

The standard and Polar version 3.1.1 of the Weather Research and Forecasting (WRF) model, both initialized by the ERA-40 re-analysis, were run in the Antarctic region for July 1998. Two different land surface models (5-layer thermal diffusion and Noah) were used to test the sensitivity of the standard WRF to land surface parameterizations. The considered quantities were 2-m temperature and surface pressure. Moreover, the performances of the standard and the Polar version were compared. The model results were validated against SYNOP weather observations from nine coastal and one inland station (Vostok).

Three nine-day experiments did not reveal significant differences in the error growths of the standard WRF with the Noah LSM and the Polar WRF. However, the standard WRF with the 5-layer diffusion LSM quickly developed a considerable negative temperature bias. The standard WRF showed thus great sensitivity to the choice of land surface parameterization in the Antarctic winter conditions. Employing the Noah LSM the standard WRF gave a better average 30-day temperature simulation for the reference stations than the Polar WRF. On the coldest station, Vostok, the standard WRF succeeded better than the Polar WRF which developed a strong positive temperature bias. The least biased surface pressure simulation was produced by the Polar version of the model but the respective correlation values were weaker than the ones achieved with the standard version.