Geophysical Research Abstracts, Vol. 9, 00569, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-00569

The wet tropospheric correction for altimetry in coastal and inland water regions.

C. Desportes (1), E. Obligis (1), and L. Eymard (2)

(1) Collecte Localisation Satellites (DOS), Ramonville St Agne, France, (2) CNRS/IPSL, LOCEAN, Paris, France (charles.desportes@cls.fr)

The exploitation of altimetric measurements over ocean relies on the possibility to correct the altimeter range from all external perturbations. One of them, the atmospheric humidity, strongly affects the range measured by the altimeter. Today, no meteorological model can provide this quantity with the required accuracy, so a dedicated instrument is added to the mission, a microwave radiometer (ERS2/MWR, Envisat/MWR, Jason/JMR, and TOPEX-Poseidon/TMR). In open ocean, the combination altimeter/radiometer is satisfactory both in terms of accuracy and spatial resolution. This is not the case for transition areas (sea/land): the signal coming from the surrounding land surfaces (with a strong and very time variable emissivity) contaminates the measurement and makes the humidity retrieval method unsuitable.

Nevertheless, the exploitation of altimer measurements in coastal areas becomes necessary for oceanography, and studies are in progress to exploit altimetry for hydrological budgets over large continental basins. Untill now, the different tests performed to retrieve the wet tropospheric correction near coasts are empirical and give poor results. Recent studies conducted by Karbou *et al* (2004) have shown the feasability of an estimation of land emissivity depending on the soil type, frequency, incidence angle, allowing the exploitation of radiometric measurements over land.

We propose here to evaluate the feasability of an operational retrieval of the wet tropospheric correction over these transition areas, which could fulfill the constraints related to the altimeter measurement processing, both in terms of accuracy and spatial resolution.

The first part of the work consists in an evaluation of the current methods. A radiometer simulator is built, using data from the FETCH experiment (high resolution meteorological model, in-situ measurements and collocated TOPEX/TMR measurements), to perform sensitivity tests and to analyze and compare the performances of the different methods. Refinements are then proposed. We also evaluated the feasibility and performances of two methods that take into account the land surface effect in the brightness temperature estimation. The latter was found to give significantly better results. This study has been conducted with TMR measurements available during the Fetch experiment, but the proposed methodology is fully applicable to other radiometers, just taking into account the corresponding instrumental characteristics (frequencies).

The second part of the study concerns the developement of a general method, valid everywhere with enough accuracy. The high variability in time and space of land emissivity (depending on its humidity and on the vegetation cover, with a strong seasonal cycle) makes this task difficult. We propose to evaluate the feasability of a retrieval with a one-dimensional variational method (1D-var) based on the adjustement of different parameters (surface emissivity, temperature and wet tropospheric correction) by minimization of the difference between simulated and measured brightness temperatures.