

1. INTRODUCTION

The Japan Meteorological Agency (JMA) started the operation of numerical weather prediction (NWP) in June 1959 after several years of extensive research activities of a Numerical Weather Prediction Group of Japan. That was the third NWP operation in the world, following the Swedish Meteorological and Hydrological Institute (SMHI) in September 1954 and the US Weather Bureau in May 1955. The development of NWP since then has been tremendous. Operational NWP centers, including JMA, have benefited from ever increasing computing power, efficient telecommunication systems, and improved observing systems, especially meteorological and earth-observing satellite systems.

The JMA currently operates a suite of NWP models for very short-range prediction of meso-scale disturbances, and for short- and medium-range prediction of synoptic-scale disturbances. One-month and seasonal forecasts and El-Nino forecasts are issued using results from ensemble runs of global models and an coupled ocean-atmosphere model, respectively. Numerical models are also applied to the prediction of ocean waves, storm surges, sea ice extent, and transport of trace elements including radioactive materials. The reader will find in this report that numerical models are applied to the analysis and prediction of a wide range of meteorological phenomena, and that they constitute the base of meteorological services of JMA.

Various kinds of application products of NWP are also necessary to assist forecasters efficiently in issuing weather forecasts and meteorological warnings. Forecast guidance for several weather elements is prepared by applying Kalman filtering or neural networks to NWP outputs. Very short-range forecasts of precipitation are produced by combining time extrapolation of the latest observed precipitation with outputs from a meso-scale model.

This report is published to present technical details of the operational NWP systems of JMA as of March 2007, as an appendix to "WMO Technical Progress Report on the Global Data-Processing and Forecasting System (GDPFS) and Numerical Weather Prediction (NWP)". The JMA has a plan to introduce a global model with a horizontal resolution of 20 km and an ensemble prediction system for typhoon track forecasts in the near future. A four-dimensional variational assimilation (4D-Var) system for the meso-scale model will be upgraded to be based on a non-hydrostatic model. The reader will find updated information on the NWP systems of JMA on a WMO Distributed Data Bases (DDBs) server managed by JMA and in the WMO Technical Progress Report on GDPFS/NWP that is issued every year.