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Reconstruction of ocean velocities from the synergy between SSH and SST measurements

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Recent advances in our understanding of the dynamics in the upper layers of the ocean have allowed us to develop methodologies to recover high resolution velocities from surface measurements such as Sea Surface Heights (SSH) and Sea Surface Temperatures (SST). These methods are based on the combined use of advanced signal processing techniques, such as wavelet analysis and singularity analysis, with dynamical approaches such as the Surface Quasi-Geostrophic (SQG) equations. Within the SQG framework, SSH and SST are closely related, which can be exploited to develop a synergetic approach that combines existing satellite measurements of these fields that can be used to recover subsurface buoyancy anomaly, surface and subsurface horizontal velocities and vertical velocities in the upper 300-500 m. Sentinel-3 satellite will follow its predecessors, ERS-1/2 and Envisat, and will provide simultaneous measurements of SST (SLSTR instrument) and SSH (SRAL and auxiliary instruments) that can be combined to produce high resolution surface currents. To test the feasibility of this approach for Sentinel-3 satellites we have reconstructed surface currents from AATSR and RA data provided by Envisat and compared results against independent SSH measurements provided Jason-1/2 platforms.