Development of a UAV capable of flying over Antarctic coastal areas in summer

In cooperation with Kyushu University, companies and the Japan Radio Control Safety Association, NIPR has developed an unmanned aerial vehicle (UAV) with a wingspan of 3m that flies automatically via computer control. The UAV has succeeded in flying 1,108km continuously and at an altitude of 5,700m in Japan.

Using the UAV for aerial magnetic observation in the Antarctic

After taking off from Livingstone Island in Antarctica, the UAV flew over a range of 300km above Deception Island (a volcano) 35km to the south and succeeded in conducting aerial magnetic observation. These observations revealed the magnetization structure of the island and surrounding seas for the first time (diagram below).

Flight up to an altitude of 10 km achieved for the first time in the world

We have created an observation platform based on the new idea of suspending the UAV under a balloon to lift it up to the target altitude, cutting the suspension rope automatically there, and allowing it to return to Syowa Station autonomously. Using this technique, we have succeeded in carrying out aerosol measurement and hi-vision animation photography up to an altitude of 10 km for the first time in the world.

Aerial photography by the UAV in the Antarctic

The UAV took aerial photographs of Livingstone Island and Deception Island in Antarctica, and also photographed the distribution of glaciers and sea ice, etc. The results provided basic data on the regression of glaciers due to global warming (photos below).

Social contribution

• Developing the UAV has made it possible to conduct safe and economic aerial observation, not only in Antarctica but also in Japan.
• Researchers can now conduct aerial observation at low cost.
• The UAV was used for aerial photography after the Fukushima Daiichi Nuclear Power Station accident, among others, and contributed to ascertaining the level of damage.