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Improvements in ERS-1 and ERS-2 precise orbit determination

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New precise orbits of the European Remote Sensing Satellites ERS-1 and ERS-2 have been computed at three institutes (DEOS, ESOC and GFZ) using three different softwares for satellite precise orbit determination (GEODYN, NAPEOS and EPOS-OC) and two different altimetry databases: the Radar Altimeter Database System (RADS) developed at DEOS and supported by Altimetrics LLC and the Altimeter Database and Processing System (ADS) developed at GFZ. Additionally, combined solutions have been created using three individual solutions for each satellite. The orbits were derived using consistent models in the same LPOD2005 terrestrial reference frame within the European Space Agency (ESA) Project "Reprocessing of Altimeter Products for ERS (REAPER)". The purpose of the project is to reprocess consistently all ERS-1 and ERS-2 radar altimetry and microwave radiometer data available from August 1991 till July 2003 to generate an improved, homogeneous long-term series. For this purpose, homogeneous orbits of ERS-1 and ERS-2 satellites play very important role. The new orbits cover time span from August 1991 till July 1996 for ERS-1 and from May 1995 till July 2003 for ERS-2. These new orbit solutions show notable improvements with respect to previously existing ERS-1/2 orbit solutions due to using up-to-date, most precise models, improved parameterization, intercomparison of four solutions for each satellite to avoid any systematic differences and outliers in individual solutions. The paper describes the new orbit solutions and shows the improvements in ERS-1/2 precise orbit determination. Use of new improved orbits of ERS-1 and ERS-2 will benefit to altimetry, Interferometric Synthetic Aperture Radar (SAR) and other applications.