[JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG44]Promotion of Application and Utilization of Aircrafts for Earth sciences

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Under the current situation of rapid global environmental change, such as global warming, that affects the human societal activities and societal basis such as water and food, both the observational study of the Earth become more important as well as the studies on the numerical models. In particular, aircraft observation is expected to be better than the satellite and/or ground based observation when the immediate or direct observation is needed. For example, in situ measurements of the microscopic values such as concentration of greenhouse effect gaseous and size distribution and chemical components of aerosols and clouds are only available by aircraft observation. Aircraft observation is also useful for detailed remote sensing of typhoons, ecosystem, atmosphere, ocean, geodesy, volcanology, seismology. Activities of the aircraft observation has not been weighted in Japan comparing with other countries. From the viewpoint of using aircraft for research purposes, the same situation also faces the aerospace field. Also, in the field of atmospheric sciences, big research projects using aircraft are in progress and a new field of aircraft observation is opening up. Based on these facts, we propose this session as a forum for discussing ideas from various fields on further progress of aircraft observation.

[ACG44-P01]Development of a high-resolution 1.3 GHz wind profiler radar

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By receiving radio waves scattered by radio refractive index irregularities (clear-air echo), wind profiler radar (WPR) measures height profiles of vertical and horizontal wind velocity in the clear air. Recent development of measurement techniques enables WPRs to increase their capability. Range imaging (RIM), which utilizes multiple frequencies and adaptive signal processing, enables WPR to enhance its range resolution. Adaptive clutter suppression (ACS), which controls sidelobes by using subarrays and adaptive signal processing, provides a mean for mitigating clutter contamination. Therefore, it is expected that WPR with RIM and ACS capability is able to resolve small-scale turbulence.
In order to develop high-resolution 1.3 GHz WPR, a 1.3 GHz WPR operated by National Institute of Information and Communications Technology has been utilized. The WPR is referred to as LQ-13. Capability of RIM and oversampling (OS) were implemented to LQ-13. In order to implement ACS capability, auxiliary subarrays for receiving clutters were installed to LQ-13. ACS system developed aims at implementing ACS capability to existing WPRs. In 2017, new 1.3 GHz boundary layer radar, which is operated by Disaster Prevention Research Institute, Kyoto University and is referred to as LQ-7, was installed in Kobe, Japan. LQ-7 has capability of RIM and OS. An ACS system similar to that for LQ-13 was installed to LQ-7.

We expect that measurements using high-resolution 1.3 GHz WPR and other instruments contribute to clarify dynamical processes in the atmosphere. At the meeting, details of high-resolution 1.3 GHz WPR are presented.