JGR: Earth Surface

Supporting Information for

Variations in Subsidence along the Gulf of Mexico passive margin from Airborne-LiDAR data and Time Series InSAR in Louisiana

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Introduction

In Supplementary figure 1 we compare data from the DEMs from 1999 and 2018 and the results from LiDAR differencing from GCD and InSAR time-series with PSI across the profiles shown in Figure 1 on the main text. Supplementary figure 2 shows some examples of constructions on both blocks of the fault showing that constructions are not causing vertical displacement anomalies. Supplemental figure 3 shows the results of both methods in the areas shown in figure 9 compared with the location of injection and extraction wells.
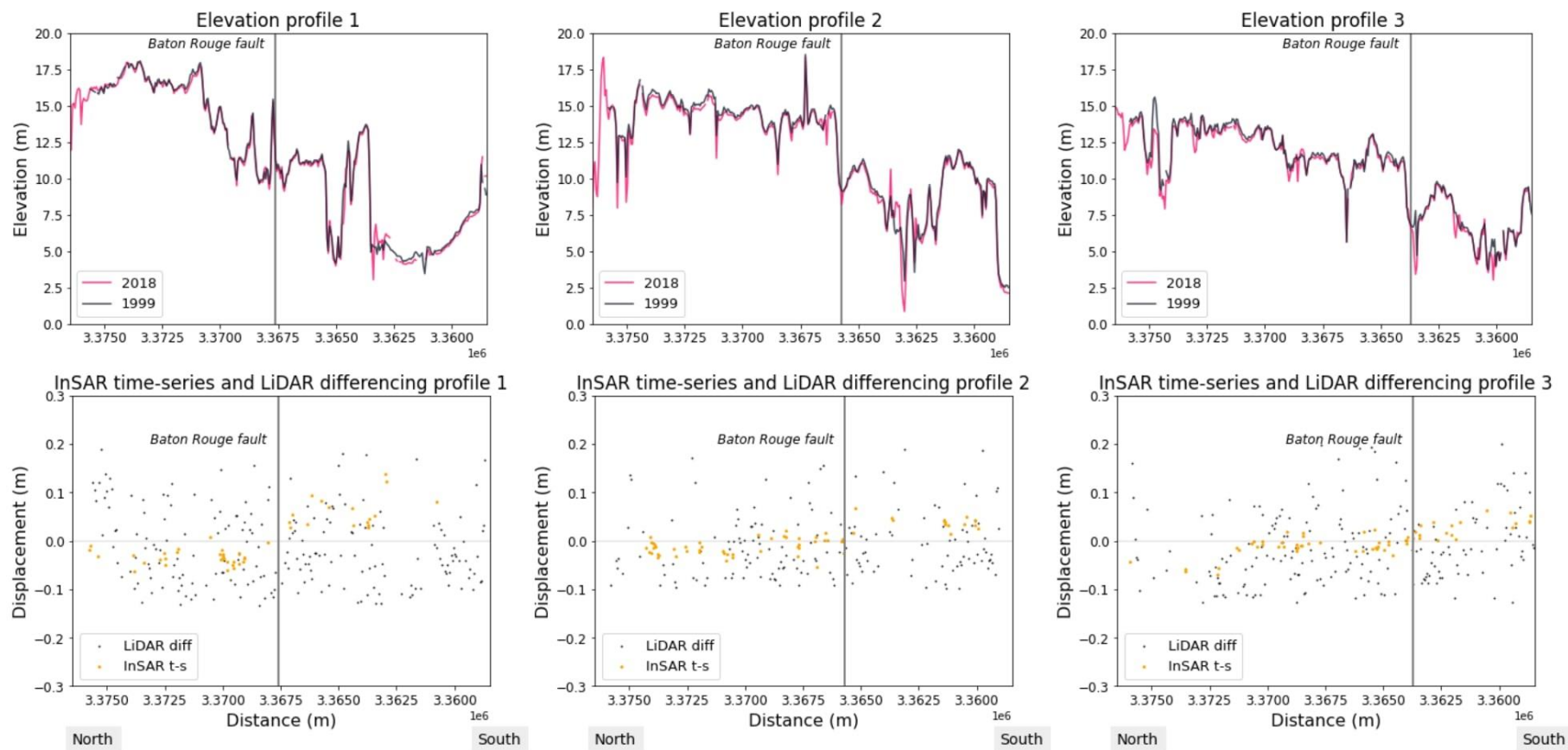
Figure S1. Comparison of elevations using the DEM from 1999 and 2018 in the upper panel and results from our methods along those profiles. For location of the profiles see Figure 1. For the upper profiles, data is averaged every 10 meters from the DEMs, and lower panel is averaged every 20 meters from the GCD results (Fig. 9) and the InSAR time-series for Sentinel-1 results (Fig. 5)
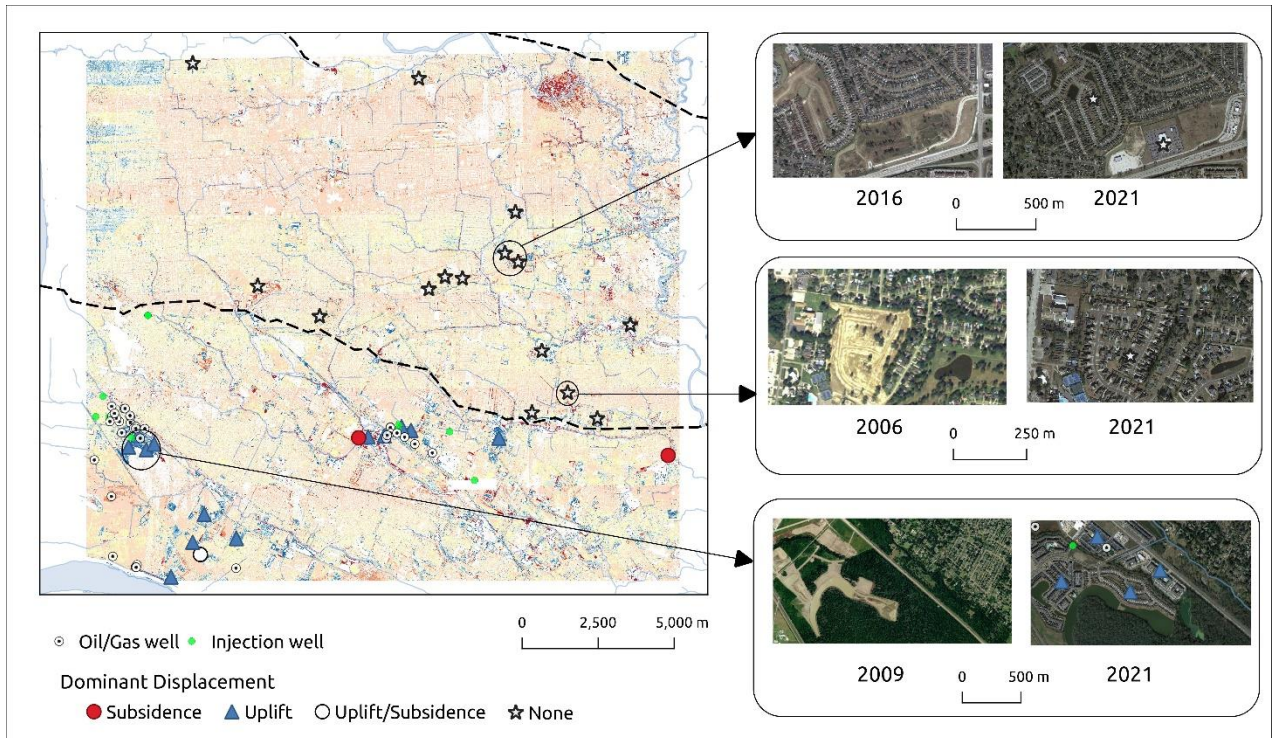
Figure S2. Examples of location of urban constructions built between 1999-2020 and how they look in 2021. Dominant displacement refers to the dominant vertical movement in the area near to the construction. The point labeled as Uplift/Subsidence is the location of Baton Rouge Wastewater Treatment that encounter uplift to the northwest and subsidence to the southeast. Oil/Gas and injection wells are drawn to compare with building constructions near and far from these wells. Legend for displacement is in Figure 9. Images from 2021 taken from QuickMapServices - QGIS (Map data ©2015 Google). Images from past years are taken from the Historical imagery from Google Earth Pro. Well data from the Louisiana Department of Natural Resources (SONRIS), (n.d.).
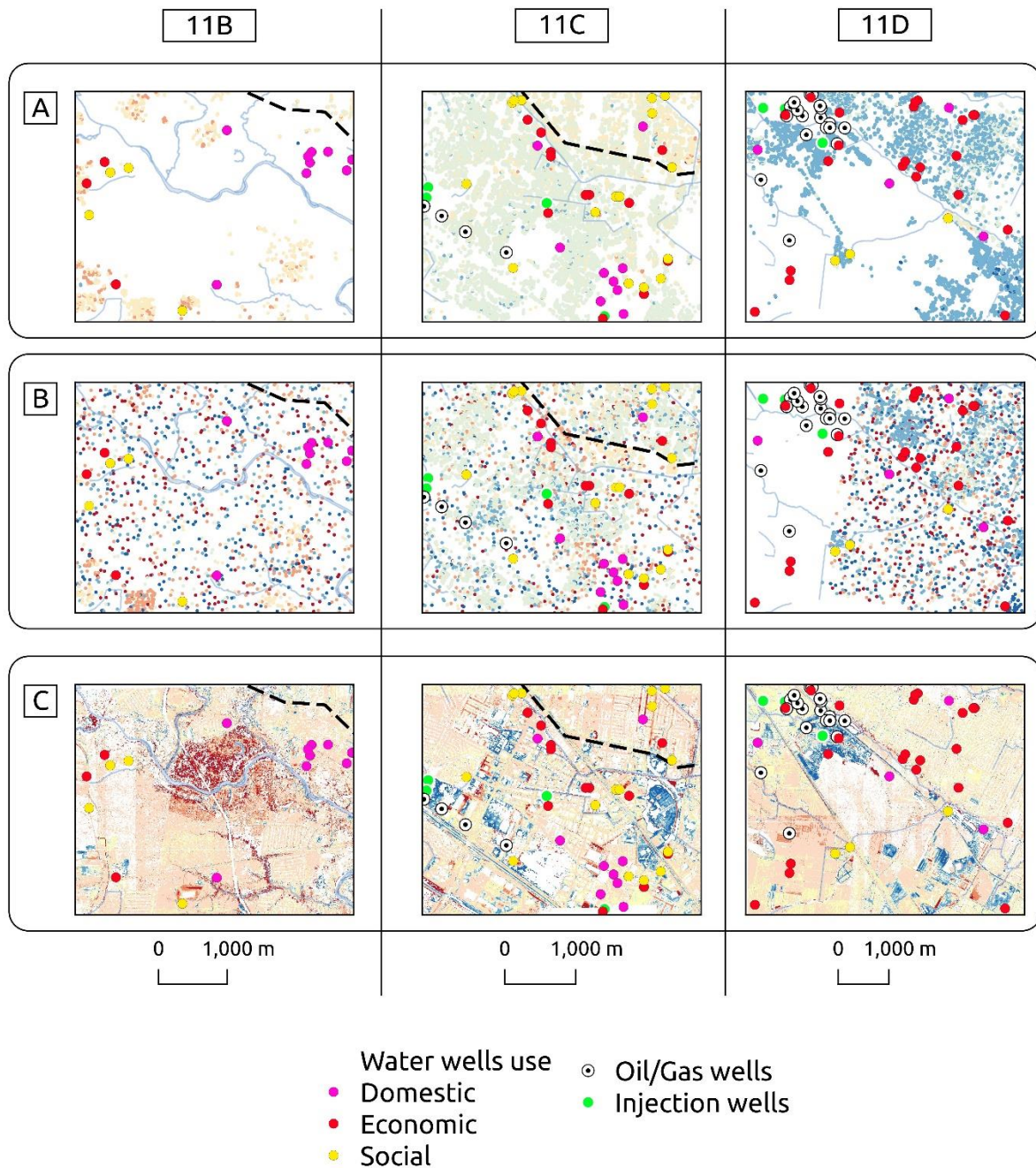
Figure S3. Example of areas experiencing subsidence or uplift determined by different methods compared with injecting and extracting wells. A) Vertical displacement rates calculated with InSAR time series using Sentinel-1 data between 2017-2020. B) Vertical displacement rates calculated with InSAR time series using EnviSAT data between (2004-2010). C) Vertical displacement calculated with LiDAR differencing between 1999-2018. Location of these areas are found in Figure 9. Legend for displacement and rates are in Figures 5 and 9. Well data from the Louisiana Department of Natural Resources (SONRIS), (n.d.