Submarine slumping and tsunami generation in the Indus Canyon, NW Indian Ocean

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The submarine canyon of the Indus River in the North Indian Ocean spreads for a length larger than 185 km and constitutes one of the most prominent channel-levee systems in the region. Past bathymetric surveys have identified plethora of evidence that exhibit submarine slumping on the slopes of the Indus Canyon. In this study, we use recent high-resolution bathymetric data to examine and recompile past events on the slopes of the canyon. Potentially submarine landslides in this area pose threats to coastal communities in Pakistan and India. The aim is to assess any potential hazard that might arise in the future from similar slump episodes. The characteristics of the slumps are incorporated in empirical formulas to estimate the potential initial water surface elevation. Varying scenarios are computed based on the landslide dimensions obtained from available marine seismic profiles. The input parameters of each episode are carefully selected depending on the slope morphology and with the aid of state-of-the-art sampling. Dispersive tsunami modelling is performed for the study of the propagating tsunami waves. A stochastic surrogate of the numerical model is then built and provides with predictive distributions of the tsunami amplitudes that might impact the adjacent coastlines.