



Mechanism of earthquake clustering in the southernmost Ryukyu seismogenic zone

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The southernmost Ryukyu subduction zone terminates in northeast Taiwan. Large earthquakes in the south Ryukyu subduction zone have occurred along the seismogenic plate interface and clustered beneath the western portion of the Nanao forearc basin. Based on the bathymetry, earthquake focal mechanisms and multi-channel seismic profiles, we have identified the NW-SE trending Suao Fault Zone and the Nanao Fault zone cutting across the whole crust of the south Ryukyu forearc. These two en échelon dextral strike-slip fault zones have created a restraining stress in the step-over area and increased the normal stress on the plate interface. Thus, the failure strength at the seismogenic plate interface has increased and generated the Nanao cluster. In light of this study, some asperities in subduction zones may be associated with local zones of convergence due to restraining step-overs in arc or forearc areas, instead of roughness on fault planes.