

Global Monitoring Of Inland Surface Water Using Multi-Mission Satellite Radar Altimetry

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Satellite altimeters have been used for many years to measure inland water heights of a small number of targets, generally utilising data from the NASA Topex and Jason-1 missions. However, complex echoes are frequently returned from inland water surfaces, often including both land and water components; reliance on the automated echo processing thus drastically limits the targets for which heights can be obtained. By designing a range of algorithms specifically configured to identify and ‘retrack’ to the water surface, data can be retrieved from many thousands of targets globally. The addition of the ESA altimeters on ERS-1, ERS-2 and Envisat, which were designed to operate over topographically varying surfaces, further extends the scope of inland water measurement from altimetry into mountainous terrain; combining data from different missions thus gives access to a huge global database of time series spanning 15 years. This paper presents global results from analysis of this unique dataset, investigates the capabilities and limitations of different instruments, and describes the development of a Near Real Time measurement capability from the Envisat RA-2. The results demonstrate both the huge amount of information currently available, and the continuing scientific challenge, particularly over rivers and wetlands, to optimise, filter and retrieve accurate heights. Understanding of these complex and difficult targets is also required to accurately design a future dedicated water mission.