MEKANISME DAN ALGORITMA SISTEM PERINGATAN DINI GEMPA BUMI BERDASARKAN FLUKTUASI GAS RADON STASIUN TELEMONITORING SERANG

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INTISARI

Kota Serang merupakan salah satu lokasi yang berpotensi mengalami aktivitas seismik, mengingat kawasan tersebut berada di zona patahan tektonik yang aktif, sehingga Kota Serang berpotensi mengalami gempa bumi. Oleh karena itu, dibutuhkan sistem peringatan dini gempa bumi sebagai upaya peningkatan kesiapsiagaan sebelum terjadi gempa bumi. Menurut USGS, prediksi gempa bumi yang ideal harus mencakup tiga elemen: waktu, magnitudo, dan lokasi.

Penelitian ini dilaksanakan di Laboratorium Sensor dan Sistem Telekontrol, DTNTF, Fakultas Teknik, Universitas Gadjah Mada dan Stasiun Telemonitoring Kota Serang (-6.129529888398368, 106.22206646742357). Metode penelitian yaitu eksperimental dan statistika. Algoritma prediksi waktu, magnitudo dan lokasi gempa bumi terhadap stasiun pemantauan konsentrasi gas radon dapat diperoleh dengan cara mengolah secara statistik data konsentrasi gas radon 1-17 hari terakhir sebelum waktu prediksi gempa bumi yang selanjutnya digunakan dalam memprediksi gempa pada 1- 4 hari yang akan datang.

Berdasarkan hasil penelitian, diperoleh algoritma prediksi waktu, magnitudo dan lokasi gempa pada stasiun pemantau konsentrasi gas radon di Kota Serang dengan nilai mekanisme kebolehjadian gempa bumi 80%. Algoritma prediksi waktu sensitivitas 85% dan presisi 75%. Algoritma prediksi magnitudo presisi 93% dengan standar deviasi eror M0,59 dan eror rata-rata M0,37. Algoritma prediksi lokasi presisi 63% dengan standar deviasi eror 1 klaster dan eror rata-rata 1 klaster. Hasil implementasi prediksi waktu dan magnitudo sudah sesuai, sedangkan prediksi lokasi terdapat galat nilai prediksi sebesar 1 klaster. Algoritma dapat dimanfaatkan sebagai sistem peringatan dini prediksi waktu, magnitudo, dan lokasi dalam upaya mitigasi gempa bumi.

Kata kunci: *gempa bumi, gas radon, sistem peringatan dini, prediksi gempa bumi.*

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MECHANISM AND ALGORITHM OF EARTHQUAKE EARLY WARNING SYSTEM BASED ON RADON GAS FLUCTUATION OF SERANG TELEMONITORING STATION

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ABSTRACT

Serang is one of the locations that has the potential to experience seismic activity, considering that the area is located in an active tectonic fault zone, so Serang City has the potential to experience earthquakes. Therefore, an earthquake early warning system is needed as an effort to improve preparedness before an earthquake occurs. According to the USGS, an ideal earthquake prediction should include three elements: time, magnitude, and location.

This research was conducted at the Sensor and Telecontrol System Laboratory, DTNTF, Faculty of Engineering, Universitas Gadjah Mada and Serang City Telemonitoring Station (-6.129529888398368, 106.22206646742357). The research method is experimental and statistical. Algorithms for predicting the time, magnitude and location of earthquakes on radon gas concentration monitoring stations can be obtained by statistically processing radon gas concentration data for the last 1-17 days before the earthquake prediction time, which is then used in predicting earthquakes in the next 1-4 days.

Based on the results of the research, a prediction algorithm for the time, magnitude and location of the earthquake at the radon gas concentration monitoring station in Serang City was obtained with a mechanism value of 80% earthquake probability. The time prediction algorithm is 85% sensitivity and 75% precision. Magnitude prediction algorithm 93% precision with standard deviation error M0.59 and average error M0.37. Location prediction algorithm 63% precision with standard deviation error 1 cluster and average error 1 cluster. The implementation results of time and magnitude predictions are appropriate, while location predictions have a prediction value error of 1 cluster. The algorithm can be utilized as an early warning system for predicting time, magnitude, and location in earthquake mitigation efforts.

Keywords: *earthquake, radon gas, early warning system, earthquake prediction*.

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