

# **CURRENTS IN RIVERS, COASTAL AREAS, AND THE OPEN OCEAN FROM TerraSAR-X ALONG-TRACK InSAR**

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The experimental along-track interferometry (ATI) capabilities of TerraSAR-X [1][2][3][4] have been activated over several test sites since spring 2008. A first analysis of six ATI images of the Elbe river (Germany), acquired in Aperture Switching (AS) mode in May through July 2008, was presented at IGARSS 2009 [5][6] and published in the TerraSAR-X special issue of TGARS in early 2010 [7][8]. In spring 2009, the superior Dual Receive Antenna (DRA) mode was tested. In fall 2009, more AS mode images were acquired over the Elbe river and over other test sites in coastal regions and the open ocean. As of current planning (December 2009), another dedicated DRA mode campaign will take place in spring 2010, including ATI image acquisitions over two river estuaries in North America and over other test sites. Furthermore, repeated AS-mode image acquisitions over selected test sites will be continued. In some cases, in-situ data and other satellite data will be acquired for comparison with the TerraSAR-X ATI results. On the data processing side, the SAR / InSAR processor settings for AS mode data have been optimized for a more efficient suppression of ghost signatures of land targets over water, and the procedures for correcting ATI-derived Doppler velocities for contributions of wave motions on the basis of theoretical ATI model results [9][10] have been improved. Furthermore, the University of Miami's Center for Southeastern Tropical Advanced Remote Sensing (CSTARS) is becoming a Direct Access Station (DAS) for TerraSAR-X with independent data ordering, downlinking, and processing capabilities in 2010. All this together generates a lot of exciting new results and opportunities, which will be presented in this paper and oral presentation. We will examine the quality of the latest TerraSAR-X ATI data products, and we will discuss their suitability for various spaceborne ATI applications and the potential of providing TerraSAR-X ATI-based current fields in a few test areas to selected users as a quasi-operational data product of CSTARS.

Fig. 1 shows improved results for three Elbe river cases as obtained with our latest processor settings.

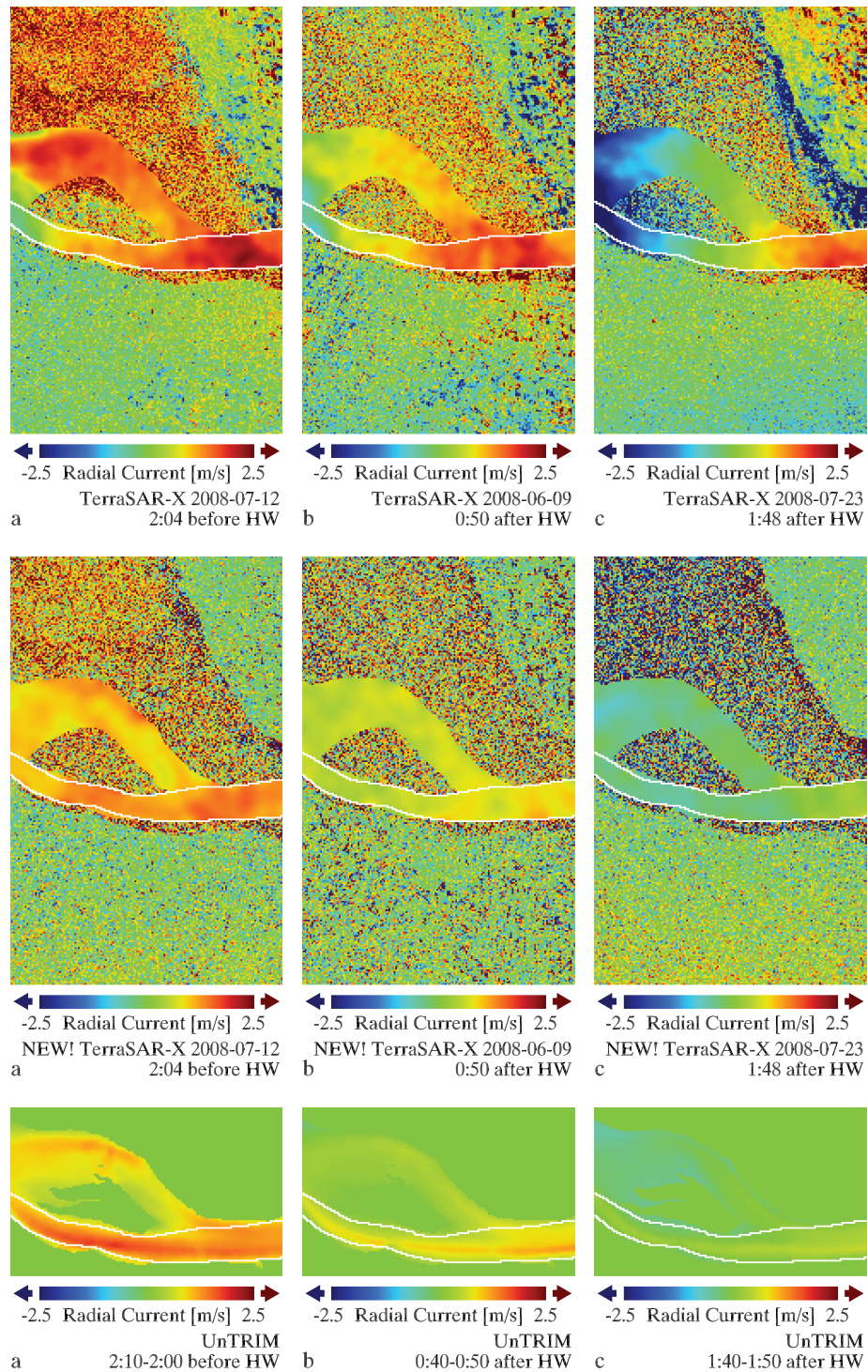


Fig. 1: Example of improvements since IGARSS 2009. Top row: Three TerraSAR-X ATI-derived line-of-sight current fields with strong artifacts on the left-hand side, which were attributed to ghost signature effects in [6] and [8]. Center row: The same current fields as obtained with optimized SAR processor settings in fall 2009. The artifacts are now gone, and the current fields look much more uniform. Bottom row: Reference current fields for the three cases from numerical model UnTRIM [11][12][13].

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