ABSTRAK

PREDIKSI *RUN-UP*, INUNDASI, DAN *TRAVEL TIME* TSUNAMI BENGKULU 1833 MENGGUNAKAN BAYESIAN MARKOV CHAIN MONTE CARLO (MCMC) PADA WILAYAH PESISIR BARAT SUMATERA

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Tsunami merupakan bencana alam yang memberikan dampak signifikan terhadap wilayah pesisir. Salah satu peristiwa tsunami besar di Indonesia terjadi di daerah Bengkulu tahun 1833 dengan magnitudo gempa 8.2 SR yang menyebabkan kerusakan luas. Di Bengkulu, gelombang tsunami merusak permukiman. Di Padang, kapal-kapal terlepas dan hanyut. Di Indrapura, menyebabkan kerusakan material serta menimbulkan korban jiwa. Di Pariaman, menghanyutkan kapal-kapal di pelabuhan. Penelitian ini bertujuan untuk memprediksi *run-up* (tinggi maksimum tsunami di daratan), inundasi (tinggi genangan air di daratan setelah terjadi tsunami), dan *travel time* (waktu rambat gelombang) tsunami 1833 di wilayah Bengkulu, Pagai Selatan, Padang, Indrapura, dan Pariaman menggunakan pendekatan Bayesian Markov Chain Monte Carlo (MCMC). Metode ini merupakan teknik stokastik yang mengandalkan nilai rata-rata dan standar deviasi untuk menghasilkan model posterior (*output*) dari model prior (*input*), yang dihitung menggunakan rumus Wells dan Coppersmith (1994). Hasil simulasi menunjukkan estimasi *run-up* sebesar 75–120 meter di Bengkulu, 90–105 meter di Pagai Selatan, serta 75–105 meter di Padang, Indrapura, dan Pariaman. Estimasi inundasi berkisar antara 48–64 meter di Bengkulu dan Pagai Selatan, 40–56 meter di Padang dan Pariaman, dan 24–48 meter di Indrapura. Waktu tiba tsunami diperkirakan mencapai Bengkulu dalam 28,95 menit, Pagai Selatan 12,57 menit, Padang 44,4 menit, Indrapura 28,67 menit, dan Pariaman 49,4 menit. Berdasarkan *tavel time* , animasi tsunami dibuat dengan spasial grid sebesar 0,01 dan time step 0,05 detik selama 201 detik. Hasil ini diharapkan dapat digunakan untuk mendukung mitigasi bencana untuk mengurangi resiko tsunami.

Kata Kunci: Tsunami, Markov Chain Monte Carlo, *Run-up*, Inundasi, *Travel time*.

ABSTRACT

PREDICTION OF RUN-UP, INUNDATION, AND TRAVEL TIME OF THE 1833 BENGKULU USING BAYESIAN MARKOV CHAIN MONTE CARLO (MCMC) IN THE WEST COAST OF SUMATERA

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Tsunami is a natural disaster with significant impacts on coastal areas. One of the most notable tsunami events in Indonesia's history was the 1833 tsunami, occurred as a result of a major earthquake in Bengkulu which caused a lot of damage. In Bengkulu, the tsunami waves damages settlement, in Padang, ships were detached and carried out to sea, while in Indrapura, it caused material damage and fatalities, and Pariaman it swept away ships in the harbor. This research aims to predict the run-up (maximum tsunami height on land), inundation (high water levels on land after the tsunami, and travel time (wave propagation time) of the 1833 tsunami in the areas of Bengkulu, Pagai Selatan, Padang, Indrapura, and Pariaman, using Bayesian Markov Chain Monte Carlo (MCMC) approach a stochastic method that use mean and standard deviation for resulting posterior (output) model from prior (input) result, especially the prior model is calculated by Wells and Coppersmith (1994). For the result contaims of run-up range from 75 to 120 meters in Bengkulu, 90 to 105 meters in Pagai Selatan, and 75 to 105 meters in Padang, Indrapura, and Pariaman. While estimated inundation range from 48 to 64 meters in Bengkulu and Pagai Selatan, 40 to 56 meters in Padang and Pariaman, and 24 to 48 meters in Indrapura. The calculated travel times show that the tsunami is expected to reach Bengkulu in 28,95 minutes, Pagai Selatan in 12,57 minutes, Padang in 44,4 minutes, Indrapura in 28,67 minutes, and Pariaman in 49,4 minutes. According to the travel time, tsunami animation is generated spacial grid is about 0.01, time step is 0.05 seconds with total duration of 201 seconds. Than this result can be used a description of disaster mitigation to reduce the risk tsunami.

Keywords: Tsunami, Markov Chain Monte Carlo, Run-up, Inundation, Travel time.