

Maejima, Y., T. Miyoshi, M. Kunii, H. Seko, and K. Sato, 2019: Impact of dense and frequent surface observations on 1-minute-update severe rainstorm prediction: A simulation study. *J. Meteor. Soc. Japan*, **97**, <https://doi.org/10.2151/jmsj.2019-014>.

Plain Language Summary: This study aims to investigate the potential impact of surface observations with a high spatial and temporal density on a local heavy rainstorm case that caused five fatalities in Kobe, Japan on July 28, 2008. The control experiment (CTRL) assimilates only the phased array weather radar (PAWR) data, and two sensitivity experiments are performed to investigate the impact of additional surface observations obtained every minute at 8 (S8) and 167 (S167) stations in Kobe. The results show that the dense and frequent surface observations have a significant positive impact on the analyses and forecasts of the local heavy rainstorm (Fig. 1).

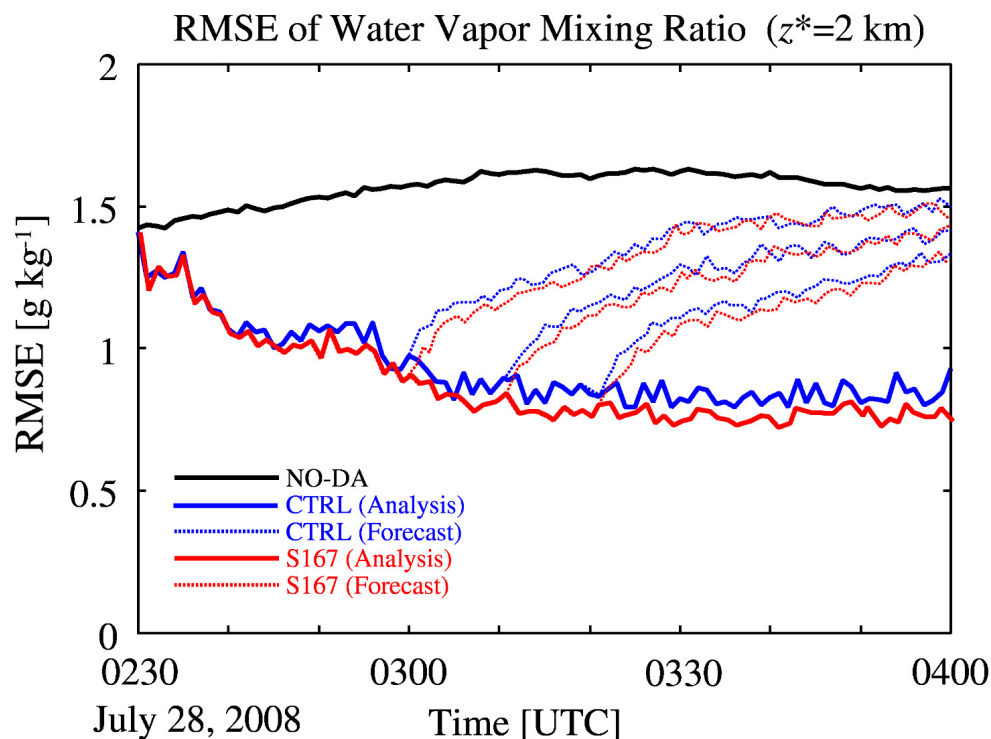


Figure 1. Time series of RMSE for water vapor mixing ratio [g kg^{-1}] at $z^*=2$ km. Black, blue and red lines correspond to NO-DA, CTRL, and S167, respectively. Full and broken lines show the analysis and forecast RMSE, respectively.

- The dense and frequent surface data assimilation improved analyses and forecasts of surface temperature, moisture and convergence.
- The number of the surface data is relatively small, but they provide important observations about lower atmospheric conditions that are generally more difficult to observe by remote sensing instruments.