The ML = 6.8 25 October 2018 Earthquake Zakynthos Island (Ionian Sea) and the evolution of the aftershock sequence one year later

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The area of Zakynthos (Ionian Island) is located at a complex plate boundary region where two tectonic plates (Africa-Nubia and Eurasia) converge, thus forming the western Hellenic Arc. On the midnight of 26th October ($M_L = 6.6$, 22:54:49 UTC) a very strong earthquake has struck at the eastern part of Zakynthos Island (Ionian Sea, Western Greece). Epicentral coordinates of the earthquake was determined as 37.3410° N, 20.5123° E and a focal depth at 10 km, according to the manual solution of National Observatory of Athens (http://bbnet.gein.noa.gr/alerts_manual/2018/10/evman181025225449_info.html).

This earthquake was strongly felt at the biggest shock was felt as far afield as Naples in western Italy, and in Albania, Libya, and the capital Athens. Nobody was injured by these events but there was significant damage to the local port and a 13th Century island monastery south of Zakynthos.

A few minutes later (23:09:20, UTC) a second intermediate earthquake with magnitude $M_L=5.1$ was followed the first event. The $M5+$ events of 25 October 2019, as well as the rich aftershock sequence of 10.000+ events with magnitudes 1.0<$M_L<$4.9 of the 12 following months have been relocated using the double – difference algorithm HYPODD.

For the aftershocks with $3.7<M_L<6.6$ we applied the moment tensor inversion to determine the activation of the faulting type, the Seismic Moment ($M_0$) and the Moment Magnitude ($M_w$). For this purpose, 3-component broadband seismological data from the Hellenic Unified Seismological Network (HUSN) at epicentral distances less than 3˚ were selected and analyzed. The preparation of the data, includes the deconvolution of instrument response, following the velocity was integrated to displacement and finally the horizontal components rotated to radial and transverse. All the focal mechanisms were compared with those from other institutes and they are in agreement. The second part of this study refers to the calculation of the stress tensor using the STRESSINVERSE package by Václav Vavryčuk. The final part of this study includes an extensive kinematic analysis of geodetic data from local GNSS permanent station to further examine the dynamic displacement.

References: