

Outline of Selected Projects

Host institution	Tokyo Institute of Technology
Center name	Earth-Life Science Institute
Head of host institution	Yoshinao Mishima
Chief center-project officer	Kei Hirose
Prospective center director	Kei Hirose

<Project Summary>

ELSI aims to answer the fundamental question "when and where did life originate and how did it evolve?" This question, which originated with the Greek philosophers, has been one of the most important topics of natural science. We will focus our research on addressing the formation and early history of the Earth and its unique environments that gave birth to life and their subsequent changes, with the main aim to study the origin and early evolution of life and persistent ecological systems in their geological context. We will also approach the primordial environment of the Earth through explorations of deep-sea microbial ecosystems and extraterrestrial primitive asteroids. In addition, we will critically examine the universality of these processes, to determine the uniqueness of our planet, with implications for the search for extraterrestrial life, both in the solar system and beyond.

So far, discussions about the origin of life on Earth have been mostly limited to the biochemistry of proto-life forms. While the Earth environment has been described as a "cradle of life", the image of a "cradle" points to a supporting background role, rather than a dynamic interplay. In ELSI, we want to radically broaden these discussions by focusing equally strongly on both sides of Earth and Life. For one thing, life is preserved through a continuous exchange of matter and energy with the surrounding environment. For another, it is a two-way interaction: as soon as life forms are present, they start to influence the environment, just as the environment is influencing life. Our basic outlook is reflected in the name of our proposed center: ELSI stands for Earth-Life Science Institute, in which Earth sciences and Life sciences will be equally represented.

Target research field

Interdisciplinary Research on Solid-Earth Science, Planetary Science, Geology, Environmental Biology, and Microbial Genome Science

<Remarks>

A very fundamental research topic addressing "How did life originate?" based on the understanding of the early earth, which can attract interest from the public.

The prospective center director is a young, visionary and strong leader with impressive track record. Excellent researchers outside Tokyo Tech are going to join.

The proposal to bring in the interdisciplinary orientation technique from Princeton is strong. The collaborations at Princeton and Harvard add strength and may help to attract talents.