Seber, D., Barazangi, M., Tadili, B., Ramdani, M., Ibenbrahim, A., Ben Sari, D., and El Alami, S. O., *Sn to Sg conversion and focusing along the Atlantic margin, Morocco: Implications for earthquake hazard evaluation*. Geophysical Research Letters, 20, 1503-1506, 1993.

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Abstract:

Digital data from a telemetered, short-period seismic network in Morocco provide a new perspective for understanding the cause of severe shaking and macroseismic reports in Morocco produced by large, offshore earthquakes located along the Azores-Gibraltar seismic zone. Even though the earthquake epicenters are 500-1000 km away from the Moroccan coast, historical records show that such events are capable of producing considerable damage in inland areas. We analyze 15 earthquakes that occurred in this region. The records show multiple S phases with varying frequencies and amplitudes. The S phase with the largest amplitude, usually misinterpreted as Sn, has a phase velocity of 4.2-4.4 km/s. We show that these S arrivals can best be explained as Sn to Sg converted phases. Calculated locations of the conversion points for these phases exhibit two distinct zones almost parallel to the Atlantic coastline: one is located along the passive continental margin and the other is located about 100 km inland from the coastline. We interpret these two zones to be regions where a sudden change in crustal thickness occurs. Such zones act to focus and magnify the amplitudes of seismic phases. This interpretation explains the unusually strong felt reports within Morocco from such distant offshore events, and it has a significant effect on earthquake hazard evaluation and mitigation studies.

Figure 5. A proposed conceptual model for the regional phase propagation across the Moroccan continental margin. This model explains the low-velocity S phases, and two zones of refraction locations with caustic points capable of generating high amplitude phases, as well as weak Sn arrivals.