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Examination of observation and model error for all-sky infrared radiance assimilation

Characterizing and modeling of cloud dependent observation error covariances are crucial to all-sky infrared radiance assimilation. Our previous studies demonstrated a cloud dependent observation error model using a symmetric cloud effect parameter performed well to assimilate all-sky infrared radiances of Himawari-8. We developed a diagonal observation error covariance that was inflated with the cloud effect parameter. However, detailed characterization and modeling of cloud dependent observation error correlation is under investigation.

We also found significant forecast model bias due to considerable deficit of high cloud and observation biases due to overestimated absorption in radiative transfer calculation in the global data assimilation system. The detrimental effects of these biases can be alleviated, to some extent, by quality control procedures and the observation error model. However, it seems that these treatments are not sufficient and development of bias correction is necessary. We are examining some approaches of sampling and predictors for bias correction.

We would like to discuss how to handle these errors based on what we have examined and participants' experience.

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