



High resolution mapping of hydrologic deformation induced by the West African Monsoon

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Precipitation from the monsoon system in West Africa produces regional- and local-scale surface deformation due to changes in terrestrial water storage. However, the surface displacement signal varies with subsurface conditions. Modeling results and GPS data indicate that the West African Monsoon system induces regional-scale subsidence due to increased hydrologic loading. This affect may be offset locally by soil shrinkage/swelling induced by moisture content changes in clay-rich areas. High resolution surface deformation data combined with in-situ data is one way to separate the contradictory signals. We use differential interferometry of synthetic aperture radar techniques to measure surface deformation over the AMMA-CATCH upper Ouémé mesoscale site, located in Northern Benin. The AMMA-CATCH observatory has collected critical zone data from stations in this study area since 2002. Surface displacements derived from Sentinel 1 acquisitions over the study area are compared to in-situ data to better understand hydrologic deformation induced by the West African monsoon. This research may be extended to identify zones of high clay content across West Africa, providing new data to inform regional hydrologic models and the development of groundwater resources.