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The rate of rise, fall and gravity spreading at Siahou diapir (Southern Iran)

P. Aftabi (1) and M. Roustaie (2)

(1) Geological Survey of Iran, Tectonic, Tehran, Islamic Republic Of Iran (ped_aftabi@yahoo.com), (2) Geological Survey of Iran, Tectonic, Tehran, Islamic Republic Of Iran

InSAR imaging can be used for extracting three dimensional information of the diapirs surface by using the phase part of the radar signal. We used InSAR to examine the cumulative surface deformation between 920706 to 060518, in a 10×10 km region surrounding the salt diapir at Kuh-e-Namak Siahou. The interferograms span periods was between 35-70 and 1248 days. Images acquired in 12 increments provided by ESA. This technique used here involves computation and subsequent combinations of interferometric phase gradient maps were used for mapping the salt flow deformation in the Zagros. Kuh-e-Namak Siahou is one of the salt extrusions currently active in the Zagros range in Iran. Salt rises from a mother salt horizon about 4 km deep and extruded as a dome with glacier on the surface. The geometry and inferred flow pattern of the salt changed between the increments, emphasizing that the extrusion rate and gravity spreading is not steady. Elevations in the salt mountain range from 1000 to 1640 meters and the displacements exceed to 20cm per year . Our InSAR study(Fig1) suggest that the dimensions and velocity of the salt movements are changing between 2 to 20mm per year(-0.7 to0.59 mm per day).The rate of surface dissolution changed between 2 to 4 cm a–1, and its rate of rise out of its orifice at 0 to 200 mm per year. The InSAR study suggest that the vigorous salt extrusion in Siahou is probably active.The deep source probably rise at a similar rates in the past but it fall in the time of InSAR study. The rate of fall was 260 mm per year(for 14 years). The InSAR images suggest that salt extrusion in Siahou flow laterally at rate 20-25 mm per year and the namakiers felt at -2 mm per month. The InSAR results indicated concentric and radial flow in the diapir from a central point at summit and spreading glaciers in sideways.Phase differences measured in our interferograms generally in the range of 0–260 mm/yr(-260 mm) within the studied period, with exceptional high rates that exceed 50 mm/yr in diapir Siahou. Comparison of our InSAR observations with models suggest a similarity in the strain pattern in the model and prototype. Our observations also show that in certain locations of Zagros, movements appear to be structurally controlled by salt flow, and diapirism. This report will improve our understanding on how the salt diapirs work and our capability to predict future flow and the associated hazards for storages in salt and provides the first direct, spatially resolved, measurement of ongoing flow of salt.

Key words: Salt tectonics,InSAR,Monitoring,Iran,Zagros,Salt diapir,salt kinematics, Zagros fold–thrust belt, Hormuz salt, analogue modelling,salt extrusion, crustal shortening