

6-2 億年前の深海堆積物から地球外物質を見つける

To find extraterrestrial material from deep-sea sediment of one hundred million years ago

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It is proposed that the encounter of dark clouds and supernova explosion caused extreme environmental change of the earth surface (the mass extinction and Snowball Earth), yet the evidence to verify it through geological record is scarcely reported. In this research, we aim to estimate the amount of descent cosmic dusts through the earth history (mainly Phanerozoic time). The best target to obtain cosmic dusts through ancient time is deep-sea deposits in the accretionary complex. We focus on the cosmic spherules which are one of the cosmic dusts. Especially, the shale beds, whose depositional rate is very slow, is suitable to estimate the rate of the cosmic spherule descent. It is generally thought that cosmic spherules are derived from in the solar system, but the amount of cosmic dusts descent has a correlation with the perturbation between our solar system and galaxy.

We target three areas of Inuyama, Gujo-hachiman and Llyen Peninsula (U.K.), which crop out the T/J boundary, the P/T and G/L boundary and the Marinoan Snowball Earth, respectively, and made detail geological map to sample bed-by-bed to pick up cosmic spherules from each shale-bed. To identify cosmic spherules from crushed sample, SEM-EDS analyses are applied for the observation of surface and cross-section of cosmic spherules.

We collected 74 shale samples from Inuyama, about 180 from Gujo-hachiman and about 40 from UK and separated cosmic spherules from 101 shale samples. The results show that cosmic spherules are obtained in layers of Toarcian and T/J boundary and also found in nearly 167 Ma and 214 Ma layers corresponding to large impact events (Puchezh-Katunki and Manicouagan). But, cosmic spherules were not recovered from layers of P/T and G/L boundary in Gujo-hachiman and Marinoan Snowball Earth in the UK, respectively. For the future, we try to pick up shale one by one (every 20 thousand years) and separate cosmic spherules and extrasolar materials which come from outside solar system.