

## A rigid block rotation model for the GPS velocity field along the Ryukyu arc

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Southeastward motion is dominant along the Ryukyu arc. This implies that the backarc spreading along the Okinawa trough forces the arc moving toward southeast. In this study, we try to get informations about the backarc spreading along the Okinawa trough.

We model the GPS velocity field along the Ryukyu arc by 4 rigid block rotations ( Nankai, northern Ryukyu, central Ryukyu, and southwestern Ryukyu ) and estimate their Euler vectors. We cannot use the velocities in Nankai and N-Ryukyu region, which is influenced by the interplate coupling. Therefore, we use the relative motion along the block boundaries for such regions.

The relative motion along the block boundary is obtained by a following equation:

$$Y(x) = Ax^{**2} + Bx + C + D H(x)$$

x: distance from the boundary

Y(x): velocity component

H(x): Heavyside function

Using the velocities near the block boundary, we obtain the relative motion D by a least square fitting.

From 37 GPS velocities and 22 relative motion rates, we estimate 4 Euler vectors. The estimated rigid rotations are comfortably fit the velocity field along the Ryukyu arc. We calculate the rate and direction of the backarc spreading from the estimated block motions. The rate of the backarc spreading is large along the northern and southern Okinawa trough. Active volcanism along the Ryukyu arc might have a relationship with the rate of the backarc spreading. Trench-parallel extension exists along the Ryukyu arc. Considerable trench-parallel east-west extension in southern yuku arc is consistent with focal mechanisms of shallow moderate sized earthquakes.