Insight into activity of Angur salt diapir (Southeast of Zagros, Iran) by InSAR time series analysis

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Abstract

There are more than 250 salt domes in south of Iran and Persian Gulf which belong to a unit sedimentary basin Hormuz salt and separated by further tectonic factors. Salt dome outcrop in Zagros orogenic Simply Folded Belt (SFB) is a unique composition of exotic rocks which reached the earth surface from depth of 3-5 km by Hormuz evaporates in Late Precambrian. Estimates of the total stratigraphic thickness vary from 10 to 15 km and detached from the 1-2 km thick infra-Cambrian Hormuz. The Hormuz series penetrates the overburden as diapirs that feed spectacular salt glaciers moving by plastic flow along the ground surface. Most of salt diapers of Zagros have close relationship with the regional geodynamic history as well as the hot arid of Persian Gulf can control the soluble salt escape rapid erosion.

We investigate the surface deformation of Angur (Gasho) salt diapir at the west of Bandar-Abbas (27°17’ N, 55°51’ E) by advanced Interferometric Synthetic Aperture Radar (InSAR). The rates of flow of salt within diapirs have traditionally been measured by standard survey techniques in the previous works while InSAR can provide a quick review of the Quaternary motions of most observed surface salt flows in some elevated diapirs which are impossible in-situ measurements. Barnhart and Lohman (2010) identified Anguru as an active salt that showing good coherence in individual ALOS and Envisat interferograms. Due to high surface velocities or steep local topography performing classical InSAR time-series analysis is challenging at Anguru. We performed advanced analysis and modified several aspects within the processing chain using Small Baseline Subset (MSBAS) method to create time-dependent deformation signal using ALOS data. The modification includes filtering prior to phase unwrapping, topographic correction within 3-dimentioanl phase unwrapping and orbital correction to estimate deformation. By this modification, we were able to obtain 1421 coherent pixels over Anguru and subsidence deformation continuously observes in time series. The signature of different selective points within deforming region show approximately same behavior and suggest that major part of salt diapir broadly sustains subsidence, although the local uplift is also recorded.

Key words: Hormuz salt, Zagros, Anguru, MSBAS algorithm