



## **Constrained bias correction for satellite radiance assimilation in the presence of model bias**

Wei Han

Numerical Weather Prediction Center, Chinese Meteorological Administration, Beijing, China (hanwei@cma.gov.cn)

Radiance bias correction is a very important and necessary step in the proper use of satellite observations in a data assimilation system. Variational bias correction (VarBC) is an adaptive bias corrections for satellite radiances which need to separate the observation bias from the systematic errors in the background in order to prevent the analysis from drifting towards its own climate. It shows some skill in distinguishing between the background biases and the observation biases when other unbiased observations are available and sufficient to anchor the system. When there are significant model biases and seldom unbiased observations in the assimilation process (e.g. ozone in the stratosphere), VarBC will force agreement with the biased model background. A Constrained VarBC (CVarBC) is proposed using prior knowledge and radiometric uncertainty information of the channel in this study in order to avoid the drift of observation bias correction to the biased model background. It is some kind of regularization techniques in inverse problems. The theoretical study of this method is firstly demonstrated by a toy model and then is applied to the real case of bias correction for satellite radiance assimilation. Finally the summary and conclusions are presented.