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The contributions of Satellite Laser Ranging to Satellite Altimetry

Since the early 1990's ocean radar altimeters carried onboard orbiting satellites have provided us with regular synoptic measurements of the ocean surface topography. The data from such missions as TOPEX/Poseidon, the Jason series of satellites, ERS-1, ERS-2, Envisat, and current missions such as Cryosat-2, SARAL and HY-2A have provided vital new information about the state of the oceans including ocean circulation and sea level change, as well as have helped to directly map the marine geoid. The launch of the ICESAT-1 mission initiated a new era of direct mapping of the height change of the global ice sheets using laser altimeter data, which will continue with the upcoming ICESAT-2 mission. SLR plays two critical roles for satellite altimetry: In the first and most important contribution, they anchor the satellite orbits to the geocenter, and to the terrestrial reference frame. The second vital contribution is to provide an independent means of validation for orbits that are independently derived using only DORIS or GNSS data. This paper will present an overview of the contributions of Satellite Laser Ranging to the acquisition and analysis of satellite altimeter data, and provide a select synopsis of the most significant science contributions from these missions.