

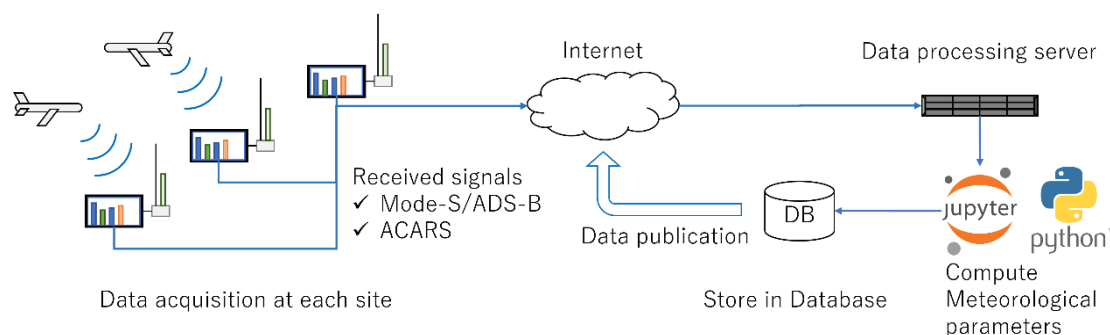
Development of a novel Meteorological observation system using the air traffic control protocol for commercial aircrafts

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Abstract

We introduce a novel meteorological observation technique using air traffic control protocol for commercial aircraft. The method is based on airborne digital radio communication protocols for air traffic control named Secondary Surveillance Radar (SSR) Mode S and Automatic Dependent Surveillance – Broadcast (ADS-B). They are relatively new protocols that started in 2007 and are now widely used in many commercial flights. The communication via SSR Mode S and ADS-B includes parameters about the position, direction, speed, and attitude of aircraft, which are computed from measurements of their surrounding atmosphere. Hence, they can be regarded as in-situ measurements of the atmosphere like those obtained by Radiosondes, and we can reconstruct atmospheric parameters such as wind speed/direction and temperature by receiving these signals at ground stations.

To implement the meteorological observation system using SSR Mode S and ADS-B, we developed small and cheap Raspberry Pi-based receivers and a data processing server connected via the internet. The whole system is called “atc2met,” and the schematic diagram is shown in the figure below. This atc2met system aims to be a complementary data source for the existing AMDAR (Aircraft Meteorological Data Relay) system by WMO. We currently have two sites at Yokosuka (JAMSTEC) and Shigaraki (MU observatory) in Japan. Several airports in Indonesia are planned to be equipped with the atc2met system in the future.



This presentation shows the development status of the whole system, followed by preliminary results of the measured vertical profiles of winds and temperatures.