

Deserted nineteenth century Paliwal villages around Jaisalmer, western Rajasthan, India: historical evidence of palaeoseismicity

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Seismicity or seismic susceptibility implies proneness to earthquake incidence in a region. For this we cannot depend entirely on instrumental records, because this facility was almost unknown about 70-odd years ago, whereas the ‘period of quiescence’ between two successive major earthquakes in a region may be hundreds of years and sometimes more. This places a severe constraint on the understanding of the regional variability of seismic susceptibility or the proneness of any particular region to the occurrence of an earthquake. In such cases, the necessity is to look for evidence of palaeoseismicity in historic/pre-historic and archaeological records, and for much older events the different fault features preserved in geomorphic features. Here we cite an incidence of seismic event based on the examination of a large number of deserted early nineteenth century houses scattered around Jaisalmer region in western Rajasthan, India. Lying unoccupied for about 190 years or more, evidence of destruction is observed in each and every house, which is not generally witnessed in disused old houses standing for hundred years or more. Looking into the nature of collapse-related flattening features such as collapsed roofs, fallen joists, lintels and pillars in all these houses, we suggest that these are manifestations of earthquake-related destruction. Such an assumption finds strong support from the observed evidence of recent tectonic activities and from the observed ground movements along several major faults in the region covering Jaisalmer and the adjoining areas.

Keywords: Deserted Paliwal villages, evidence of recent tectonics, earthquake related destruction, historical evidence of earthquake, palaeoseismicity.

THE vast stretch of desert land in western Rajasthan, India (also extending into Pakistan) not only stands testimony to extensive aridity in the region, but also forms a thick cover of sand hiding records of the geological past of the region. An important place in this stretch of arid country is the ancient town Jaisalmer in the Thar Desert. Apart from the rolling sand dunes and the exquisitely curved buildings and palaces, there is another feature

which allures people in general – the view of desolate houses in rows around Jaisalmer. These houses spread over 84 villages belonged to the Paliwal community who lived there in the late 13th century¹. Once a prosperous place, all these Paliwal villages now stand in ruins. It is difficult to attribute such a massive destruction to social compulsions that led to abandonment of villages by the community. While exploring the probable cause of ‘mass overnight evacuation’ from the abandoned villages by the community (the Paliwal Brahmins) without leaving any trace of their whereabouts, we preferred to look at the whole issue exploring different angles. We started with terrain evaluation by examining topographic maps and satellite imagery of the region. The most interesting feature we noted in the topo-maps was the presence of several settlements in the regions marked as ‘ruins’. Additionally, we could observe evidence of drainage disorganization in the form of abrupt changes in the course of



Figure 1. Part of the devastated village of Khabha near Jaisalmer, Rajasthan. Renovations are restricted to temple and ‘chhatra’ (canopy usually made to demarcate funerary sites). Rainwater has accumulated in the narrow depression in the background, which is a fault-bounded valley area (graben).



Figure 2. Google Earth imagery showing a general overview of destroyed houses near Kuldhra, Jaisalmer.

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Figure 3 a-d. Collapsed walls and scattered dressed stones along with evidences of fallen joists, lintels and pillars strewn inside the houses. Some collapsed houses turned into heaps of rubble.

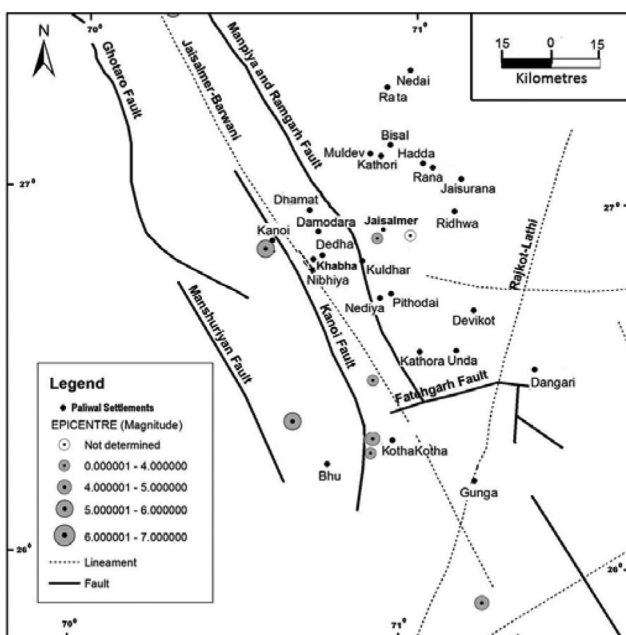


Figure 4. Seismotectonic map of Jaisalmer area, western Rajasthan showing faults, lineaments and earthquake epicentre locations³.

straight-running streams (though ephemeral in nature). We interpreted such geomorphic landscapes as fault-controlled features. Our interest in the region was enhanced when we saw some pictures of the deserted Paliwal villages. What struck us most was the destruction in all these ‘roofless’ houses which was similar to that recorded in the remains of Harappan cities like Mohenjo-Daro, Dholavira and Lothal² (Figures 1 and 2). This induced us to consider evidence of archaeoseismicity to match descriptions recorded in different parts of the world³⁻⁶.

Notwithstanding the popular stories describing mass evacuation from all the Paliwal villages, we could gather certain records which speak of a different tale about the desertion of the Paliwal community from the villages where they stayed for long. What drew our immediate attention were the rows of roofless houses testifying evidence of extensive destruction which cannot be ascribed to the normal processes of weathering and erosion in about a couple of hundred years (Figures 1 and 2). Lying unoccupied for about 190 years or more, evidence of destruction and devastation is visible in every house in these villages. The collapsed walls with scattered dressed



Figure 5. *a*, Waterlogged graben bounded by ENE-WSW trending horsts on either side. *b*, Flat-lying horst marked by narrow uplifted ridge separating the graben on the northwestern side.

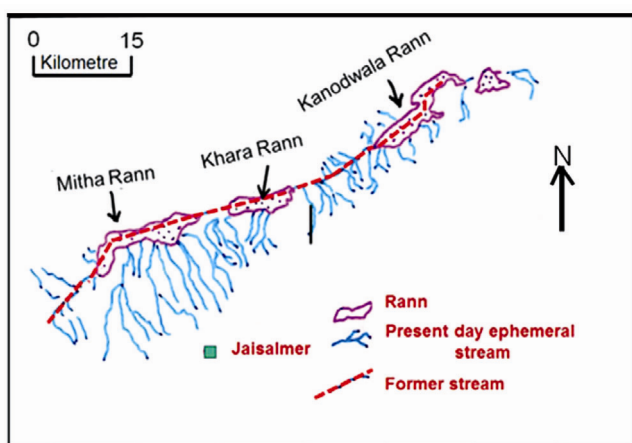


Figure 6. Rows of playa lake (Rann) formed due to segmentation of a stream⁹.



Figure 7. Three levels of terraced structure formed indicating gradual uplift of the Kuldhar village (on the left side).

stones along with evidence of fallen joists, lintels and pillars provide tell-tale evidence of devastation in all the houses (Figure 3). Some houses are damaged to such an extent that they look like rubbles of scattered stones. Destruction of such scale and complexity is generally not

witnessed in unoccupied old houses standing for hundred years or more.

The suggestion of earthquake-related destruction finds strong support from the evidence of recent tectonic activities and the observed ground movements along several major faults in the region covering Jaisalmer and the adjoining areas. To understand this, a seismotectonic map was compiled (Figure 4) on Arc GIS platform using the available data on faults, lineaments and earthquake epicentres (recorded between 1985 and 1991) from the published records of the Geological Survey of India⁷. On this map was superimposed the locations of some of the prominent Paliwal villages. This had been a revealing exercise as the map shows clustering of the Paliwal villages not only close to the active faults, but also close to the plotted epicentres. General country rocks in the region include different types of limestone of Jurassic age.

The major faults that pass through the area have NNW-SSE trend. Most of these faults are traceable through geomorphic features such as narrow, flat linear valleys (grabens) bounded between flat ridges (horsts). There are also several cross faults that trend in the ENE-WSW direction. One such is the Fatehgarh Fault that runs south of Jaisalmer⁴ (Figure 4). The geomorphology of the terrain is broadly controlled by the two major NNW-SSE trending faults: Kanoi Fault in the west and Manpiya Ramgarh Fault in the east⁸. A depression between the two faults marks a graben, which itself is segmented by a number of sub-parallel fault systems bounding horsts and grabens (Figure 5). Because of development of such fault systems, the major graben is dissected into a series of narrow (between 250 and 300 m wide) valleys (graben) separated by a narrow, elevated upland (horst). The ENE-WSW faults though not so prominent like major faults, appear to have effectively controlled the drainage pattern. The drainage disorganization, especially of the NE-SW trending ephemeral drainage systems in the Jaisalmer area turned them into saline lakes^{9,10} (Ranns) (Figure 6).

Apart from the segmentation of stream channels, the intersection of two sets of faults has also resulted in the formation of rhombic blocks of different sizes. Some Paliwal villages (Khabha and Kuldhar in particular) show successive terraced structure formed during the gradual subsidence (causing depression) or uplift (shallow uplands) in the individual blocks on the one side, with corresponding degree of uplift on the other. A classic example is seen on the eastern side of Kuldhar (Figure 7), where the village ends at the water body bounded on one side by a steep scarp surface.

Summarizing, apart from the clustering of epicentres in the Paliwal villages, the present-day geomorphic pattern also indicates earth movements in the recent past, all of which must have ensued earthquakes. In other words, the area around Jaisalmer may be considered a seismically susceptible belt because of the development of a number of active faults.

All the evidences mentioned above suggest that there cannot be any other cause for the massive evacuation of the Paliwal villages, other than the destruction due to the incidence of earthquake. Looking into the nature of collapse-related flattening features, we are of the firm opinion that this region must have experienced strong earthquakes of unknown intensity. The nature of destruction observed in the houses is comparable in scale and complexity to that witnessed in recent earthquake-affected areas like Latur (Maharashtra) and Bhuj (Gujarat). Though not recorded by any seismograph, it is possible to conclude that the earthquakes which affected the Jaisalmer area might not have been of very severe intensity to cause damage witnessed in the Paliwal houses. A general impression one gets from inspecting the houses is the poor quality of construction from an engineering point of view. Hardly any cementing material has been used in the construction of these structures. The brick-like blocks were placed one above other in constructing the walls. The roofs of the houses were covered by placing logs, which were held in place by small square/rectangular-shaped joists supported by narrow but heavy limestone pillars. Another point that needs clarification is about evacuation. There is no documented evidence that supports the theory of massive evacuation of the Paliwal community from the region. There are suggestions that the Paliwals emigrated through a tunnel unnoticed by anyone, which seems absurd. We may presume looking into the destruction caused by the collapsed walls with scattered dressed stones along with evidences of fallen joists, lintels and pillars in all the houses that the devastation, both of life and property, might have been quite substantial and virtually total. The survivors could have been only a few, who may have been badly injured. We can presume that only a few may have escaped the fatality. Since the event of destruction, nobody lived in these villages presumably because of the stories of mysterious deaths. Another point worth considering is that even

today the Paliwal community does not celebrate the auspicious event of 'rakshabandhan', as it falls on the day when the calamity occurred. Instead, they commemorate the tragic event as a black day.

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