

STRATEGIC NETWORK DESIGN: THE CHALLENGE TO MEET NOWCASTING NEEDS

Jim Abraham, Mike Manore, Bill Scott and Rodica Nitu¹

¹Meteorological Service of Canada

ABSTRACT

The Meteorological Service of Canada (MSC) is responsible for design and operation of environmental monitoring networks to meet the needs of weather, water, climate services for Canada. This is challenged by budget limitations in the face of deficit reductions, in very large country with significant remote areas, and a harsh climate with variety of threatening summer and winter weather hazards.

The monitoring program recently developed a strategic plan as a framework for responsible decision-making, and consistent with ISO9000 certification, to ensure the needs of the clients are met. While external clients include the general public, other government departments and levels of government, and academia, the priority of the Strategic Plan and related network design is to meet the needs of the operational forecast and warning program. While monitoring is foundational to data assimilation and numerical weather prediction, much of the in-situ and remote-sensing observing program is intended on meeting the nowcasting needs of the Storm Prediction Centres.

The Strategic Plan comprises two broad components; sustainability and advancement. The sustainability component focuses on the operation and life-cycle management of the core network, the related data management system, and the recruitment and retention of qualified engineering and technological staff. The advancement dimensions include taking advantage of non-conventional data and partnered networks, as well as science and technological developments to better meet client needs, in particular nowcasting.

It is recognized that nowcasting applications require data of high data quality, high spatial and temporal resolution. The Canadian Strategy includes using data from partners in a Networks of Networks concept to satisfy the spatial requirement. Using disparate technology requires inter-comparison studies and the application of data management principles to understand the data quality issues. A modernized Data Management System, retiring legacy systems, and enabling ingest of third-party data, is a key objective. To meet the high temporal resolution, and further satisfy spatial demands, remote sensing and novel technologies need to be considered.

For the 2010 Winter Olympic Games, a network of Automated Weather Stations had been developed in support of the games, with real time reporting at 15 minute intervals to meet the demands of high resolution nowcasts and forecasts. In addition, advanced sensors were deployed to further meet the nowcasting demands, as well as to facilitate the development and verification of high resolution numerical prediction models. Feedback from users confirmed the utility of the weather services provided for logistical and specific event and venue planning. Nevertheless, the measurement of solid precipitation using automated instrumentation remains extremely challenging.

Very recently, recognizing the importance of cryospheric change has on the sustainability of buildings, road, coastal and runway infrastructure in the North, Arctic marine shipping and water

resource management, the World Meteorological Organization has endorsed the development and implementation of the Global Cryosphere Watch. Snowfall and snow cover comprise an important component of the cryosphere.

Recognizing the importance of solid precipitation measurements, and the challenges related to automated measurements, the WMO Commission for Instruments, Methods, and Observations (CIMO) has launched the 2nd Solid Precipitation Inter-Comparison Experiment (SPICE). Canada has agreed to exercise a leadership role in the SPICE initiative, building on the lessons learned from the 2010 Olympic Games, and recognizing the priority within the Global Cryosphere Watch. Similarly, Canada has identified the WMO Radar Quality Control and Quantitative Precipitation Estimation Project (RQEI) as of fundamental importance to our observing and nowcasting challenges as we prepare to modernize our radar network. The upcoming 2015 Pan Am Games in the Toronto area will be a suitable opportunity to improve the detection and short-term prediction of significant weather using dual-pol radar and total lightning sensor technology.

This paper will describe the steps taken to implement the Strategic Plan, the experience gained from the 2010 Winter Olympics, and the successful recent receipt of additional funding to support the monitoring infrastructure. Finally, we will share the plans for improved snow measurements as part of WMO SPICE, as well as a peek at the observing plans in preparation for the 2015 Toronto PanAm Games.