Altimetry for inland Water

Karina Nielsen[1], Lars stenseng[1], Heidi Villadsen[1], Ole B. Andersen[1] and Per Knudsen[1]
[1]Department of Geodesy, DTU Space, National Space Institute, Kgs. Lyngby, Denmark. E Mail: karni@space.dtu.dk

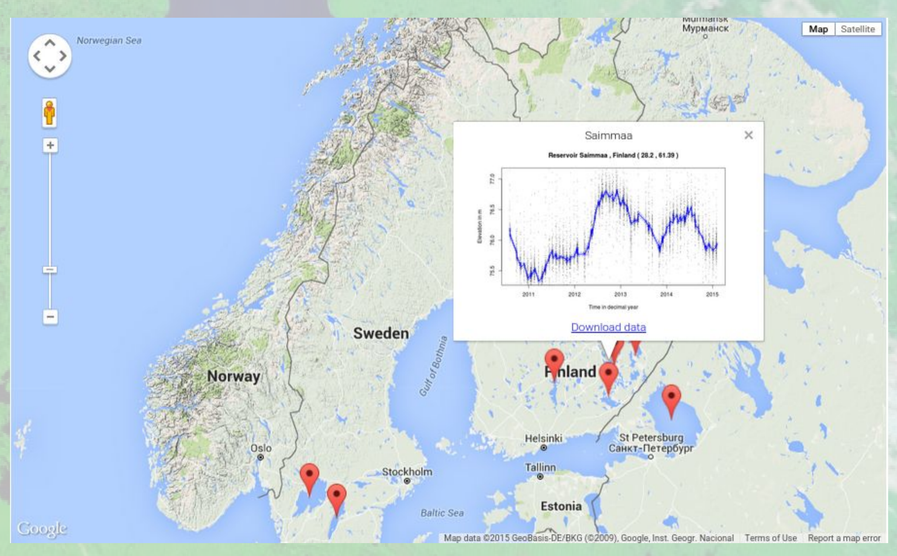
Introduction

Altimetry for inland Water (AltWater) is a freely available service that provides water level time series for inland water bodies. The service is currently based on CryoSat-2 data, but other missions are planned to be added in the future. AltWater is found at http://altwater.dtu.space/.

Data download

To download data simply click on the target of interest. For each target the following files are available:

- plot of time series
- along-track water levels
- water level time serie



tsHydro

tsHydro is an “R” package to derive water level time series for hydrology. The core of the package is a state-space model with a mixture distribution to account for erroneous observations. The package is available from github at https://github.com/cavios/tshydro. The following boxes describes how water level time series are derived with just a few command lines from the functions in tsHydro

The input data format for “tsHydro” is:

```
   height   track     time
1  3.854  2200 2010.683
2  3.864  2200 2010.683
3  3.900  2200 2010.683
```

Where
height is the water level
track is the satellite track number
time is time in decimal years

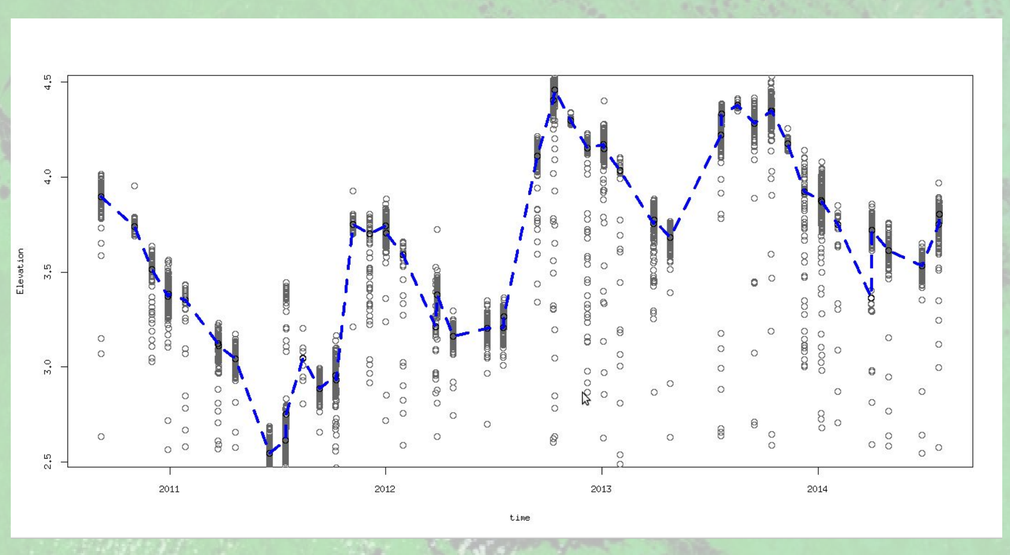
The function “get.TS()” derives the time series.

```
>fit<-get.TS(data input file)
```

The function “plot.tsHydro” enables the user to display the derived time series.

```
>plot(fit)
```

An example is her demonstrated for the data set “lakelevels”, which displays water level changes for lake Väneren in Sweden



The function “export.tsHydro()” saves the output in a file with the default name “ts.dat”. The output format is:

Hence
> export.tsHydro(fit)

```
 time      wl      wlsd
2010.682 3.895 0.00496
2010.836 3.739 0.00818
2010.915 3.512 0.01022
```

Hence, to derive a time serie, simply apply the following commands in R

```
> dat<-read.table(“input file”,header=TRUE)
> fit<-get.TS(dat)
> export.tsHydro(fit)
```

Reference: Nielsen, K., Stenseng, L., Andersen, O. B., Villadsen, H., & Knudsen, P. (2015). Validation of CryoSat-2 SAR mode based lake levels. *Remote Sensing of Environment*, *171*, 162-170.

Background, Credit: Jacques Descloitres, MODIS Land Rapid Response Team, NASA/GSFC