Summary

Highly information-oriented society today demands more accurate and detailed weather forecasts, warnings and advisories. According to the eighteenth report of the Meteorological Council in view of above situation, Japan Meteorological Agency(JMA) made a plan that weather forecasts would be issued three-hourly for every 20-km square area, and weather advisories and warnings be issued in as much detail as possible.

Timely and precise correction of numerical predictions and forecast guidance outputs based on the actual observation is indispensable for these reliable fine meshed forecasts. However, this correction is rather difficult for each individual forecaster to do appropriately. New techniques are required to help forecasters make an objective modification of these outputs.

This report deals with a part of the project, which is called Applied Study on Objective Weather Forecast Techniques. Chapter one is introduction, which describes the background and purpose of this study, the history of objective forecast, and problems on the Model Outout Statistics(MOS) guidance outputs. Chapter two describes the machine learning techniques, especially the incremental learning methods, for example, Artificial Neural Networks which modify the numerical prediction data using the newly given observational data, the automatic producing of the Decision Tree with ID3 algorithm and the Entropy Net which converts Decision Tree to Neural Network and adjusts Decision Tree parameters using Neural Network learning algorithm. Chapter three describes an expert system that converts experiential knowledge and meteorological knowledge on meso -scale phenomena processed into a knowledge base that can be processed with computer. Chapter three also describes the techniques to objectively established criteria of rules of knowledge base and their reliability, and those to objectively combine the rules.

Chapter four describes the algorithms for precipitation nowcasting focused on detailed analysis using radar and raingauge data. N.Noguchi described Chapters one and three, K.Koizumi Chapter two, and Y.Makihara Chapter four. The authors would like to apologize for readers' inconvenience since papers, parts of which were introduced in other publications in advance, were assembled in their original languages into this report.