

## **Development of a Framework for Systematic Model Diagnosis**

There are numerous centres in India where standalone Atmosphere/ Ocean/ Land surface/ Coupled models are in use and or development. These models are used for various purposes ranging from operational weather prediction, seasonal forecasting, and climate change runs etc.

Common problems with modelling centres in India are: a lack of awareness of global data standards, meta-data standards, diagnostic frameworks and modern programming tools. Modern tools such as CDAT based on Python programming language when combined with data/metadata standards have proven their use in many modelling centres around the world. We propose to build such a diagnostic framework that will be implemented at the institution with the mandate for research & development on global NWP models in India – NCMRWF. Its use will be demonstrated by enhancing their capabilities in operational as well as research components. This framework will be then be made available to other modelling centres for their use especially an operational centre such as IMD. One of the objectives of the proposed work involves training a small group of students and programmers on global data standards, model diagnosis, and the use of modern tools for automating much of the diagnostics.

### **Objectives**

1. To develop and implement a framework for routine and research diagnostics at NCMRWF. The diagnostic framework and tools that will be used are general enough that they will be appropriate for application to a variety of models from regional meso-scale to long coupled runs of Earth System Models.
2. This framework will be implemented for the Global Forecast Model currently operational at NCMRWF.
3. A prototype framework and diagnostic system will be developed for verification of the model forecast, and to enhance the diagnosis of systematic errors in model simulations as well as the causes of these errors.
4. After demonstration of its feasibility, this diagnostic framework will be enhanced with the consultation of a range of users and made available to other modeling groups in India especially the India Meteorological Department (IMD).
5. Training manpower and dissemination of the technical knowhow and tools developed to a broader audience.