

[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-GI General Geosciences, Information Geosciences & Simulations

[M-GI27]Data-driven geosciences

convener: Tatsu Kuwatani (Japan Agency for Marine-Earth Science and Technology), Hiromichi Nagao (Earthquake Research Institute, The University of Tokyo), Takane Hori (独立行政法人海洋研究開発機構・地震津波海域観測研究開発センター)

Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

It is important to extract essential processes and structures from observed data sets in order to understand and predict the dynamic behavior of the earth and planetary systems. Recently, many powerful methodologies have been proposed to extract useful information from high-dimensional data sets in information sciences. This session aims to provide an opportunity to gather various geoscientists to have a productive discussion for interdisciplinary collaborations.

[MGI27-P05] Application of the Earth Mover's distance (EMD) for a quantitative comparison of SPO data from the rigid particle rotation model and the columnar mineral grain in metamorphic rock

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Shape preferred orientation (SPO) is widely used in the deformation analysis of rock. As the evaluation of the distribution pattern is generally performed by qualitative comparison, it is difficult to evaluate a lot of distribution patterns systematically. In order to solve such difficulties, in this study, we introduce the Earth Mover's distance (EMD) as the scale of similarity in the distribution pattern of SPO. The EMD calculates the similarity between the distributions on the basis of the distance that is obtained by the transport problem. In this presentation, we demonstrate the similarity between two types of the SPO data, both of which are collected by the numerical simulation based on the rigid particle rotation model and the measurement of columnar tourmaline grains embedded within an individual metachert specimen. SPO data of columnar grains is collected by the measurement of the direction of the long axis, the length of long axis and width of the 3136 and 1577 columnar tourmaline grains, respectively. The similarity between SPO data was represented on the value of the EMD, and then we estimated the strain, degree of non-coaxiality and Flinn parameter as indexes to constrain the development of SPO pattern of columnar grains under ductile deformation. Our analysis showed that the smallest EMD is obtained from the simulation data calculated by setting the strain to 1-2, the degree of non-coaxiality to 75°-90°, and the Flinn parameter to 1-3. This result suggests that the analysed sample would be deformed under the pure shear condition.