INTISARI

Lempeng Samudera Hindia-Australia bertumbukan dengan Lempeng Eurasia membentuk Sesar Sumatera yang membentang sepanjang Pulau Sumatera. Aceh merupakan salah satu wilayah yang dilewati Sesar Sumatera, dimana sejarah mencatat cukup banyak peristiwa gempa bumi di Aceh. Gempa bumi yang bersumber dari sesar darat mengakibatkan kerugian dan kerusakan yang parah sehingga perlu upaya mitigasi bencana dengan mengetahui lokasi sesar. Pemetaan sesar di Aceh pernah dilakukan menggunakan metode terestris dalam lingkup lokal, namun deteksi sesar secara komprehensif meliputi seluruh Aceh belum pernah dilakukan. Dengan kemajuan teknologi, deteksi sesar secara komprehensif dapat menggunakan data gayaberat *airborne* dan satelit GOCE. Penelitian ini bertujuan mengetahui kemampuan gayaberat *airborne* dan GOCE dalam mendeteksi sesar di Aceh.

Penelitian ini menggunakan data gayaberat *airborne* berupa anomali *free air* dari Badan Informasi Geospasial dan data GOCE dari *International Center for Global Earth Model*. Anomali *free air airborne* dilakukan reduksi bouguer dan *terrain* sehingga mendapatkan anomali bouguer lengkap, sedangkan data GOCE dilakukan reduksi *free air* dan bouguer untuk mendapatkan anomali bouguer sederhana. Deteksi sesar berdasarkan anomali bouguer gayaberat *airborne* dan GOCE menggunakan metode *moving average* dan *Second Vertical Derivative* (SVD). Kedua metode tersebut menghasilkan anomali *residual* dan SVD.

Hasil penelitian menunjukkan pola anomali gayaberat satelit GOCE secara umum mirip dengan pola anomali gayaberat *airborne*. Namun, anomali *airborne gravity* lebih detail menggambarkan kondisi topografi wilayah penelitian dibandingkan GOCE. Deteksi sesar menggunakan peta anomali bouguer, *residual*, dan SVD. Anomali bouguer gayaberat *airborne* dan GOCE dapat mendeteksi dugaan awalan sesar. Anomali *residual* gayaberat *airborne* dapat mendeteksi sesar mayor dan minor, sedangkan GOCE dapat mendeteksi sesar mayor. Anomali SVD gayaberat *airborne* secara visual lebih jelas mendeteksi sesar mayor dan minor daripada SVD GOCE yang hanya dapat mendeteksi beberapa sesar mayor dan minor. Berdasarkan anomali SVD gayaberat *airborne* dan GOCE didapatkan dugaan sesar baru di Aceh yang belum ada pada peta sesar Pusat Studi Gempa Bumi.

Kata kunci: gayaberat *airborne*, GOCE, sesar, Aceh, mitigasi bencana

ABSTRACT

The India-Australian Ocean Plate converges with the Eurasia plate forming the Sumatran Fault, which stretches along the island of Sumatra. Aceh is one of the areas traversed by the Sumatran Fault, where history records quite a few earthquakes in the vicinity. Earthquakes originating from land faults cause severe losses and damage, so disaster mitigation efforts are needed by knowing the location of the fault. Fault mapping in Aceh has been carried out using the terrestrial method in a local scope, but comprehensive fault detection has never been carried out covering all of Aceh. With technological advances, comprehensive fault detection can be done using airborne gravity data and GOCE satellites. This study aims to determine the ability of airborne gravity and the GOCE satellites to detect faults in Aceh.

This study uses airborne gravity data from free air anomalies from the Geospatial Information Agency and GOCE data from the International Center for Global Earth Model. The free air airborne anomaly was reduced by bouguer and terrain reduction to obtain a complete bouguer anomaly, while the GOCE data was reduced to free air and bouguer reduction to obtain a simple bouguer anomaly. Detection of airborne gravity faults and GOCE using moving average and Second Vertical Derivative (SVD) methods of bouguer anomaly. Both methods are used to obtain residual anomalies and SVD anomalies.

Based on the research results, the GOCE satellite gravity anomaly pattern is generally similar to the airborne gravity anomaly pattern. However, the airborne gravity anomaly describes the topography of the research area in more detail. Fault detection use bouguer anomaly, residual anomaly, and SVD maps. Airborne gravity bouguer anomaly and GOCE can detect presumed faults. Airborne gravity residual anomaly can detect major and minor faults, while GOCE residuals can detect major faults. The airborne gravity SVD anomaly visually detects major and minor faults more clearly than the GOCE SVD, which can only detect a few major and minor faults. Based on the SVD anomaly of airborne gravity and GOCE, it was found that a new fault was suspected, which did not yet exist on the Aceh fault map of the Earthquake Study Center.

Keywords: airborne gravity, GOCE, fault, Aceh, disaster mitigation