International Session (Oral) | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-CG Complex & General

[A-CG06_29PM2]Satellite Earth Environment Observation

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In recent years, we cannot avoid facing issues on global environmental changes that occur in various spatiotemporal scales. The earth environmental observation data by satellites became the necessary basic data to tackle and solve those issues. Due to the recent advancement in the observation sensor technique and the data processing technique, the satellite observation has been showing rapid progress, and the time is changing from examining the accuracy of the observation sensor data to the advancement of the data application, leading to broaden potential users. Although earth environmental remote sensing studies tended to be discussed separately in the individual conference so far, in these days where application became synergetic, we comprehensively pick up this topic in the Atmospheric and Hydrospheric Sciences Session of this Union Meeting that enables to comprise the atmospheric, oceanic and land sciences; by combining the intelligence and the knowledge of the party, we propose a session that aims to prompt further studies towards the issues on earth environmental change and the advancement in the data application.

5:45 PM - 6:00 PM

[ACG06-P02_PG]A potential map of precipitation area using the geostationary meteorological satellite for the GSMaP

3-min talk in an oral session

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The Global Satellite Mapping of Precipitation (GSMaP) produces accurate precipitation data with high time and spatial resolution (per 1hour, 0.1 degree) by utilizing the satellite microwave radiometer. At the time and place which all microwave radiometer satellites are not available, the GSMaP estimates where the precipitation area observed before that time will moves by using a cloud moving vector retrieved from the infrared brightness temperature (IR Tb) observed by the geostationary meteorological satellite (GMS) (GSMaP_MVK, GSMaP_NRT; v5.222.1). However this method has some

possibility of missing the convective precipitation which develops quickly (Ushio et al. 2009), and uses only IR1 channel (10.5~11.5μ m) of the GMS observation to calculate the cloud moving vector. Therefore, this study made more accurate data of estimated precipitation area by using multi-channel GMS observation, called potential map, and then improved the accuracy of GSMaP_MVK and GSMaP_NRT precipitation areas by utilizing the potential map.As a precipitation area index of the GMS, we used difference of the Tb between IR1 channel and water vapor (WV) channel (6.5~7.0μ m). This index is based on the assumption which a deep convective cloud with precipitation probably occurs at the area with a small Tb difference of IR1 and WV (Ohsawa et al. 2001). Moreover since almost all of geostationary satellites have the IR1 and WV channel, the index is available globally on a long-term basis. We used near surface rain observed by the precipitation radar of the Tropical Rainfall Measurement Mission (TRMM) (PR; 2A25, V7) and the rainfall intensity retrieved from ground-based precipitation radar of Japan Meteorological Agency (JMA) as the truth of the precipitation area and converted the Tb of the GMS to the probability of precipitation with simultaneous observation between the GMS and the precipitation radar.At first we compared the precipitation area obtained from the GSMaP and the precipitation radar, and found that the GSMaP_MVK overestimated the precipitation area over the ocean without the microwave observation. And therefore we tried to identify the area which the GSMaP precipitation was less than 1.0 mm per hour and the possibility of precipitation obtained of the potential map was less than 15 % as non-precipitation area. As the result the threat score of the GSMaP_MVK precipitation detection was improved from 0.37 to 0.41 over the ocean without the microwave observation. As it is considered that the threat score of GSMaP_MVK with the microwave observation is 0.45, this improvement is regarded as significant. On the other hand, the GSMaP_NRT underestimated the precipitation area over the land and coast without the microwave observation. And then we identified the area which the potential map was more than 40 % as precipitation area. As the result the threat score of the GSMaP_NRT was much improved from 0.27 to 0.34 over the land and coast without the microwave observation. In these areas and conditions, we can expect that the GSMaP estimates the precipitation area more accurately by utilizing the potential map.