Spatial Variation of the Crustal Stress Field along the Ryukyu-Taiwan-Luzon Convergent Boundary

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We applied an improved stress inversion method to a comprehensive dataset of earthquake focal mechanisms to depict the pattern of crustal stress along the western convergent boundary of the Philippine Sea plate. Our results indicate that the crustal stress along the Ryukyu forearc is segmented with boundaries at or near the places of seamount subduction, including the Tokara channel. An extensional stress regime is observed along the entire Ryukyu backarc, implying that backarc-rifting may have extended northward to Kyushu. A triangular area near the southernmost terminus of the Ryukyu arc is characterized by a unique stress signature. The eastern boundary of this Ryukyu-Taiwan Stress Transition (RTST) coincides with the 123E meridian where the Gugua ridge intercepts the Ryukyu trench; whereas its western boundary agrees remarkably well with the border between the post-collision and waning-collision domains in northern Taiwan. The Taiwan collision zone is dominated by compression that rotates locally according to the structural configuration of the Lukang Magnetization High (LMH), suggesting that the LMH may be critical in controlling the local stress distribution. The stress signature of the Luzon arc-Taiwan collision reaches as far south as 19.5N. The tectonic stress along the Manila trench-Luzon forearc is dominated by a complex regime of extension that cannot be explained by simple plate bending or in-slab membrane stress. Since this extensional regime is observed only south of $\sim$ 22N, it probably marks the northern limit of the contemporary boundary between the subduction along the Manila trench and the collision in Taiwan.