# Toward organization of a new field on fast process in Earth and planetary science

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In the evolution of the Earth and the planet, it is necessary to consider that the event occurred on a short scale, which is different from the evolution on the geological time scale, gives a global impact on the evolution of the planetary scale and its surface environment.In order to understand such events, it is indispensable to understand high-speed processes such as destructive processes as typified by seismic activity, eruption processes in volcanic activities, and huge meteorite collision processes. Since these phenomena are events that can occur anytime even now, it is also an important research topic in terms of disaster prevention. In this presentation, we propose to combine the research on the elementary processes of these phenomena and the research on the influence of these phenomena from various types of research fields, and aim to construct an interdisciplinary research organization.
In recent years, with the progress of measurement experiment technology in large synchrotron radiation facility and X-ray free electron laser facility, It has been possible to detect the short time scale catastrophic phenomenon occurring in extreme environments in a wide range time interval extending from several minutes (> $10^2$ s) to femtosecond ($10^{-15}$ s). Studies combining synchrotron radiation with high pressure experiments is shifting from the observation of static processes to monitoring of dynamic processes such as deformation, attenuation, and destruction. It is becoming possible to capture phenomena on the millisecond scale.Situations are being developed that can detect the high-speed process. In studies using X-ray free electron laser, a situation where the collision process can be tracked in detail at 100 picosecond scale has been realized during impact compression experiment using high intensity laser. Furthermore, in the field of computer science using supercomputers, the progress of high-speed process reproduction experiments has been remarkable, and it is time to be able to oversee seamless research on capturing high-speed processes from atomic scale to huge meteorite collision.Research on high-speed processes has been studied independently in each event, but there are many aspects that common phenomena in the method of grasping the high-speed process and its elementary process are common. This session was planned with the goal of forming a research network that can efficiently operate "knowledge" by incorporating numerous methods such as material science, geophysical observation and numerical model. By establishing and utilizing this network, it is expected that we will comprehensively understand the high speed dynamics in Earth and planetary science, and at the same time obtain new knowledge about the impact on the global scale and cause a new paradigm shift.

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