



Multiple source modelling the 28 September Sulawesi tsunami – earthquake and landslide sources

Finn Løvholt (1), Haider Hasan (2), Fabrizio Romano (3), Stefano Lorito (3), Beatriz Brizuela (3), Piatanesi Alessio (3), and Geir Pedersen (4)

(1) NGI, Computational Geomechanics, Oslo, Norway (finn.lovholt@ngi.no), (2) NED University of Engineering & Technology, Karachi, Pakistan, (3) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy, (4) University of Oslo, Department of Mathematics

Just a few minutes following the Mw 7.5 earthquake striking Sulawesi Island, a powerful tsunami hit the city of Palu and surroundings, causing large material damage and numerous fatalities. The earthquake exhibited a strike slip focal mechanism, and initiated different landslides causing local short period tsunamis, evident from several recorded footages. At the same time, the available tide gauge of Pantoloan in Palu Bay shows evidence for a wave with a period of at least 2-3 minutes. Field studies of the tsunami inundation show tsunami maximum inundation heights of 5-10 m inside the bay, whereas the inundation is smaller outside the bay. Footages of waves with periods of several minutes are also available from the web. Together, this indicates a larger tsunami source than the individual smaller slides that can be seen in the video recordings. Moreover, the clear polarity in the tide gauge record put a possible constraint on the source mechanism. We have carried out a multiple source modelling study investigating: (1) A broad set of landslide unit sources distributed across Palu Bay. These sources were modelled using the landslide software BingClaw, and coupled to the GeoClaw software for tsunami propagation and inundation. (2) Earthquake sources simulated using Tsunami-HySEA compliant with main tectonic structures and observed surface displacements. In all cases compliance with observations are discussed. We find that the earthquake source provides a signal roughly in agreement with observations, whereas it is more difficult to describe observations with a single landslides. In addition the possibility of combinations of an earthquake source with one of more landslides are discussed.