GOCESeaComb

External calibration/validation of ESA's GOCE mission and contribution to DOT and SLA determination through stochastic combination with heterogeneous data

Newsletter Issue 11/30.04.2014

GOCESeaComb

The **GOCESeaComb** project is funded by the European Space Agency (ESA) within its Scientific Experiment Development Program (PRODEX) following a successful application to the General Secretariat for Research & Technology (GSRT) after an invitation to the Greek scientific community in response to the 1st PRODEX Programme Call for Greece.

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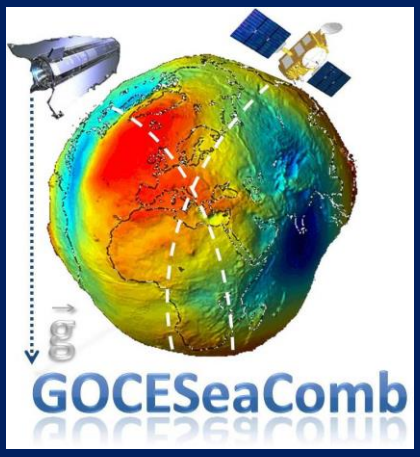


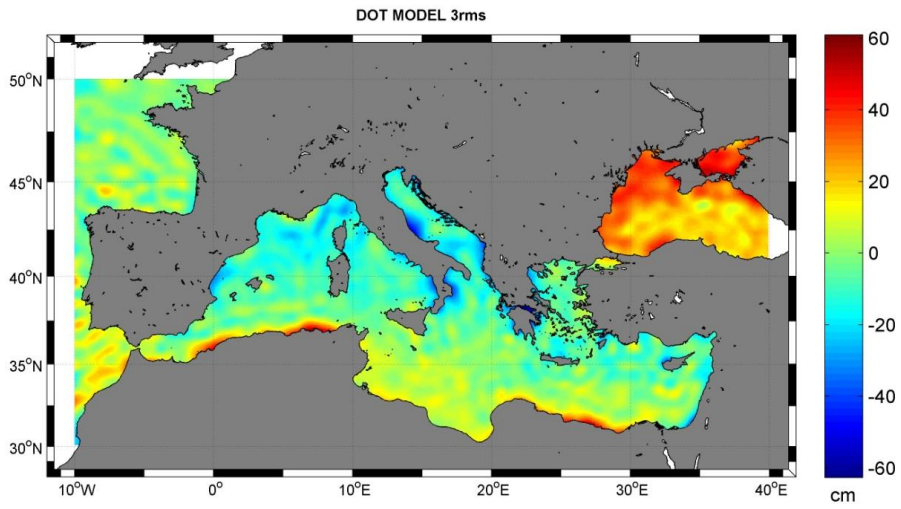
The GOCESeaComb Project Logo

MDOT and SLA Determination

During the period of this newsletter and since the last newsletter in Febraury 2014, all project activities are going according to schedule. Having completed the detailed validation of the GOCE/GRACE GGMs and the determination of the empirical and analytical covariance functions for the MDOT, along with the analysis of the TDOT models and their covariance functions, this period the determination of the DOT and SLA in the Mediterranean with LSC has been carried out. This refers to the use of the determined analytical covariance functions (see Newsletter Issue 10) to determine the MDOT and the SLA.

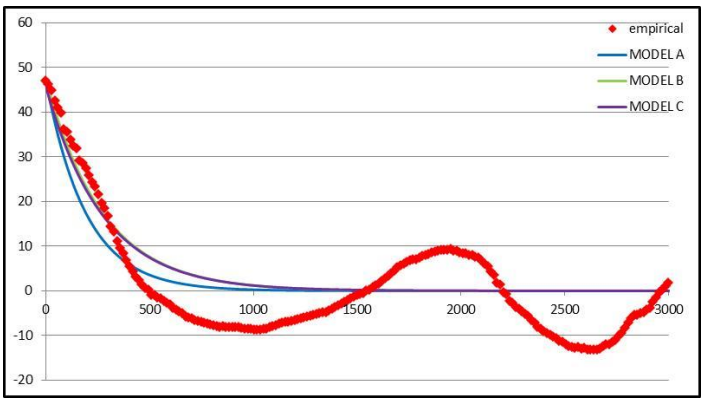
MDOT Model Determination

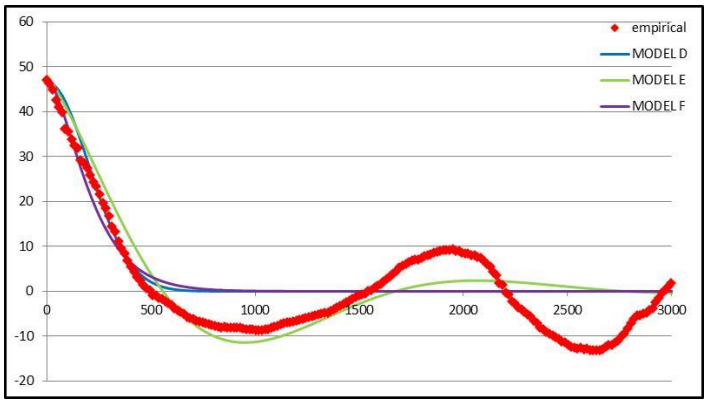
Given the availability of recent GGMs from the satellite gradiometry mission of GOCE, and in order to validate the contribution that the mission can have to altimeter calibration, the latest GGMs based on GOCE and GRACE can be used to determine a DOT model for the wider area under study. As far as the mean dynamic ocean topography model is concerned, this can be derived from a combination of a GGM and some mean sea surface (MSS) model, which for the GOCEseaComb project will be the one from the Danish Space Agency group (DTU2010). The MSS model is employed with the GOCE/GRACE GOCO02s GGM to estimate the dynamic ocean topography (DOT) in the Mediterranean Sea. The DOT is derived as a deviation from the MSS model and the only filtering operation that was carried out is the 3rms test (see the Figure below).

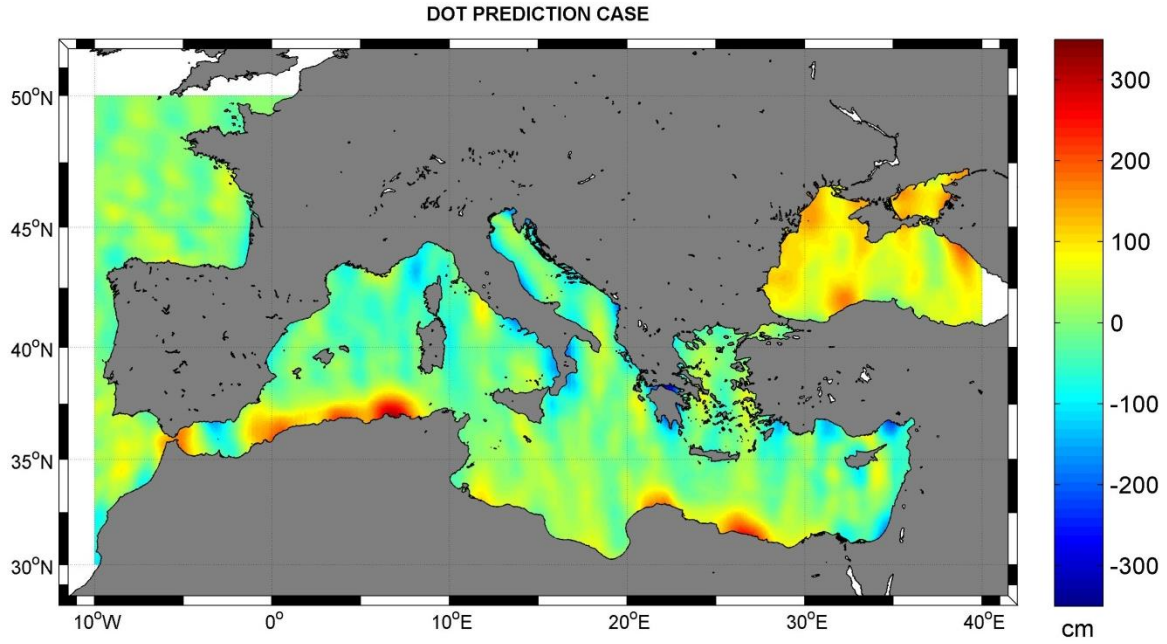


From this DOT and using the analytical covariance function Model A (see also the images below) outlined in Issue#10 for the DOT, the prediction has

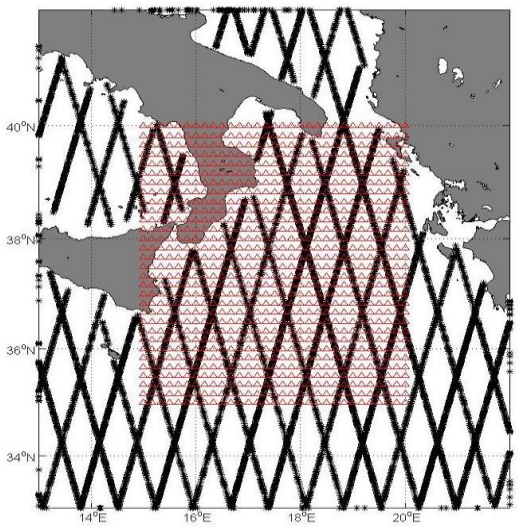
been carried out. The new filtered MDOT model is depicted in the Figure below, presenting a smooth MDOT model. Generally, away from coasts filtering has been achieved.





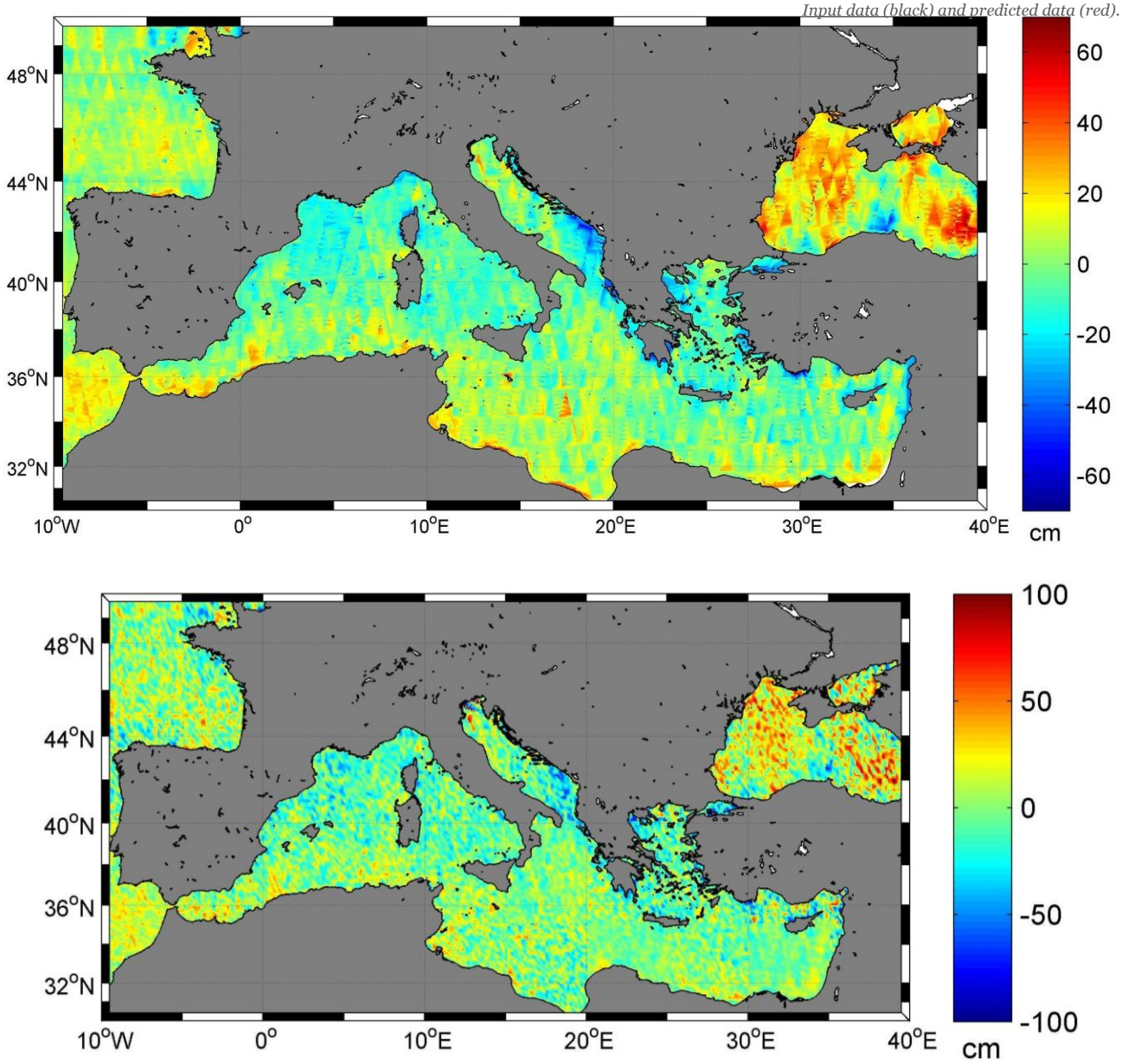


The same procedure has been carried out for the SLA in the Mediterranean Sea. Given the large number of satellite altimetry SLAs and the grid to be predicted with LSC, it was decided to create in each window a 10' x 10' grid, in order to predict values in these points and compare the predicted values with the original ones. Moreover, because the correlation length of the most local covariance functions is about 50-100 km, only points which are 1° away from the prediction point were be used for the prediction. In the Figure to the right one example of the grid of the predicted data and of the input data is presented.



The input SLAs were those from ENVISAT, Jason1, Jason2, ERS1/2 for the Mediterranean Sea. That field was wiener-filtered through LSC based on the analytical covariance functions that were previously determined. The results of this LSC-prediction are presented in the Figures below where the initial and filtered SLA models are presented, respectively.

Input data (black) and predicted data (red).



ACRONYMS

LSC	Least Squares Collocation
MDOT	Mean Dynamic Ocean Topography
TDOT	Time-varying Dynamic Ocean Topography
SLA	Sea Level Anomalies

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