

Model, where earth science and the philosophy of science meets

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We carried out a project called "Decoding the Whole Earth History", in which we identified the birth and development of science as the seventh big event in the Earth's history. A natural extension will be to locate science in the Earth's history through a more intensive investigation. On the other hand, philosophy of science is also trying to locate science in a broader perspective of human intellect. Having this aim of locating science in a broad perspective in common, we have organized a group of scientists and philosophers.

Nevertheless, we have realized difficulties in finding topics with common interest. Since modern philosophy of science originates from logical reconstruction of mathematics and the advent of quantum mechanics, the main theme of philosophy of science has been the logical reconstruction of the logic of science and the ontology of physical object. These topics are distant from the interest of earth sciences. However, with the recent turn of philosophy toward naturalization, we have found various common topics, one of which is the problem of scientific models.

In earth sciences, models play a central role in explaining various natural phenomena. On the other hand, in the philosophy of science, semantic conception of scientific theories tries to characterize models as representations of the world. However, the characterization has been found difficult due to the diversity of scientific models (Nakao, 2011). We have thus tried to classify scientific models from the viewpoints of both science and philosophy, with examples taken from earth sciences. We classify models into three categories: reality-representing type, idealization type, and hypothesis type. We further classify the reality-representing type into prediction type and causal-explanation type. With these classifications, we explore the diversity of models, thereby trying to characterize explanations in earth sciences.

Keywords: model, classification, earth and planetary sciences