The 22 December 2018 Sunda Strait Tsunami:
Analysis from Field Observation Data, Spectral Analysis, Physical- and Numerical-Model

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Outline

- Overview of Disaster
- Field observation
- Spectral Analysis
- Numerical Model
- Summary

Main references

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The December 2018 Anak Krakatau Volcano Tsunami as Inferred from Post-Tsunami Field Surveys and Spectral Analysis

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Numerical modeling of the subaerial landslide source of the 22 December 2018 Anak Krakatoa volcanic tsunami, Indonesia

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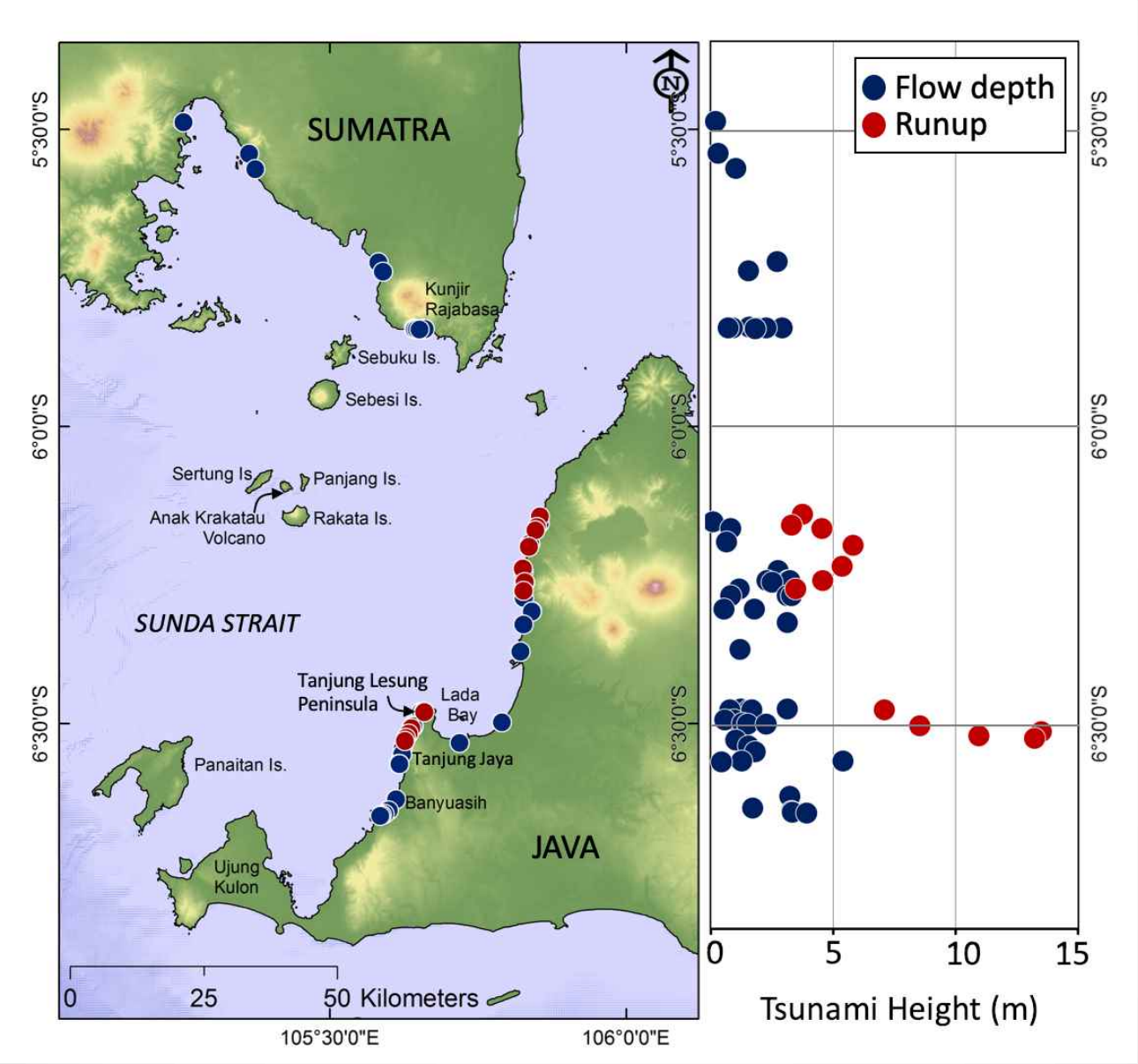
1. Overview of Disaster

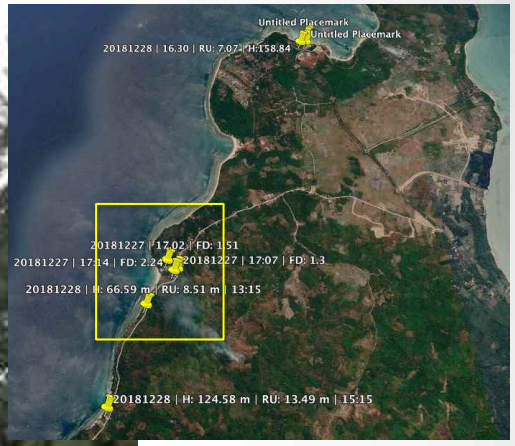
Different types of damages



2. Field Observation Data

25 – 28 Dec 2018 | Post tsunami survey (in land survey)

Highlighted features | Maximum inundation height | 13.49m



2. Field Observation Data

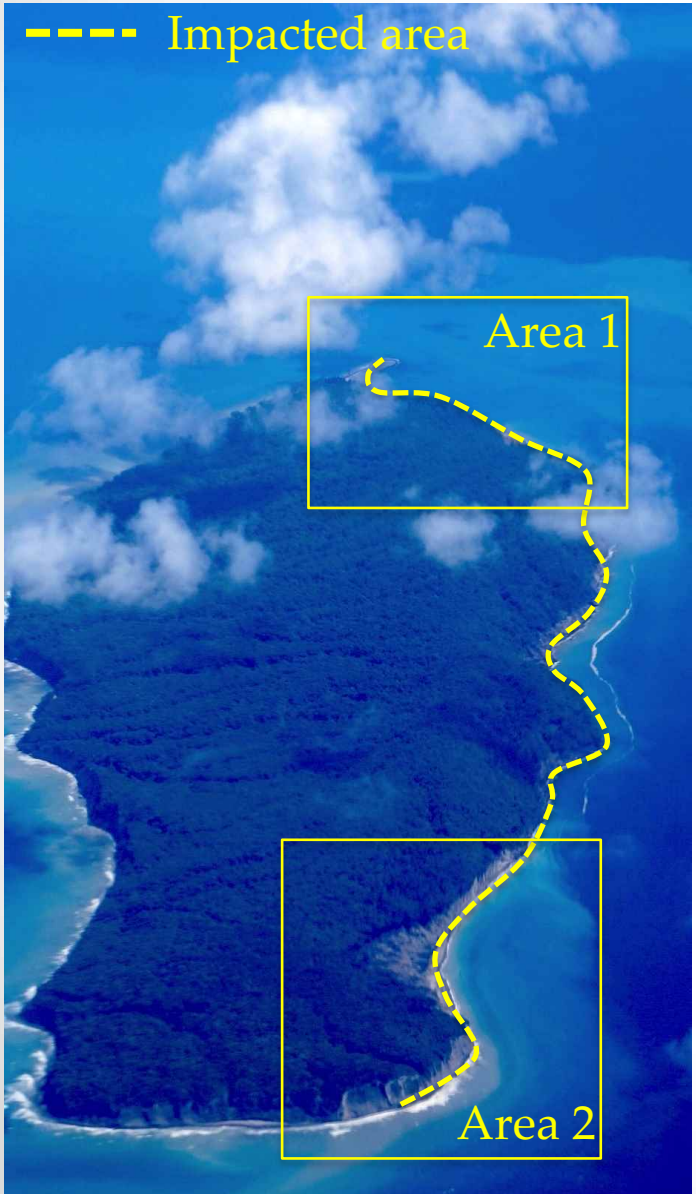
25 – 28 Dec 2018 | Post tsunami survey (in land survey)

Highlighted features | Boulder transport

At the location where:
Run up max: 10.49m
Inundation distance: 159.42m

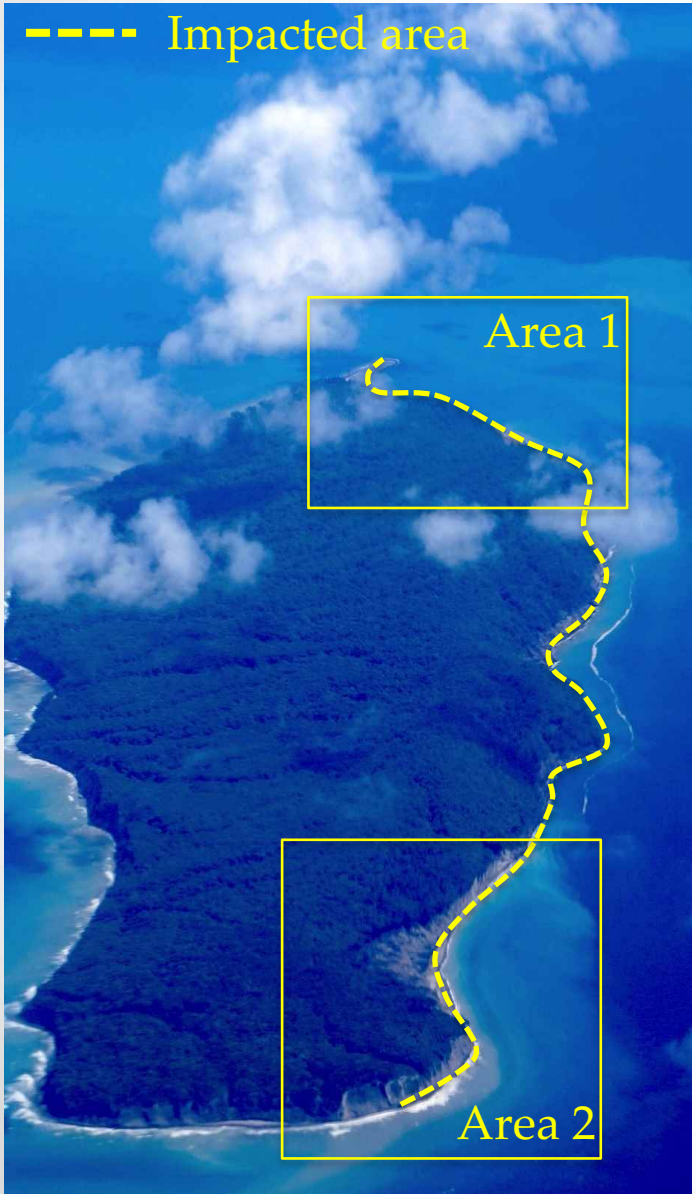
2. Field Observation Data

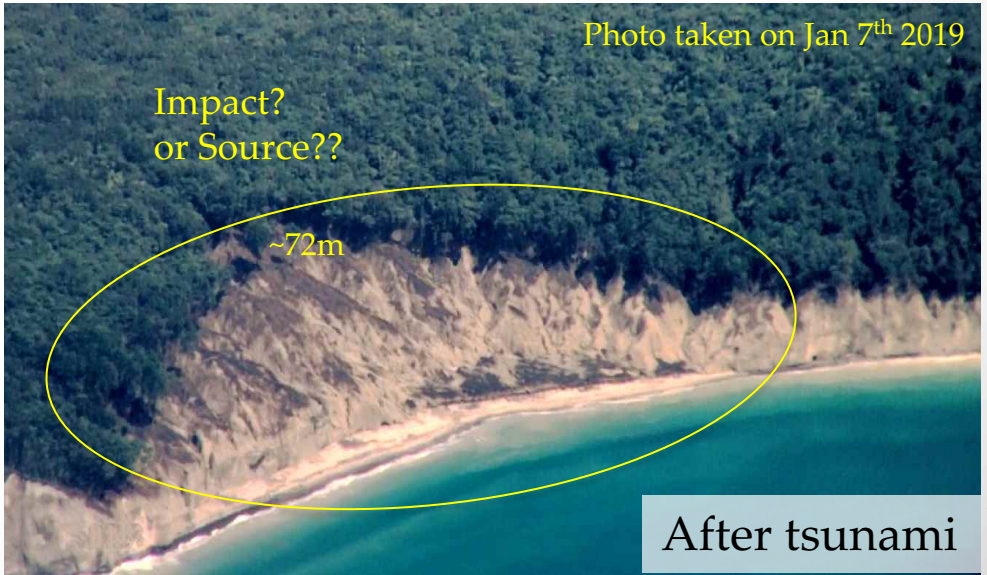
29 Dec 2018 – 7 Jan 2019 | Airborne survey | Sertung Island | Area 1



2. Field Observation Data

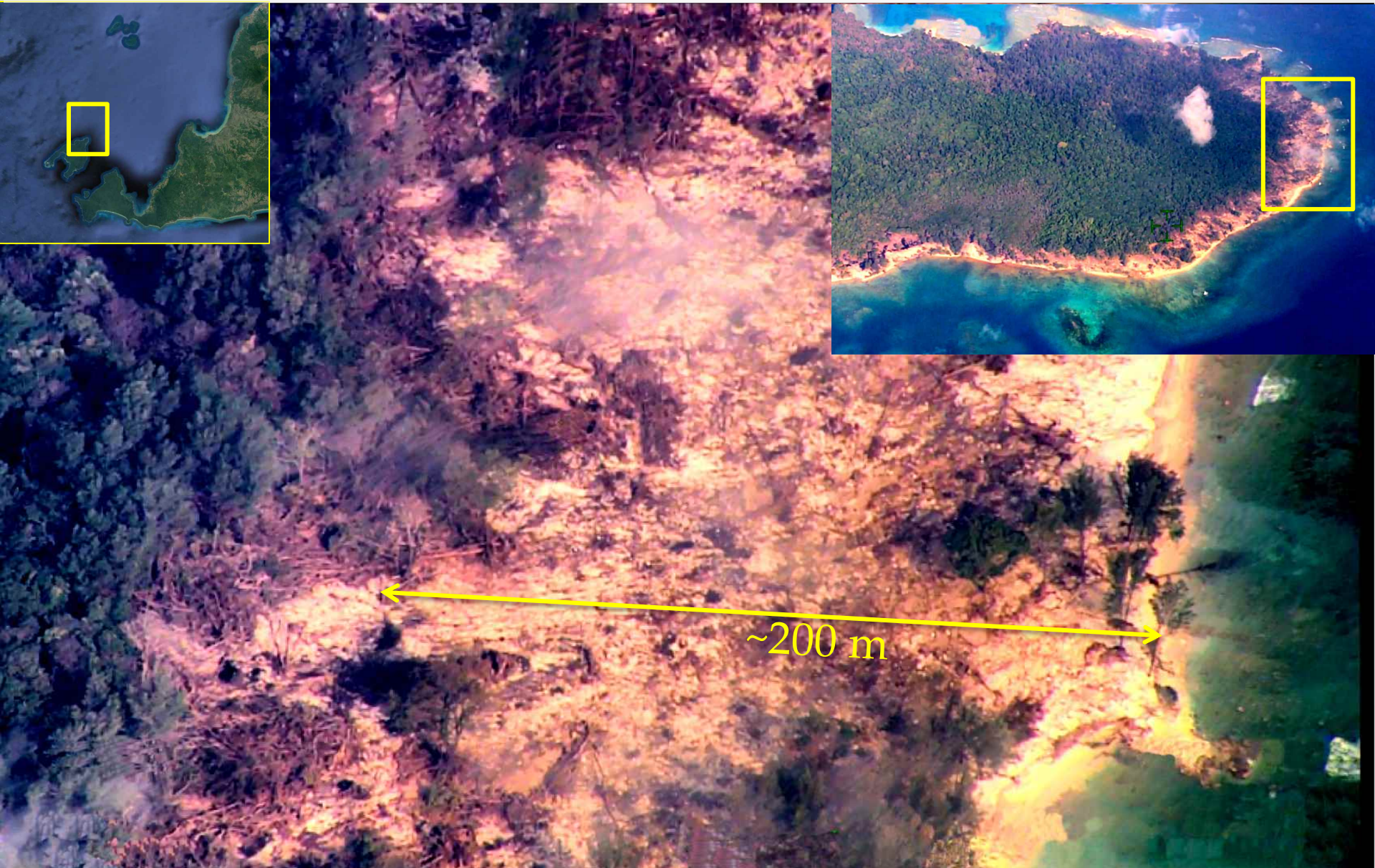
29 Dec 2018 – 7 Jan 2019 | Airborne survey | Sertung Island | Area 2





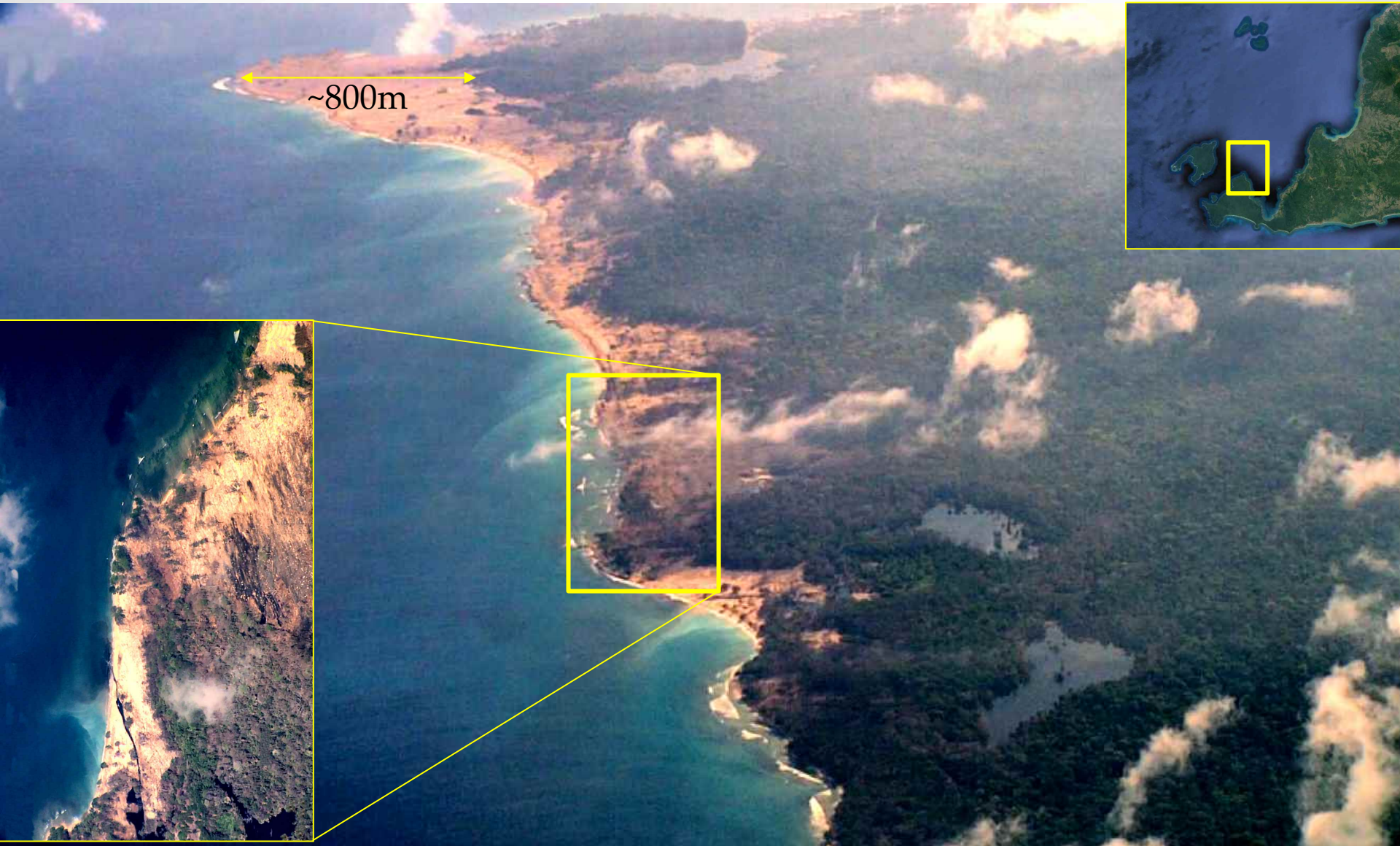
2. Field Observation Data

29 Dec 2018 – 7 Jan 2019 | Airborne survey | Panaitan Island



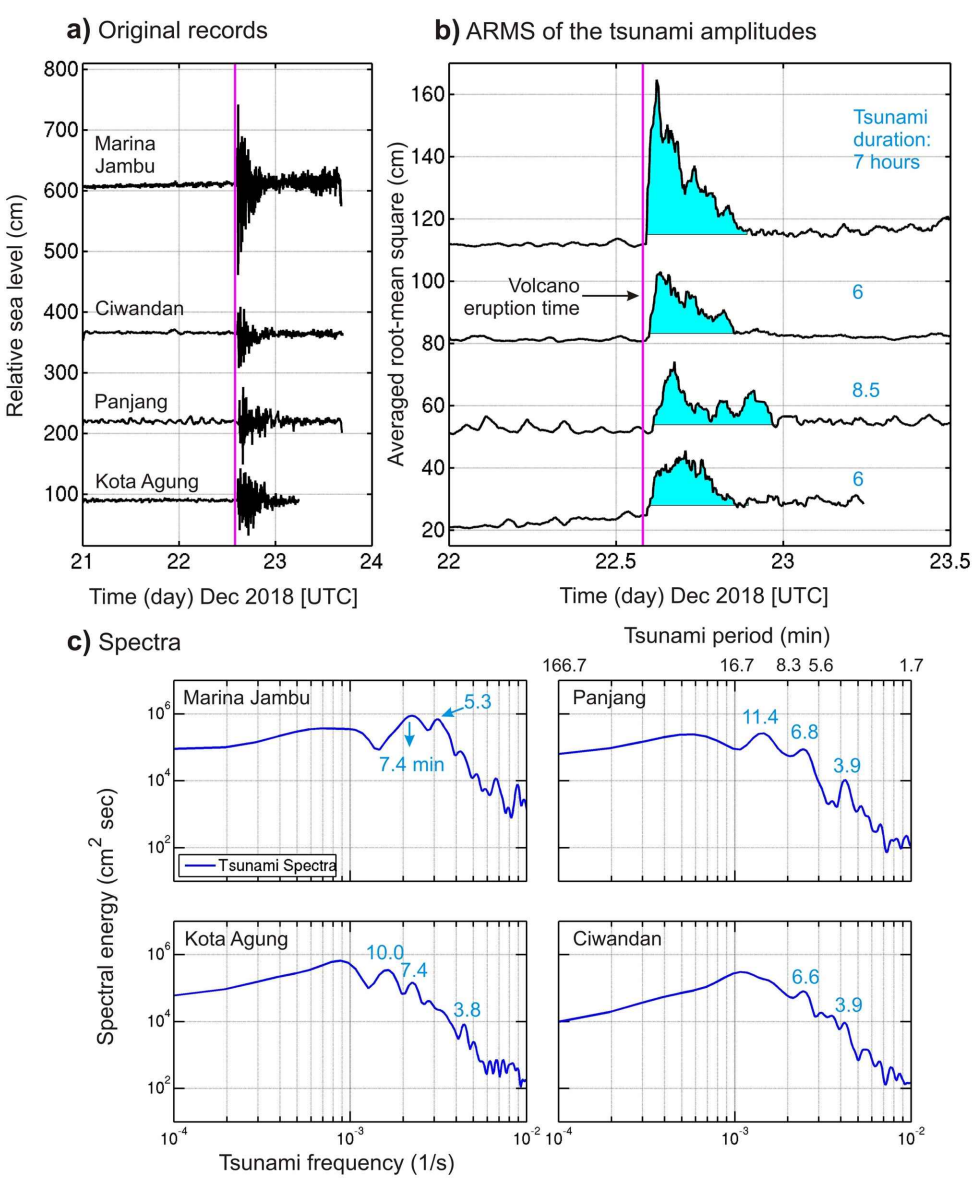
2. Field Observation Data

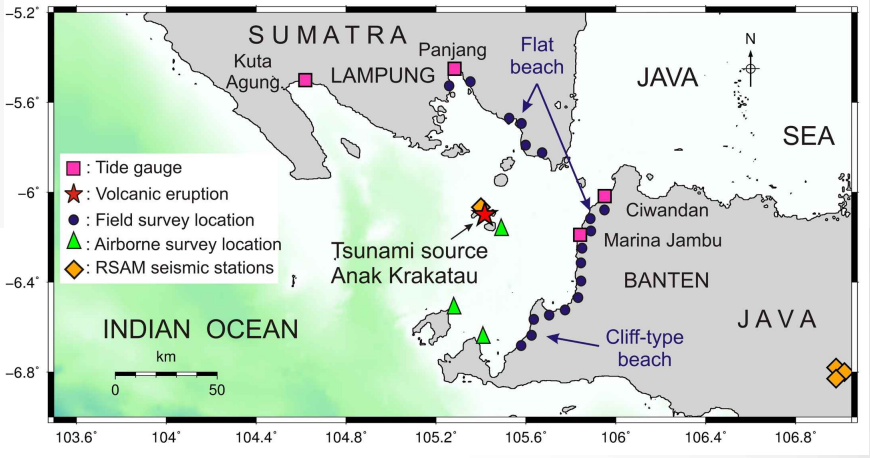
29 Dec 2018 – 7 Jan 2019 | Airborne survey | Ujung Kulon



3. Spectral Analysis

Four (4) tide gauges data were analyzed





1. It is assumed that tsunami generated on 20:56 PM local time so is consistent with seismic records.
2. Tsunami arrival time 33 – 35 mins in Banten and 41 – 57 mins in Lampung (Sumatra area)
3. Max tsunami amplitude 1.4 m (Marine Jambu) Banten
4. Duration of the tsunami ~ 6-8 hours
5. The dominating period of the 2018 Krakatoa tsunami was 6.6−7.4 min

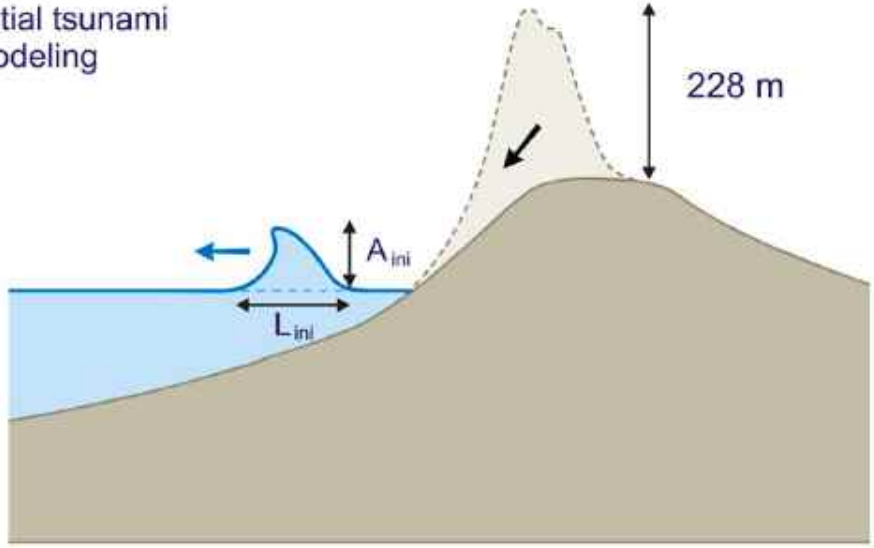
4. Modeling exercise

Physical Model on generation mechanism

a) Anak Krakatoa **before** eruption

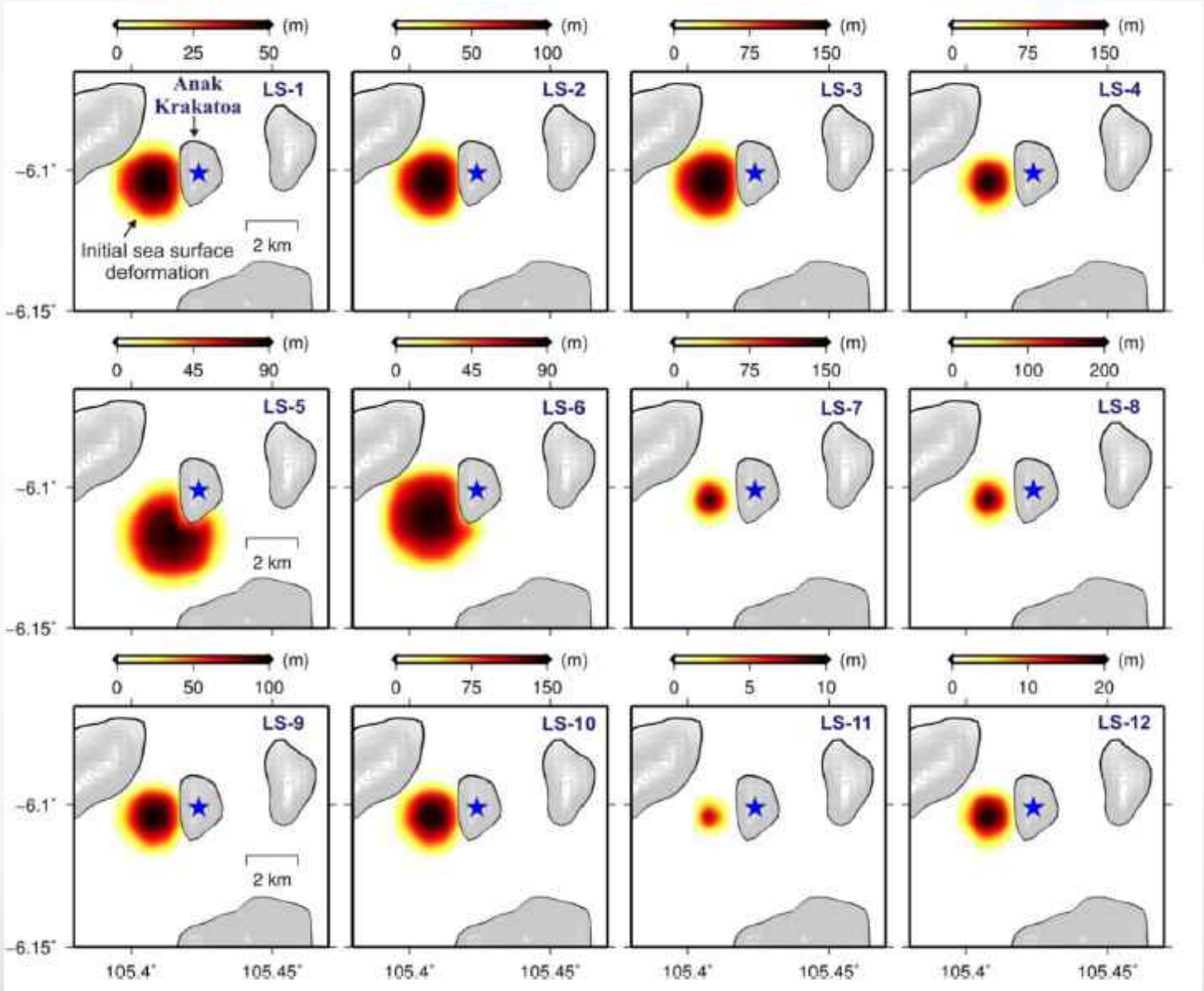
b) Anak Krakatoa **after** eruption

c) Parameters of initial tsunami wave used for modeling



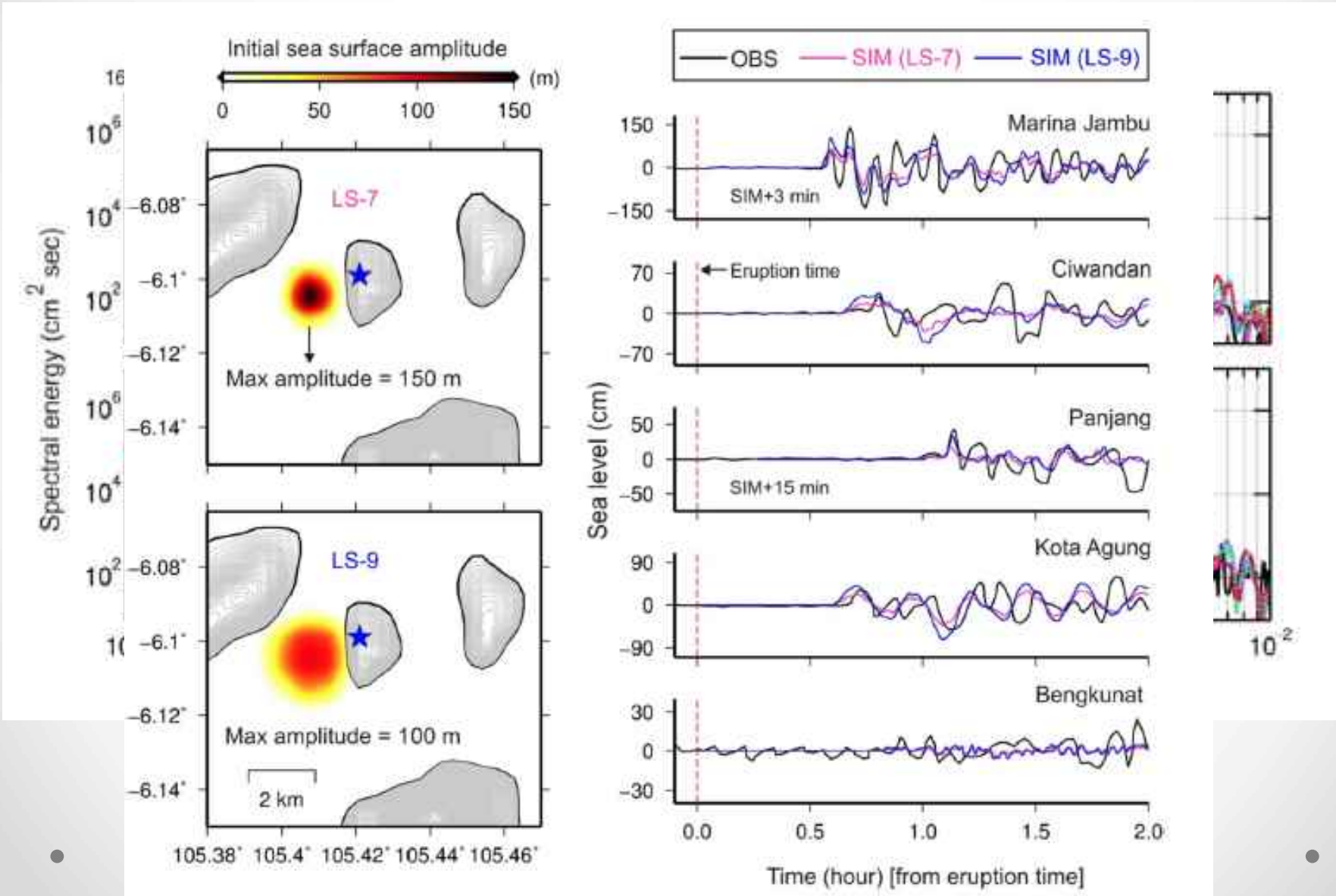
4. Modeling exercise

Numerical Model on generation mechanism



4. Modeling exercise

Numerical Model on generation mechanism



Summary

- Different types of damages were observed between one in the coastline of Banten and Lampung with another one in small islands nearby Volcano and exposed area
- Based on result from physical and numerical models, we conclude that during the early phase of generation and its propagation, the tsunami was very high, but since the period is short, the energy somehow dissipated when it hit small islands surrounding Anak Krakatau Volcano.
- We showed that based on the validation of the modeled tsunami with observed data in tide gauge, the early phase of tsunami generation is possible to create ~100 m pure elevation wave. The existence of small island reduce the energy, thus wave hit Banten and Lampung coasts were not that high.