



Recent Advances in Highly Accurate Range Measurements with TerraSAR-X

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Earth surface displacement measurement from space using Synthetic Aperture Radar (SAR) imagery is an interesting alternative to SAR interferometry (InSAR). The advantages are that 2D information can be retrieved (InSAR only 1D), absolute displacements can be retrieved (no reference point required) and it is very robust (phase unwrapping not required). On the other hand, the accuracy is limited by the pixel resolution, the object contrast, the orbit accuracy, by wave propagation distortion and by geodetic effects. Therefore the accuracy was more in the meter / decimeter level in the past, compared to millimeter accuracy of InSAR.

During the recent years our team established a test and validation site at the geodetic observatory Wettzell, Germany and developed compensation methods to reduce the overall error of absolute range measurements from decimeters to only one centimeter. The methods include correction of dry and wet atmospheric delays, ionospheric corrections, solid earth tides, continental drift, atmospheric pressure loading and ocean tidal loading.

For more one year a radar reflector was monitored and each image evaluated. Our presentation gives and overview of methods and achieved results.

Futhermore, examples of real world applications and an outlook on more applications is given such as phase unwrapping augmentation.