Updated wind speed and sea state bias models for Ka-band altimetry

N. Tran (1), D. Vandemark (2), H. Feng (2), A. Guillot (3), N. Picot (3)

(1) Collecte Localisation Satellite (CLS), Toulouse, France
(2) University of New Hampshire (UNH), Durham, USA
(3) Centre National d’Études Spatiales (CNES), Toulouse, France

2D Wind Speed

METHODOLOGY

• The operational algorithm for retrieving Altika wind speed [Libbrecht et al. 2016] is based solely on the Ka-band backscatter coefficient and used the same formalism than the Envisat operational algorithm [Modola, 2007, 2012].
• The aim of the present work is to develop a two-parameter retrieval algorithm similarly to the one used for the Jason-1 and -2 missions [Collard, 2009] that depends on both backscatter coefficient and significant wave height.

RESULTS

• As expected, the SWH dependence on retrieved winds is reduced when one compares with the one observed with the operational 1D model (F1 to F3).
• This new model shows better agreement with Jason-2 altimeter winds and buoy data (F2 and F3).

3D Sea State Bias

METHODOLOGY

• A preliminary 2D model based on the first four cycles of data has been computed last year and used ECMWF model for both the wind and the wet tropospheric correction. These results were presented at the last CEF nodes meeting SSB workshop in Paris [Picard et al, 2014; Fréry et al, 2014].
• A preliminary 3D model based on the first four cycles of data has been performed last year and used ECMWF model for both the wind and the wet tropospheric correction. These results were presented at the last CEF nodes meeting SSB workshop in Paris [Picard et al, 2014; Fréry et al, 2014].
• Model estimations were used since the turnings of the wind speed and the radiometer based wet troposphere correction were not yet optimums.
• An updated 2D SSB solution has been computed based on a year-period of AltiKa measurements with a five-tuned altimeter 2D wind speed (above panel) and a refined radiometer wet troposphere correction that takes into account the correction of the saturated values observed on the 37 GHz hot calibration measurements during a few cycles [Picard et al, 2014; Fréry et al, 2014].
• Comparisons with the operational AltiKa SSB model (GDR Patch 2, [Scharroo et al., 2013]) and with the most up-to-date Jason-2 model [Tran et al., 2012] have been performed.

RESULTS

• Clear improvements (i.e. reduction of variance) are obtained with the 1-year solution when one compares with the version used in GDR (F1 and F2).
• Maps of mean and standard deviation of the differences are provided in F3.
• Recommendation is to use SSB solutions based on ECMWF winds to analyze the frequency dependence (F4) to avoid introduction of wind speed differences due to differences in retrieval algorithms (F5) in the comparison.

Updated 2D Sea State Bias

METHODOLOGY

• A preliminary 2D model based on the first four cycles of data has been computed last year and used ECMWF model for both the wind and the wet tropospheric correction. These results were presented at the last 2013 COSTE meeting and at the 2014 SARAR International Sciences and Applications Meeting [Poisson et al., 2013, 2014].
• Model estimations were used since the turnings of the wind speed and the radiometer based wet troposphere correction were not yet optimums.

REFERENCES

Huang, W., M. Picard, M-L. Fréry, N. Tran, E. Obligis, N. Picot, 2016: “Correction of 37 GHz channel”, SARAL/Altika workshop, poster session, Lake Constance, Germany.