

INCS: INTEGRATED NOWCASTING SYSTEM

C. Landry¹, J.-F. Deschenes¹, L. Huang², G. Isaac², L. C. Nguyen¹, D. Talbot¹, J.-P. Talbot¹

¹MSC, Development Branch, Meteorological Systems,

Canadian Meteorological Centre, Dorval, Québec, Canada

²MSC, Cloud Physics and Severe Weather Research Section

Downsview, Ontario, Canada

ABSTRACT

The Meteorological Service of Canada (MSC) has implemented in 2005 a prototype version of the Integrated Nowcasting System (INCS) into the *Scribe* forecast production tool. This system was design to allow forecasters to consult and integrate real-time observations and nowcasting data directly in the operational forecasting production tool. Until recently, no significant improvements have been made on the prototype. However, feedbacks from the users provided indications on what development was needed to address issues related to the interaction with the data and the reliability of the weather elements. A description of the recent modifications to the system as well as objective verification results will be presented.

1. INTRODUCTION

Since 2004, the Meteorological Service of Canada (MSC) has implemented an Expert System Forecast Production Tool called SCRIBE (Verret et al, 1993). All Canadian Storm Prediction Centers (SPC) are using this system to produce the weather forecast products (Public, Marine, and Air Quality) for the country.

The SCRIBE system (see black boxes in fig. 1) uses as input a selection of Numerical Weather Prediction (NWP) model and post-processing statistical forecast variables. A rules-based system analyzes all the data and prepares a coherent set of weather elements or "Best Guidance" for an ensemble of Canadian forecast points. This Best Guidance will be use by operational forecasters as a base line to prepare the official forecasts.

Consequently, all the weather elements available in the Guidances are only based on model data. Therefore, the Guidances are totally unaware of the recent weather events. Thus, forecasters have to intervene by making adjustments to merge the SCRIBE weather elements with the current observations.

To compensate for this weakness, a nowcasting prototype system, named "Integrated Nowcasting System" (INCS) has been implemented in 2005 to offer an additional guidance based on current observations and very short term forecast techniques. The INCS is capable of ingesting surface, radar and lightning observations and producing a very short range forecast for about 500 forecast points in Canada.

Since the implementation of the INCS, feedbacks from the operational forecasters have indicated that the system needs to be improved to increase its usefulness in the forecast process. Recent development activities have tried to address this issue.

2. DESCRIPTION OF THE SYSTEM

The INCS (see red boxes in fig. 1) processes observations and very short range weather forecast data produced by independent nowcasting models. At every hour, a coherent set of weather elements is produced by the INCS and sent to every SPC. Forecasters can use this recent information to update the "Best Guidance" produce by SCRIBE, or the forecast on which they are working on.

The observation data sets contain the surface weather (METAR, SPECI, and SYNOP), the radar and lightning observations. Radar data has been recently removed to wait for cleaner products. The satellite data are not processed yet, but experiments are under development to integrate diagnostic fields from Satellite Application Facilities (SAF). Quality control algorithms are used to detect any erroneous weather elements in the surface observation messages.

The forecasted data that are processed by the INCS come from radar and the lightning extrapolating systems, NWP models and post-processing statistical forecasts. The Radar forecast is based on the MAPLE (McGill Algorithm for Precipitation Langrangian Extrapolation; Zawadski, I. & All) algorithm. A statistical method called "PubTool" (Bourgouin, P. MSC-CMC, 2004) is used to produce a probability of occurrence for different weather element categories. Other nowcasting systems are currently evaluated such as the Weighting, Evaluation, Bias Correction and Integration System (WEBIS) (Huang, L. & Isaac G.)

All observed and forecasted data are then analyzed by a network of rules where nowcasting principles such as persistency,

bias correction and NWP blending algorithms are applied.

The INCS system runs at CMC at every hour. The final product is a matrix containing a coherent time series of weather elements populated by seven hours of observations and followed by a 12 hours forecast. The time resolution is one hour compared to three hours in the regular SCRIBE matrices. When ready, the Nowcasting Matrices are sent to all SPC's SCRIBE systems to be processed and formatted for being displayed on the working interface. The INCS weather elements are produced for more than 500 stations over Canada and are available about 25 minutes after the hour.

3. RECENT DEVELOPEMENT

Supported by objective verification results, recent developments have shown improvement for most forecasted weather elements. This result was achieved by integrating additional NWP runs and statistical forecast variables and by adjusting the rules-based system. Also, the interaction between the user and the INCS data was improved by adding more reliability and configurability to the INCS Scribe interface. The latest improvements and performances will be presented.

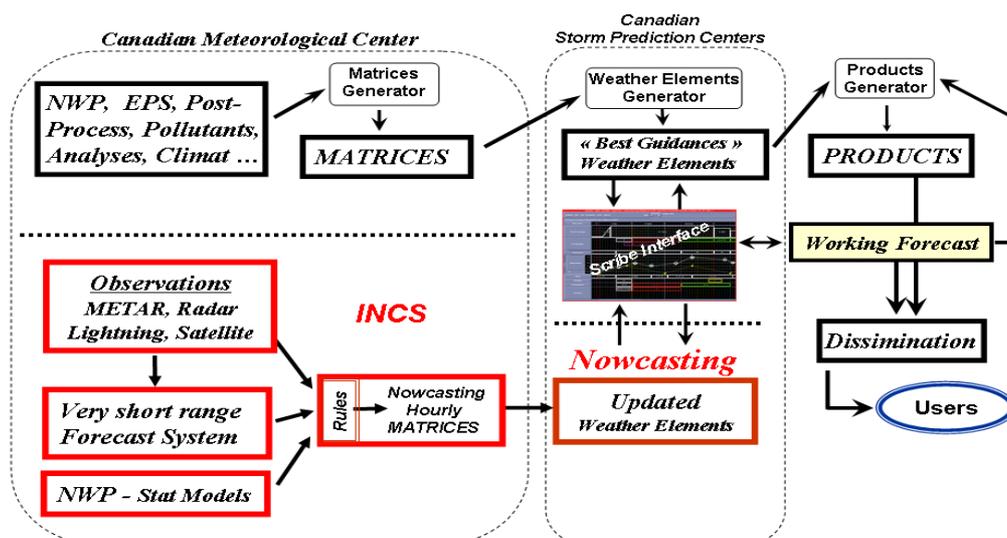


Fig. 1. Scribe system (black boxes) and INCS (red boxes) diagram.