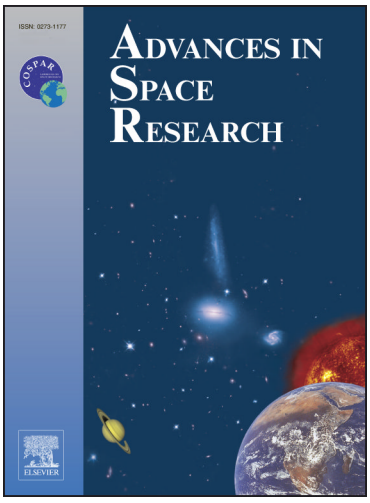

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The impact of different background errors in the assimilation of satellite radiances and in-situ observational data using WRFDA for three rainfall events over Iran

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Keywords

Satellite Radiance Data; Data Assimilation; Background Error; Precipitation and Temperature Forecasts; Numerical Weather Prediction

Abstract

Satellite radiances and in-situ observations are assimilated through Weather Research and Forecasting Data Assimilation (WRFDA) system into Advanced Research WRF (ARW) model over Iran and its neighboring area. Domain specific background error based on x and y components of wind speed (UV) control variables is calculated for WRFDA system and some sensitivity experiments are carried out to compare the impact of global background error and the domain specific background errors, both on the precipitation and 2-m temperature forecasts over Iran. Three precipitation events that occurred over the country during January, September and October 2014 are simulated in three different experiments and the results for precipitation and 2-m temperature are verified against the verifying surface observations. Results show that using domain specific background error improves 2-m temperature and 24-h accumulated precipitation forecasts consistently, while global background error may even degrade the forecasts compared to the experiments without data assimilation. The improvement in 2-m temperature is more evident during the first forecast hours and decreases significantly as the forecast length increases.

1. Introduction

Iran is located in a mountainous area in southwest Asia with a complicated topography containing Alborz and Zagros mountain ranges. The country is a semi-arid to arid area with Persian Gulf and the Caspian Sea located in southern and northern Iran. This complexity makes the numerical weather prediction over Iran quite challenging. Precise prediction of atmospheric