Geophysical Research Abstracts
Vol. 14, EGU2012-1485, 2012
EGU General Assembly 2012
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Investigation of land subsidence due to climate changes in surrounding areas of Urmia Lake (located in northwest of Iran) using wavelet coherence analysis of geodetic measurements and methodological data

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Urmia Lake (salt lake in northwest of Iran) plays a valuable role in environment, wildlife and economy of Iran and the region, and now faces great challenges for survival. The Lake is in immediate and great danger and rapidly going to become salty desert. During the recent years and new heat wave, Iran, like many other countries are experiencing, is faced with relativity reduced rain fall. From a few years ago environment activists warned about potential dangers. Geodetic measurements, e.g., repeated leveling measurements of first order leveling network of Iran and continuous GPS measurements of Iranian Permanent GPS network of Iran (IPGN) showed that there is subsidence in surrounding areas of the lake. This paper investigates the relation between subsidence and climate changing in the area, using the wavelet coherence of the data of permanent GPS stations and daily methodological data. The results show that there is strong coherence between the subsidence phenomena induced by GPS data and climate warming from January 2009 up to end of August 2009. However, relative lake height variations computed from altimetry observations (TOPEX/POSEIDON (T/P), Jason-1 and Jason-2/OSTM) confirms maximum evaporation rates of the lake in this period.