Package 'GInSARCorW'

May 7, 2026

Type Package

Title GACOS InSAR Correction Workflow

Version 1.15.8

Date 2023-05-13

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Description A workflow for correction of Differential Interferometric Synthetic Aperture Radar (DInSAR) atmospheric delay base on Generic Atmospheric Correction Online Service for InSAR (GACOS) data and correction algorithms proposed by Chen Yu. This package calculate the Both Zenith and LOS direction (User Depend). You have to just download GACOS product on your area and preprocessed D-InSAR unwrapped images. Cite those references and this package in your work, when using this framework.
References:
Yu, C., N. T. Penna, and Z. Li (2017) <doi:10.1016/j.rse.2017.10.038>.
Yu, C., Li, Z., & Penna, N. T. (2017) <doi:10.1016/j.rse.2017.10.038>.
Yu, C., Penna, N. T., and Li, Z. (2017) <doi:10.1002/2016JD025753>.

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URL <https://subhadipdatta.wixsite.com/profile/post/ginsarcorw-gacos-insar-correction-workflow>

Repository CRAN

Depends raster, circular, sp

Encoding UTF-8

RoxygenNote 7.2.3

NeedsCompilation no

Date/Publication 2023-05-14 05:30:02 UTC

Contents

`coh.mask` *Mask image with coherence threshold*

Description

Mask image with coherence threshold

Usage

```
coh.mask(img, coh_band, threshold = 0.2, noData_as_NA = TRUE)
```

Arguments

`img`	Any image (i.e Phase,Displacement,GACOS imported image)
`coh_band`	coherence band
`threshold`	A value from coherence band above which the mask will be process.(within 0-1)
`noData_as_NA`	If TRUE, it convert noData to NA or 0

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
dztd<-d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
unw_pha<-raster(system.file("td","Unw_Phase_ifg_17Mar2017_10Apr2017_VV.img",package = "GInSARCorW"))
crs(unw_pha)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
re_dztd<-d.ztd.resample(unw_pha,dztd)
unw_phase<-GACOS.PhCor(unw_pha,re_dztd,0.055463,inc_ang=39.16362,ref_lat=NA,ref_lon=NA)
disp<-Phase.to.disp(unw_phase,0.055463,unit="m",39.16362)
coh_band<-raster(system.file("td","coh_IW2_VV_17Mar2017_10Apr2017.img",package = "GInSARCorW"))
crs(coh_band)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
coh.mask(disp,coh_band,threshold=0.4)
```

d.ztd *Calculate ZTD difference between times*

Description

Calculate ZTD difference between times

Usage

```
d.ztd(GACOS_ZTD_T1, GACOS_ZTD_T2)
```

Arguments

GACOS_ZTD_T1	ZTD time 1
GACOS_ZTD_T2	ZTD time 2

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
```

d.ztd.resample *Resample Di-ZTD to phase cell resolution and match raster extents.*

Description

Resample Di-ZTD to phase cell resolution and match raster extents.

Usage

```
d.ztd.resample(unw_pha, dztd, method = "bilinear")
```

Arguments

unw_pha	Un-wrapped InSAR tile/raster.
dztd	Di-ZTD.
method	Raster resampleing method "ngb" for nearest neighbor or "bilinear" for bilinear interpolation

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
dztd<-d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
unw_pha<-raster(system.file("td","Unw_Phase_ifg_17Mar2017_10Apr2017_VV.img",package = "GInSARCorW"))
crs(unw_pha)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
d.ztd.resample(unw_pha,dztd)
```

GACOS.Import *Import GACOS product in R*

Description

Import GACOS product in R

Usage

```
GACOS.Import(rscFile.path, noDataAsNA = FALSE)
```

Arguments

rscFile.path	Path of the GACOS .ztd.rsc file
noDataAsNA	If true it convert 0 values to NA

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
rscFile.path<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
noDataAsNA<-FALSE
GACOS.Import(rscFile.path,noDataAsNA)
```

GACOS.PhCor *GACOS Atmospheric Phase delay correction*

Description

GACOS Atmospheric Phase delay correction

Usage

```
GACOS.PhCor(
  unw_pha,
  re_dztd,
  wavelength = "in meter",
  inc_ang = 90,
  ref_lat = NA,
  ref_lon = NA
)
```

Arguments

unw_pha	Un-wrapped InSAR tile/raster.
re_dztd	Resampled Di-ZTD.
wavelength	SAR wavelength in meter.
inc_ang	SAR incident angle (to get output in LOS direction, don't use if not needed).
ref_lat	A reference point for correction, If NA, It use the tile center latitude.
ref_lon	A reference point for correction, If NA, It use the tile center longitude.

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
```

```
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
dztd<-d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
unw_pha<-raster(system.file("td","Unw_Phase_ifg_17Mar2017_10Apr2017_VV.img",package = "GInSARCorW"))
crs(unw_pha)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
re_dztd<-d.ztd.resample(unw_pha,dztd)
GACOS.PhCor(unw_pha,re_dztd,0.055463,inc_ang=39.16362,ref_lat=NA,ref_lon=NA)
```

`Phase.to.disp` *InSAR Unw-Phase to displacement*

Description

InSAR Unw-Phase to displacement

Usage

```
Phase.to.disp(unw_phase, wavelength = "in meter", unit = "m", inc_ang = 0)
```

Arguments

`unw_phase`	Un-wrapped InSAR tile/raster.After/before correction.
`wavelength`	SAR wavelength in meter.
`unit`	output unit meter , centimeter or milimeter ("m", "cm" or "mm").
`inc_ang`	SAR incident angle (to get output in LOS direction, don't use if not needed).

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
dztd<-d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
unw_pha<-raster(system.file("td","Unw_Phase_ifg_17Mar2017_10Apr2017_VV.img",package = "GInSARCorW"))
crs(unw_pha)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
re_dztd<-d.ztd.resample(unw_pha,dztd)
unw_phase<-GACOS.PhCor(unw_pha,re_dztd,0.055463,inc_ang=39.16362,ref_lat=NA,ref_lon=NA)
Phase.to.disp(unw_phase,0.055463,unit="m",39.16362)
```

Phase.to.height *InSAR Unw-Phase to height*

Description

InSAR Unw-Phase to height

Usage

```
Phase.to.height(unw_phase, wavelength = "in meter", unit = "m")
```

Arguments

unw_phase	Un-wrapped InSAR tile/raster.After/before corrction.
wavelength	SAR wavelength in meter.
unit	output unit meter , centimeter or milimeter ("m", "cm" or "mm").

Author(s)

Subhadip Datta

Examples

```
library(raster)
library(GInSARCorW)
library(circular)
noDataAsNA<-FALSE
i1m<-system.file("td","20170317.ztd.rsc",package = "GInSARCorW")
i2m<-system.file("td","20170410.ztd.rsc",package = "GInSARCorW")
GACOS_ZTD_T1<-GACOS.Import(i1m,noDataAsNA)
GACOS_ZTD_T2<-GACOS.Import(i2m,noDataAsNA)
dztd<-d.ztd(GACOS_ZTD_T1,GACOS_ZTD_T2)
unw_pha<-raster(system.file("td","Unw_Phase_ifg_17Mar2017_10Apr2017_VV.img",package = "GInSARCorW"))
crs(unw_pha)<-CRS("+proj=longlat +datum=WGS84 +no_defs")
re_dztd<-d.ztd.resample(unw_pha,dztd)
unw_phase<-GACOS.PhCor(unw_pha,re_dztd,0.055463,inc_ang=39.16362,ref_lat=NA,ref_lon=NA)
Phase.to.height(unw_phase,0.055463,unit="m")
```

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