

## Monostatic Calibration of both TanDEM-X Satellites

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The primary object of the TanDEM-X mission is to generate a highly accurate digital elevation model (DEM) with never achieved accuracy on global scale [1]. But in addition to this DEM acquisition realized by a helix constellation of two satellites, nominal TerraSAR-X operation shall be available anymore, i.e. the bistatic TanDEM-X mission and the monostatic TerraSAR-X mission have to be operated in parallel with both satellites. Consequently the second satellite TDX, scheduled for launch in the first half of 2010, has to achieve the same accuracy and performance as those of the first satellite TSX, already in-flight since 2007. For this purpose a defined number of acquisitions over precise reference targets deployed within the DLR Calibration Field in Southern Germany and across the DLR test area in the Amazon Rainforest will be executed. Consequently, SAR instrument calibration is the main driver for the duration of the commissioning phase. But, the TanDEM-X commissioning phase has to be performed as fast as possible, because only then a maximal overlap of the lifetime of both satellites can be ensured. Hence, an efficient calibration strategy will be applied based on innovative and exact calibration techniques and successfully demonstrated with TSX [2].

In preparation of the TanDEM-X mission the first satellite TSX has been successfully recalibrated in summer 2009, two years after launch. This recalibration campaign has been shown once again how accurately the complex TSX system can be adjusted. More over, deriving the stability of the whole SAR system by real measurements two years after launch, the accuracy could be improved further on. The stability and the accuracy of the whole TSX system and especially the radar instrument itself is still of unprecedented quality. Furthermore, the effort for this recalibration campaign could be minimized by the experience and the results achieved already during the commission phase and the reliable performance of TSX since launch in 2007. This is a major milestone to perform likewise an efficient calibration of the second satellite TDX of the TanDEM-X mission and thus to ensure the delivery of precisely calibrated SAR data products as soon as possible.

Based on a short overview of different calibration procedures like geometric and pointing calibration, antenna model verification as well as internal and radiometric calibration the paper discusses the calibration results derived for the first satellite TSX two years after launch in summer 2009 and for the second satellite TDX scheduled for launch in the first half of 2010.

## References

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- [2] M. Schwerdt, B. Bräutigam, M. Bachmann, B. Döring, D. Schrank, and J. H. Gonzalez, "Final TerraSAR-X Calibration Results Based on Novel Efficient Calibration Methods," *IEEE Transaction on Geoscience and Remote Sensing*, Vol. 48, No. 2, February 2010.