RMSI

Morocco M6.8 Earthquake Impact Summary

September 09, 2023

The September 8, 2023, 6.8 Mw earthquake near Oukaïmedene, Morocco (Figure-1), occurred due to reverse faulting at shallow depth within the Moroccan High Atlas Mountain range, roughly 75 km southeast of Marrakech. Earthquakes of this size in the region are uncommon but not unexpected. Compared to other Mediterranean countries (Algeria, Italy, Greece, Turkey, etc.), Morocco is affected by moderate seismic activity primarily related to the convergence between Africa and Eurasia. However, every year, there are earthquakes felt by the population and, in some cases, cause local damage. The memories of the Agadir catastrophic earthquake, with 12,000 deaths, and Al Hoceima, with 629 victims,[1] are still fresh in the memories of Moroccans.

The epicenters of these major events are shown in the seismotectonic map in Figure 1. The current event epicenter was located between the North and South Atlas faults. Till now, there has been only one aftershock of this earthquake. The map also includes the historical earthquakes since 1900. A quick map analysis suggests that since 1900, one Mw 7 and eight Mw 6 earthquakes occurred within 500 km of this earthquake, and 12 Mw 5 and larger earthquakes occurred within 500 km of the current earthquake's epicenter (Figure 2). All of these earthquakes occurred along the northern part of Morocco.

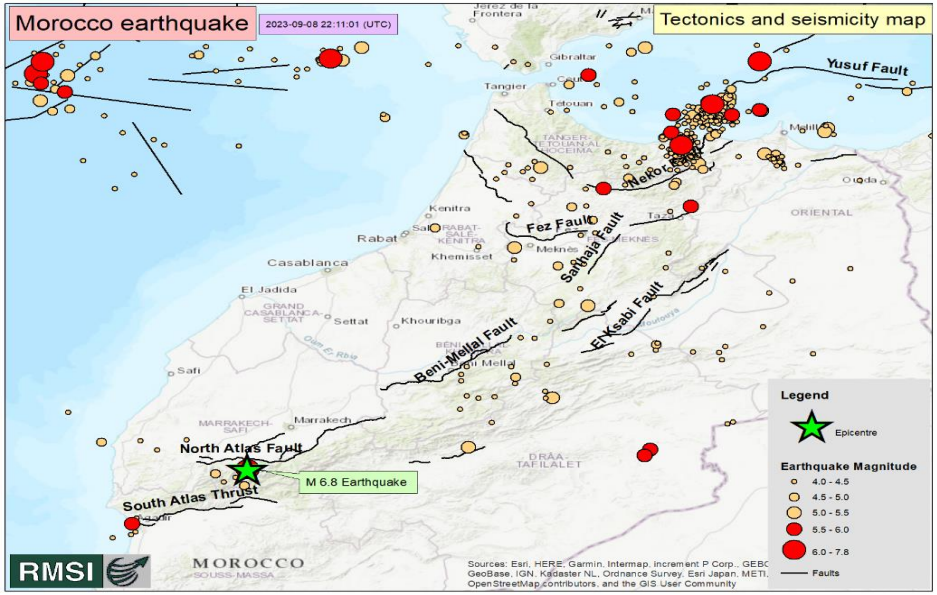

Figure 1: Epicentre of current earthquake and major earthquakes of > 5.5 Magnitude

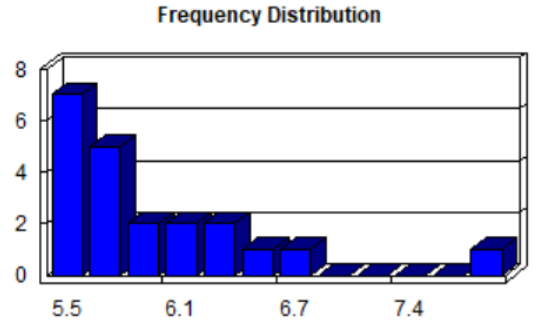

Figure 2: Magnitude-frequency distribution of major earthquakes in Morocco region

[1] Cherkaoui, T., & EL HASSANI, A. (2012). Seismicity and Seismic Hazard in Morocco 1901-2010. Retrieved December 2, 2018.

Past Earthquakes in Morocco

- The last major earthquake that struck Morocco occurred in 2004; a Mw 6.3 earthquake killed more than 600 people. That temblor, the Al-Hoceima earthquake, was positioned on an active plate boundary on the country's northernmost coast bordering the western Mediterranean Sea.
- In 1960, the Agadir region was hit by a 5.8 Mw earthquake, causing more than 10,000 deaths with extreme damage.
- So far, the Morocco region has experienced around 21 earthquakes with moderate to strong magnitude (Mw>5.5).

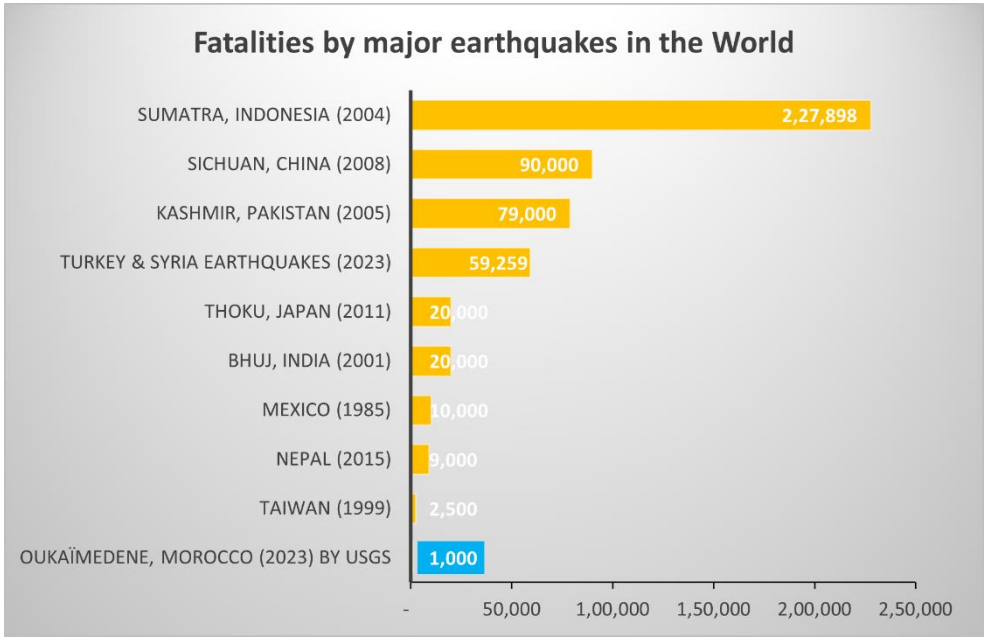

Figure 3: Fatalities by major earthquakes in the world

On a global scale, this event could potentially rank as one of the most fatal earthquakes as the death toll has already crossed more than 1,000, which is likely to increase further as rescue work is in its early stage. Classifying where this earthquake would rank on a scale of economic loss is challenging. However, Figure 4 depicts the top economic loss causing earthquakes in the world so far.

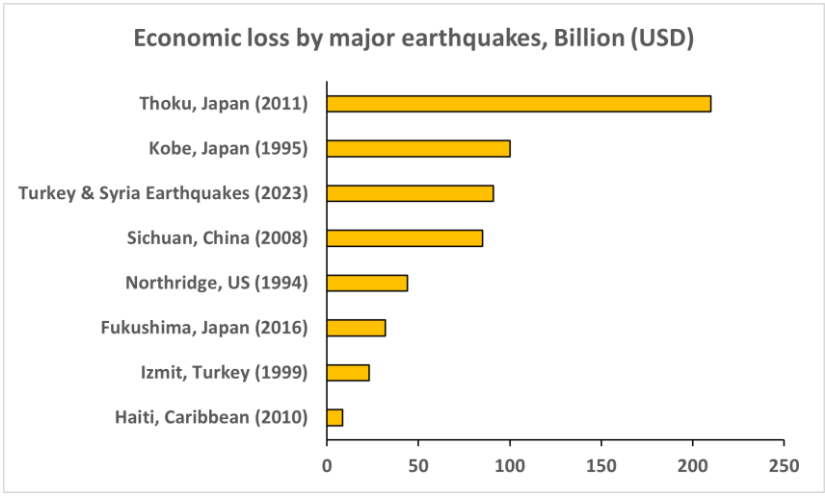

Figure 4: Economic Loss by Major Earthquakes

Impact Summary by RMSI

- Moderate destruction was caused due to this event occurring at shallow depths due to large ground shaking. According to government sources, the death toll from this earthquake has risen to more than 1,000
- The ministry also recorded deaths in Ouarzazate, Chichaoua, Azilal, Youssoufia provinces, Marrakesh, Agadir, and Casablanca. Reports show 1,200 more are injured, and the death toll is expected to rise.

To understand the impact of this event, RMSI has prepared an intensity map of the earthquake, which represents the physical damage of the event. The intensity map depicts the measure of the ground shaking caused by the quake; the higher the shaking, the more potential for damage.

The areas along the epicenter have experienced an impact that can be categorized into the ‘severe to very strong’ category (Figure 5). The severe quake damaged buildings from the historic city of Marrakech to villages in the Atlas Mountains. In Marrakech, most damage was in the old city area as the buildings are prone to collapse due to their fragile state.

*Please stay tuned for our next advisory on the Morocco Earthquake; it will contain insights into the economic losses resulting from this event.

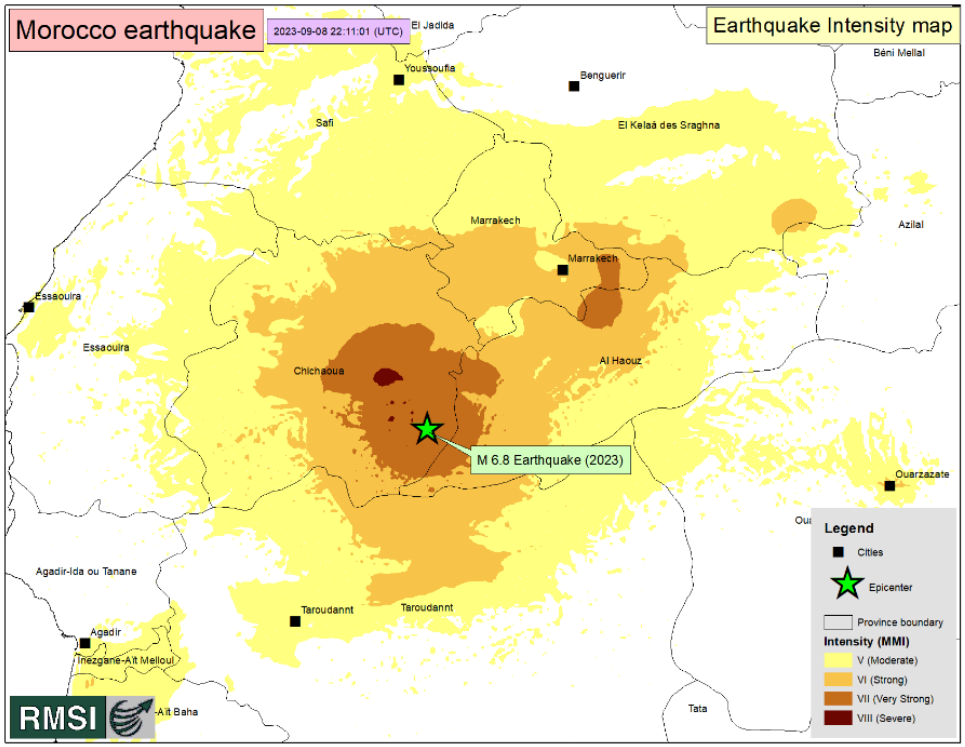

Figure 5: Intensity map of the earthquake