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A Real-Time Algorithm for Radar Interferometry of Ocean Surface Height

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We present an algorithm implementation for real time processing of interferometric signal. This algorithm is designed for the Wide Swath Ocean Altimeter (WSOA) which extends TOPEX ocean topography measurement to a larger swath using radar interferometry. This implementation of the interferometric processing algorithm is characterized by its attempt to correct for channel misregistration and geometric decorrelation using estimates of the current geoid scenario. The channel misregistration is caused by the time delay between the signal received at one antenna with respect to the other one separated by the baseline. This algorithm corrects the misregistration over the entire swath with the Chirp-Z transform which resamples the signals appropriately [Rabiner et al. 1969; Raney et al., 1994]. Another important factor is the geometric decorrelation (or baseline decorrelation) that occurs because the targets within the resolution cell contribute different interferometric phases. In essence, the ground projected wavelengths are different for various look angles which produces a shift of the effective spectrum. This is corrected by shifting the spectra relative to one another and by applying filters to eliminate the non-overlapping part of the spectra [Gatelli et al., 1994]. However, the co-registration and the spectral shift require the estimation of the current look and incidence angles and therefore the algorithm considers the Earth Ellipsoid WGS-84 and the Geoid EGM-96. The angle estimation is performed with look up tables and time interpolation of geometric parameters to describe the various viewing scenarios encountered around the Earth Geoid. In this presentation we will finally discuss the expected measurement error for various scenarios.