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Spatial and temporal characteristics of CO2 injection at InSalah, Algeria. InSAR and modeling.

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We analyse the surface deformation resulting from the storage of CO2 within the site of InSalah, Algeria, in order to provide constrain on the temporal and spatial evolution of CO2 in the reservoir.

The processing of Synthetic Aperture Radar Interferograms from the pre-injection period 1992-2004 and the injection period 2004-2009 reveals surface uplift in the regions adjacent to the injection wells, coinciding with the onset of injection (Vasco, 2009). The uplift is non linear in time with a period of relative stability in 2006 for all 3 wells, and then in 2008 during the interruption of well KB502. A maximum surface uplift of 2cm is observed for a volume of uplift of 1.5 10e6 m3. The uplift is mostly localised around the injection wells with the exception of an extended area of low uplift east of the KB502 well. In this area, the lateral spreading of uplift reaches 10km/yr.

The geomechanical response to injection is modeled using the analytic poroelastic formulation of Geertsma (1973) incorporating a transient pore pressure solution (Dake, 2001, equation 4.12). The results of the modeling indicate that the observed surface uplift can be explained by plume migration within the 20 m thick Carboniferous sandstone.