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Burst echo retrieval - the future of satellite radar altimetry?

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A series of altimeter bearing satellites has been launched over the past few decades with the aim of returning height information from planetary surfaces. Within earth observation, the primary target has been the oceans; more recently, attention has shifted towards the cryosphere and, most recently, land and inland water. Common to all these missions has been the concept of averaging individual pulse-limited echoes, and transmitting these averaged data to earth. The advent of the Envisat RA-2 allows, for the first time, reconstruction of the individual 'burst' echoes obtained from the earth's surface. This paper presents the first results from investigation of these data over land, ice, inland water and open ocean. The results demonstrate that very detailed information is encoded in the individual echoes, particularly over non-ocean surfaces. Together with the advances in instrumentation over the past decade, these results strongly support the argument that all future altimeter missions should retain these data with minimal averaging, in order to optimise the terrain related information returned from planetary surfaces.