\_MERIS(), Be16FLHblue\_OLCI(), Be16FLHblue\_S2(), Be16FLHblue\_WV2(), Be16FLHviolet\_LS8(), Be16FLHviolet\_MERIS(), Be16FLHviolet\_OLCI(), Be16FLHviolet\_S2(), Be16FLHviolet\_WV2(), Be16NDPhyI644over615(), Be16NDPhyI644over629(), Be16NDPhyI(), Be16NDTIblue(), Be16NDTIviolet(), Be16Phy2BDA644over629(), Da052BDA(), De933BDA(), Gi033BDA(), Go04MCI(), HU103BDA(), Kn07KIVU(), MI092BDA(), MM12NDCIalt(), MM12NDCI(), MM143BDAopt(), SI052BDA(), SM122BDA(), SY002BDA(), TurbBe16GreenPlusRedBothOverViolet(), TurbBe16RedOverViolet(), TurbBow06RedOverGreen(), TurbChip09NIROverGreen(), TurbDox02NIRoverRed(), TurbFrohn09GreenPlusRedBothOverBlue(), TurbHarr92NIR(), TurbLath91RedOverBlue(), TurbMoore80Red(), Wy08CI()

MM12NDCI

*MM12NDCI algorithm***Description**

Applies the MM12NDCI algorithm

**Usage**

MM12NDCI(w715, w686)

**Arguments**

|      |  |
|------|--|
| w715 | numeric. Value at wavelength of 714 nm |
| w686 | numeric. Value at wavelength of 686 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S.; and Mishra, D.R. Normalized difference chlorophyll index: A novel model for remote estimation of chlorophyll-a concentration in turbid productive waters, *Remote Sens. Environ.*, 2012, 117, 394-406.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIR0verGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

MM12NDCIalt

*MM12NDCIalt algorithm***Description**

Applies the MM12NDCIalt algorithm

**Usage**

```
MM12NDCIalt(w700, w658)
```

**Arguments**

|      |  |
|------|--|
| w700 | numeric. Value at wavelength of 700 nm |
| w658 | numeric. Value at wavelength of 658 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S.; Mishra, D.R.; A novel remote sensing algorithm to quantify phycocyanin in cyanobacterial algal blooms, *Env. Res. Lett.*, 2014, 9 (11), DOI:10.1088/1748-9326/9/11/114003

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

MM143BDAopt

*MM143BDAopt algorithm***Description**

Applies the MM143BDAopt algorithm

**Usage**

MM143BDAopt(w629, w659, w724)

**Arguments**

|      |  |
|------|--|
| w629 | numeric. Value at wavelength of 629 nm |
| w659 | numeric. Value at wavelength of 659 nm |
| w724 | numeric. Value at wavelength of 724 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S.; Mishra, D.R.; A novel remote sensing algorithm to quantify phycocyanin in cyanobacterial algal blooms, *Env. Res. Lett.*, 2014, 9 (11), DOI:10.1088/1748-9326/9/11/114003

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [Turblath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

SI052BDA

*SI052BDA algorithm***Description**

Applies the SI052BDA algorithm

**Usage**

```
SI052BDA(w709, w620)
```

**Arguments**

|      |  |
|------|--|
| w709 | numeric. Value at wavelength of 709 nm |
| w620 | numeric. Value at wavelength of 620 nm |

**Value**

SpatRaster or numeric

**References**

Simis, S. G. H.; Peters, S.W. M.; Gons, H. J.; Remote sensing of the cyanobacteria pigment phycocyanin in turbid inland water. *Limn. Oceanogr.*, 2005, 50, 237–245.

**See Also**

Other algorithms: [Al10SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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 SM122BDA

*SM122BDA algorithm*


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**Description**

Applies the SM122BDA algorithm

**Usage**

SM122BDA(w709, w600)

**Arguments**

|      |  |
|------|--|
| w709 | numeric. Value at wavelength of 709 nm |
| w600 | numeric. Value at wavelength of 600 nm |

**Value**

SpatRaster or numeric

**References**

Mishra, S. Remote sensing of cyanobacteria in turbid productive waters, PhD Dissertation. Mississippi State University, USA. 2012.

**See Also**

Other algorithms: [Al10SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

SY002BDA

*SY002BDA algorithm***Description**

Applies the SY002BDA algorithm

**Usage**

SY002BDA(w650, w625)

**Arguments**

|      |  |
|------|--|
| w650 | numeric. Value at wavelength of 650 nm |
| w625 | numeric. Value at wavelength of 625 nm |

**Value**

SpatRaster or numeric

**References**

Schalles, J.; Yacobi, Y. Remote detection and seasonal patterns of phycocyanin, carotenoid and chlorophyll-a pigments in eutrophic waters. *Archiv fur Hydrobiologie, Special Issues Advances in Limnology*, 2000, 55,153–168.

**See Also**

Other algorithms: A110SABI(), Am092Bsub(), Am09KBBI(), Be162B643sub629(), Be162B700sub601(), Be162BsubPhy(), Be16FLHBlueRedNIR\_LS8(), Be16FLHBlueRedNIR\_MERIS(), Be16FLHBlueRedNIR\_OLCI(), Be16FLHBlueRedNIR\_S2(), Be16FLHBlueRedNIR\_WV2(), Be16FLHGreenRedNIR\_LS8(), Be16FLHGreenRedNIR\_MERIS(), Be16FLHGreenRedNIR\_OLCI(), Be16FLHGreenRedNIR\_S2(), Be16FLHGreenRedNIR\_WV2(), Be16FLHVioletRedNIR\_LS8(), Be16FLHVioletRedNIR\_MERIS(), Be16FLHVioletRedNIR\_OLCI(), Be16FLHVioletRedNIR\_S2(), Be16FLHVioletRedNIR\_WV2(), Be16FLHblue\_LS8(), Be16FLHblue\_MERIS(), Be16FLHblue\_OLCI(), Be16FLHblue\_S2(), Be16FLHblue\_WV2(), Be16FLHviolet\_LS8(), Be16FLHviolet\_MERIS(), Be16FLHviolet\_OLCI(), Be16FLHviolet\_S2(), Be16FLHviolet\_WV2(), Be16NDPhyI644over615(), Be16NDPhyI644over629(), Be16NDPhyI(), Be16NDTIblue(), Be16NDTIviolet(), Be16Phy2BDA644over629(), Da052BDA(), De933BDA(), Gi033BDA(), Go04MCI(), HU103BDA(), Kn07KIVU(), MI092BDA(), MM092BDA(), MM12NDCIalt(), MM12NDCI(), MM143BDAopt(), SI052BDA(), SM122BDA(), TurbBe16GreenPlusRedBothOverViolet(), TurbBe16RedOverViolet(), TurbBow06RedOverGreen(), TurbChip09NIR0verGreen(), TurbDox02NIR0verRed(), TurbFrohn09GreenPlusRedBothOverBlue(), TurbHarr92NIR(), TurbLath91RedOverBlue(), TurbMoore80Red(), Wy08CI()

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TurbBe16GreenPlusRedBothOverViolet

*TurbBe16GreenPlusRedBothOverViolet algorithm*


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## Description

Applies the TurbBe16GreenPlusRedBothOverViolet algorithm

## Usage

TurbBe16GreenPlusRedBothOverViolet(w558, w658, w444)

## Arguments

|      |  |
|------|--|
| w558 | numeric. Value at wavelength of 558 nm |
| w658 | numeric. Value at wavelength of 658 nm |
| w444 | numeric. Value at wavelength of 444 nm |

## Value

SpatRaster or numeric

## References

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

## See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIViolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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TurbBe16RedOverViolet *TurbBe16RedOverViolet algorithm*

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### Description

Applies the TurbBe16RedOverViolet algorithm

### Usage

TurbBe16RedOverViolet(w658, w444)

### Arguments

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w444 | numeric. Value at wavelength of 444 nm |

### Value

SpatRaster or numeric

### References

Beck, R.; Xu, M.; Zhan, S.; Liu, H.; Johansen, R.A.; Tong, S.; Yang, B.; Shu, S.; Wu, Q.; Wang, S.; Berling, K.; Murray, A.; Emery, E.; Reif, M.; Harwood, J.; Young, J.; Martin, M.; Stillings, G.; Stumpf, R.; Su, H.; Ye, Z.; Huang, Y. Comparison of Satellite Reflectance Algorithms for Estimating Phycocyanin Values and Cyanobacterial Total Biovolume in a Temperate Reservoir Using Coincident Hyperspectral Aircraft Imagery and Dense Coincident Surface Observations. *Remote Sens.* 2017, 9, 538.

### See Also

Other algorithms: [Al10SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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TurbBow06RedOverGreen *TurbBow06RedOverGreen algorithm*

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## Description

Applies the TurbBow06RedOverGreen algorithm

## Usage

TurbBow06RedOverGreen(w658, w558)

## Arguments

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w558 | numeric. Value at wavelength of 558 nm |

## Value

SpatRaster or numeric

## References

Bowers, D. G., and C. E. Binding. 2006. The Optical Properties of Mineral Suspended Particles: A Review and Synthesis.” *Estuarine Coastal and Shelf Science* 67 (1–2): 219–230. doi:10.1016/j.ecss.2005.11.010.

## See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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TurbChip09NIROverGreen

*TurbChip09NIROverGreen algorithm*

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## Description

Applies the TurbChip09NIROverGreen algorithm

## Usage

TurbChip09NIROverGreen(w857, w558)

## Arguments

|      |  |
|------|--|
| w857 | numeric. Value at wavelength of 857 nm |
| w558 | numeric. Value at wavelength of 558 nm |

## Value

SpatRaster or numeric

## References

Chipman, J. W.; Olmanson, L.G.; Gitelson, A.A.; Remote sensing methods for lake management: A guide for resource managers and decision-makers. 2009, Developed by the North American Lake Management Society in collaboration with Dartmouth College, University of Minnesota, and University of Nebraska for the United States Environmental Protection Agency.

## See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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TurbDox02NIRoverRed     *TurbDox02NIRoverRed algorithm*

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## Description

Applies the TurbDox02NIRoverRed algorithm

## Usage

TurbDox02NIRoverRed(w857, w658)

## Arguments

|      |  |
|------|--|
| w857 | numeric. Value at wavelength of 857 nm |
| w658 | numeric. Value at wavelength of 658 nm |

## Value

SpatRaster or numeric

## References

Doxaran, D., Froidefond, J.-M.; Castaing, P. ; A reflectance band ratio used to estimate suspended matter concentrations in sediment-dominated coastal waters, *Remote Sens.*, 2002, 23, 5079-5085.

## See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbFrohn09GreenPlusRedBothOverViolet\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

---

TurbFrohn09GreenPlusRedBothOverBlue

*TurbFrohn09GreenPlusRedBothOverBlue algorithm*

---

### Description

Applies the TurbFrohn09GreenPlusRedBothOverBlue algorithm

### Usage

TurbFrohn09GreenPlusRedBothOverBlue(w558, w658, w458)

### Arguments

|      |  |
|------|--|
| w558 | numeric. Value at wavelength of 558 nm |
| w658 | numeric. Value at wavelength of 658 nm |
| w458 | numeric. Value at wavelength of 458 nm |

### Value

SpatRaster or numeric

### References

Frohn, R. C., & Autrey, B. C. (2009). Water quality assessment in the Ohio River using new indices for turbidity and chlorophyll-a with Landsat-7 Imagery. Draft Internal Report, U.S. Environmental Protection Agency.

### See Also

Other algorithms: [Al10SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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|               |                                |
|---------------|--------------------------------|
| TurbHarr92NIR | <i>TurbHarr92NIR algorithm</i> |
|---------------|--------------------------------|

---

**Description**

Applies the TurbHarr92NIR algorithm

**Usage**

TurbHarr92NIR(w857)

**Arguments**

w857                    numeric. Value at wavelength of 857 nm

**Value**

SpatRaster or numeric

**References**

Schiebe F.R., Harrington J.A., Ritchie J.C. Remote-Sensing of Suspended Sediments—the Lake Chicot, Arkansas Project. *Int. J. Remote Sens.* 1992;13:1487–1509.

**See Also**

Other algorithms: A110SABI(), Am092Bsub(), Am09KBBI(), Be162B643sub629(), Be162B700sub601(), Be162BsubPhy(), Be16FLHBlueRedNIR\_LS8(), Be16FLHBlueRedNIR\_MERIS(), Be16FLHBlueRedNIR\_OLCI(), Be16FLHBlueRedNIR\_S2(), Be16FLHBlueRedNIR\_WV2(), Be16FLHGreenRedNIR\_LS8(), Be16FLHGreenRedNIR\_MERIS(), Be16FLHGreenRedNIR\_OLCI(), Be16FLHGreenRedNIR\_S2(), Be16FLHGreenRedNIR\_WV2(), Be16FLHVioletRedNIR\_LS8(), Be16FLHVioletRedNIR\_MERIS(), Be16FLHVioletRedNIR\_OLCI(), Be16FLHVioletRedNIR\_S2(), Be16FLHVioletRedNIR\_WV2(), Be16FLHblue\_LS8(), Be16FLHblue\_MERIS(), Be16FLHblue\_OLCI(), Be16FLHblue\_S2(), Be16FLHblue\_WV2(), Be16FLHviolet\_LS8(), Be16FLHviolet\_MERIS(), Be16FLHviolet\_OLCI(), Be16FLHviolet\_S2(), Be16FLHviolet\_WV2(), Be16NDPhyI644over615(), Be16NDPhyI644over629(), Be16NDPhyI(), Be16NDTIblue(), Be16NDTIviolet(), Be16Phy2BDA644over629(), Da052BDA(), De933BDA(), Gi033BDA(), Go04MCI(), HU103BDA(), Kn07KIVU(), MI092BDA(), MM092BDA(), MM12NDCIalt(), MM12NDCI(), MM143BDAopt(), SI052BDA(), SM122BDA(), SY002BDA(), TurbBe16GreenPlusRedBothOverViolet(), TurbBe16RedOverViolet(), TurbBow06RedOverGreen(), TurbChip09NIR0verGreen(), TurbDox02NIRoverRed(), TurbFrohn09GreenPlusRedBothOverBlue(), TurbLath91RedOverBlue(), TurbMoore80Red(), Wy08CI()

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TurbLath91RedOverBlue *TurbLath91RedOverBlue algorithm*

---

### Description

Applies the TurbLath91RedOverBlue algorithm

### Usage

TurbLath91RedOverBlue(w658, w458)

### Arguments

|      |  |
|------|--|
| w658 | numeric. Value at wavelength of 658 nm |
| w458 | numeric. Value at wavelength of 458 nm |

### Value

SpatRaster or numeric

### References

Lathrop, R. G., Jr., T. M. Lillesand, and B. S. Yandell, 1991. Testing the utility of simple multi-date Thematic Mapper calibration algorithms for monitoring turbid inland waters. *International Journal of Remote Sensing*

### See Also

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbMoore80Red\(\)](#), [Wy08CI\(\)](#)

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|                |                                 |
|----------------|---------------------------------|
| TurbMoore80Red | <i>TurbMoore80Red algorithm</i> |
|----------------|---------------------------------|

---

### Description

Applies the TurbMoore80Red algorithm

### Usage

TurbMoore80Red(w658)

### Arguments

w658                    numeric. Value at wavelength of 658 nm

### Value

SpatRaster or numeric

### References

Moore, G.K., Satellite remote sensing of water turbidity, Hydrological Sciences, 1980, 25, 4, 407-422.

### See Also

Other algorithms: [Al10SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [Wy08CI\(\)](#)

---

|               |                               |
|---------------|-------------------------------|
| wq_algorithms | <i>wq_algorithms database</i> |
|---------------|-------------------------------|

---

**Description**

A dataset containing the information about the water quality algorithms

**Usage**

```
wq_algorithms
```

**Format**

A tibble with 91 rows and 4 variables:

- name: algorithm name
- funs: algorithm function
- satellite: satellite/instrument name ("worldview2", "sentinel2", "landsat8", "modis", or "meris")
- bands: list of the bands used from the given satellite/instrument

---

|         |                                  |
|---------|----------------------------------|
| wq_calc | <i>Water quality calculation</i> |
|---------|----------------------------------|

---

**Description**

Calculates a set of water quality indices

**Usage**

```
wq_calc(terraRast, alg = "all", sat, ...)
```

**Arguments**

|           |  |
|-----------|--|
| terraRast | Terra SpatRaster containing a satellite data   |
| alg       | Name (e.g. <code>Am09KBBI()</code> ) or type of the algorithm ("chlorophyll", "phycocyanin", "turbidity") or "all" |
| sat       | Name of the satellite or instrument ("worldview2", "sentinel2", "landsat8", "modis", "meris", or "OLCI")           |
| ...       | Other arguments passed on to <code>terra::rast()</code>  |

**Value**

SpatRaster

**Examples**

```

library(terra)

# sentinel2 example
s2 = terra::rast(system.file("raster/S2_Harsha.tif", package = "waterquality"))
s2_A110SABI = wq_calc(s2, alg = "A110SABI", sat = "sentinel2")
s2_two_alg = wq_calc(s2, alg = c("TurbChip09NIROverGreen", "Am092Bsub"), sat = "sentinel2")

## Not run: (
s2_wq = wq_calc(s2, alg = "all", sat = "sentinel2")

# landsat8 example
l8 = terra::rast(system.file("raster/L8_Taylorville.tif", package = "waterquality"))
l8_wq = wq_calc(s2, alg = "all", sat = "landsat8")
)
## End(Not run)

```

---

 Wy08CI

*Wy08CI algorithm*


---

**Description**

Applies the Wy08CI algorithm

**Usage**

```
Wy08CI(w681, w665, w709)
```

**Arguments**

|      |  |
|------|--|
| w681 | numeric. Value at wavelength of 681 nm |
| w665 | numeric. Value at wavelength of 665 nm |
| w709 | numeric. Value at wavelength of 709 nm |

**Value**

SpatRaster or numeric

**References**

Wynne, T. T., Stumpf, R. P., Tomlinson, M. C., Warner, R. A., Tester, P. A., Dyble, J.; Relating spectral shape to cyanobacterial blooms in the Laurentian Great Lakes. *Int. J. Remote Sens.*, 2008, 29, 3665–3672.

**See Also**

Other algorithms: [A110SABI\(\)](#), [Am092Bsub\(\)](#), [Am09KBBI\(\)](#), [Be162B643sub629\(\)](#), [Be162B700sub601\(\)](#), [Be162BsubPhy\(\)](#), [Be16FLHBlueRedNIR\\_LS8\(\)](#), [Be16FLHBlueRedNIR\\_MERIS\(\)](#), [Be16FLHBlueRedNIR\\_OLCI\(\)](#), [Be16FLHBlueRedNIR\\_S2\(\)](#), [Be16FLHBlueRedNIR\\_WV2\(\)](#), [Be16FLHGreenRedNIR\\_LS8\(\)](#), [Be16FLHGreenRedNIR\\_MERIS\(\)](#), [Be16FLHGreenRedNIR\\_OLCI\(\)](#), [Be16FLHGreenRedNIR\\_S2\(\)](#), [Be16FLHGreenRedNIR\\_WV2\(\)](#), [Be16FLHVioletRedNIR\\_LS8\(\)](#), [Be16FLHVioletRedNIR\\_MERIS\(\)](#), [Be16FLHVioletRedNIR\\_OLCI\(\)](#), [Be16FLHVioletRedNIR\\_S2\(\)](#), [Be16FLHVioletRedNIR\\_WV2\(\)](#), [Be16FLHblue\\_LS8\(\)](#), [Be16FLHblue\\_MERIS\(\)](#), [Be16FLHblue\\_OLCI\(\)](#), [Be16FLHblue\\_S2\(\)](#), [Be16FLHblue\\_WV2\(\)](#), [Be16FLHviolet\\_LS8\(\)](#), [Be16FLHviolet\\_MERIS\(\)](#), [Be16FLHviolet\\_OLCI\(\)](#), [Be16FLHviolet\\_S2\(\)](#), [Be16FLHviolet\\_WV2\(\)](#), [Be16NDPhyI644over615\(\)](#), [Be16NDPhyI644over629\(\)](#), [Be16NDPhyI\(\)](#), [Be16NDTIblue\(\)](#), [Be16NDTIviolet\(\)](#), [Be16Phy2BDA644over629\(\)](#), [Da052BDA\(\)](#), [De933BDA\(\)](#), [Gi033BDA\(\)](#), [Go04MCI\(\)](#), [HU103BDA\(\)](#), [Kn07KIVU\(\)](#), [MI092BDA\(\)](#), [MM092BDA\(\)](#), [MM12NDCIalt\(\)](#), [MM12NDCI\(\)](#), [MM143BDAopt\(\)](#), [SI052BDA\(\)](#), [SM122BDA\(\)](#), [SY002BDA\(\)](#), [TurbBe16GreenPlusRedBothOverViolet\(\)](#), [TurbBe16RedOverViolet\(\)](#), [TurbBow06RedOverGreen\(\)](#), [TurbChip09NIROverGreen\(\)](#), [TurbDox02NIRoverRed\(\)](#), [TurbFrohn09GreenPlusRedBothOverBlue\(\)](#), [TurbHarr92NIR\(\)](#), [TurbLath91RedOverBlue\(\)](#), [TurbMoore80Red\(\)](#)

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