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Is the debate on the sources of large historical tsunamigenic earthquakes along the Italian coasts closed? The tsunami research point of view

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We present a review on the research regarding the possible sources of the largest historical tsunamis hitting the Italian coasts and following large magnitude earthquakes. Although it is known that tsunamis are rather rare events, especially when compared to earthquakes, we emphasize that 6 out of 10 earthquakes occurred in the last thousand years in Italy, and having equivalent moment magnitude equal or larger than 7 where accompanied by destructive or heavily damaging tsunamis: the percentage is still significant (around 40%) if we extend the lower limit of the equivalent moment magnitude down to 6.5. The most famous of these events are those occurred on 30 July 1627 in Gargano, on 11 January 1693 in eastern Sicily, and on 28 December 1908 in the Messina Straits. Maximum run-ups in the order of 10 m, significant maximum inundation distances, and large (although not precisely quantifiable) numbers of victims are reported, or can be deduced from coeval sources. Analyses carried out on paleo-tsunami deposits in the impacted regions and published over the last decade help to better characterise the tsunami impact, confirming that none of the cited events can be reduced to local or secondary effects. Hence, we point out the importance of including a proper analysis and simulation of tsunami data in the approach to a correct definition of the sources responsible for the largest Italian tsunamigenic earthquakes. Unfortunately, this is not the usual practice, as macroseismic, seismic and geological/geomorphological observations and data typically are assigned much heavier weights; one of the consequences is that in-land faults are often assigned larger credit than the offshore ones, and the tsunami generation is imputed a-priori to only supposed, and sometimes even non-existing, submarine landslides. We try to summarise the tsunami research point of view on the largest Italian historical tsunamigenic earthquakes, having in mind that the different datasets analysed by different disciplines must be reconciled rather than put into contrast with each other: we highlight the open problems, trying to suggest the possible answers that tsunami observations and simulations can contribute towards their solution.
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