

Combined stress and strain analyses of calcite twins: Application to a natural data set and comparison with fault-slip analysis

*wakamori kei¹, Atsushi Yamaji¹, Katsumasa Yamanaka¹, Katsushi Sato¹

1. Division of Earth and Planetary Sciences, Graduate school of Science, Kyoto University

Our method of the combined stress and strain analyses was applied to e-twins in a calcite vein sampled in the Amatsu Formation, central Japan. The depositional age of the sampling horizon is about 11 Ma (Kameo et al., 2002).

As a result, we found two stresses, both of which had WNW-ESE trending sigma₃-axes. One of them was of the normal faulting regime with the stress ratio of 0.55; the other was of the regime between normal and strike-slip faulting with the stress ratio of 0.82. Their differential stresses normalized by the critical resolved shear stress were 5.3 and 3.7, respectively. Formation of the twin lamellae under the stresses showed the equivalent strains of 4.4 and 3.6%, respectively. The principal axes of the strain tensors were more or less parallel to the principal stress axes. In addition, the paleostress analysis of the mesoscale faults around the site where the calcite was obtained resulted in similar stresses. Therefore, the stress and strain analyses of calcite twins and mesoscale faults showed consistent results.

Keywords: Calcite twin, Stress inversion, Strain analyses