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[Volume XL-8](#)

Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-8, 1027-1033, 2014
www.int-arch-photogramm-remote-sens-spatial-inf-sci.net/XL-8/1027/2014/
doi:10.5194/isprsarchives-XL-8-1027-2014

Spatial Coherence of winds and waves over the Arabian Sea and Bay of Bengal and their evolution during SW Monsoon: a novel application of along-track Radar Altimeter measurements from Space

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Keywords: Oceanic winds and waves, spatial coherence, SW Monsoon, Radar Altimeter

Abstract. We have examined, for the first time, the spatial coherence of oceanic parameters, namely, the ocean surface wind and significant wave height (SWH), using near-instantaneous along-track sampling over vast oceanic tracks provided by Poseidon-2 Radar Altimeter onboard Jason-1. The spatial coherence length scales over the Arabian Sea and the Bay of Bengal regions, derived using Auto correlation analysis, display interesting characteristics in relation to onset and evolution of SW Monsoon over India. The estimated spatial coherence scales are found to be of the order of 100–500 km. Generally, SWH coherence lengths over Arabian Sea are observed to increase from June to July during good monsoon year (2012). This trend is not followed for the poor monsoon year (2002). Similar trend is observed for spatial coherence scales for wind speed. The temporal evolution of analyzed spatial coherence scales of winds and waves over Arabian Sea clearly brings out the distinction between a "good" (2012) and a "poor" (2002) monsoon year. The spatial coherence lengths of these parameters over the Bay of Bengal are found to be shorter and do not show any systematic relation to onset and evolution of SW monsoon. Anisotropy in coherence lengths is also analyzed by treating ascending and descending tracks separately. Generally, the descending tracks measurements show higher spatial coherence lengths than the ascending ones. Like the spatial coherence scales, the anisotropy of the coherence scales over the Arabian Sea also mimics the behaviour of the strength of SW Monsoon.

[Conference Paper](#) (PDF, 935 KB)

Citation: Bhandari, S. M. and Hareef Baba Shaeb, K.: Spatial Coherence of winds and waves over the Arabian Sea and Bay of Bengal and their evolution during SW Monsoon: a novel application of along-track Radar Altimeter measurements from Space, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-8, 1027-1033, doi:10.5194/isprsarchives-XL-8-1027-2014, 2014.

