MAPPING URBAN FLOOD USING INTERFEROMETRIC SAR – PRELIMINARY RESULTS

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Interferometric Synthetic Aperture Radar (InSAR) has been a unique technique that can provide an intrinsic, image-based direct measurement of water level changes beneath flooded forests between SAR acquisition dates with high spatial resolution (~40 m) [e.g., *Alsdorf et al.*, 2000; *Kim et al.*, 2009; *Jung et al.*, 2010, *Yuan et al.*, 2015, *Lee et al.*, 2015]. This is based on the fact that water beneath vegetation with strong stems can provide double-bounce backscattering, which allows InSAR coherence to be maintained. However, there has been no attempt to apply the technique to map urban floods. In this study, considering the fact that buildings can be a stable structure leading to the double-bounce backscattering, for the first time, we attempt to use InSAR technique to map water level changes in flooded urban areas due to the 2005 Hurricane Katrina in New Orleans and due to the 2008 Iowa Flood in Cedar Rapids. This flood maps could be used to delineate severely flooded areas and identify flood-prone area for better flood mitigation and recovery.
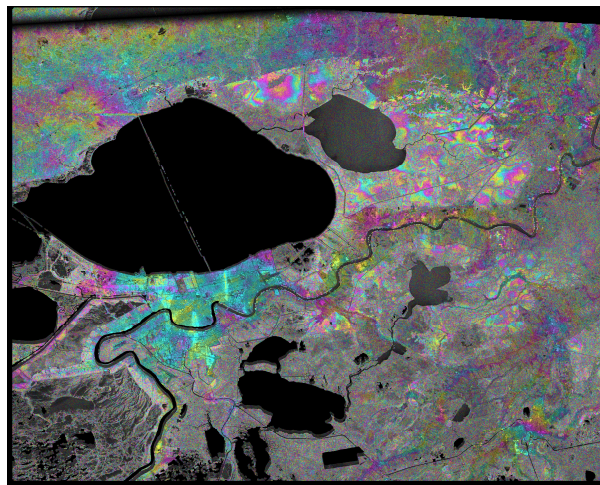
Figure 1. Differential interferogram over New Orleans using C-band Radarsat-1 images obtained on 9/14/2005 and 11/25/2005.

References

Alsdorf, D.E., J.M. Melack, T. Dunne, L.A.K. Mertes, L.L. Hess, L.C. Smith, Interferometric radar measurements of water level changes on the Amazon floodplain, Nature, 404, 174-177, 2000.

Kim, J.W., Z. Lu, H. Lee, C. Shum, M. Swarzenski, T.W. Doyle, S.H. Baek, Integrated analysis of PALSAR/Radarsat-1 InSAR and ENVISAT altimeter data for mapping absolute water level changes in Louisiana wetlands, Remote Sensing of Environment, 113, 2356-2365, 2009.

Jung, H. et al, Characterization of complex fluvial systems via remote sensing of spatial and temporal water level variations, Earth Surface Processes and Landforms, 35, 294-304, 2010.

Yuan, T., H. Lee, H.C. Jung, Toward estimating wetland water level changes based on hydrological sensitivity analysis of PALSAR backscattering coefficients over different vegetation fields, Remote Sensing, 7, 3153-3183, 2015.

Lee, H., T. Yuan, H.C. Jung, E. Beighley, Mapping wetland water depths over the central Congo Basin using PALSAR ScanSAR, Envisat altimetry, and MODIS VCF data, Remote Sensing of Environment, 159, 70-79, 2015.