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Anthropogenic and geologic influences on subsidence in the vicinity of New Orleans, Louisiana

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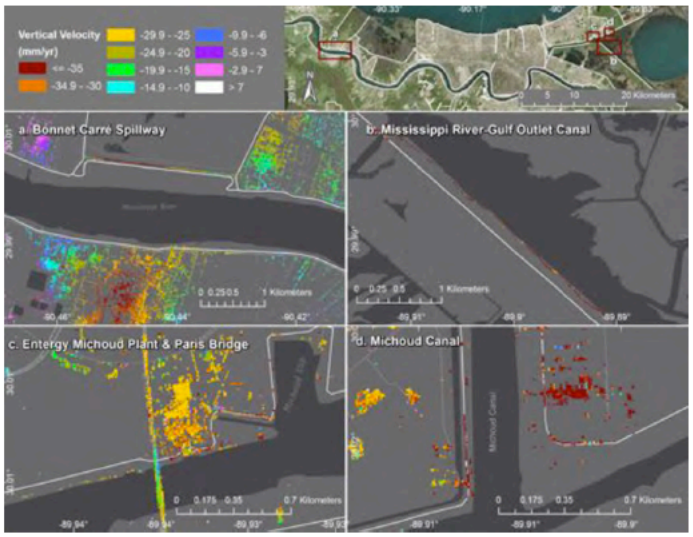
We present an InSAR analysis of Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) data acquired on 16 June 2009 and 2 July 2012 covering New Orleans, Louisiana (USA) and two upriver communities situated near major industrial complexes. The results are used to determine the areas showing greatest subsidence, and to evaluate proximate causes for subsidence in those areas. The measured subsidence trends are similar to those reported by Dixon et al. (2006) for 2002-2004 in parts of New Orleans where observations overlap. The analysis differs from previous work in using L-band SAR and having much higher spatial resolution (6 m). The geographic associations of cumulative surface displacement suggest that the most likely drivers of susidence are groundwater withdrawal and drainage/dewatering activities. High subsidence rates are observed localized around some major industrial facilities, and appear in some cases to affect flood control infrastructure at distances >1 km. Rapid subsidence from shallow compaction is observed to occur in highly localized areas, showing that this source of subsidence could be missed in surveys relying on point measurements collected at limited locations and/or infrequent time intervals.



Subsidence of flood control infrastructure in relation to subsidence of the adjacent areas. (top) Overview of area showing levees (white) and outlined areas of (a) the Bonnet Carré Spillway; (b) the Mississippi River-Gulf Outlet Canal); (c) the power plant in Michoud; and (d) east of the NASA Michoud facility