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Surface properties in West Africa from spaceborne radars in C and Ku bands

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We propose to compare the backscattering responses of land surfaces in West Africa for different radar spaceborne sensors: the nadir-looking radar altimeters and the side-looking radar scatterometers at different frequencies (Ku and C bands). The data used come from Envisat-RA2 measurements in Ku-band over the period 2003-2010 and the Jason-2 measurements in C band over mid-2008-2011 for radar altimetry, and from QuikSCAT - SeaWinds in Ku-band and Metop – ASCAT in C-band for radar scatterometry over the same time-spans. Along-track profiles and their temporal variations are analyzed and their behaviours are related to surfaces properties such as soil types, vegetation cover, and surface hydrology. Temporal variations of backscattering coefficients are extracted for main land covers along the bio-climatic transect (stone and sand deserts, saharo-sahelian, sahelian, and soudano-sahelian savannahs, tropical-seasonal and tropical forests) and compared to both rainfall estimates from TRMM and vegetation activity (NDVI) from MODIS. Range of variations of the backscattering signals are given for different surfaces and ecosystems along with delays between peaks of rainfall, backscattering responses of radar altimetry and scatterometry, and vegetation activity. The stability of the backscattering is also estimated over deserts and during the dry season over Sahelian environments. Finally, the complementarity of the different spaceborne sensors for continental surfaces monitoring is pointed out.