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The exploitation of altimetry measurements over ocean relies on the feasibility to correct the altimeter range for different perturbations. One of them, the wet tropospheric correction (dh) is nearly proportional to the integrated water vapor and is provided by a dedicated instrument, a microwave radiometer.

The relationship between dh and the radiations measured by the radiometer is empirically established using a statistical regression. Three frequencies are generally used to build this relationship: around 18, 23 and 37 GHz. The main 23 GHz frequency, being close to the 22.235-GHz water vapor absorption line, is highly sensitive to water vapor. The 18-GHz and the 37-GHz channels are respectively used to eliminate the sea surface and cloud contributions from the signal to be retrieved.

Altimetry missions apply this principle to compute the wet tropospheric correction, but their algorithms notably differ on two points (excluding the learning database):

1) The method of regression used: two-step log linear regression for Jason-2/AMR and its predecessors (TOPEX/TMR and Jason1/JMR); neural network for ESA missions (ERS1/MWR, ERS2/MWR, Envisat/MWR) and ISRO/CNES mission AltiKa.

2) The number of available frequencies: 3 frequencies for NASA radiometers with a measurements at low frequency (18.7 GHz for the Jason missions) used as a source of information on the sea surface and only 2 frequencies (23.8 and 36.5 GHz) for ESA missions. In this case, the lack of a low frequency channel is partly compensated by the use of the altimeter backscattering coefficient in the retrieval algorithm.

This paper will present the performances of several retrieval algorithms, including those used in the operational processing of altimetry missions. The algorithms are built and compared on the same learning and test databases to determine which regression method is more appropriate. The importance of each input for the different algorithms is analyzed and the performances of the different algorithms are assessed in terms of error (bias and standard deviation) but also in terms of geographical distribution of the errors and correlation with other environmental variables.
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