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Ocean surface currents reconstruction at a global scale from SST microwave measurements

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Accurately identifying ocean circulation is crucial to our understanding of climate and ocean processes and building as reliable as possible ocean current datasets is important for operational tasks and navigation. This requires acquiring synoptic measurements of the ocean velocity field. Although velocity fields derived from altimetric measurements are extensively used, distances between tracks are generally large, and that restricts the scales of the obtained velocity field below 100-150 Km. In addition, the limited number of available altimeters leads to errors in the accurate location of oceanic currents, which limits the quantitative reconstruction of the velocity field using exclusively altimeters. To circumvent such a limitation, other sources of satellite data, such as sea surface temperature (SST), can be considered. New methodologies based on Surface Quasi-Geostrophic (SQG) theory allow to reconstruct ocean velocity fields from only a snapshot of SST. The good results obtained after applying this methodology to infrared SST images in the Mediterranean led us to validate this approach at a global scale. However, applying this methodology at a planetary-scale is not straightforward. First, the cloud cover at a global scale is too large to reconstruct the velocity field in a routine way. This problem can be solved if global SST images observed with microwave radiometers are used. In this presentation, we evaluate surface ocean current reconstruction at a global scale from microwave SST measurements, based on the Surface Quasi-Geostrophic (SQG) theory. A new heuristic method that combines the benefits of microwave and altimetry measurements is also presented and evaluated. Results showed that the reconstruction of surface currents based on SQG theory can be improved if the information about the energy spectrum provided by altimeters is used.