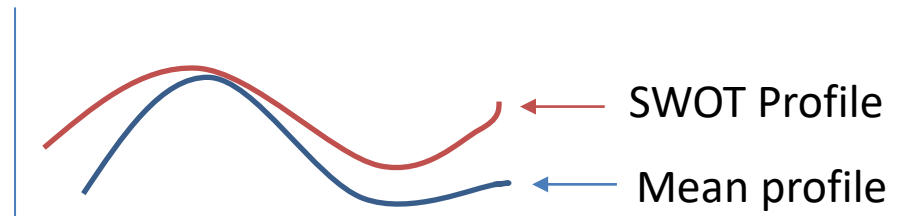
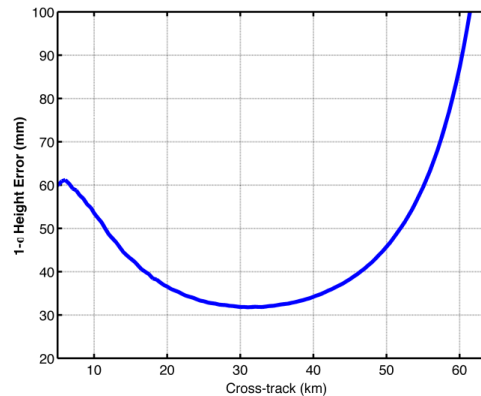
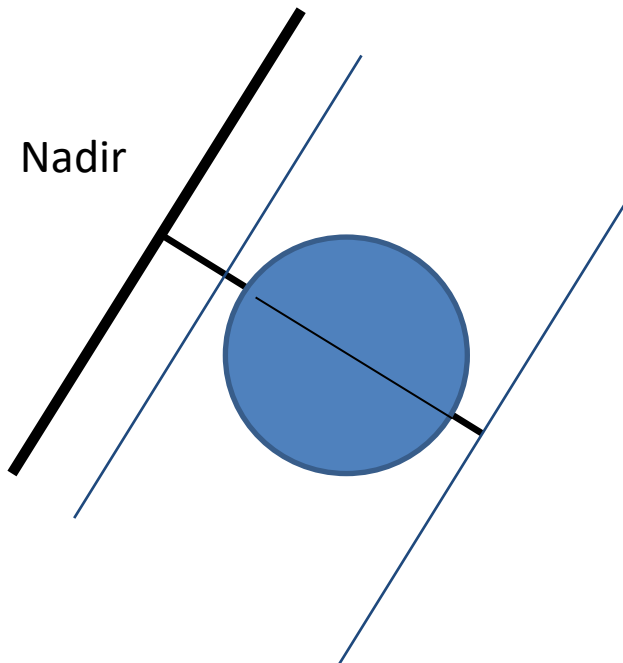


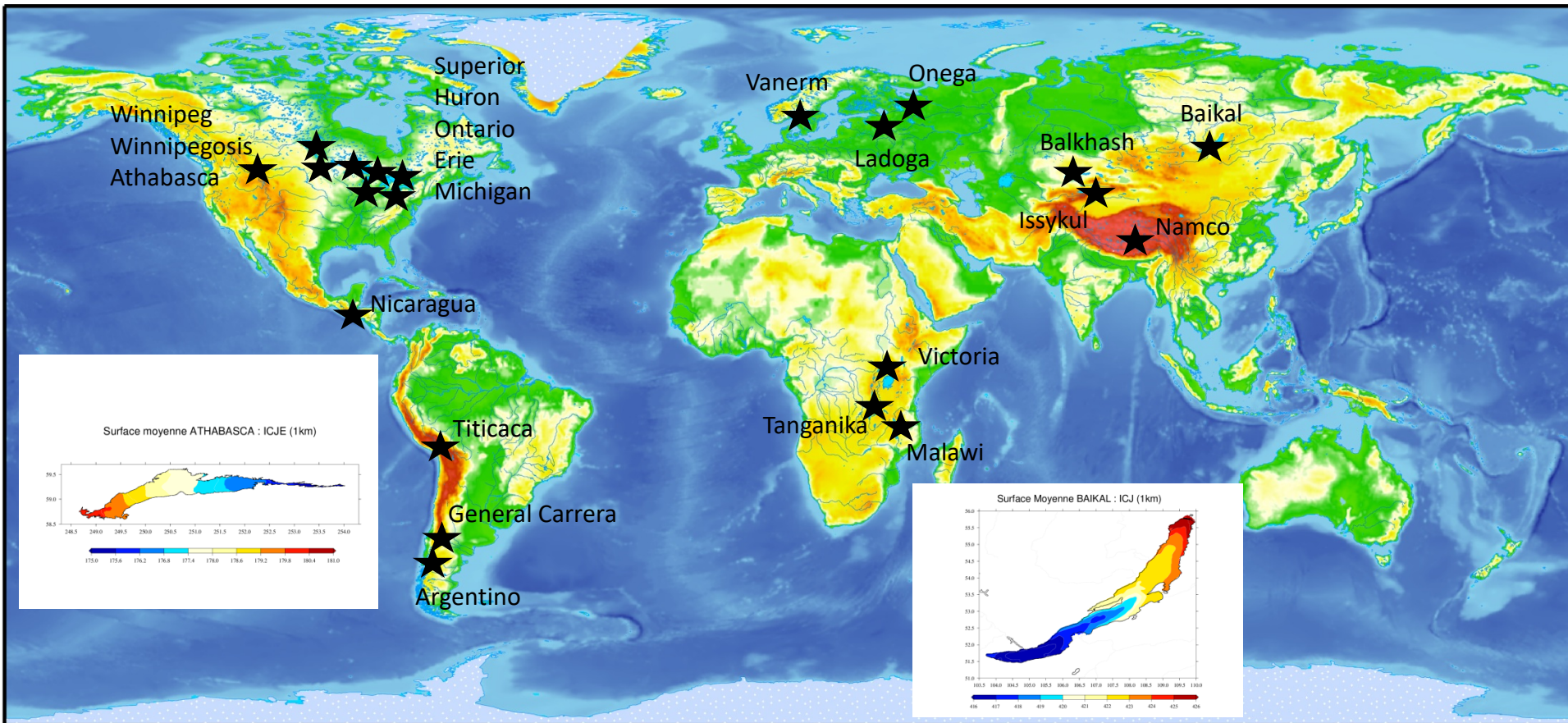
A priori geoid for SWOT

Objectives:

1. for ADT: choice of the best geoid correction over continental surface
1. Provide a data set on vertical gradient of lake surfaces for
 - Continental large lake reference vertical profiles for roll error
 - validation of SWOT heights across the swath when passing over large lakes

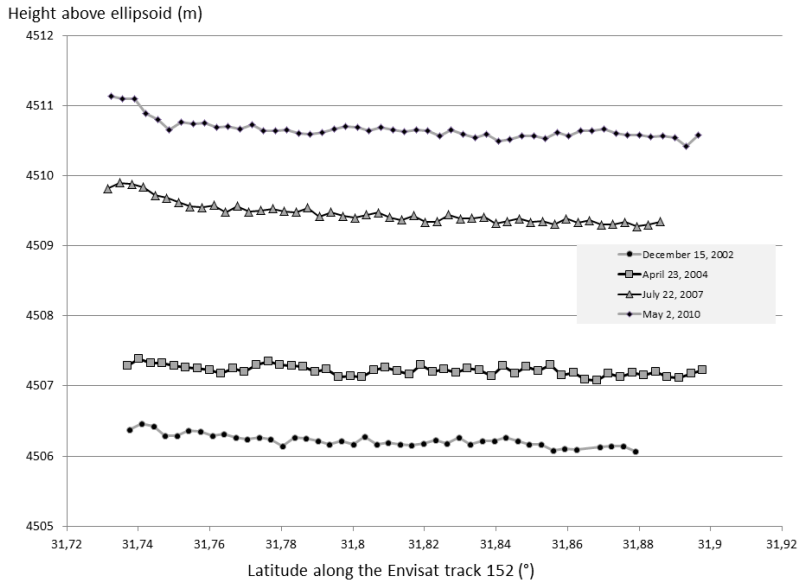


22 lakes with mean surface calculated from combination of:
Icesat, Jason1&2, Envisat, Cryosat-2 and GPS field work (Issykkul)

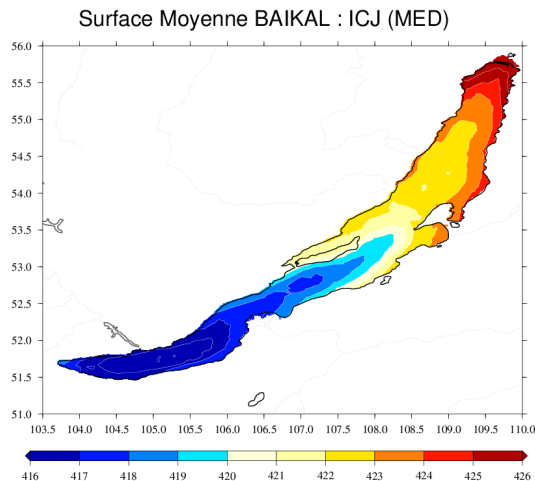


~1000 mean altimetry & GPS profiles

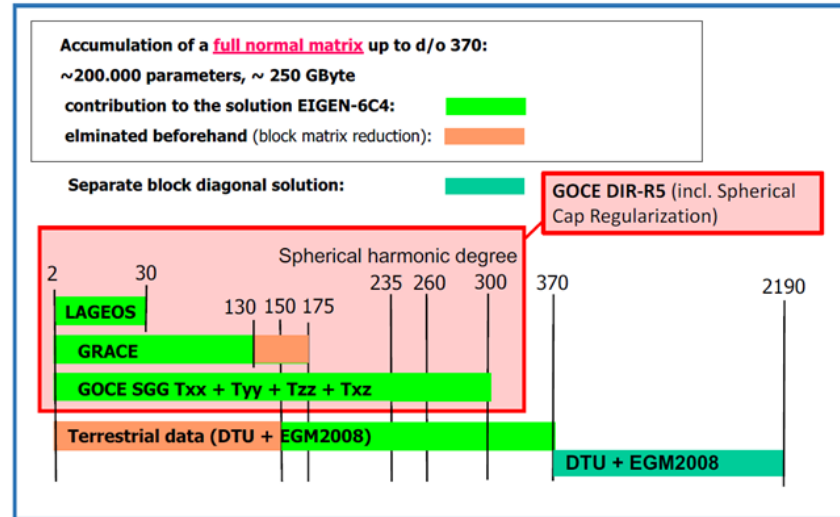
Method



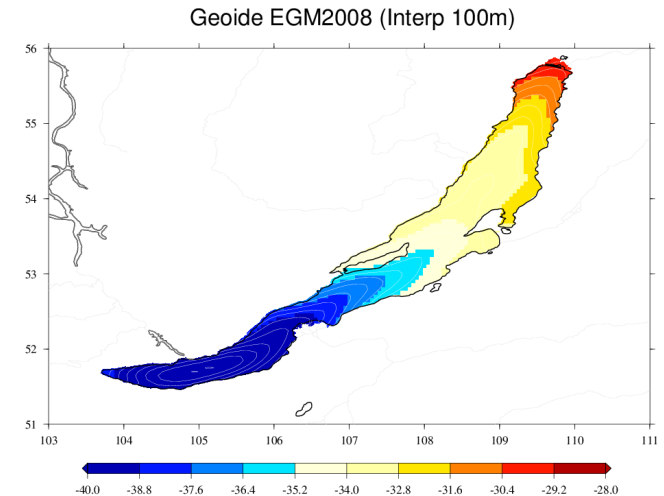
Aggregate all altimetry profile to a mean profile at a reference date & inter-track biases estimation at cross-over points
 Delaunay triangulation & interpolation across the lake shapefile



Combination scheme of the normal equations for GOCE DIR_R5 and EIGEN-6C4

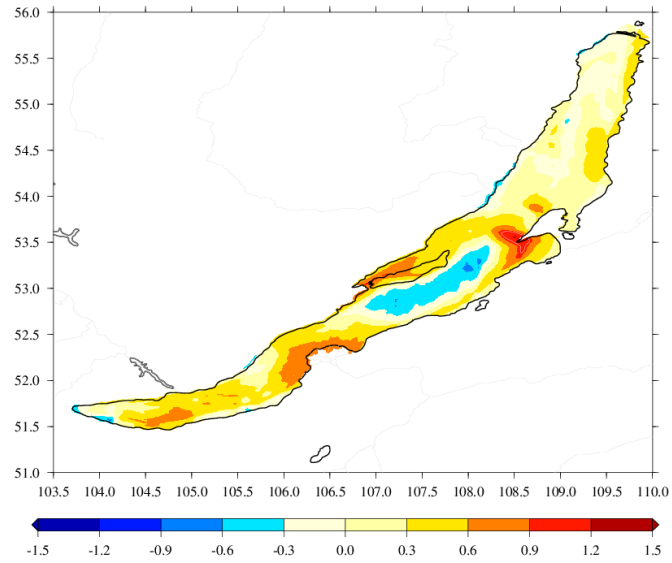


Main difference between EGM2008 & EIGEN:
 GOCE data were used between degree 2 to 300
 Above the EGM2008 & EIGEN are similar

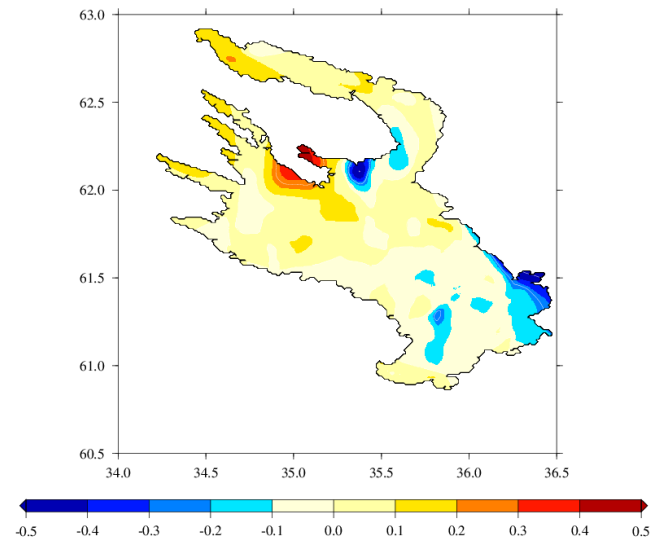


Results

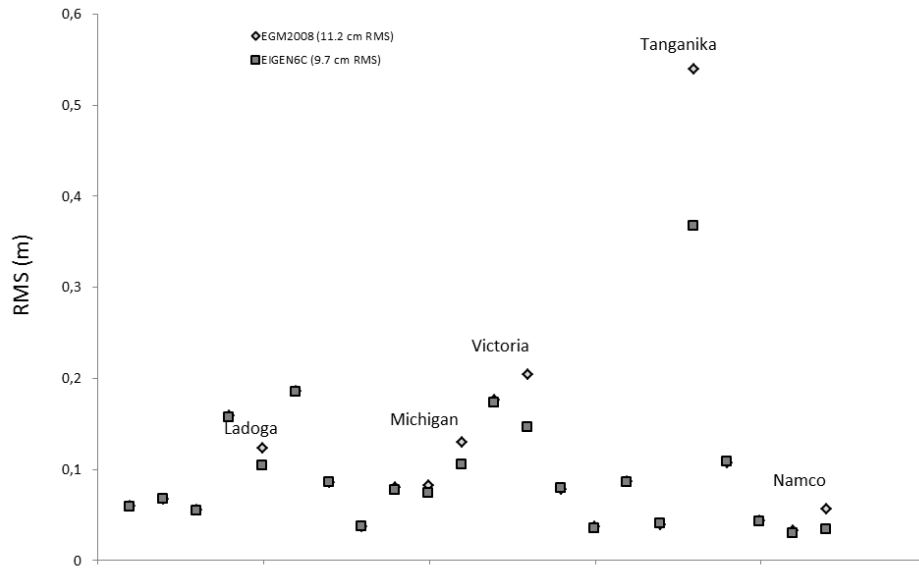
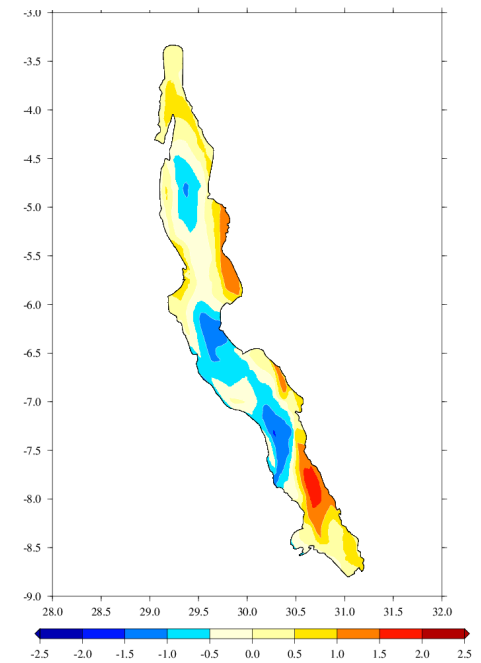
BAIKAL : ICJ Diff EIGEN-6C4 (1km)



DNEGA : ICJE Diff EIGEN-6C4 (1km)



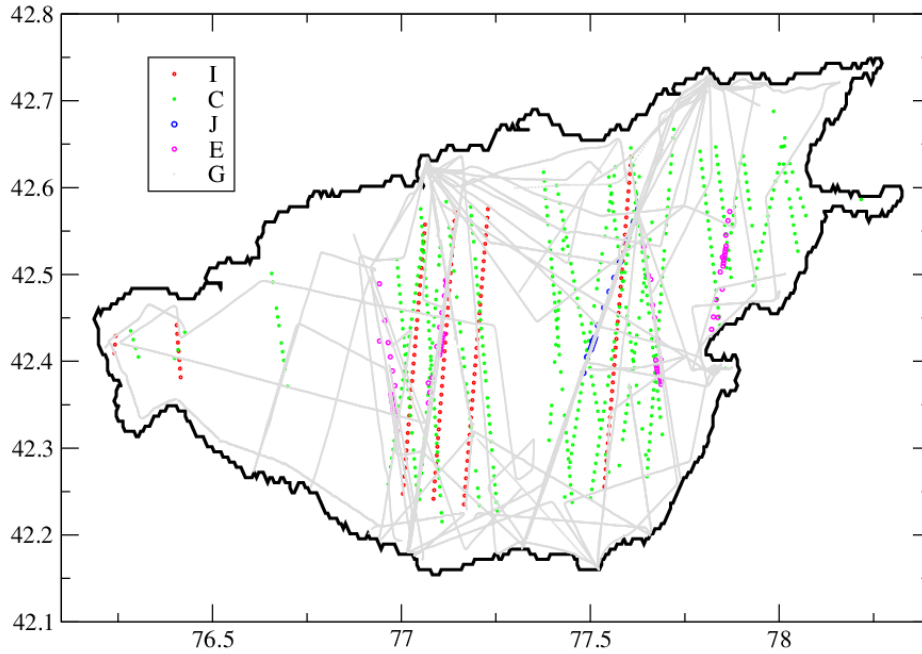
TANGANIKA : ICJE Diff EIGEN-6C4 (1km)



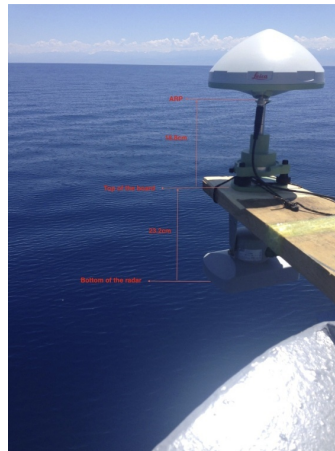
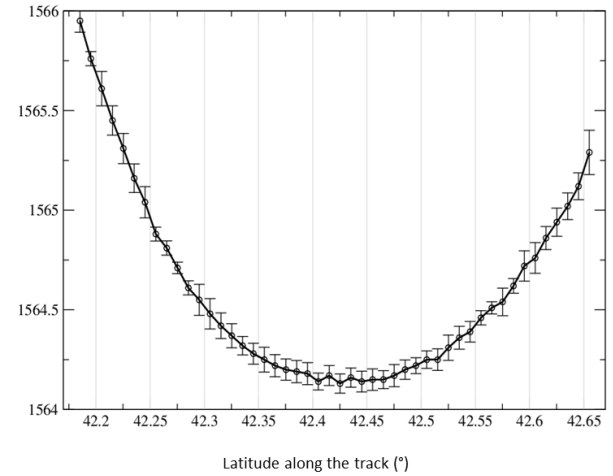
Aggregation of GPS profiles over 14 fields campaigns and altimetry data

ISSYKKUL

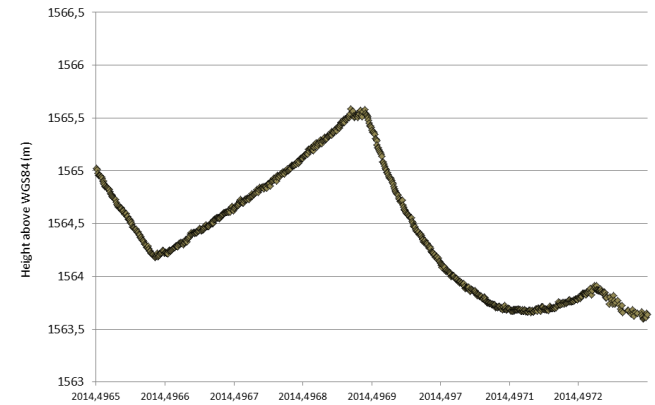
Traces Utilisees SM (16/05/17)



Height above ellipsoid (m)

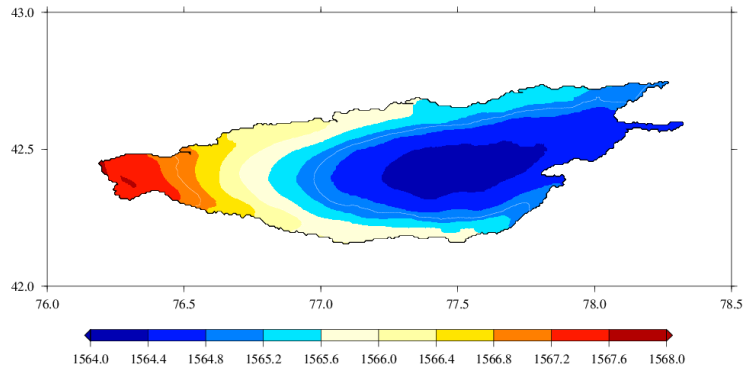


GPS corrected profile (July 1, 2014)

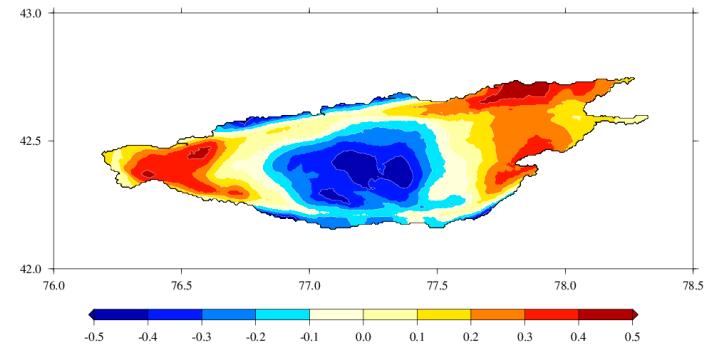


Results: differences between mean lakes surface and the geoids

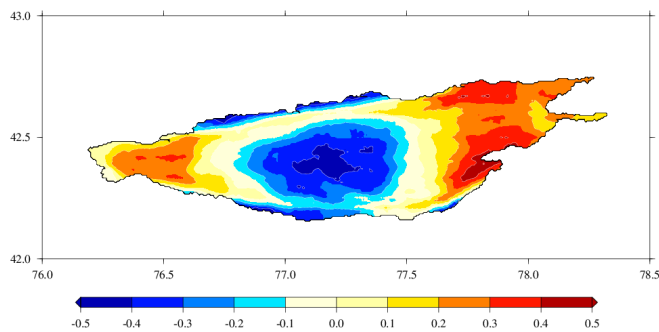
SURFACE moyenne ISSYKKUL : ICJEG (1km)



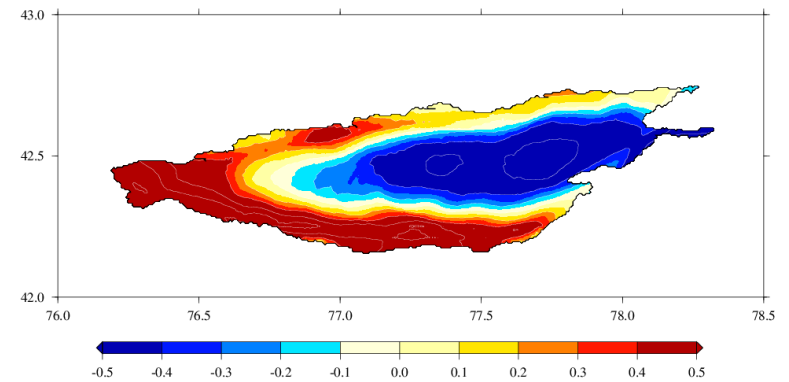
ISSYKKUL : ICJEG Diff EGM2008 (1km)



ISSYKKUL : ICJEG Diff EIGEN-6C4 (1km)

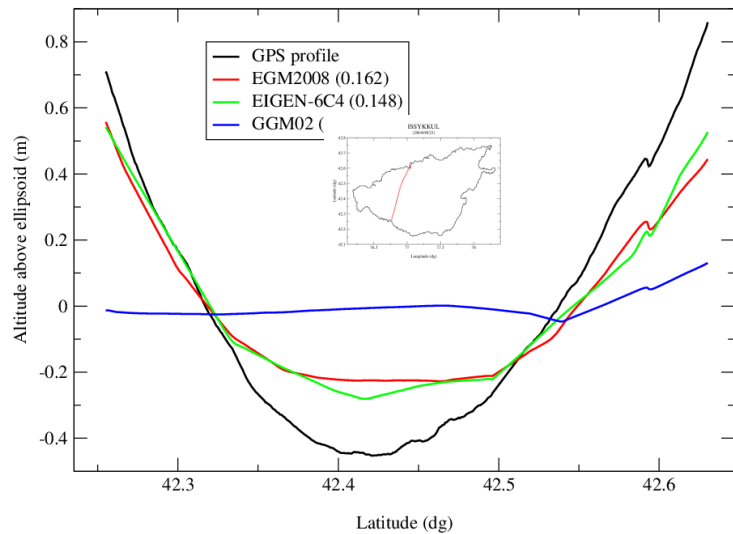


ISSYKKUL : ICJEG Diff GGM02 (1km)

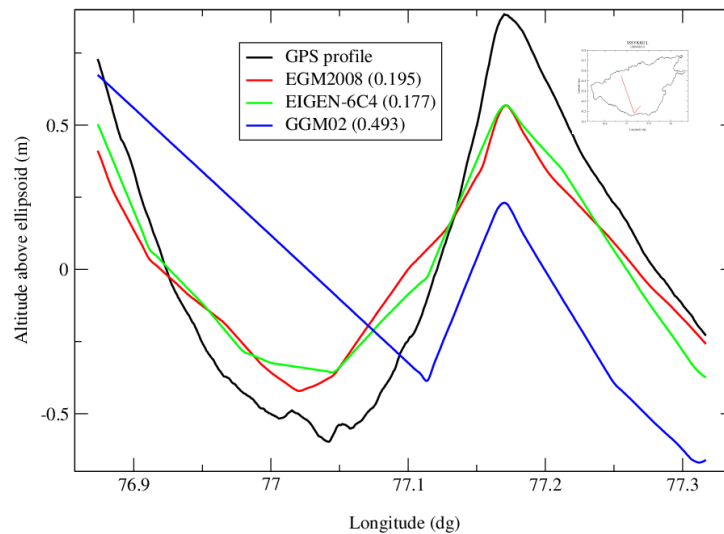


Results: differences between mean lakes profiles and the geoids

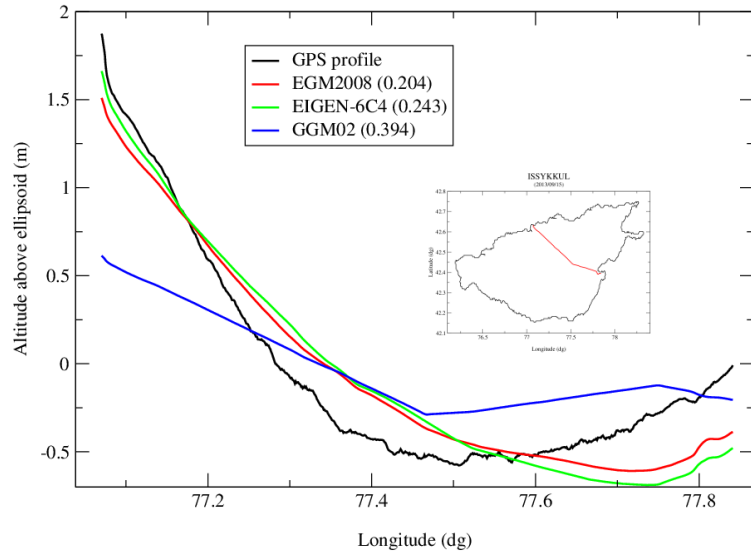
ISSYKKUL
(2004/09/23)



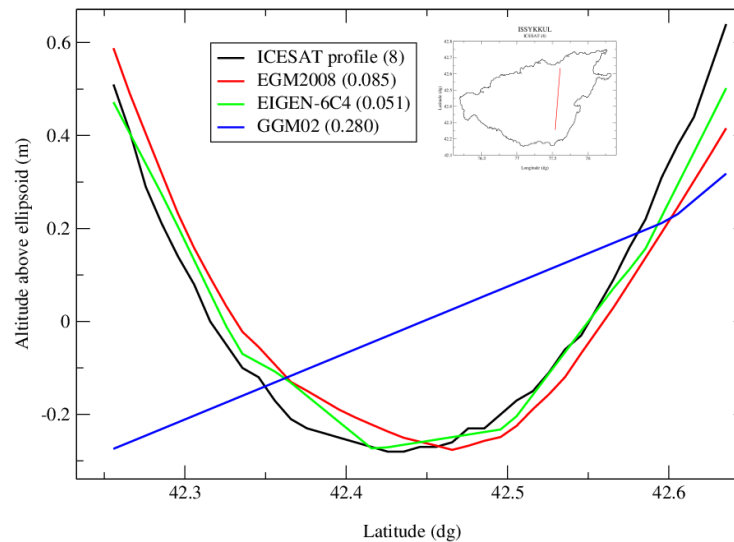
ISSYKKUL
(2009/08/31)



ISSYKKUL
(2013/09/15)



ISSYKKUL



Conclusions (1/2)

Geoids a priori data is necessary for the correction of all individual SWOT data

The approach is based on comparison using a set a 22 large lakes between:

3 main models: GGM02C, EGM2008 and EIGEN_6C

GGM02C has large errors not acceptable (up to meters)

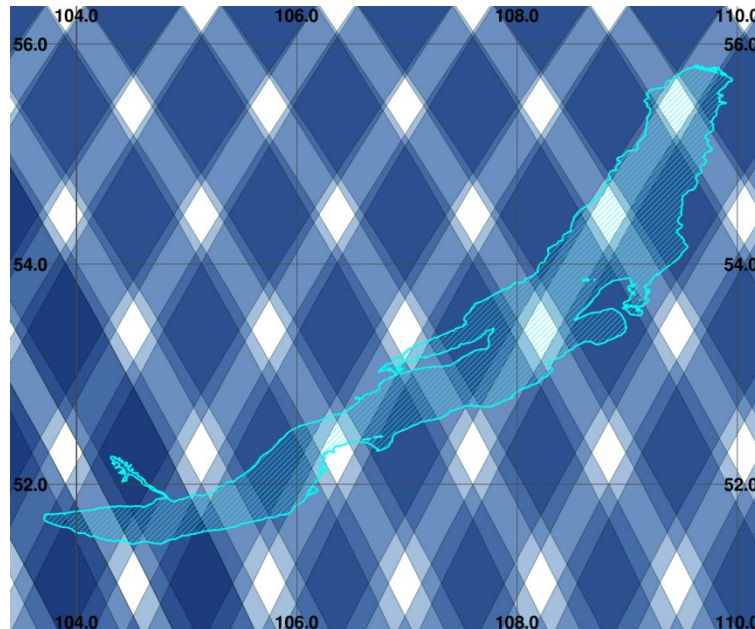
EIGEN-6C and EGM2008 by construction are very close with precision ranging from few centimeters to 20-30 cm in RMS in the worse cases (« rift » lakes with high gradient of the mean lake profiles at short distance).

EIGEN-6C a little bit better

Conclusions (2/2)

A set of ~1000 mean tracks will be delivered to the project for calibration

It will probably be necessary to use altimetry-based mean lake surface for large lakes due to the errors induced by multipasses per cycle to cover the whole lake extent



Using SWOT data over the whole lifetime of the mission will allow refine mean lake surface at an unprecedented resolution for all small and large lakes worldwide