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The use of InSAR over storage sites: examples from salt domes, depleted reservoirs and other areas

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Abstract

InSAR (Interferometric Synthetic Aperture Radar) uses satellite radar data to measure ground deformation. Compared to traditional surveying techniques it has the advantage of offering a high density of measurement points over large areas. Measurements have a high precision and are characterized by time series of movement that allow changes in ground movement dynamics to be easily highlighted over time including, for example sudden movement acceleration or a return to ground stability.

In recent years InSAR has found increased use in the areas of salt domes, gas storage and solution mining. From the high profile case of the Napoleonville salt dome in the area of Bayou Corne, LA to gas storage fields in Europe the technique is being used to integrate or supplant traditional surveying techniques as well as in other innovative ways. A good example of the latter is in underground gas storage sites in Europe, where InSAR derived deformation data is being used as input to geomechanical models to safely increase the amount of gas being stored in formerly depleted gas storage reservoirs.

Over salt domes it is being used both to observe historical ground deformation as well as a tool to actively monitor ongoing deformation in response to operations. The use of appropriate monitoring programs based on InSAR can provide early warning of impending problems.

In this presentation we show examples from several sites in which InSAR is being used in various capacities. From simple comparisons with traditional survey data, such as at the Tersanne storage site, to more advanced use in which depleted gas reservoirs are repressured to greater than original geopressure allowing a significant increase the volume of gas stored.

Key words: InSAR, Caverns for Gas Storage, Caverns for Liquid Storage, Surface Deformation, Instrumentation and Monitoring, Surveying, Gas storage

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