Assimilation experiments of SSR mode-S downlink data of aircrafts

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The positions of aircrafts and the data on the aircrafts, such as true track angle, ground speed, true air speed, magnetic heading and Mach number, are obtained by sending the data requests to individual aircraft from the new type air traffic control radar. The data on aircrafts converted to the horizontal wind and temperature is very dense data, because the temporal interval of data from many aircrafts is as short as 10 seconds. The data of aircrafts at climb and descent provides the dense vertical profiles of horizontal wind and temperature near the airports. These high frequent and dense data are expected to be effective assimilation data for the prediction of heavy rainfalls and local heavy rainfalls, because the wind data influences the positions of rainfall regions.
The mode-S data obtained from the experimental SSR mode S system of the Electronic Navigation Research Institute on 14th Aug. 2015 was assimilated by meso-NAPEX system. On 14th Aug., the intense convections passed the Kanto plain. The assimilation of mode-S data improved the positions of shear lines and convections. The intensity of the rainfalls became similar to the observation. These results indicate that the vertical profiles of horizontal wind converted from mode-S data are useful assimilation data for the improvement of the prediction of the rainfalls caused by convections.

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