INSTANTANEOUS AND FINITE KINEMATICS IN THE NORTHERN ARM OF SULAWESI

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Geodetic data acquired in the Northern Arm of Sulawesi are compared with the geologic and paleomagnetic data obtained in North Sulawesi and the Celebes Sea. The objective of this study is to try to extrapolate the instantaneous motions measured by GPS to the finite motion deduced from paleomagnetic and geological arguments.
The instantaneous motion in Sulawesi reveals in between 2.5 cm/yr and 5 cm/yr of relative displacement on the Palu-Koro fault.
Paleomagnetic data collected in the Northern Arm (Surmont et al.,1994) show a 20° semi-rigide rotation of the Northern Arm with a pole located right North of Manado, and this since 5 million years. This suggests around 150 km of left lateral displacement along the Palu-Koro fault and consequently a velocity of 3 cm/yr. This fits quite well the 4 years average instantaneous motion obtained by GPS on this fault.
A higher relative displacement on the Palu fault is given by the asymmetric magnetic anomaly of the Celebes Sea. It implies that 200 - 250 km of oceanic crust was subducted along the North Sulawesi Trench.
The time interval of rotation of the Northern Arm could be reduced by radiometric data on the calc-alcalic-potassic volcanisme in West Sulawesi which continues up to 2 million years. If this volcanisme is present in the Northern Arm, the long term velocity on the Palu-Koro fault, which is offsetting this volcanisme, could be higher by a factor of two. Although on the upper boundary, this estimate could still be compatible with the rates inferred from recent GPS measurements.

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