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First results from the e Copernicus Sentinel-6 satellite mission

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The threat of sea level rise to coastal communities is an area of significant concern to the well-being and security of future generations. Environmental policy actions and decisions affecting coastal states are being made now. Given the considerable range of applications, sustained altimetry satellite missions are required to address operational, science and societal needs. This article describes the Copernicus Sentinel-6 mission that is designed to address the needs of the European Copernicus programme for precision sea level, near-real-time measurements of sea surface height, significant wave height, and other products tailored to operational services in the climate, ocean, meteorology and hydrology domains. It is designed to provide enhanced continuity to the very stable time series of mean sea level measurements and ocean sea state started in 1992 by the TOPEX/Poseidon (T/P) mission and follow-on Jason-1, Jason-2 and Jason-3 satellite missions. The mission is implemented through a unique international partnership with contributions from NASA, NOAA, ESA, EUMETSAT, and the European Union (EU). It includes two satellites that will fly sequentially (separated in time by 5 years). The first satellite, named Sentinel-6 Michael Freilich, launched from Vandenburg Air Force Base, USA on 21st November 2020. The main payload is the Poseidon-4 dual frequency (C/Ku-band) nadir-pointing radar altimeter providing synthetic aperture radar (SAR) processing in Ku-band to improve the signal through better along-track sampling and reduced measurement noise. The altimeter has an innovative interleaved mode enabling radar data processing on two parallel chains, one with the SAR enhancements and the other furnishing a "Low Resolution Mode" that is fully backward-compatible with the historical T/P and Jason measurements, so that complete inter-calibration between the state-of-the-art data and the historical record can be assured. A three-channel Advanced Microwave Radiometer for Climate (AMR-C) developed by NASA JPL provides measurements of atmospheric water vapour that would otherwise degrade the radar altimeter measurements. An experimental High Resolution Microwave Radiometer (HRMR) is also included in the AMR-C design to support improved performance in coastal areas. Additional sensors are included in the payload to provide Precise Orbit Determination, atmospheric sounding via GNSS-Radio Occultation and radiation monitoring around the spacecraft.

Early in-orbit performance data are presented.