

Promotion of Scientific Research on Climate and Earth System Sciences Using Aircrafts

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The purpose of this research is to introduce Japan's first aircraft dedicated to earth observation, and to dramatically promote researches in climate and earth system sciences across all earth science fields, including the atmosphere, oceans, terrestrial ecosystem, cryosphere, and solid earth.

Global warming and global environmental change are progressing rapidly, and are having a significant impact on human society. Microscopic measurements of greenhouse effect gas concentrations, aerosols, cloud particle size distribution, and chemical compositions, which are the keys to understanding and predicting global environmental change over wide areas and including vertical profiles, can only be made by airborne observations. In this research, we will systematically observe microscopic quantities at scales of less than 100 m, which cannot be observed by satellites, and aim at a paradigm shift in earth science to understand the climate and earth system based on the understanding of microscopic quantities and elementary processes. In particular, we will focus on Asia and the Arctic, which have become the missing areas for aerial observation while rapid environmental changes are becoming apparent.

Japan's aircraft observation technology is at the top level in the world. This research will take advantage of Japan's strengths to achieve innovative results through long-term (10 years) and systematic observation research, instrument development, and human resource development. In order to achieve this goal, we will establish an operational system that allows researchers in a wide range of fields to share use of dedicated Earth observation aircraft. The observation aircraft will be Gulfstream-IV class jets owned by private companies for exclusive use. The use of unmanned aerial vehicles for Earth observation, which has been making rapid technological progress in recent years, will also be strongly promoted through integrated research in science and engineering. The budget is 15.5 billion yen for 10 years. The project will also contribute to disaster prevention, disaster mitigation, SDGs, and Future Earth.

The Center for Orbital and Suborbital Observations, Institute for Space and Earth Science, Nagoya University, will be the core of the joint use and operation of the project. In addition, a research promotion committee consisting of researchers from all over Japan in various fields of earth science will be established to promote research from an impartial standpoint. In addition, Aviation Technology Directorate of JAXA will participate in the development of flight technology for Earth observation. The ownership and operation of the observation aircraft will be entrusted to a private company with a long-term record.

Keywords: Aircraft observation, Earth system sciences