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Fast characterization of moment magnitude and focal mechanism in the context of tsunami warning in the NEAM region : W-phase and PDFM2 algorithms.

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Over past centuries, several large earthquakes (Mw $\geq$ 7.5) have been reported in the North East Atlantic and Mediterranenan sea (NEAM) region. Most of the tsunami potential seismic sources in the NEAM region, however, are in a magnitude range of 6.5 $\leq$ Mw $\leq$ 7.5 (e.g. tsunami triggered by the earthquake of Boumerdes in 2003 of Mw = 6.9). The CENALT (CENtre d'ALerte aux Tsunamis) in operation since 2012 as the French National Tsunami Warning Centre (NTWC) and Candidate Tsunami Service Provider (CTSP) has to issue warning messages within 15 minutes of the earthquake origin time. The warning level is currently based on a decision matrix depending on the magnitude, and the location of the hypocenter. Two seismic source inversion methods are implemented at CENALT: the W-phase algorithm, based on the so-called W-phase and PDFM2 algorithm , based on the surface waves and first P wave motions. They both give accurate moment magnitude and focal magnitude respectively in 10 min and 20 min. The results of the Mw magnitude, focal depth and type of fault (reverse, normal, strike-slip) are the most relevant parameters used to issue tsunami warnings. In this context, we assess the W-phase and PDFM2 methods with 29 events of magnitude Mw $\geq$ 5.8 for the period 2010-2015 in the NEAM region. Results with 10 and 20 min for the W-phase algorithm and with 20 and 30 min for the PDFM2 algorithm are compared to the Global Centroid Moment Tensor catalog. The W-phase and PDFM2 methods gives accurate results respectively in 10 min and 20 min.

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