

Volcanic rocks from the Togeian Islands, Indonesia: Estimation of Subduction Component at a Complex Tectonic Regime

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Togeian Islands are located at gulf of Tomini, Central Sulawesi, situated between the North Arm of Sulawesi and South Arm of Sulawesi. This area is a complex transition, which is formed by subduction and obduction of three plates during Miocene until Quaternary Period.

North Arm of Sulawesi is the volcanic arc. The present configuration formed due to the double subduction, North Sulawesi Subduction Zone in the north and the East Sangihe Subduction Zone in the east of the North Arm of Sulawesi. The North Sulawesi Subduction Zone is subduction of Celebes Sea Plate and supposed to be active since early Tertiary. On the other hand, the East Sangihe Subduction Zone is subduction of Molucca Sea Plate and thought to be active since early Quaternary.

Different with the North Arm of Sulawesi, the South Arm of Sulawesi was a collision of Banggai Sula Microcontinent. This micro plate was derived from the Bird Head Microcontinent and has thrust contact with ophiolite. Thrusting of the East Sulawesi ophiolite on to the western edge of the Banggai Sula occurred at the end of the Miocene.

Solitair Una-Una Volcano exists between the volcanic arc of North arm of Sulawesi and accreted ophiolite in South Arm of Sulawesi. This volcano is a part of the extinct volcano located in another island in Togeian Island. Major, trace and rare earth elements compositions of volcanic rocks from Togeian Island were analyzed in order to estimate the subduction component at a complex tectonic regime along the boundary of two subductions from the north and the east and also post collision process from the south.

Volcanic rocks from Una-Una Island are showing typical characteristics of adakitic rocks, such as silica-rich (SiO₂ ? 56 wt%), MgO < 3%, high Sr (>1400 ppm), high Sr/Y (>20), low Y and steep rare earth element (REE) pattern with Nb enrichment (>15 ppm). Further to the east, the compositions are quietly different. Volcanic rocks from Walea Kodi and Walea Bahi Island can be identified by SiO₂ < 50 % wt%, MgO > 4%, with Nb depletion (< 6 ppm) and low Sr content in comparison to Una-Una Island. The compositions seem to be similar with volcanic rocks from Sangihe Region.

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