Radar Remote Sensing of Subsidence in the Sacramento-San Joaquin Delta

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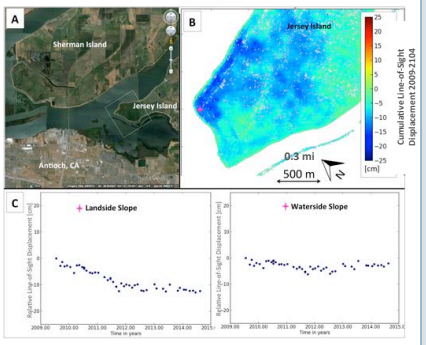
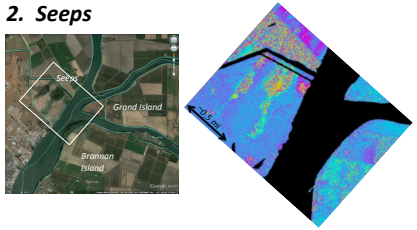
Delta Independent Science Board
14 July 2016, DELTA LEVEE SCIENCE

Identify Localized Deformation

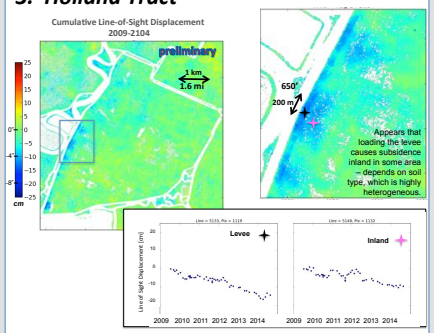
1. Jersey Island, Blind Point Peninsula



2. Seepage



3. Holland Tract



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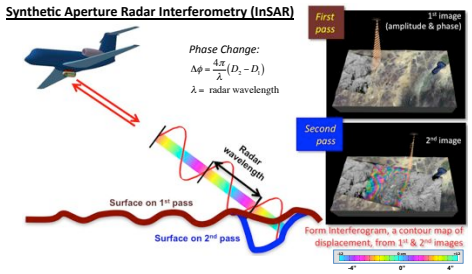
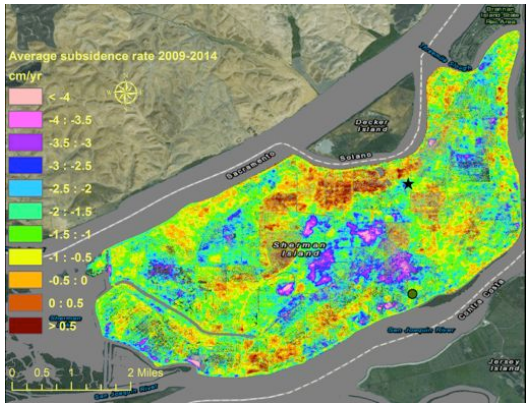
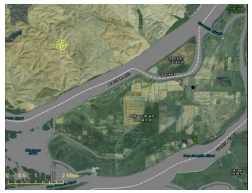
NASA-CDWR Study: Application of Earth Science Methods to Subsidence & Levee Monitoring

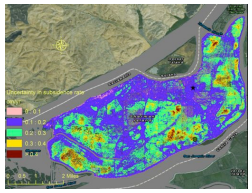
- Uses NASA UAVSAR instrument for high resolution mapping
- ~60 Acquisitions since July 2009
- Coverage of the entire Sacramento-San Joaquin Delta from multiple viewing angles
- Develop methods for measuring small deformations in a challenging area

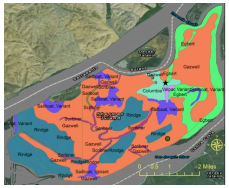


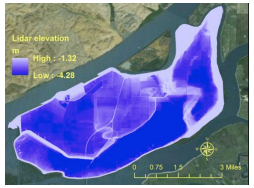
Sherman Island Subsidence Rates, 2009-2014

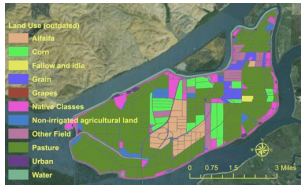










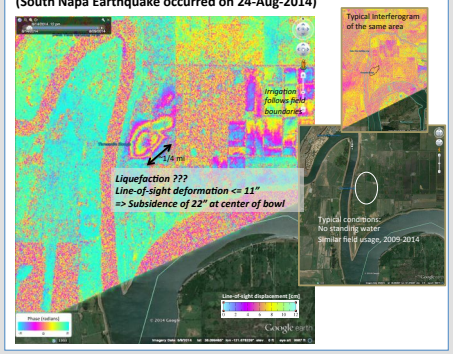


References:
1. Sharma, P., Jones, C. E., Dudas, D., Bawden, G., S. Deverel (2016). Monitoring of subsidence with UAVSAR on Sherman Island in California's Sacramento-San Joaquin delta. *Remote Sensing of Environment*, *181*, 218-236, doi:10.1016/j.rse.2016.04.012.
2. Jones, C. E., Dudas, J., Bawden, G. W. (2016). Application of remote sensing to assessment of water conveyance infrastructure integrity. In R. L. Anderson and H. Ferriz (Eds.), *Applied Geology in California, Special Publication 26*. Association of Environmental and Engineering Geologists, Star Publishing Company.
3. Jones, C. E., Bawden, G., Deverel, S., Dudas, J., Hensley, S., & Yun, S. H. (2012, November). Study of movement and seepage along levees using DINSAR and the airborne UAVSAR instrument. In *SPIE Remote Sensing* (pp. 85360E-85360E). International Society for Optics and Photonics.

South Napa Earthquake

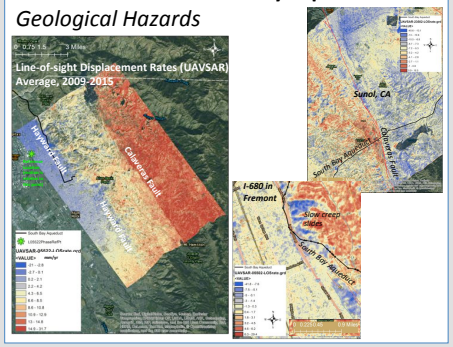
Twitchell Island Subsidence

15-day interferogram, 14-Aug-2014 to 29-Aug-2014 (South Napa Earthquake occurred on 24-Aug-2014)



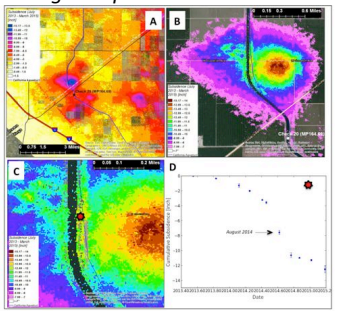
Related Work 1: South Bay Aqueduct

Geological Hazards



Related Work 2: California Aqueduct

Drought Impact



(A) Subsidence near Avenal (between Huron and Kettleman City) (overview)

(B) Subsidence bowl just north of Avenal Cut-off Road

(C) Close-up of the section of the aqueduct nearest the center of the bowl.

(D) Cumulative subsidence vs. time

Reference: Farr T. G., Jones C., Liu Z. (2015) Progress report: Subsidence in the Central Valley, California. http://water.ca.gov/groundwater/docs/NASA_REPORT.pdf.

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