



AGU FALL MEETING

San Francisco | 14–18 December 2015

H51A-1342

Mechanisms, Monitoring and Modeling Earth Fissure generation and Fault activation due to subsurface Fluid exploitation (M3EF3): A UNESCO-IGCP project in partnership with the UNESCO-IHP Working Group on Land Subsidence

Friday, 18 December 2015

Poster Hall (Moscone South)

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Abstract:

Land subsidence due to groundwater extraction was recently mentioned as one of the most urgent threats to sustainable development in the latest UNESCO IHP-VIII (2014–2020) strategic plan. Although advances have been made in understanding, monitoring, and predicting subsidence, the influence of differential vertical compaction, horizontal displacements, and hydrostratigraphic and structural features in groundwater systems on localized near-surface ground ruptures is still poorly understood. The nature of ground failure may range from fissuring, i.e., formation of an open crack, to faulting, i.e., differential offset of the opposite sides of the failure plane. Ground ruptures associated with differential subsidence have been reported from many alluvial basins in semiarid and arid regions, e.g. China, India, Iran, Mexico, Saudi Arabia, Spain, and the United States. These ground ruptures strongly impact urban, industrial, and agricultural infrastructures, and affect socio-economic and cultural development. Leveraging previous collaborations, this year the UNESCO Working Group on Land Subsidence began the scientific cooperative project M3EF3 in collaboration with the UNESCO International Geosciences Programme (IGCP n.641; www.igcp641.org) to improve understanding of the processes involved in ground rupturing associated with the exploitation of subsurface fluids, and to facilitate the transfer of knowledge regarding sustainable groundwater management practices in vulnerable aquifer systems. The project is developing effective tools to help manage geological risks associated with these types of hazards, and formulating recommendations pertaining to the sustainable use of subsurface fluid resources for urban and agricultural development in susceptible areas. The partnership between the UNESCO IHP and IGCP is ensuring that multiple scientific competencies required to optimally investigate earth fissuring and faulting caused by groundwater withdrawals are being employed.

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