

INTISARI

KARAKTERISASI ALIRAN LAHAR DENGAN ANALISIS SPEKTRUM SINYAL MENGGUNAKAN TRANSFORMASI WAVELET KONTINYU PADA DATA LAHAR MERAPI BULAN FEBRUARI – APRIL 2011

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Gunung Merapi yang tingkat aktivitasnya tinggi telah menghasilkan material rombakan dalam jumlah besar yakni sekitar 140 juta m³ yang terdeposisi dan berpotensi menjadi bencana lahar. Telah dilakukan penelitian mengenai karakterisasi aliran lahar dengan menganalisis nilai amplitudo dan frekuensi berdasarkan spektrum sinyal yang diolah menggunakan metode *Continuous Wavelet Transformation (CWT)* atau Transformasi Wavelet Kontinyu. Penelitian dilakukan di 6 stasiun pengamatan yakni Sungai Gendol di stasiun GDN1, Sungai Kuning di stasiun KKN1, Sungai Putih di PTH1, Sungai Boyong di stasiun SBY1 dan SBY2, Sungai Krasak di stasiun SKR1. Data berupa seismogram dari alat seismometer 1 komponen yang berformat .sac dengan frekuensi sampling dan diri 100 Hz dan 1 Hz yang selanjutnya diolah menggunakan *software* Matlab.

Berdasarkan hasil pengolahan, kejadian lahar ditunjukkan dengan nilai amplitudo 850-18.000 counts berdurasi minimal 1 jam. Fasies aliran lahar dibagi menjadi 3 yakni aliran *debris* dengan nilai frekuensi dan amplitudo sebesar 9,45-20,25 Hz dan 856-17.348 counts; aliran *hyperconcentrated* sebesar 11,63-20,25 Hz dan 923-2.690 counts; serta aliran *mud/stream* dengan nilai 4,11-24,32 Hz dan 13-670 counts. Penambahan material ditunjukkan dengan meningkatnya nilai amplitudo, begitu pula sebaliknya. Sedangkan peningkatan frekuensi menunjukkan penambahan fluida yang mempengaruhi ruang gerak serta tumbukan partikel.

Kata kunci : Merapi, lahar, CWT, Transformasi Wavelet Kontinyu, spektrum sinyal

ABSTRACT

**CHARACTERIZATION OF LAHAR BASED ON SIGNAL SPECTRUM
USING CONTINUOUS WAVELET TRANSFORM IN MERAPI DATA
FOR FEBRUARY – APRIL 2011**

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Mount Merapi, which is highly active, has generated a significant quantity of materials, approximately 140 million m³, that have been deposited and could result in a lahar disaster. A study was conducted to characterize lava flow by examining amplitude and frequency values via signal spectra analysis using the Continuous Wavelet Transformation (CWT) technique. The study was performed at six observation stations: Gendol River at GDNI, Yellow River at KKN1, White River at PTH1, and Boyong River at SBY1 and SBY2, and Krasak River at SKR1. Data was collected from a one-component seismometer in .sac format, sampled at frequencies of 100 Hz and 1 Hz then processed using Matlab software.

Based on the processing results, lava events are identified by amplitude values ranging from 850 to 18,000 counts and lasting for a minimum duration of 1 hour. Lava flow facies can be classified into three categories: debris flow with frequency and amplitude values of 9.45-20.25 Hz and 856-17,348 counts, hyperconcentrated flow between 11.63-20.25 Hz and 923-2,690 counts, and mud/stream flow with values of 4.11-24.32 Hz and 13-670 counts. The increase or decrease in amplitude value indicates the addition or removal of material, respectively. The increase in frequency suggests that fluid has been added, which affects both the space of motion and particle collisions.

Keyword: Merapi, lava, CWT, Continuous Wavelet Transform, Signal Spectrum