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Relate the earthquake parameters to the maximum tsunami runup

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Considering the 1 September 1992 Nicaraguan tsunami manifested itself with an initial shoreline recession, there was paradigm shift from solitary wave to an N-wave (Tadepalli and Synolakis, 1994, Proc. R. Soc. A: Math. Phys. Eng. Sci., 445, 99-112) to define the initial waveform of tsunamis (Kanoglu et al., 2015, Phil. Trans. R. Soc. A, 373: 20140369). The N-wave initial waveform shows specific features, which might enhance maximum runup at a target coastline. Tadepalli & Synolakis (1994) showed that the leading depression N-wave (LEN) run up higher than its mirror image, the leading elevation N-wave (LEN). Later, Kanoglu et al. (2013, Proc. R. Soc. A: Math. Phys. Eng. Sci., 469, 20130015) considered two-dimensional propagation of a finite crest length N-wave over a flat bottom and showed that focusing effect of an N-wave in the direction of leading depression, which enhance the runup. Recently, Kanoglu (2016, EGU Abstract)'s preliminary results suggest that later waves could be higher on the leading depression side for an N-wave, i.e. sequencing defined by Okal and Synolakis (2016, Geophys. J. Int. 204, 719-735) is more pronounced on the leading depression side.

Here, we consider submarine earthquakes and estimate the initial ocean surface profiles through Okada's formulation (1985, Bull. Seismol. Soc. Am. 75, 1135-1040). We parameterize earthquake source parameters, such as the length and the width of the fault, the focal depth, the rake (slip) and the dip angles, and the slip amount. Then, we relate ocean surface profiles calculated through Okada (1985) to the generalized N-wave profile defined by Tadepalli and Synolakis (1994) and identify N-wave parameters. Since, for an N-wave type initial condition, Tadepalli and Synolakis (1994) presented maximum runup for a canonical problem –wave propagating over a constant depth segment first and then over a sloping beach– and Kanoglu (2004, J. Fluid Mech., 513, 363-372) for a sloping beach their results allow us to relate earthquake parameters to the maximum runup. Further, we also present the effect of earthquake parameters on the focusing phenomena, which is introduced by Kanoglu et al. (2013).

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