



## **ENVISAT altimeter individual echoes: new scientific applications for ocean, land and ice remote sensing**

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The Radar Altimeter on ENVISAT (RA-2) is the first space borne altimeter to provide bursts of up to 2000 coherent individual echo samples at Ku band. This paper presents results of recent investigations into ENVISAT burst echoes. Scientific studies of the individual echoes (IE) reveal that IE contain a wealth of new scientific information about the Earth surface and the performance of the RA-2 altimeter. Preliminary examinations of the phase over the ocean, for example, have confirmed theoretical hypotheses that the statistical characteristics of the phase respond to changes in ocean surface conditions. New results for the IE phase over land/ice point to promising new applications. Unexpectedly, the phase information can be processed to yield along track information showing complex and intricate patterns of change. Even over mountainous regions, this phase derived parameter shows coherence and high information content.