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Assimilation experiment of the GPS-driven water vapor observations on the local heavy rainfall event in Okinawa

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A meso convective system was initiated around 14 h on 19 August 2009 on the south sea of Naha, Okinawa island. After that, a small cumulonimbus, about 2 km x 2 km square, was initiated on the north of that system. This cloud rapidly induced freshet in small Ga-bu river in Naha. This freshet swept away 5 persons who constructed a bridge and 4 persons of them were passed away.

For the prediction on this heavy rainfall event, it is necessary to use the initial field with precise water vapor information, especially in the south sea of Naha. To modify the initial field, we conducted the assimilation experiment which assimilated the ground based GPS-derived water vapor observations. In this experiment, we assimilated 3 types of observations, i.e. precipitable water vapor on the GPS observation point, zenith total delay observations, and slant total delay observations to the GPS satellites (STD), and investigated the impact of the 3 h rainfall forecasts. The results showed that the assimilation of STD provided the best rainfall forecast, because the assimilation modified the water vapor distribution of the sea around Okinawa island.

Keywords: Data Assimilation, GPS, slant delay