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Canada

Environment
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Vigilance Map: Risk Communication Tool

**- From Regional Pilot Project to National Project
Presented at
Second Experts Symposium on Multi-Hazard Early
Warning Systems (MHEWS-II)**

**Michel Jean et al.,
Meteorological Service of Canada
Région du Québec
Mai, 2009**

Plan

- Introduction Case study
- 1- EC Warnings - Current format
- 2- EC Warnings - Vigilance Map
- 3- GéoCollaboration – Web mapping
- Conclusion... and beyond...

Introduction

« Environment Canada provides weather forecasts and warnings 24 hours a day, seven days a week, to help ***PROTECT*** the safety and security of Canadians and their property ».

EC web site, 2008

Hazard monitoring, forecasting and mandates for warning development

What are the specific mandates of your National Meteorological Service with detection, forecasting and hazard information development ?

Please use the following typology :

- -Type 1 hazards : NMHS has sole mandate for the development of the warning for the hazard
 - -Type 2 hazards : NMHS has joint mandate for the development of the warning for the hazard
 - -Type 3 hazards : NMHS provides information to other agencies that have the mandate for the development of the warning for the hazard
-
- **Environment Canada's Meteorological Service has mandates for:**
 - **Type 1 hazards: all weather and marine hazards, smoke, dust, waterborne and airborne hazardous substances (CBRN, spills)**
 - **Type 3 hazards: floods, drought, avalanche, landslide, mudslide, forest fire**
 - **Mixed type (depending on province): air quality**
 - Whenever there is a cross provincial or international border involved, Federal Government is legally mandated to be involved
 - Transboundary water quantity-quality issues
 - National security considerations
 - **No legislative basis for weather warnings.... Although plenty of references to information and expertise provider in Public Safety Act, Emergencies Act, Federal Nuclear Emergency Plan, National CounterTerrorism Plan, etc...**

Introduction – Case Study

Weather event – Jan 6-10, 2008

- Major mild spell + precipitations

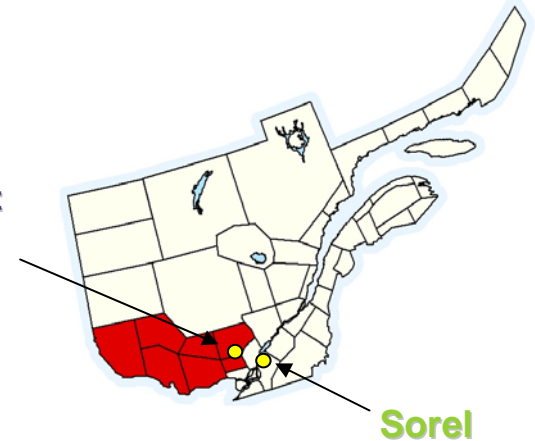
Context

- Above average snow packs

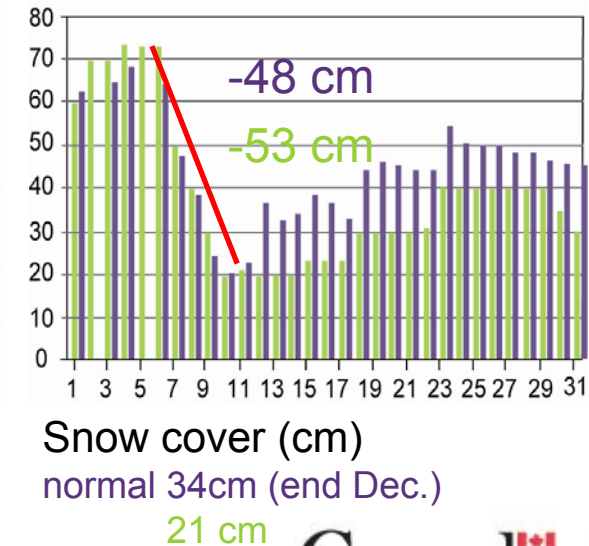
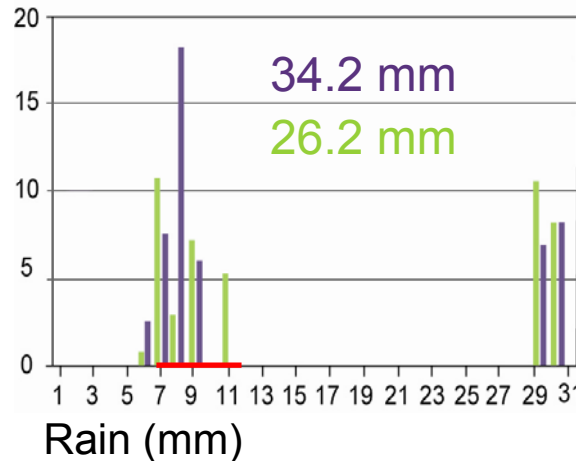
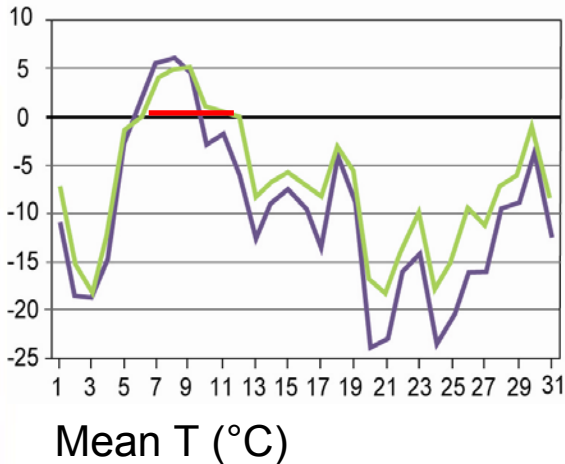
Impacts

- Floods

Saint-Donat



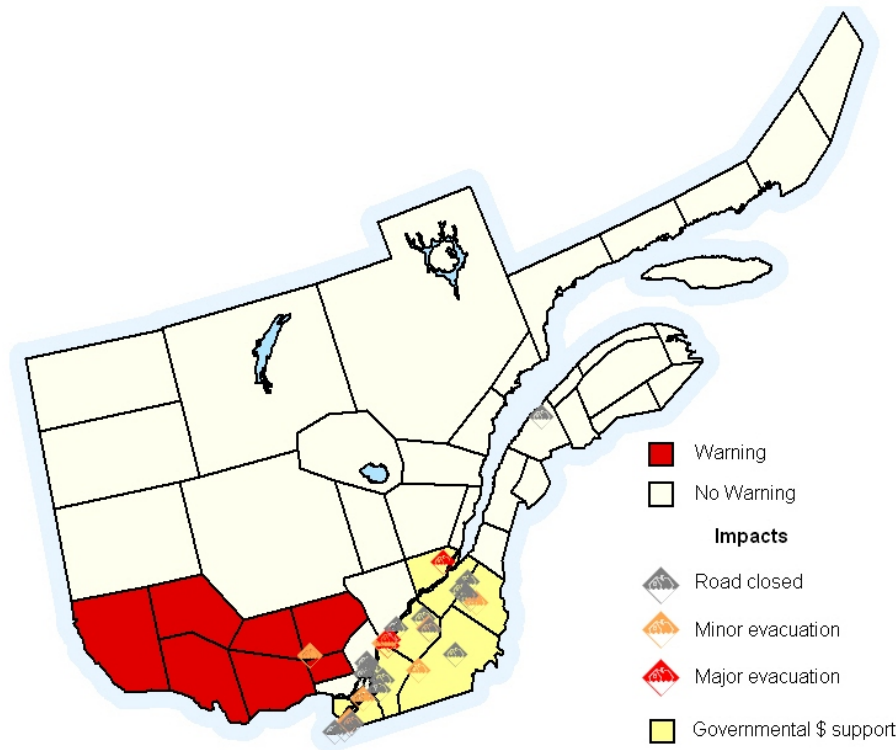
Sorel



Introduction – Case Study

Impacts

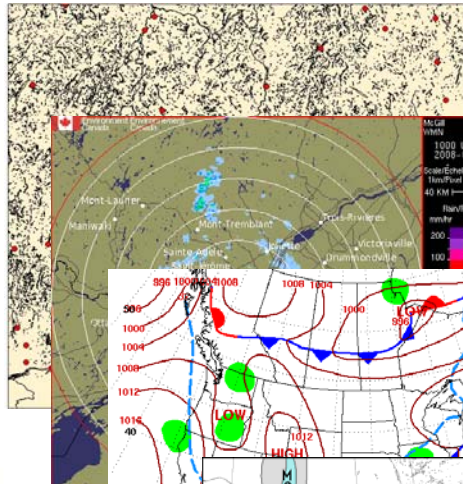
- Floods and evacuations South of the St-Lawrence (~ \$1.5M in claims, ~ 1000 evacuees, 30 municipalities)



Yamaska river, Jan. 8th 08

Warning – Current

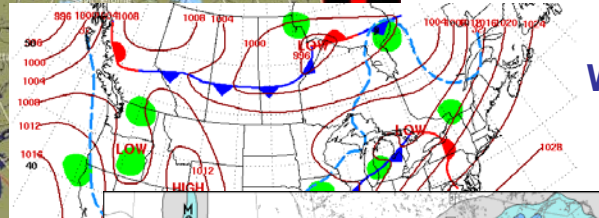
- Information / Knowledge**



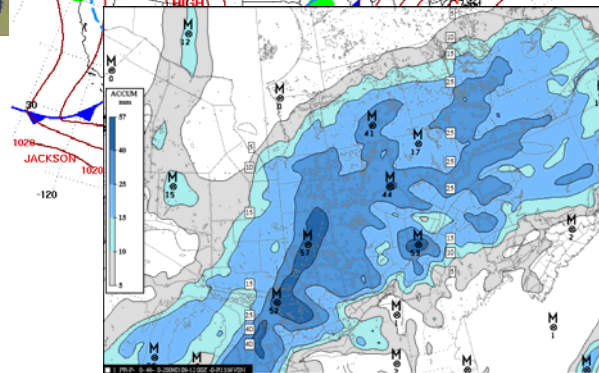
Weather Observations



Accumulated precipitation Radar



Weather chart

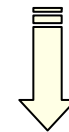


Forecasted accumulation of precipitation (GEM 15 km)

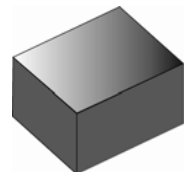
Decision

Warning Set criteria

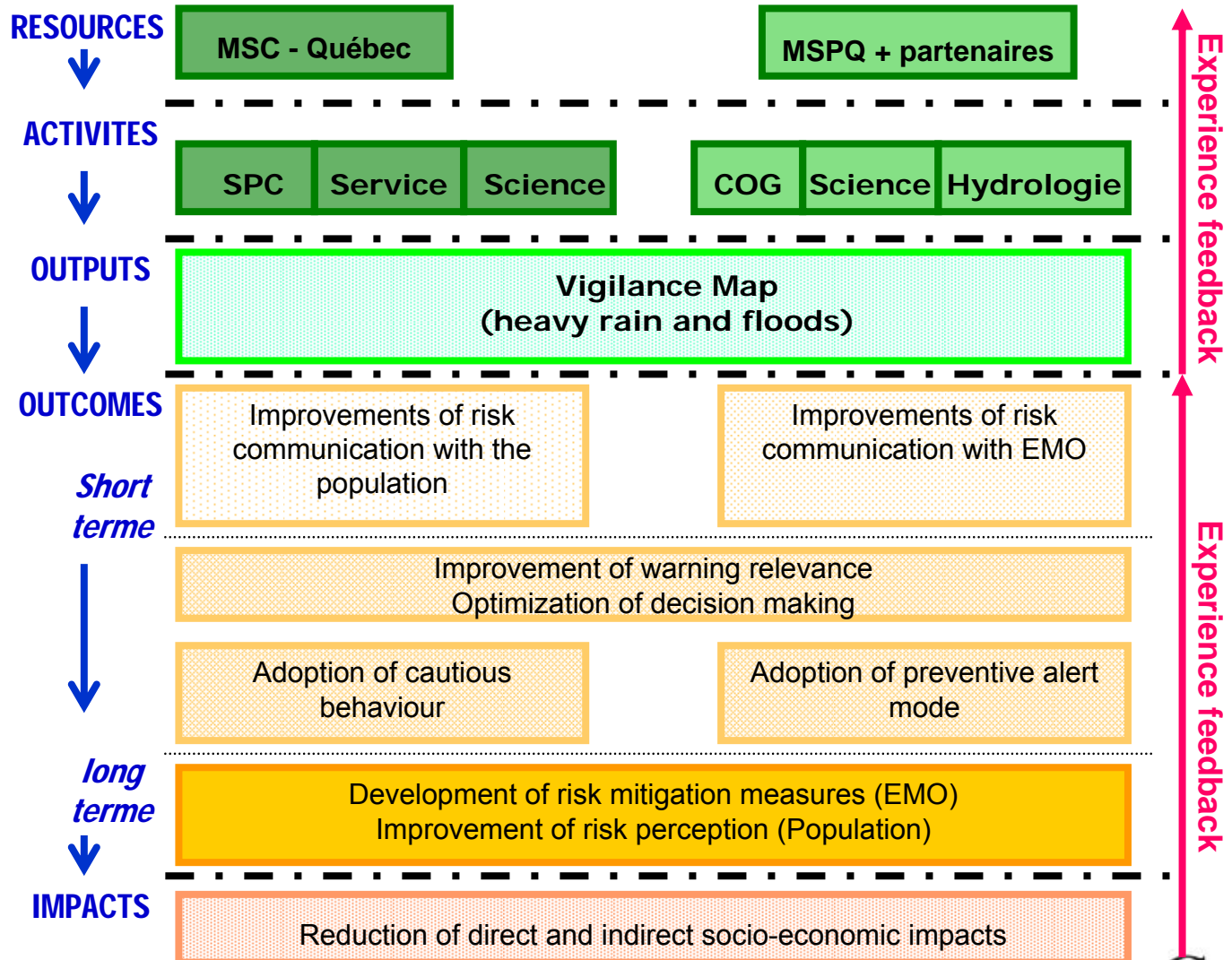
Heavy Rain	(1 May – 30 Nov)
	50mm / 24h
Torrential Rain(Storm)	(1 Dec – 30 Apr.)
	30mm / 24h
Torrential Rain(Storm)	25mm / 1h
	40mm / 3h



Impact Potential

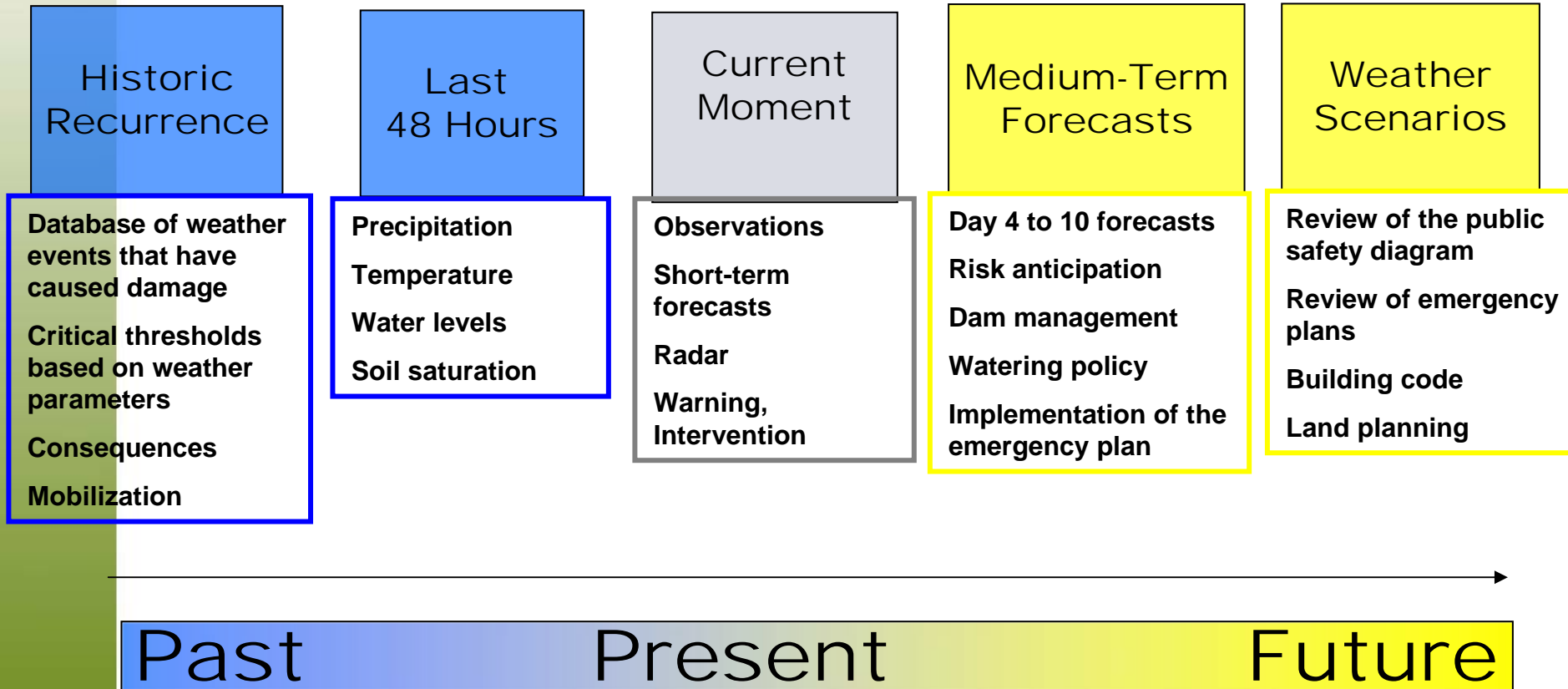


Vigilance Map – Conceptual framework



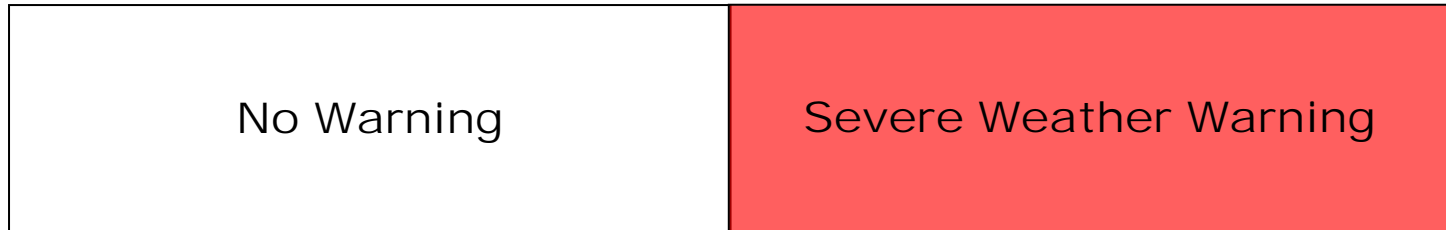
Vigilance Map – Concept

- A forecast that integrates more context

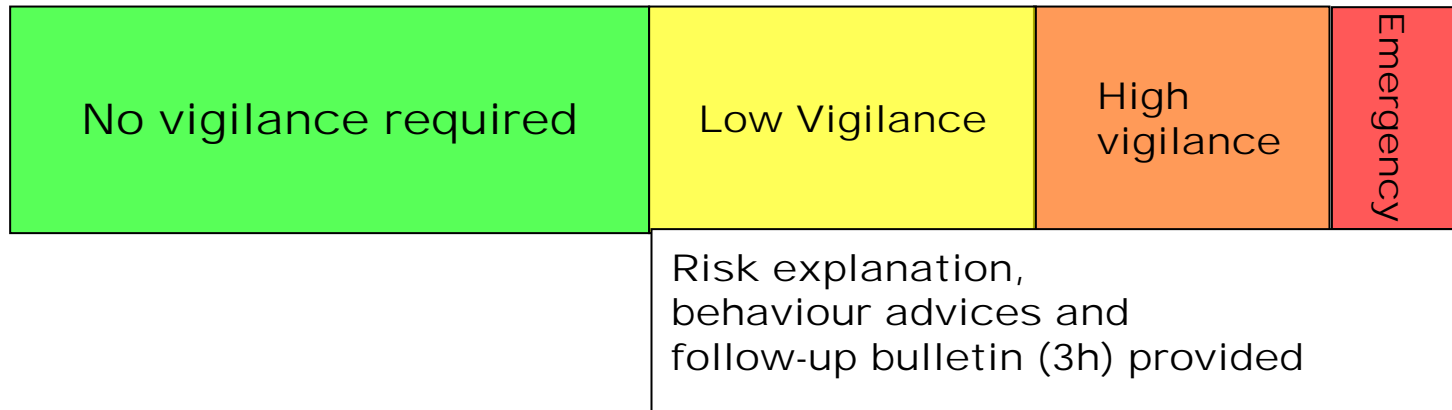


Vigilance Map – Concept

Current warning system



Proposed alternative: Vigilance Map



Warning – Vigilance Map

Information / Knowledge

Decision



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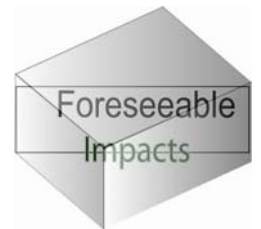
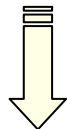
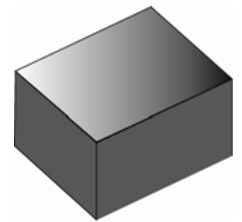
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CaPA analysis

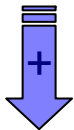
Historic data

Impact
Potential

Potential

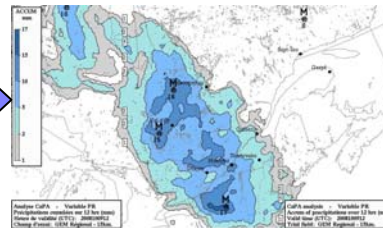
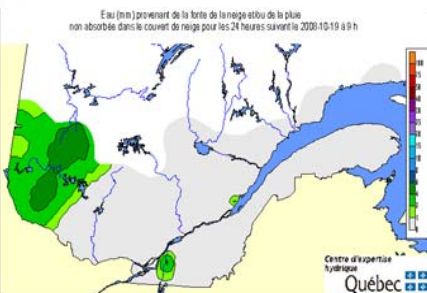


Actually used
information

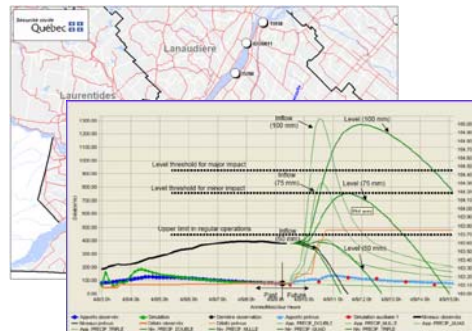


GOC

Runoff potential



Water levels



Ice movement potential



YUL (Year)	Sum DD> 0, (3 days)	Rain (mm)	Impact
2008	18	22,3	
2007	28,2	38,1	Yes/No
1986	7,4	33	Yes/No
1975	10,6	9,4	Yes/No
1946	14,5	2	Yes/No



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Warning – Vigilance Map

- **Communication**

Environment Canada / Environnement Canada

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Weatheroffice
www.weatheroffice.gc.ca

Franglais | Home | Contact Us | Help | Search | canada.gc.ca

Home > Warnings >

Public Weather Warnings for Southern Quebec

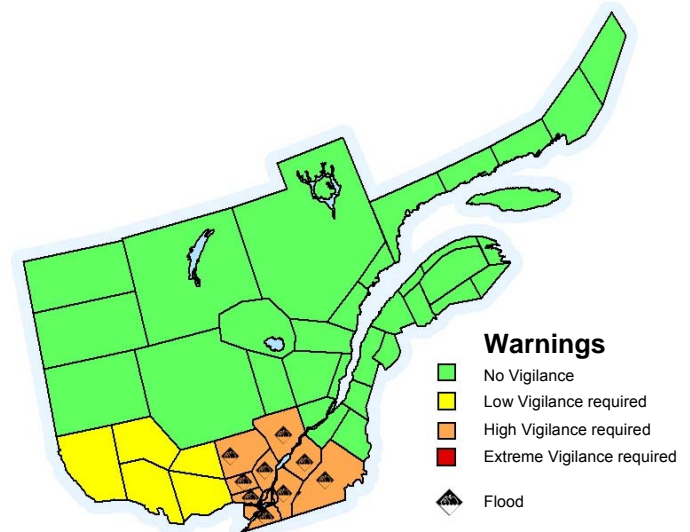
Current Conditions & Forecasts | **Public Warnings** | Marine Warnings | Special Weather Statements

Radar & Satellite +
Marine Info +
Aviation Weather
Analyses & Modelling
Text Bulletins
Historical Weather
Educational Resources +
About Us +
FAQ
Links
Site Map
Proactive Disclosure

Click on a coloured region for the latest warning.

■ Warning
■ Watch
■ Ended warning or watch
■ No warning or watch
■ No forecast service

Vigilance Map – Risk communication tool



Vigilance Map – Gains

Problems with the current format	Gains from a vigilance map
Binary qualification of risk	4 levels of risk
Questionable relevance	<ul style="list-style-type: none"> - Limits alerts - Increases relevance - Reduces losses - Optimizes dispatch of 1st responders
Does not explain the risks	<ul style="list-style-type: none"> - Better anticipation - Culture of risk



Vigilance Map – Gains

Problems with the current format	Gains from a vigilance map
Lack of recommendations	<ul style="list-style-type: none">- Broader information- Optimizes coordination- Better monitoring of operations
Ignores the context and medium-term forecasts	Includes context (past, future)
Can go unnoticed by the public	One window
Absence of warning verification	Periodic verification of level 3-4 warnings

Vigilance Map – Challenges

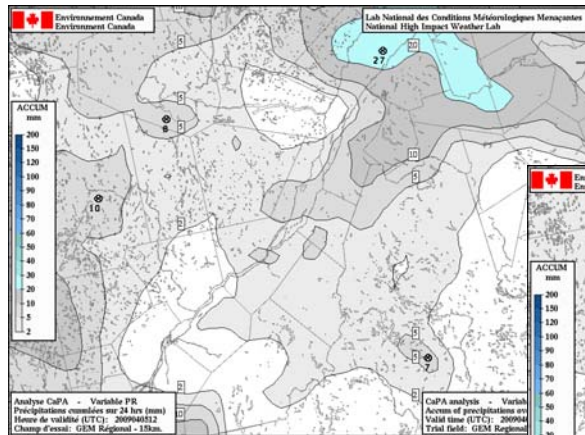
- Politics
- Management
- Technology
- Science



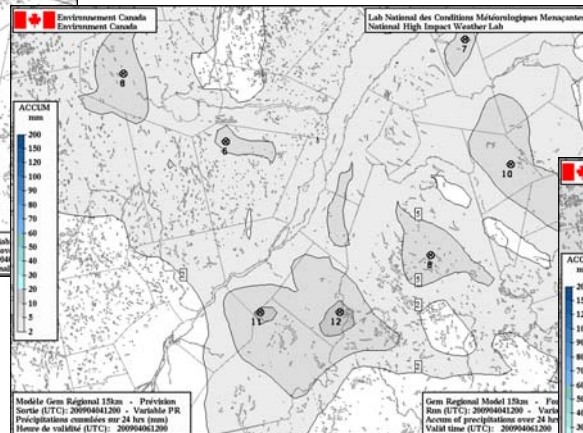
2- Vigilance Map – Pilote project

- Daily automated transmission

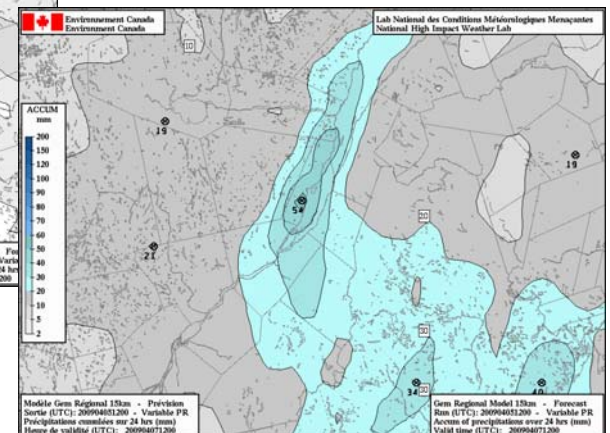
Accum of precip.24h (CaPA analysis)



Accum of precip. 0-24h

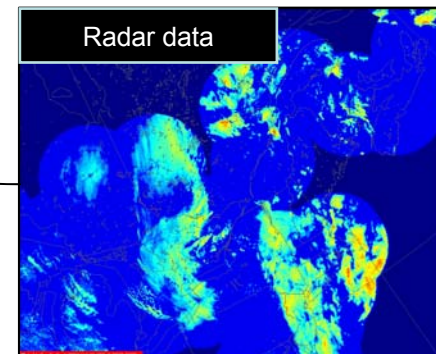
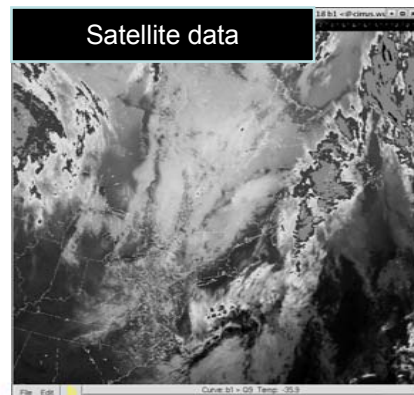
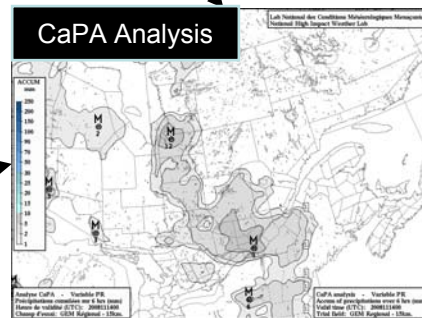
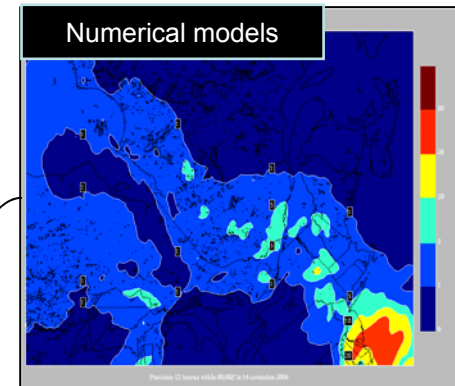
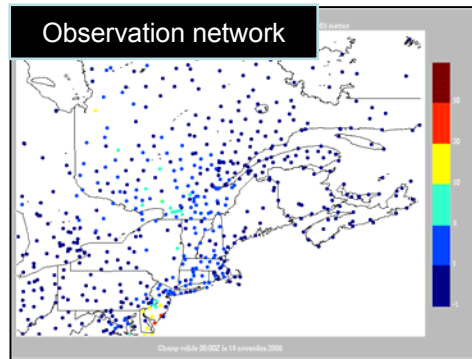


Accum of precip. 24-48h



2- Vigilance Map – Pilote project

- CaPA Analysis



2- Vigilance Map – Pilote project

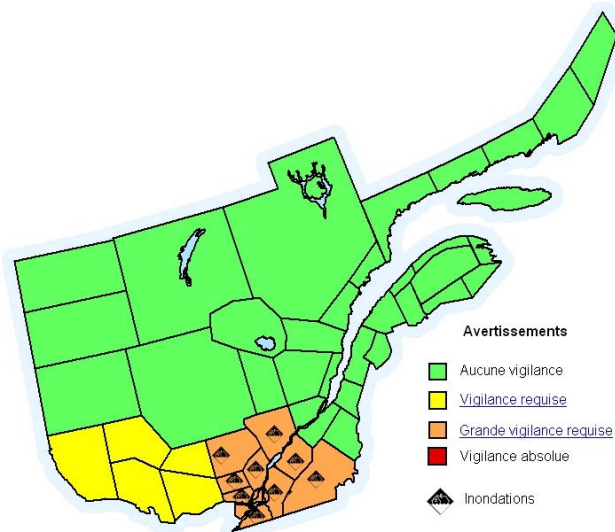
Feedback from Quebec's Public safety

- Warnings based on a better linkage of **Field actions – hydrologic expertise – meteorological expertise**
- GeoCollaboration – decentralized access to interoperable (WMS, WFS)
- Real time access to accumulation of precipitation- 24h, 0-24h, 24-48h and weather stations

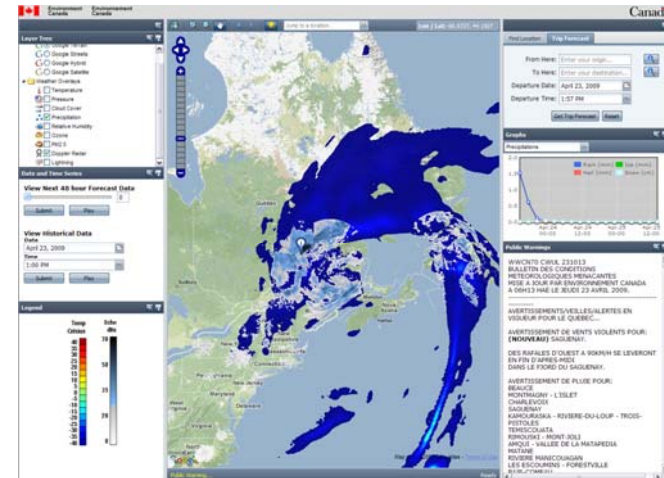
3- Web Mapping

- **Communication**

Vigilance Map
Risk communication tool
(Expertise provided)



Web mapping
Data sharing tool
(no expertise provided)



3- Web Mapping

The screenshot displays the Environment Canada web mapping interface. The main map shows a weather forecast for Quebec, Canada, on April 23, 2009. The interface includes several panels:

- Layer Tree:** Lists various map layers such as Google Terrain, Google Streets, Google Hybrid, Google Satellite, and Weather Overlays (Temperature, Pressure, Cloud Cover, Precipitation, Relative Humidity, Ozone, PM2.5, Doppler Radar, and Lightning).
- Date and Time Series:** Allows users to view the next 48-hour forecast data and historical data for a specific date and time.
- Legend:** Provides a color scale for temperature in Celsius (ranging from -40 to 40) and Echo in dBz (ranging from 0 to 70).
- Graphs:** Displays a precipitation graph showing Rain (mm), Ice (mm), Hail (mm), and Snow (cm) over time.
- Public Warnings:** Lists active warnings for Quebec, including severe wind warnings and heavy rain warnings for various locations.

Conclusion – key points

Vigilance Map : Objective

To increase the protection potential of our warnings

It will optimize :

- The integration of information
- The relevance of risk communications
- The coordination via frequent follow-ups of events
- The development of knowledge regarding links between environmental forecasts and impacts

Web mapping : Objective

- To make weather data available

Conclusion – MSC Development vision

“We serve Canadians and our partners – in so doing we must examine the relevance and usefulness of our services and products in the face of the changing needs of Canadians and our partners. [...] we should consider adding to our current role of primarily *observing and predicting* the current and anticipated physical states of the environment, the additional responsibility of ***informing and reporting on the impacts*** of these changes, and communicating results to decision makers.”

David Grimes, Assistant Deputy Minister, MSC

(“Forecasts for Canadians, foresight for Canada : Articulating a vision and strategic direction for environment Canada’s Weather and environmental services. *A Consultation document.*” August 2008)

Development of understandable, authoritative, recognizable and timely warnings

- Can you describe how warning messages are developed, and the collaboration mechanisms between NMHS, Disaster Risk Management Agencies and other partners ?
- National Public Alerting System will provide an effective capability to all levels of government to issue alerts and warnings of imminent emergencies to populations likely to be adversely impacted. More specifically, NPAS alerts will identify the authorized government agencies issuing alerts; the imminent danger; and the communities and areas affected. These alerts may also include recommended protective actions that should be taken as well as where to obtain additional information.

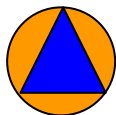
Warning dissemination mechanisms

- What are the channels used to reach the authorities and the communities at risk ?
- **NPAS would work on a 24/7 basis and use a multimedia approach to maximize the reach of alerts including AM/FM radio broadcasting; over-the-air cable and direct-to-home (DTH) satellite television; and eventually to other media (e.g. the Internet).**
- **NPAS is adopting the international standard for alert messaging – the Common Alerting Protocol (CAP) – and will be implementing the CAP Canadian Profile (CAP-CP) in order to adapt the international CAP standards to meet the geo-political and language needs of Canada. NPAS will provide structured audio and text alert phrases in both French and English. CAP-CP may be used across multiple technologies, including CNS.**

Role of the NMHS in the EWS

- Please provide a summary of the main roles and responsibilities of the NMHS in your EWS
- **As the organization responsible to issue weather warnings in Canada and as the owner and operator of the Weatheradio network, Environment Canada is at the forefront of the development of NPAS.**
- **Environment Canada, in collaboration with PS, has developed and is presently hosting a website that provides sample alerts in CAP / CAP-CP compliant XML Really Simple Syndication (RSS) feeds for industry testing purposes.**
- **Environment Canada has two Weatheradio projects underway that are funded through a national Search and Rescue funding program:**
 - 1. to install Weatheradio stations in 20 Northern communities, and
 - 2. to distribute Weatheradio receivers to approx. 13,000 schools and 340 scouts and girl guides organizations across Canada.**These projects will educate and increase awareness about the Weatheradio network and enhance alerting capabilities in the North.**

Remerciements



COG

D. Fortin, É. Houde



CEHQ



Hydro Météo



SMC-Québec

O. Gagnon, M. Benjamin, L. Bussière, A. Cantin, S. Gagnon, D. Gosselin, M. Hardy, R. Héroux, M. Jean, A. Julien, C. Masse, G. Roy et V. Fortin (RPN-CMC)



The end....



Thank you!