P31 Recent Improvements in subgrid-scale cloud parameterizations in the Rapid Refresh and High-Resolution Rapid Refresh

Kenyon, Jaymes, Joseph B. Olson, *Cooperative Institute for Research in Environmental Sciences (CIRES),* John M. Brown, *National Oceanic and Atmospheric Administration (NOAA)*, Wayne M. Angevine, *CIRES*, Greg Thompson, *National Center for Atmospheric Research,* Georg Grell *NOAA,* and Saulo Freitas, *National Institute for Space Research, Brazil*

The 13-km Rapid Refresh (RAP) and 3-km convection-allowing High-Resolution Rapid Refresh (HRRR) are hourly-updating, WRF-ARW-based forecast models that support short-range forecasting interests within the United States. Experimental versions of these models have shown forecast performance gains over predecessor versions, in part, due to enhancements to the Mellor–Yamada–Nakanishi–Niino (MYNN) planetary boundary layer (PBL) scheme and the Grell–Freitas–Olson (GFO) shallow-convection scheme. These enhancements have provided an improved representation of subgrid-scale shallow cumulus clouds, along with better coupling of this information with the radiation parameterization.

Recent work has sought to further improve the treatment of subgrid-scale clouds by incorporating statistical cloud parameterization options within the MYNN PBL scheme. These parameterizations seek to provide statistical descriptions of subgrid-scale cloud properties, from which fractional cloud cover and subgrid-scale cloud condensate are obtained. Test results using various statistical schemes, applied to shallow-cumulus and stratiform cloud cases, will be shown, along with comparisons with a relative-humidity-based cloud scheme. Informed by these test results, an experimental cloud parameterization has been implemented in a real-time experimental version of the HRRR. Forecast verification metrics of solar irradiance and cloud ceiling from this experimental model, which have particular importance for renewable energy and aviation applications, will also be presented.