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Tsunami vulnerability along the western Bulgarian Black Sea coast - from the historical review towards multidisciplinary assessment approach

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Over the last two decades, in line with the global trend of expanding research into natural hazards and disaster risk reduction, the tsunami hazard and risk assessment along the coast of Europe has become a hot topic of research. In all its aspects, tsunami research includes the study of tsunami documentary evidence, historical data collection, field experiments, laboratory research, theoretical numerical and analytical modelling, and in-depth analysis of recent tsunami events. Tsunami modelling research methodologies and holistic approaches to risk assessment are continually being improved. Researches are directed to develop conventional standardised methods to analyse tsunami hazard and risk with associated uncertainties, aiming to reduce possible adverse effects on potentially vulnerable coastal settlements, coastal and marine infrastructures and natural ecosystems.

In the Black Sea, dangerous tsunami waves are a relatively rare phenomenon that cannot be forecast. Multidisciplinary studies focused on mapping and dating past events on the Black Sea coast, determining the causes, frequency of recurrence, and current prospects for tsunamis occurrence (risk) are not yet fully clarified or are in their infancy. Moreover, tsunami hazard along the Bulgarian coast is poorly understood and not considered in the National methodology for flood hazards and risk in the coastal zone. Numerical tsunami modelling performed in recent years for the region still needs to be improved. These events are relatively rare, few such cases have been documented, and validation data are scarce or missing.

This study provides a comprehensive inventory of tsunami sources from scientific publications, model studies of tsunami generated waves carried out during the recent years and an analysis of the results from recently established early warning systems in the Black Sea region. For the Bulgarian coastal zone, the results of studies of active faults with tsunamigenic potential in and around vulnerable coastal zones, available registrations at sea level during seismic events and some extreme meteorological events for the last century are summarized. A near-field and far-field tsunami sources that can generate tsunamis and affect the Bulgarian coastline are briefly reviewed. High-resolution data are needed for more credible tsunami numerical modelling for the western Black Sea region. Preliminary studies of the available datasets regarding Digital Elevation

Model (DEM) and bathymetry for specific locations along the coastal zone are presented as well the needed accuracy and completeness of the data. Some consideration regarding the available and newly establish research infrastructure in the western Black Sea are also discussed.

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