

## Overview of the proposal to the master plan 2017 on the aircraft observation of climate and earth system sciences

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The science council of Japan announced for proposal for the master plan 2017 in March 2016. The meteorological society of Japan proposed “Promotion of Scientific Research on Climate and Earth System Sciences Using Aircrafts.” In this report overview the proposal and current activities.

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

The aim of this proposal is to promote the climate and earth system research in the area of atmospheric science, oceanography including sea ice, glaciology, volcanology and ecology by a dedicated aircraft observation system.

Although in-situ measurements by the state-of-the-art instruments on board aircraft has great advantages to provide accurate data for estimating key parameters with high temporal and spatial resolutions, which lead to improve our understanding of the critical processes, Japan does not have an aircraft dedicated to the Earth observation. This is the motivation of this proposal.

The expected research area in which a breakthrough is achieved with aircrafts is the mechanism of the changes in the climate and the earth system. The climate change, especially the global warming, is caused by changes in the Earth radiation balance due to greenhouse gases such as carbon dioxide. On the other hand, aerosols, clouds and their interaction are known as the most uncertain factor on the radiation balance. Response of clouds to precipitation sometimes appears as heavy rainfalls and typhoons and it is also urgent issue. Since Japan has been leading the world by the sophisticated numerical modeling and the satellite observations, synergetic use of the aircraft observations with them will lead great progress of research in this area. Furthermore, Asian region remains an observational gap of aircrafts though it is the “hotspot” of aerosols including PM2.5 and greenhouse gases and most frequently experiences strong tropical cyclones, so that Japan’s contribution and leadership of the aircraft observation in this region is highly anticipated.

The aircraft which we think most suitable for our research is the Mitsubishi Regional Jet (MRJ) since it has enough space to simultaneously equip several observational instruments and it can be relatively easily refurbished for equipping the instruments by taking advantage of the domestic production.

Having an aircraft for exclusive use for earth sciences has great advantages for both types of researches which requires long-term monitoring such as greenhouse gases and agile observations of hazardous events such as typhoons, heavy rainfalls and volcanic eruptions.

The Center for Orbital and Suborbital Observations, Institute of Space-Earth Environmental Research, Nagoya University will lead the program in the framework of the “Joint Usage/Research Center (JURC)” . A JURC steering committee that consists of specialists of each research area from various organizations will be responsible for the research and operational plan.

Having the dedicated aircraft for the earth observation benefits the research fields other than the atmospheric sciences such as hydrology, ecology, oceanography, glaciology, volcanology, and Earth surface remote sensing.

Future activities

On the future activity, based on the activities of the aircraft observation promotion committee, strengthen cooperation with related organizations in order to establish the activity base.

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