OUTLINE

OF

THE OPERATIONAL NUMERICAL WEATHER PREDICTION

AT

THE JAPAN METEOROLOGICAL AGENCY

Appendix to WMO Technical Progress Report on the Global Data-processing and

Forecasting System (GDPFS) and Numerical Weather Prediction (NWP) Research

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JAPAN METEOROLOGICAL AGENCY

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Preface

The Japan Meteorological Agency (JMA) started the operation of numerical weather prediction (NWP) in June 1959 after several years of extensive research activities of the 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 better understanding of meteorological phenomena, improved modeling techniques, increasing computing power, efficient telecommunication systems, and improved observing systems, especially meteorological and earth-observing satellite systems. The purpose of NWP is wide-ranging and various NWP systems have been developed and operating in JMA.

This report is published to present technical details of the operational NWP systems of JMA as of March 2021, as an appendix to "WMO Technical Progress Report on the Global Data-processing and Forecasting System (GDPFS) and Numerical Weather Prediction (NWP) Research".

The first chapter provides an overview of the configurations and specifications of the current computer system at JMA. Thereafter follows a description of the operational suite and the operational job management system on the current computer system. The second chapter deals with three major data assimilation systems for atmospheric fields, namely, Global Analysis, Meso-scale Analysis and Local Analysis including the observation data used in these analyses. Data assimilation systems for snow depth and soil moisture is also described in this chapter. A description on the JMA Climate Data Assimilation System as well as more aspects on data assimilation is given in this chapter.

The third chapter describes 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. The regional deterministic and ensemble prediction system is used especially for heavy rainfall associated with mesoscale convective system which causes severe disaster in Japan. The global model is used in ensemble prediction systems for the typhoon forecast, one-week and one-month prediction, and the coupled ocean-atmosphere model is employed for the seasonal forecast and El Niño forecast. An atmospheric transport models are applied to the prediction of transport of trace elements such as radioactive materials, Yellow sand (Aeolian Dust), stratospheric ozone and volcanic ash for environmental information. The fourth chapter explains various kinds of application products of NWP such as weather charts, gridded data products, very-short-range forecasting of precipitation, hourly analysis in wind and temperature, guidance for short-range forecasting, products for aviation services, products of ensemble prediction systems and atmospheric angular momentum functions. The last chapter is on ocean models, specifically ocean wave models, storm surge models, a sea ice model and an oil spill prediction model as well as sea surface temperature analysis systems and ocean data assimilation systems.

JMA is working forward a further developments to improve the accuracy of NWP systems . The reader will find updated information on the NWP systems of JMA on the website of JMA <https://www.jma.go.jp/jma/en/Activities/nwp.html> and in the WMO Technical Progress Report on GDPFS and NWP Research that is issued every year.

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