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# FIRST ANALYSIS OF ALONG-TRACK INSAR-DERIVED CURRENT FIELDS FROM THE SUMMER 2014 TANDEM-X SHORT BASELINE OPPORTUNITY

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**ABSTRACT:**

The technique of high-resolution ocean surface current measurements by along-track interferometric synthetic aperture radar (along-track InSAR) was developed and first demonstrated with an airborne system in the second half of the 1980s. Since then, a number of further airborne along-track InSARs have been built and used for a variety of experiments, and advanced numerical techniques for processing, interpreting, and simulating along-track InSAR data have been developed. In early 2000, first spaceborne along-track InSAR data were acquired during the Shuttle Radar Topography Mission (SRTM). Since 2008, experimental divided-antenna modes of the satellite TerraSAR-X permit along-track InSAR data acquisitions on demand, with a relatively low data quality. We have shown in a recent paper that a data quality close to the theoretical optimum can be achieved with data from the two-satellite formation TanDEM-X when the along-track distance between the satellites is on the order of 50–100 m (effective along-track baseline = 25–50 m). For one TanDEM-X data set, an rms uncertainty of line-of-sight surface velocities of 0.1 m/s was obtained at a spatial resolution of about 33 m × 33 m, which is sufficient to resolve even the orbital motions of long ocean waves. Unfortunately, the opportunities to acquire TanDEM-X data at suitable along-track baselines have been very limited so far, but a considerable amount of new data sets was acquired over selected ocean and river test sites during the Short Baseline Opportunity in August-September 2014. We will present first results of this campaign and examine the data quality and its dependence on parameters such as along-track baseline, incidence angle, and wind speed. This research should be very valuable for studies related to the European Space Agency's Wavemill project, a proposed satellite mission with a highly optimized along-track InSAR system for current and wave measurements.