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Tectonics

Sāfītā castle and rockfalls in the 'dead villages' of coastal Syria – an archaeoseismological study

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ABSTRACT

Sāfītā, a crusader fortification in Tartūs Governorate, coastal Syria, bears major damages of earthquake origin. The tower suffered heavy vibration, which produced fractures across the thick walls, widening the central portion of the building, and causing arch keystones to slide downwards. Apparently a ~north–south strong motion was responsible for the damages. Further north, at Khirbat al-Qurshiyya, an abandoned village from Late Antiquity, a quarry abounds with fallen blocks. These display displacement predominantly in a northerly direction, suggesting a north–south strong motion. 'Ayn-Qadīb, a small village in the Jabal Ansāriyya ranges, was damaged by a northward-directed rockfall. A contemporary letter testifies to the fact that Sāfītā donjon was heavily damaged by the AD 1202 earthquake. The Yammouneh Fault, which probably caused the damage, is only 50 km away further south.

1. Introduction

The Dead Sea Fault is the boundary between the Arabian plate and the Mediterranean plate, being a left-lateral strike-slip fault since the Neogene. Its displacement is several millimetres annually, enabling $M > 7$ earthquakes. A relatively moderate seismicity in Syria indicates that displacement occurs through major, but rare earthquakes. The millennium-long historical record of seismic events (Ambraseys, 2009; Guidoboni and Comastri, 2005; Sbeinati et al., 2005) has been lengthened by extensive archaeoseismological studies, mostly in Israel (e.g., Amit et al., 2009; Ellenblum et al., 1998; Karcz and Kafri, 1978; Karcz et al., 1977; Korjenkov and Erickson-Gini, 2003; Korjenkov and Mazor, 1999a,b, 2003, 2005, 2013; Marco, 2008; Marco et al., 1997, 2003; Wechsler et al., 2009; Yagoda-Biran and Hatzor, 2010), and less in the West Bank (Alfonsi et al., 2013; Karcz and Kafri, 1981), in Jordan (Al-Tarazi and Korjenkov, 2007; Haynes et al., 2006; Niemi, 2009), in Lebanon (Daëron et al., 2005; Elias et al., 2007), and in Turkey (Altunel et al., 2009; Benjelloun et al., 2015). The number of studies along the 300-km-long Syrian sector is still meagre (Karakhanian et al., 2008; Kázmér and Major, 2010; Meghraoui et al., 2003; Sbeinati et al., 2010).

During the spring fieldwork season of 2010, we visited the town of Sāfītā, and the abandoned Late Antiquity village sites of Khirbat al-Qurshiyya, and 'Ayn-Qadīb, in the Jabal Ansāriyya. We identified and surveyed various damages and failures visible on buildings, and also detected rockfalls. Some of those attributable to earthquakes are described, illustrated, and explained here. Surveying instruments included a Leica Disto D8 laser distance metre, compass, and clinometre. We provide new data on these localities, which preserved evidence of earthquake damage and directionality of strong motion.

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1.1. Archaeoseismology

The instrumental record of seismic activity is less than hundred years old, while the recurrence of major earthquakes is measured on a centennial-to-millennial scale. Archaeoseismology aims at extending this record throughout the period of man-made structures. Ancient buildings bearing particular features of damages provide evidence of past earthquakes. Prime examples are the distance and time of repeated displacement of constructions across faults (on-fault studies) (Altunel et al., 2009; Ellenblum et al., 1998; Marco et al., 1997; Meghraoui et al., 2003; Passchier et al., 2013; Sbeinati et al., 2010), study of off-fault damages for the identification and assessment of displacement along the causative fault (e.g., Monaco and Tortorici, 2004), directionality of liquefaction-induced tilting in pagodas (e.g., Kázmér et al., 2011), and directionality of strong motion (e.g., Kázmér and Major, 2010; Korjenkov and Mazor, 2013). A comprehensive system of earthquake archaeological effects is available (Rodríguez-Pascua et al., 2011), allowing rapid correlation of observed damages with macroseismic scales (Rodríguez-Pascua et al., 2013).

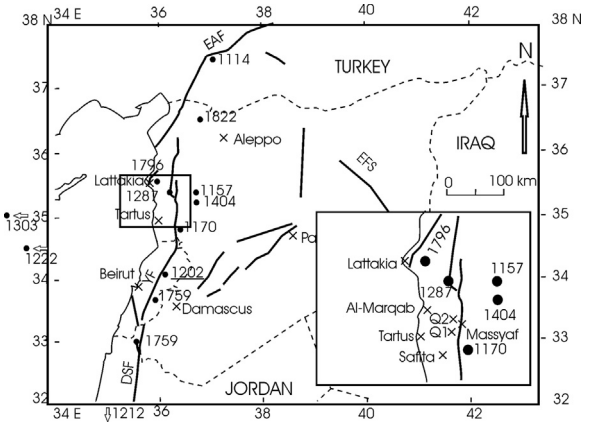

Fig. 1. Location of studied sites in coastal Syria. Major historical earthquakes are centred along left-lateral strike-slip faults ranging from the Dead Sea Fault in the south to the East Anatolian Fault in the north (after Sbeinati et al., 2005, modified). The epicentre of the 1202 earthquake is underlined. The epicentres of the events of 1212, 1222, and 1303 are out of the map in Jordan, Cyprus, and Crete, respectively. Q1: Khirbat al-Qurshiya; Q2: 'Ayn-Qadīb; DSF: Dead Sea Fault system; YF: Yammouneh Fault; EAF: East Anatolian Fault system; EFS: Euphrates Fault system. Epicentre locations are from Ambraseys (2009, electronic supplement).

2. Results

2.1. Sāfītā

The tower (donjon, keep), built of whitish Cretaceous limestone (Arabic: Burj Sāfītā, Sāfīthā, French Chastel Blanc, Latin Castrum Album), is today in the centre and highest point of Sāfītā town (34° 49′ 14.7″ N, 36° 07′ 02″ E, 374 m a.s.l.). It stands on compact Cretaceous limestone beds. Sāfītā is on the southern flanks of the Jabal Ansāriyya Range, halfway between Tartūs and the well-known castle of the Crac des Chevaliers. It overlooks the vital lowland, the Gap of Homs, which connects the interior part of Syria to the Mediterranean coast (Major, 1998: 221–222) (Fig. 1).

The central part of the castle is comprised of the enormous rectangular donjon and the scanty remains of an inner enclosure. This is encircled by a huge outer enclosure with flanking towers and the remains of a great hall on two levels. The donjon covering an area of 31.2 × 18 m and being 28 m in height is an example of a so-called *église-donjon*, a tower with a significant part of it occupied by a chapel (Kennedy, 1994: 138–141) (Fig. 2a). The chapel is situated on the ground floor. One enters the western gateway straight into the church. The barrel vault of the nave is divided into three sections by two arches that rise from pilasters in the side walls. The apse at the eastern end is flanked by two sacristies built into the massive walls on both sides. There are only five windows (really firing slits) in the 3-m-thick masonry (Fig. 2c).

The staircase built into the thickness of the southern walls brings the visitor to the upper floor. The hall on this floor has three central cruciform pillars, which divide the room into two parts, each with four bays comprised of cross-groined arches (Fig. 2e). From each bay, a loophole with an arrow slit looks over the countryside. Another staircase leads to the terrace, which is a flat roof. The parapet consists of alternating loopholes and crenulations. Also intended as a last point of refuge, the donjon had its own rock cut cistern beneath. The chapel in the donjon still serves as the main Greek Orthodox church of the town, dedicated to Saint Michael.

2.1.1. History

Sāfītā boasts with the highest surviving donjon of the Holy Land. Making its first appearance in the written sources of the 12th century, nothing is known about its early history. However, the first certain mention of the site was in 1112, when the area of the Gap of Homs, conquered by the Crusaders around 1109, was handed over by Tancred, lord of Antioch, to Pons, the count of Tripoli (Ibn al-Qalānisī, *Dzayl*, 163; trans. 89). We do not have any certain data on the origins of the fortifications in Sāfītā, but whatever survived above ground clearly dates from the Crusader period on stylistic bases. The castle was one of the earliest possessions of the Order of the Temple in the Syrian coast, who might have acquired it as early as 1152, but in any case, it was certainly in Templar possession by 1155 (Piana, 2008: 295). Lying on the strategic route between the coast and the Syrian interior, the site had a rather troubled history under Crusader domination. In H. 562 (1166/67), it was sacked by the army of Sultan Nūr al-Dīn (Ibn al-Athīr, *al-Kāmil*, IX/330) and was captured and destroyed by the same ruler again in H. 567 (1171/72) (Ibn al-Athīr, *al-Ta'rīkh al-Bāhir*, 154) (Raphael, 2010). The great northern campaign of Sultan Saladin in 1188 and his brief raids against Sāfītā are unlikely to have had much effect on the fortress (Ibn al-Athīr, *al-Kāmil*, X/48), but it withstood a serious assault in 1218, when the army of al-Malik al-Ashraf took and destroyed its suburb (Ibn Wāsil, *Mufarrij*, III/265). According to a Latin source,