

## INTISARI

Kepulauan Sangihe berada di 244 km utara Manado ibukota Provinsi Sulawesi Utara. Kepulauan Sangihe berada di pertemuan dua buah lempeng tektonik yang aktif bergerak yaitu lempeng eurasia dan lempeng pasifik yang berpotensi menyebabkan terjadinya gempa bumi. Potensi gempa bumi di kemudian hari dapat diprediksi salah satunya dengan mengetahui besar dan arah pergerakan lempeng tektonik. Data pergerakan lempeng tektonik dapat diketahui dengan melihat perubahan koordinat titik pantau deformasi dari dua *epoch* pengukuran berbeda. Penelitian ini dibuat dengan tujuan mengetahui kecepatan dan arah deformasi lempeng tektonik di Kepulauan Sangihe dari *epoch* 2014 ke *epoch* 2015.

Titik pantau yang digunakan dalam penelitian ini adalah SGH1 di utara Kepulauan Sangihe, SGH2 di tengah Kepulauan Sangihe dan SGH3 di selatan Kepulauan Sangihe. Untuk dapat mengetahui koordinat titik pantau, dilakukan pengukuran menggunakan alat GNSS tipe geodetik. Hasil pengukuran tersebut kemudian diolah menggunakan perangkat lunak ilmiah GAMIT/GLOBK untuk memperoleh nilai koordinat serta ketelitian hasil pengukuran titik pantau. Kemudian dilakukan analisis perubahan terhadap koordinat titik pantau hasil pengukuran *epoch* 2014 dan *epoch* 2015. Analisis perubahan yang dilakukan berupa uji signifikansi perubahan koordinat serta penghitungan arah dan kecepatan deformasi per tahun.

Hasil dari pengukuran pada *epoch* 2015 menunjukkan bahwa nilai koordinat dan ketelitian titik SGH1  $X = -3690953.71038 \text{ m} \pm 0.00958 \text{ m}$ ,  $Y = 5185292.90569 \text{ m} \pm 0.01245 \text{ m}$  dan  $Z = 412640.08146 \text{ m} \pm 0.00358$ , SGH2  $X = -3697214.7666 \text{ m} \pm 0.00816 \text{ m}$ ,  $Y = 5181902.82079 \text{ m} \pm 0.01053 \text{ m}$  dan  $Z = 398853.04551 \pm 0.00313 \text{ m}$  serta SGH3  $X = -3704182.17680 \text{ m} \pm 0.00637 \text{ m}$ ,  $Y = 5179231.99823 \text{ m} \pm 0.00806 \text{ m}$  dan  $Z = 369023.77712 \text{ m} \pm 0.00263 \text{ m}$ . Berdasarkan hasil tersebut apabila dibandingkan dengan *epoch* 2014, titik SGH1 mengalami deformasi horizontal sebesar 15 mm / tahun ke arah tenggara dan deformasi vertikal naik sebesar 9 mm / tahun. Titik SGH2 mengalami deformasi horizontal sebesar 200 mm / tahun ke arah tenggara dan deformasi vertikal turun sebesar 55 mm / tahun. Titik SGH3 mengalami deformasi horizontal sebesar 3.6 mm / tahun ke arah tenggara dan deformasi vertikal turun sebesar 14 mm / tahun.

**Kata Kunci :** deformasi, lempeng bumi, ketelitian, GNSS, kecepatan, GAMIT/GLOBK

## ABSTRACT

Sangihe Islands is located 244 kilometers north of Manado, Capital City of North Sulawesi Province. Sangihe islands located in the subduction zone of the Eurasian and the Pasific tectonics plate, which are moving actively and potentially caused earthquake. The next potential earthquake could be predicted by understanding the velocity and direction of the tectonics plate movement data. The data could be obtained by analyzing coordinates difference of deformation monitoring points from two measurement *epoch*. The objective of this research is to understand the velocity and direction of plate movement at Sangihe Island based on *epoch* 2014 to *epoch* 2015 GNSS data mesurements.

Deformation monitoring points used in this research were SGH1, SGH2 and SGH3 which are respectively located at north, middle and south part of Sangihe Island. Geodetic GNSS used to obtain coordinates of deformation monitoring points, the measurements has been performed in 3 DOY 215, 216 and 217. The result has been calculated using scientific software GAMIT/GLOBK to obtain coordinates and deviation of deformation monitoring points. After that, coordinate differences of deformation monitoring points from *epoch* 2014 to *epoch* 2015 wouldbe analyzed. Deformation analysis include signification test of coordinate change and measuring velocity and direction of crustal movement per year.

The result of measurements at *epoch* 2015 shows that coordinates of SGH1 are  $X = -3690953.71038 \text{ m} \pm 0.00958 \text{ m}$ ,  $Y = 5185292.90569 \text{ m} \pm 0.01245 \text{ m}$  and  $Z = 412640.08146 \text{ m} \pm 0.00358$ , SGH2  $X = -3697214.7666 \text{ m} \pm 0.00816 \text{ m}$ ,  $Y = 5181902.82079 \text{ m} \pm 0.01053 \text{ m}$  and  $Z = 398853.04551 \pm 0.00313 \text{ m}$  also SGH3  $X = -3704182.17680 \text{ m} \pm 0.00637 \text{ m}$ ,  $Y = 5179231.99823 \text{ m} \pm 0.00806 \text{ m}$  and  $Z = 369023.77712 \text{ m} \pm 0.00263 \text{ m}$ . By comparing those coordinates with *epoch* 2014, it shows that SGH1 deformed horizontally 15 mm / year to southeast and increased vertically 9 mm / year, SGH2 also deformed horizontally 200 mm / year to southeast and decreased vertically 55 mm / year and SGH3 deformed horizontally 3.6 mm / year with same direction to the others and decreased vertically 14 mm / year.

**Keywords:** deformation, earth crustal, accuracy, GNSS, velocity, GAMIT/GLOBK