

# Package ‘LakeGeoid’

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**Title** Lake geoid correction grids  
**Version** 0.0.0.9000  
**Maintainer** Karina Nielsen <karni@space.dtu.dk>  
**Description** What the package does (one paragraph).  
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## R topics documented:

C2kivu.RData . . . . .	1
getGeoidCorr . . . . .	2
getLakeGeoid . . . . .	2
kivu.RData . . . . .	3
myshape.RData . . . . .	3
plot.LakeGeoid . . . . .	4
print.LakeGeoid . . . . .	4
summary.LakeGeoid . . . . .	5
<b>Index</b>	<b>6</b>

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C2kivu.RData	<i>CryoSat-2 water level observations for lake Kivu</i>
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## Description

The CryoSat-2 L1b waveforms were retracked by the Narrow Primary Peak retracker (Villadsen, H., Andersen, O.B., Stenseng, L., Nielsen, K. and Knudsen, P., 2015. CryoSat-2 altimetry for river level monitoring—Evaluation in the Ganges–Brahmaputra River basin. Remote Sensing of Environment, 168, pp.80-89.). CryoSat-2 is available from

- L1b SAR Precise Orbit. Baseline E.<https://doi.org/10.5270/CR2-fbae3cd>
- L1b LRM Precise Orbit, Baseline E.<https://doi.org/10.5270/CR2-41ad749>
- L1b SARin Precise Orbit. Baseline E.<https://doi.org/10.5270/CR2-6afef01>

### Author(s)

Karina Nielsen (karni@space.dtu.dk)

### References

Paper in prep

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<code>getGeoidCorr</code>	<i>Predict the geoid correction error</i>
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### Description

Predict the geoid correction error

### Usage

```
getGeoidCorr(fit, newdat, UTM = TRUE)
```

### Arguments

<code>fit</code>	Object returned by <code>getLakeGeoid()</code>
<code>newdat</code>	a data set at least including the columns named "lon" and "lat" with the coordinates where the correction should be predicted.
<code>UTM</code>	logic variable to indicate if the estimated field is in a UTM projection (FALSE means the field is in degrees)

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<code>getLakeGeoid</code>	<i>Reconstruct missing geoid signal and a water level time series</i>
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### Description

The function `getLakeGeoid` reconstruct a static spatial water level signal and a water level time series. The static spatial signal is modeled as a Gaussian Markov Random Field on a triangular mesh where the nodes specifies the neighbor structure. The water level time series is modeled with an Random Walk as the underlying process and the observation error is here assumed to be Gaussian. The Static spatial field is here intended to models potential missing geoid model signals.

### Usage

```
getLakeGeoid(dat, maxEdge, myshape, UTM = TRUE)
```

Arguments

dat	Input data set; must at least contain columns names: time decimal years, lon (longitude in decimal degrees ), lat (latitude in decimal degrees), height (meters)
maxEdge	Maximum side length of the triangles in the mesh (created by the function "fm_mesh_2d" from the package "fmesher").
myshape	a shapefile/polygon of the class "sf" defining the boundary of the lake where the model will be reconstructed.
UTM	logic variable to specify if the coordinates should be projected to UTM coordinates the default is TRUE

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kivu.RData	Level 2 Water Mask Raster Image 250m Data Product, Version C extracted for lake Kivu
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Description

Selected columns of the Level 2 Water Mask Raster Image 250m Data Product, Version C. The data has been filtered by "darkwater\_frac", large outliers were removed, and the data has been down sampled to reduce the volume.

Author(s)

SWOT Level 2 Water Mask Raster Image 250m Data Product, Version C (10.5067/SWOT-RASTER-2.0)

References

Surface Water Ocean Topography (SWOT). 2024. SWOT Level 2 Water Mask Raster Image Data Product, Version C. Ver. C. PO.DAAC, CA, USA. Dataset accessed 2025-04-01 at <https://doi.org/10.5067/SWOT-RASTER-2.0>

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myshape.RData	Shapefile of the African lake Kivu
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Description

A shapefile of the class "sf" for the African lake Kivu. The shapefile is taken from the SWOT Prior Lake Database.

Author(s)

Wang et al.

## References

Wang, J., Pottier, C., Cazals, C., Battude, M., Sheng, Y., Song, C., Sikder, M.S., Yang, X., Ke, L., Gosset, M. and Oliveira, R.R.A., 2023. The Surface Water and Ocean Topography Mission (SWOT) Prior Lake Database (PLD): Lake mask and operational auxiliaries. Authorea Preprints.<https://www.authorea.com/doi/full/10.22541/au.170258987.72387777>

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plot.LakeGeoid	<i>Plot an object returned by the function getLakeGeoid()</i>
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## Description

Plot an object returned by the function getLakeGeoid()

## Usage

```
## S3 method for class 'LakeGeoid'
plot(fit, zlim = NULL, dat = NULL, doSave = FALSE)
```

## Arguments

fit	Object returned by getLakeGeoid()
zlim	vector with the zlim interval c(low,high), defined by the field "omega" if not specified
dat	The raw water level data can be added to the plot
doSave	plot is saved to a pdf file

## Examples

```
plot(fit)
```

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print.LakeGeoid	<i>Simple print of convergence statutus</i>
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## Description

This function presents a summary of the output

## Usage

```
## S3 method for class 'LakeGeoid'
print(x)
```

## Arguments

x	An object of class "LakeGeoid"
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### **Value**

Print the objective function and state convergence

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`summary.LakeGeoid` *Summary of output*

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### **Description**

This function presents a summary of the output

### **Usage**

```
## S3 method for class 'LakeGeoid'  
summary(x)
```

### **Arguments**

`x`                      An object of class "LakeGeoid"

### **Value**

Summary of output

# Index

## \* **data**

C2kivu.RData, [1](#)  
kivu.RData, [3](#)  
myshape.RData, [3](#)

## \* **plot**

plot.LakeGeoid, [4](#)

## \* **predict**

getGeoidCorr, [2](#)  
2025-04-01, [3](#)

C2kivu.RData, [1](#)

decimal years, [3](#)

getGeoidCorr, [2](#)  
getLakeGeoid, [2](#)

kivu.RData, [3](#)

myshape.RData, [3](#)

plot.LakeGeoid, [4](#)  
print.LakeGeoid, [4](#)

summary.LakeGeoid, [5](#)

the default is TRUE, [3](#)