GLOBAL COMPARISON OF MICROWAVE RADIOMETER, GNSS AND ECMWF DERIVED PATH DELAYS
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ABSTRACT
In the scope of the European Space Agency (ESA)-funded project COASTALT, a method has been developed to compute the wet tropospheric correction in the coastal regions and applied to Envisat data – the GNSS-derived path delay (ZPD) algorithm (Fernandes et al., 2020). The method has been further refined and applied to the whole Envisat mission in the scope of the ESA Change Impact Services (CIS)–LevCoast project. The GNSS-derived path delays, which play a major role in the GPM algorithm, have to undergo a specific processing, in order to get accurate wet delays (ZPD) as a level adequate for atmospheric correction. In this study, MTKA and ECMWF modeled delays were compared with the GNSS ZPD. To show the consistency of all algorithms used in the GPM computation, the GNSS-derived path delays have been compared with ECMWF ZPD interpolated at the station locations and with radiometer data at the closest points with valid MWR measurements. This study presents the results of this comparison, for a global set of 227 GNSS coastal stations, covering the various levels of variability of the tropospheric delay, and MWR data from Envisat and Jason-1 satellite missions. Comparison between GNSS and MWR WET path delays: Microwave radiometer (MWR) data, from RADARSAT, were used for Envisat, Jason-1 and Jason-2 for the period 2002-2011 and the cycles refer to Table 2. The time span of each satellite data set is illustrated in Fig. 25. Data were stored, that is, interpolated into reference stations and for the whole mission. For the location and epoch of each altimeter measurement the ZWD from each nearby GNSS station was interpolated for the same epoch. Only satellite points with distance to GNSS stations less than 100 km from each station were used. Only valid MWR data were used. An MWR point is considered invalid if one of the following conditions occur: 1) MWR land point, 2) MWR interpolation quality flag is higher than 6, 3) absolute value of the differences between the MWR and ECMWF WTC is > 10 cm. The first two conditions are mainly related with land contamination near the coast; the last one mainly points to instrument problems or misconfiguration of the instrument. A statistical analysis was performed for the differences between the interpolated GNSS and the MWR ZWD (ZWD_GNSS – ZWD_MWR). Table 3 presents the global results for all stations and Fig. 3 to 8 present the results for some representative stations (labeled in Fig. 1 and Fig. 2). Figures 3 to 8 show the mean difference and the standard deviation of the differences for each station and satellite missions. Figure 16 to 22 illustrate the results, for the same stations, for Jason-2 (2002-2010) and MWR (black) ZWD at the station location interpolated to the time of the satellite measurement. Figures 23 to 25 show the ZWD standard deviation in meters (from ECMWF). The small number of MWR points available for the comparison with some stations made the results for some representative stations (labeled in Fig. 1 and Fig. 2).

REFERENCES

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