National Analysis System

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Abstract

National Analysis System, NAS, is essentially a response to internal customers' requirements to provide a rapid and frequent update on the current state of the atmosphere in order to increase situational awareness, particularly in an advent of extreme meteorological conditions. For this purpose, Australian Bureau of Meteorology is developing a high-resolution limited area cycling suite, for a domain covering entire Australia at 2.2 km of horizontal grid spacing and 80 vertical levels. This suite is to a large extent based on existing implementations of an hourly cycling 4D-Var suite for limited area applications. This latter concept constitutes a backbone of the new system, while essential additions consist in supplementary 3D-Var analyses performed using low-latency observations. The 3D-Var processing comes in two steps, a standard step which adjusts large scales and an additional step for which errors of conventional observations are tuned. This second step limits smoothing and provides 3D-Var overfitting objective analyses with a closer match to those observations which are considered reliable and representative, rather than achieving a balanced analysis created for the purpose of initialising a weather forecast. In this presentation we propose to illustrate the new system and its applications. We will start with a brief description of NAS and its components. The observations taking part in various analyses will be listed as well as their numbers and timeliness. In the context of case studies three types of analysis increments shall be illustrated. The added value of the overfitting 3D-Var will be discussed alongside modifications to the observation error. Cross-validation verification results will be presented.

Keywords: variational analysis, rapid update, observation error tuning, cross validation

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