## Preliminary investigation of Sasan Gir Earthquake-2011, Junagadh District, Gujarat.

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## Abstract

Seismic activity in the Sasan Gir area is reported to be continuing for last 10 years and in the entire Saurashtra region for more than 200 years. The present seismic activity commenced with the occurrence of an earthquake of magnitude 5.3 on 20<sup>th</sup> October, 2011. Since then activity is continuing in the area with subsequent lower magnitude earthquakes. About 200 aftershocks have recorded and the magnitude of earthquakes is fluctuating between 1 & 2. Among 200 aftershocks 2-3 aftershocks are ranging from 3-4. Location of the epicenter of earthquake as per ISR differs from USGS. ISR has reported epicenter of the earthquake at 21.114° N; 70.54° E whereas the USGS has fixed at 21.18°N; 70.48°E. The depth of focus is also differently mentioned by ISR and USGS at 8.5 km and 15.5 km, respectively. Details are given in the following table:

Date	Time	Lat. (N)	Long.	(on	Depth	Location	Agency
	(1S1)		(E)	Richter Scale)	(KM)		
20.10.2011	10:48	21.114°	70.54°	5.3	8.5	13 km SE	ISR,
	pm					of Sasan	Gandhinagar,
						Gir,	Gujarat,
						Junagadh.	India.
20.10.2011	10:48	21.18°	70.48°	5.0	15.5	Junagadh,	USGS
	pm					Gujarat.	

Table.1. Magnitude with depth of Sasan Gir earthquake, Junagadh.

Geologically the major part of the area is covered by the Deccan Volcanics. The volcanic rocks are overlain at places by miliolitic limestone. The rocks are covered by thin veneer of soil. Different sets of lineaments / dykes trending N-S, NNW-SSE, NW-SE, NE-SW and E-W is present in the area. The affected area is bounded by two major faults aligned in NW-SE direction and NNE-SSW direction in western and eastern

margin of Saurashtra Region, respectively. Near epicenter mainly miliolitic limestone and alluviums are highly affected during the earthquake.

Mostly single storey small houses are located in and around the Sasan Gir area without proper designing. Most affected villages in the area are Ladudi, Haripur, Sandhbeda Nes, Jepur, Dhravawad, Devgam, Jalandhar, Khatrasa, Chitravad and Hiranvel. At all these places some of the poorly constructed houses developed fractures in the walls, roofs and some of the supporting pillars were also dislocated. Nowhere ground surface rupture has been observed.

On the basis of macroseismic survey, isoseismal map is prepared and meizoseismal area is demarcated. The meizoseismal area is of ellipsoidal in shape stretching about 17 km along a-axis and 13 km about b-axis. The a-axis is aligned in NE-SW direction. On the basis of field observation an isoseismal of Intensity VII is prepared and the epicenter is lying near chitravad village. The interrelationship of the local and major faults and lineaments with the ongoing seismic activity of the area can be established by carrying out detailed seismotectonic investigations in the region. As per BIS the Junagadh district falls in seismic zone-III, therefore civil engineering structures in the area are to be constructed considering seismic zoning, local geology and ongoing seismic activity.