



Development of systems for extreme environment exploration

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● Research Outline

Theme1

A transportation system for a ocean exploration using a high-altitude balloon and a parafoil

Remote sensing is not adaptable for underwater ocean exploration because seawater has a high attenuation rate for electromagnetic waves. In order to observe underwater, instruments need to be launched into the water, which requires a manned mother ship.

When using a manned mother ship, it is not possible to go into dangerous areas such as under typhoon or active volcano.

I propose an unmanned system that can safely transport observation equipment. The system is consisted of a balloon and a parafoil. The balloon is carried by the wind, allowing for energy-efficient transportation. After the balloon bursts, the observation equipment will be guided precisely by the parafoil to land in the target area.

The operation image is shown in the figure below.

Theme2

System study for an exploration system for an extraterrestrial ocean(Europa or Enceladus)

Europa and Enceladus have huge ice-covered ocean. The ocean is a potential candidate for the existence of extraterrestrial life, a new frontier.

Exploring ice-covered oceans outside the Earth requires a different system than that used to explore the Earth's oceans. There is no GPS, communication satellite, any light. We need to penetrate the ice to reach the ocean. We also need to communicate through the ice.

To realize the exploration of the extraterrestrial ocean, I will study and develop the necessary systems and fundamentals.

