



Evidence of historical seismic surface ruptures along the Sahel fault (Algeria) from paleoseismological investigations

Aicha Heddar, Christine Authemayou, Abdelkarim Yelles, Hamou Djellit, Jacques Déverchère, Azzedine Boudiaf, Brigitte Van Vliet-Lanoë, and Sofiane Gharbi

Centre de Recherche en Astronomie, Astrophysique et Géophysique (CRAAG), Etudes et Surveillance Sismique, Algiers, Algeria (a.heddar@hotmail.fr)

Abstract

The Sahel ridge, located west of Algiers is a part of the Tellian Atlas (northern Algeria) domain which is formed by subsiding basins, fold and thrust geological structures stretching from East to West on the southern shore of the Mediterranean Sea. This area is characterized by an active tectonic attested by an important seismicity. Among these active structures, the Sahel anticline is considered as an ENE-WSW fault-propagation fold associated with a north-west dipping thrust. Its proximity with the urbanized zone of Algiers makes this structure a potential source of destructive earthquakes that could hit the capital city. The Algerian seismic catalog mentions that the region of Algiers has experienced in the historical period several moderate to large damaging earthquakes particularly those which occurred on 1365 A.D and 1716 A.D causing many deaths and damages in the city of Algiers. Even if, it was observed that sometimes events are followed by a large sequence of aftershocks suggesting high magnitudes, no surface faulting has been observed in the region and no event has been associated with a specific structure. We proceed to the first paleoseismologic investigation on the Sahel ridge in the purpose to detect paleo-ruptures related to active faulting and to date them in an attempt to complement the seismologic catalog of the region and to attribute known historical seismic events to the Sahel structure activity. From our first investigations in the area, a first trench was excavated across bending-moment normal faults induced by flexural slip folding in the hanging wall of the Sahel anticline thrust ramp. Paleoseismological analyses evidence eight rupture events affecting colluvial deposits. ¹⁴C dating indicates that these events are very young, six of them being younger than 778 A.D. The first sedimentary record indicates two ruptures before 1211 A.D., i.e. older than the first historical earthquake documented in the region. Three events have age range compatible with the 1365, 1673 and 1716 Algiers earthquakes. Three rupture events are very recent, younger than 1700 A.D.

Key words: Algeria, Sahel, paleoseismology, trench, rupture event, historical earthquake.