



Environment  
Canada

Environnement  
Canada

Canada

# REPS products – current and planned

**Ronald Frenette**  
**High Impact Weather Lab**  
**Environnement Canada**  
**6th NAEF Workshop**  
**May 1st 2012**

# Epsgrams

Environment Canada internal web site

Metograms based on the regional ensemble prediction system  
Météogrammes à partir du système régional des prévisions d'ensemble

Year/Année: 2012 | Month/Mois: Mar-Mar | Day/Jour: 16 | Emission/Émission: 00Z  
 00Z  
 12Z

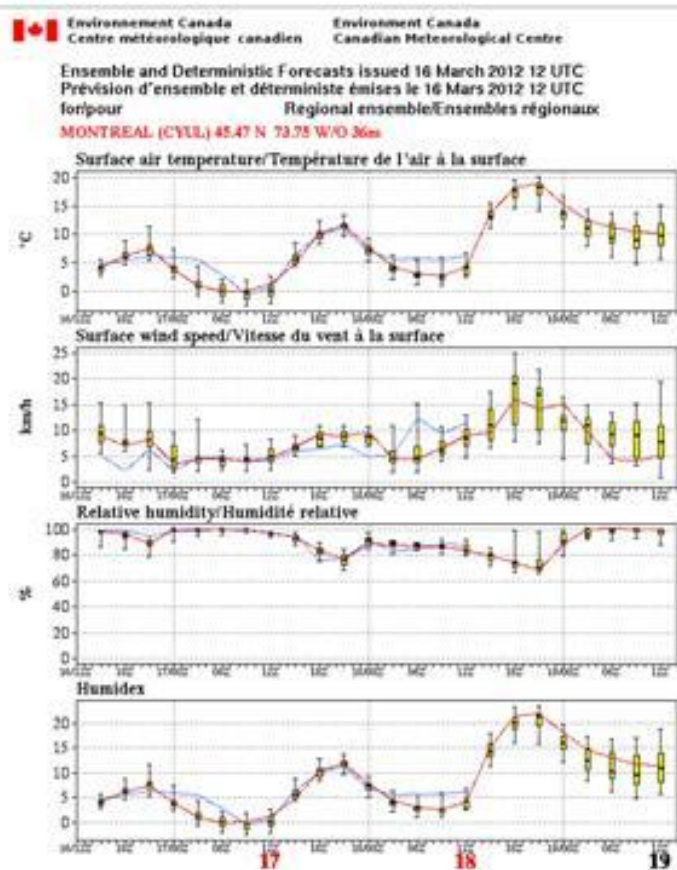
Stations: CYUL MONTREAL

Type de graphe / Graph type:

- Temperature, humidity, humidity and wind at surface  
Température, humidité, humidité et vent à la surface
- Temperature, surface wind humidity and humidity  
Température, vent de surface humidité et humidité
- Pressure over the last 6 hours of current message  
Pression sur les 6 heures de l'émission actuelle
- Precipitation  
Précipitation

Previous day	Previous issue	Day Shown	Next issue	Next day
←	←	2012-3-16	→	→
Jour précédent	Émission précédente	Jour affiché	Émission suivante	Jour suivant

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[Médiane et centiles --- Median and percentiles](#)  
[Commentaires --- Comments](#)



- Temperature
- Wind Speed
- Humidity
- Humidex
- Pressure
- Cloud cover
- Precipitation

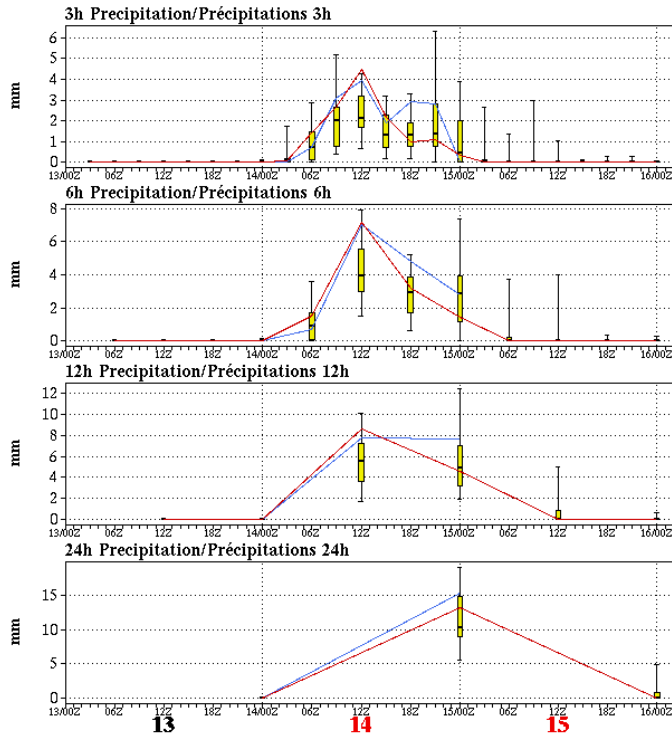
# Epsgrams - precipitation


**Environnement Canada** / **Centre météorologique canadien**

**Environment Canada** / **Canadian Meteorological Centre**

Ensemble and Deterministic Forecasts issued 13 January 2012 00 UTC  
 Prévission d'ensemble et déterministe émises le 13 Janvier 2012 00 UTC  
 for/pour **Regional ensemble/Ensembles régionaux**

**VANCOUVER (CYVR) 49.2 N 123.18 W/O 2m**



**January/Janvier 2012**

— Control Member/Membre contrôle CMC  
— Regional/Regional

max  
 75%  
 médiane/médiane  
 25%  
 min

3h rate – Intensity and timing

6h rate

12h rate

24h rate – amounts



# Threshold probabilities

EC internal web site

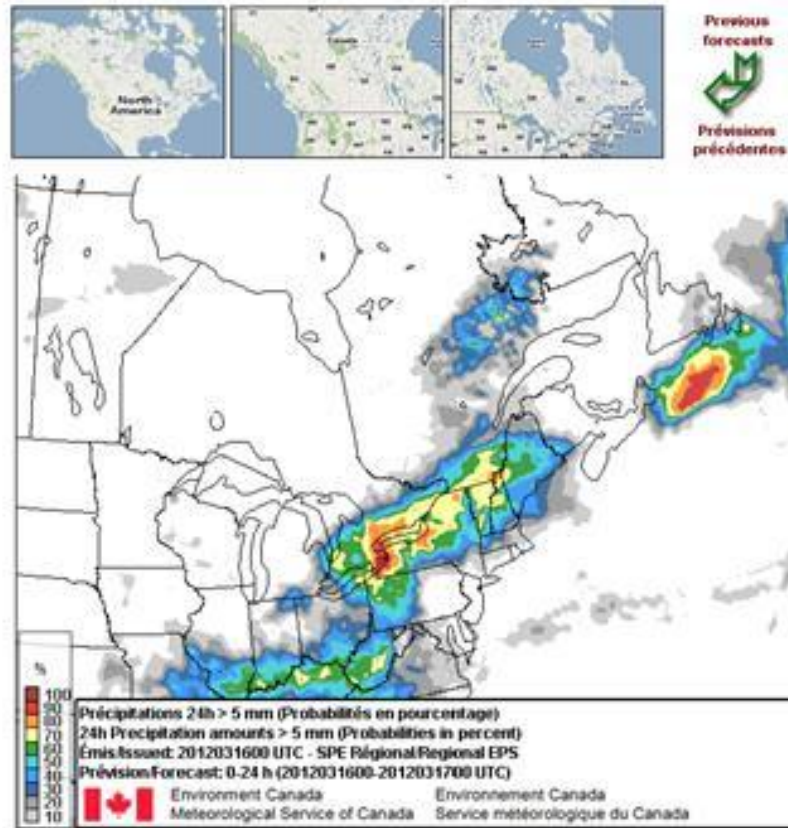
Emis/Issued:  
 < 2012-03-16 >  
 ☒ 00 UTC ☒ 12 UTC  
 Prevision/Forecast:  
 < 00-24h >

	
24h	24h
> 2 mm	>20 km/h
> 5 mm	>30 km/h
>10 mm	>40 km/h
>20 mm	>50 km/h
>30 mm	>65 km/h
>40 mm	>75 km/h
>50 mm	>90 km/h
>75 mm	>100 km/h
>100 mm	>118 km/h

	
Max 24h	Min 24h
>-10°C	<10°C
>-5°C	<5°C
>0°C	<0°C
>5°C	<-5°C
>10°C	<-10°C
>15°C	<-15°C
>20°C	<-20°C
>25°C	<-25°C

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[Médiane --- Median](#)  
[Eo stransmes --- EPS trans](#)



Previous forecasts  
  
 Prévvisions précédentes

# Percentiles

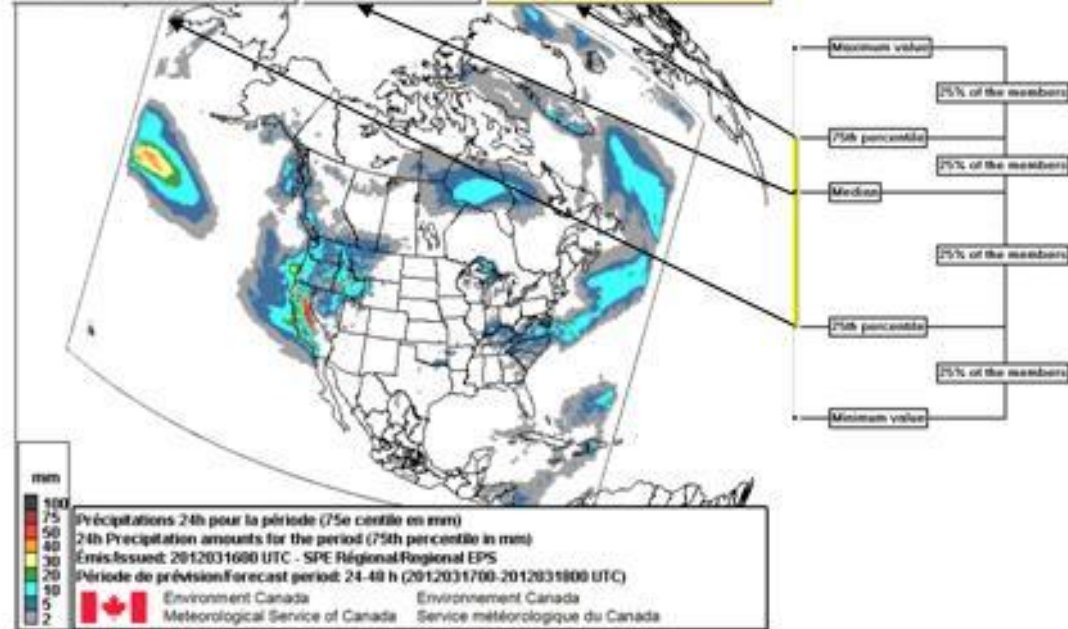
EC internal web site  
25,50,75 percentiles

**emis/Issued:**  
 2012-03-16  
 @ 00 UTC C 12 UTC  
**revu/Forecast:**  
 24-48h

**Produits/Products:**  
 24h 24h  
 Max 24h Min 24h  
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[Programme](#) --- [EPS/gram](#)  
[Commentaires](#) --- [Comments](#)

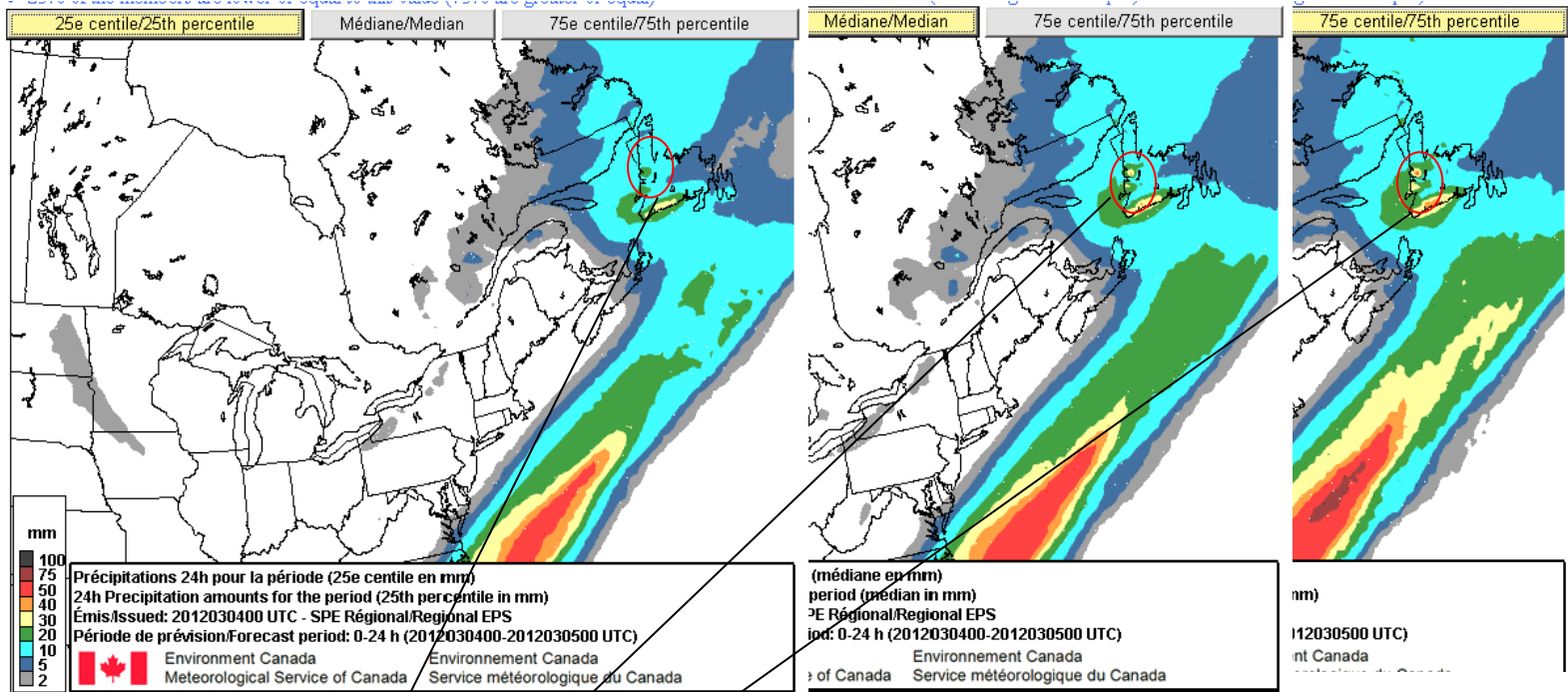


- 75% des membres sont inférieurs ou égaux à cette valeur (25% sont supérieurs ou égaux)
  - 75% of the members are lower or equal to this value (25% are greater or equal)
- 25e centile/25th percentile    Médiane/Median    75e centile/75th percentile





# Percentiles - range



25th percentile : 20mm/24h  
 Median : 30mm/24h  
 75th percentile: 40mm/24h

—————> 20-40 range

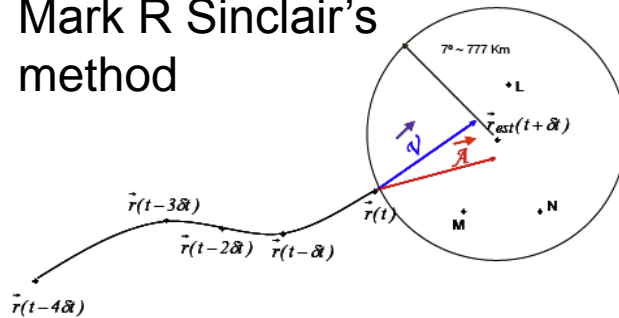
# Planned products

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- Storm tracking
- Summer severe weather
- Winter severe weather

# Storm tracking system

## Mark R Sinclair's method



$$\vec{r}_{est}(t + \Delta t) = \vec{r}(t) + w_m \cdot \vec{A} + (1 - w_m) \cdot \vec{v} \cdot \Delta t$$

$$\vec{A} = \frac{\vec{r}(t) - \vec{r}(t - 4\Delta t)}{4}$$

- $r(t^*)$  is the position of the first point of the trajectory and  $r(t)$  is the position of the current point.
- $w_m$  is a weight function depending on the number of analysis per day (2,4,8,..)

Rabah Aider  
 Jean-François Caron  
 Louis-Philippe Caron  
 Corina Costea  
 André Cotnoir  
 Ronald Frenette  
 Stéphane Gagnon  
 Philippe Gachon  
 Rares Gheti  
 Anne-Marie Leduc  
 Philippe Martin,  
 Milka Rodojevik  
 Christian Saad  
 Mark R Sinclair  
 Kaja Winger  
 Ayrtón Zadra

## Hurricane/Tropical storm diagnostic

1. Pressure minimum
2. Vorticity > Threshold
3. Warm core
4. 850 mb winds > 250mb winds
5. Surface winds > threshold
6. MSLP gradient around center > threshold
7. Search Eye using cloud cover field

+

## Tracking algorithm

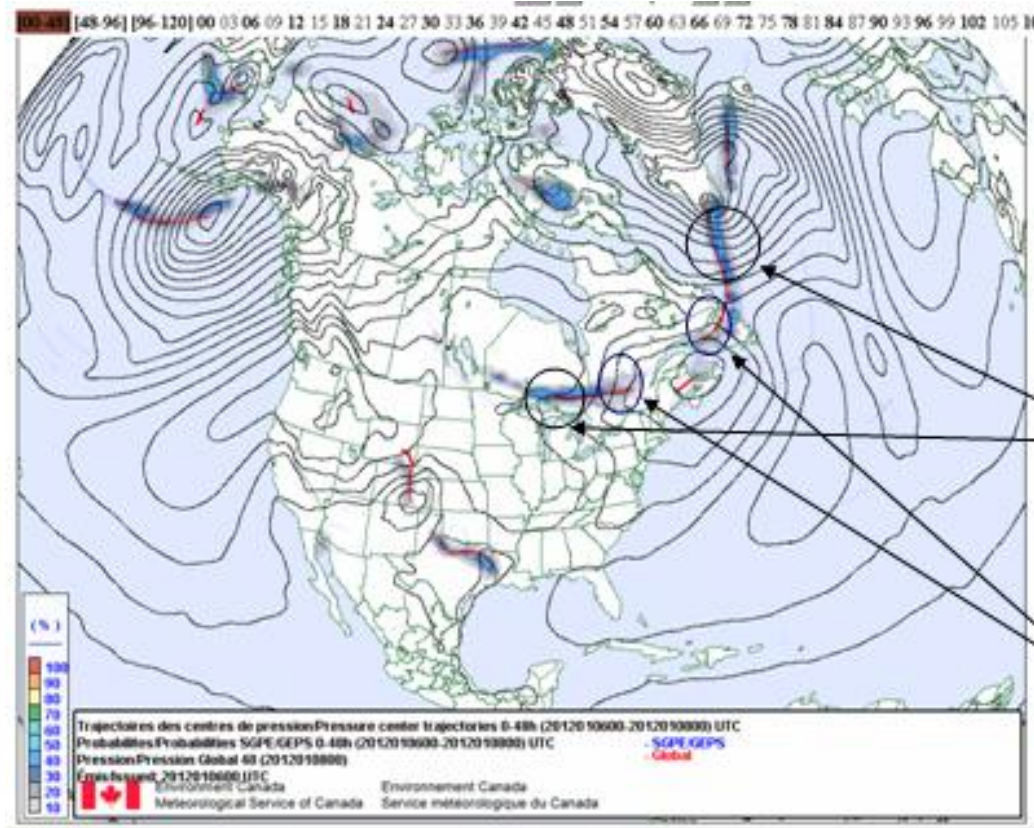
1. Calculate the distance between new and previous centers.
2. Check if distance < threshold

Special thanks to Jean-François Caron, UkMet for providing unified code

[http://meteocentre.com/tracking/index\\_e.html](http://meteocentre.com/tracking/index_e.html)



# GEPS products : storm tracking



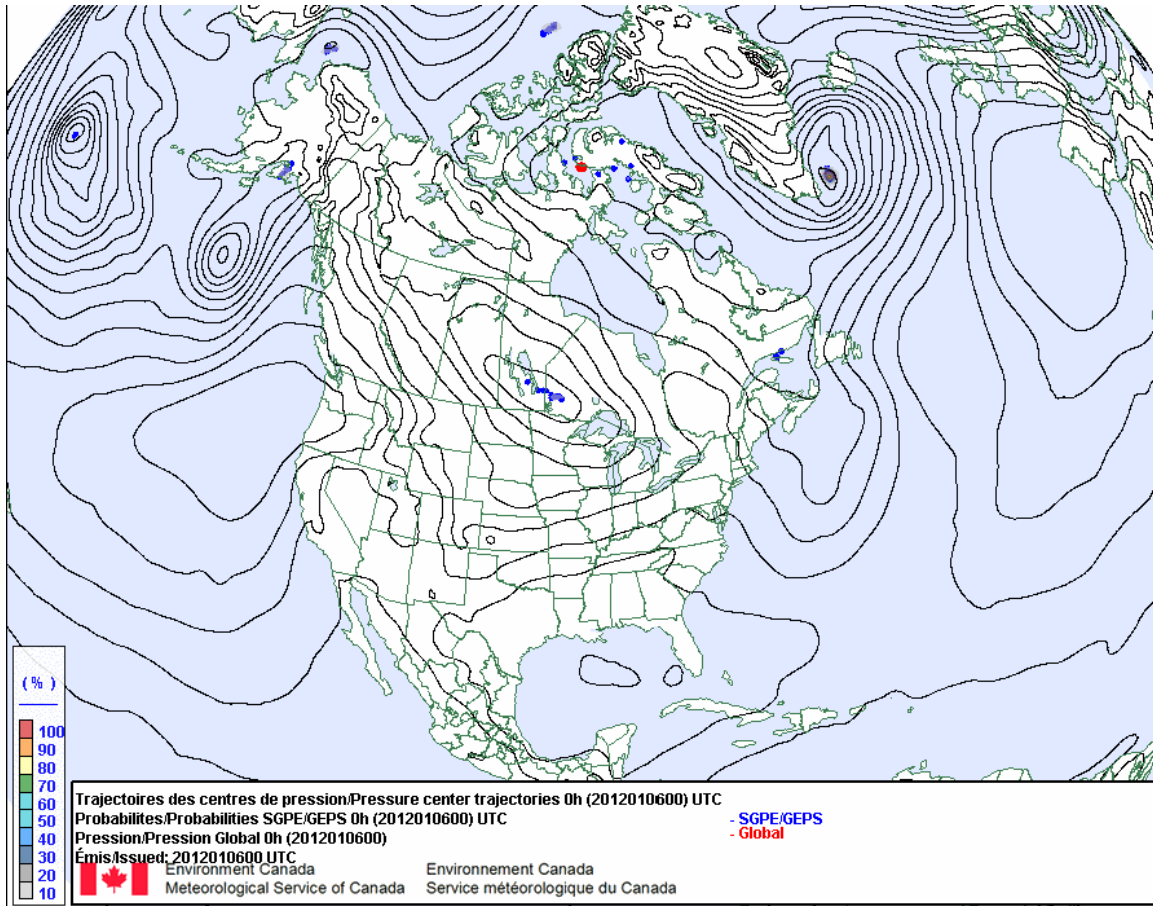
Eps tracks for periods:  
00-24h  
24-96h  
96-120h

Higher agreement  
in tracks

Lower agreement in  
tracks

*High impact weather lab Project with Rares Gheti*

# EPS products : storm tracking

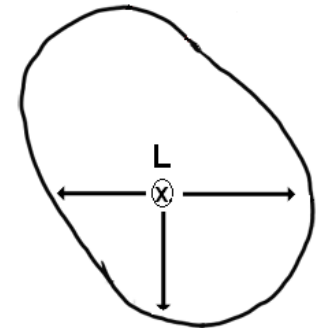


Currently: GEPS

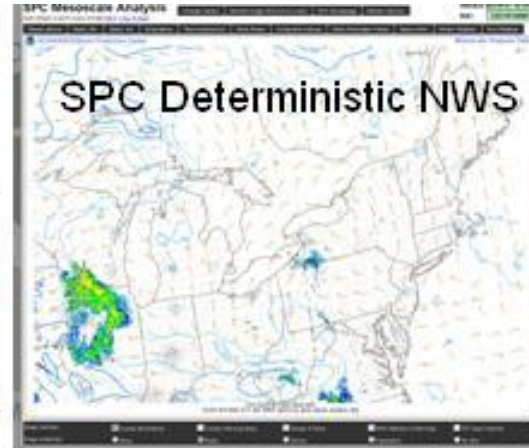
Planned: REPS

Add storm envelop  
probability products

Boundary defined as  
where vorticity change  
sign



# Severe weather indices



- Single variable
- Helicity
- Shear
- Lifted Index
- ...
- Combined
- Tornado ingredient

1. *Inventory of severe weather indices*
2. *Consulting severe weather forecasters*
3. *Prioritizing variables*
4. REPS products (summer 2013)

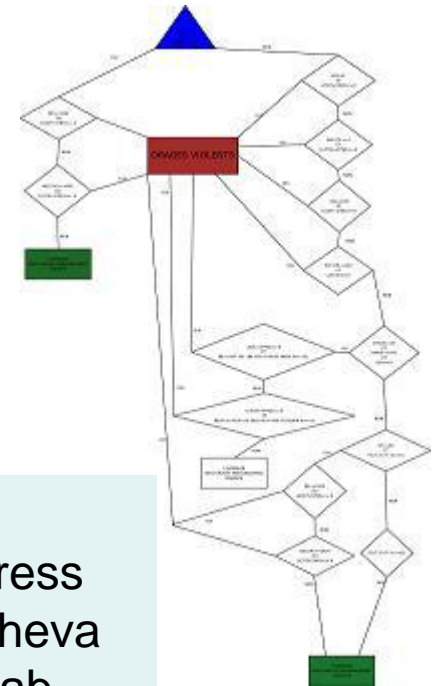
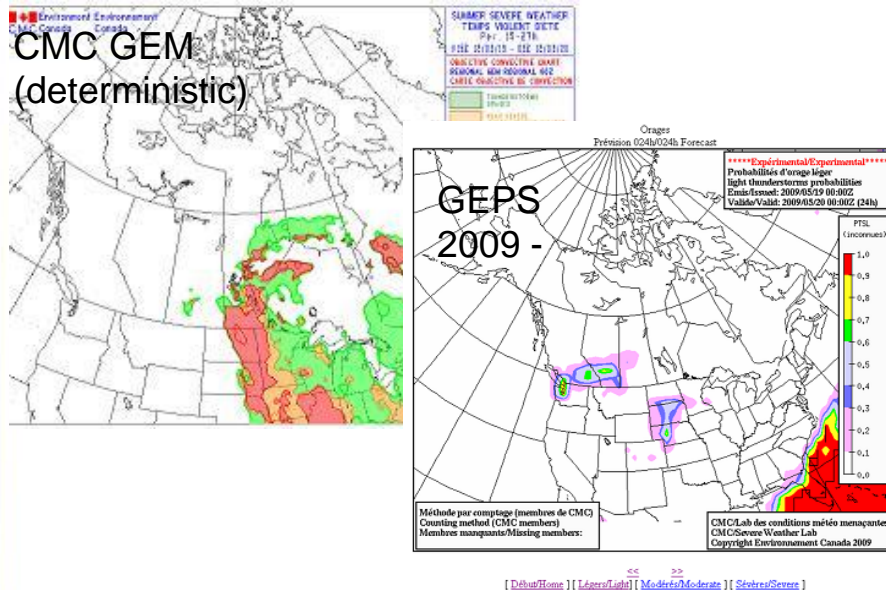
*1-3 completed*



# Summer severe weather diagnostics

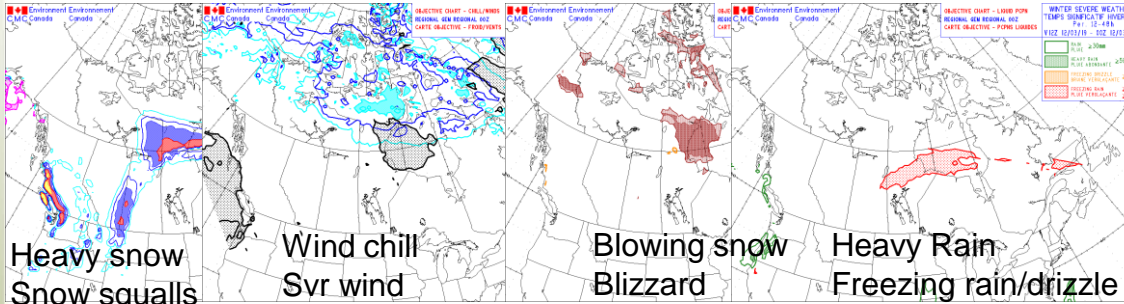
Denis Bachand's thunderstorm algorithm (synoptic)

- Decision tree algorithm
- Using CAPE, Lifted Indices, helicity, shear, precipitable water, etc..
- Outputs: lgt, mdt and svr thunderstorm and trigger conditions

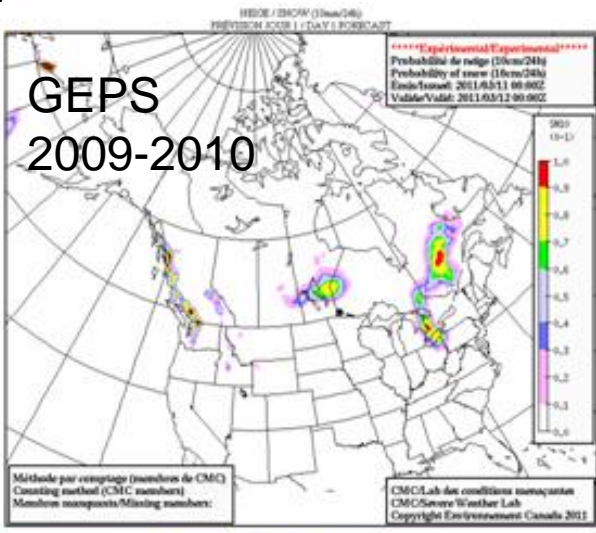


REPS  
Work in progress  
Nedka Pentcheva  
High impact lab  
Quebec – For  
Summer 2012

# Winter severe weather diagnostics



CMC Deterministic



REPS  
 Work starting summer 2012  
 Nedka Pentcheva  
 High impact weather Lab Quebec :  
 autumn 2012

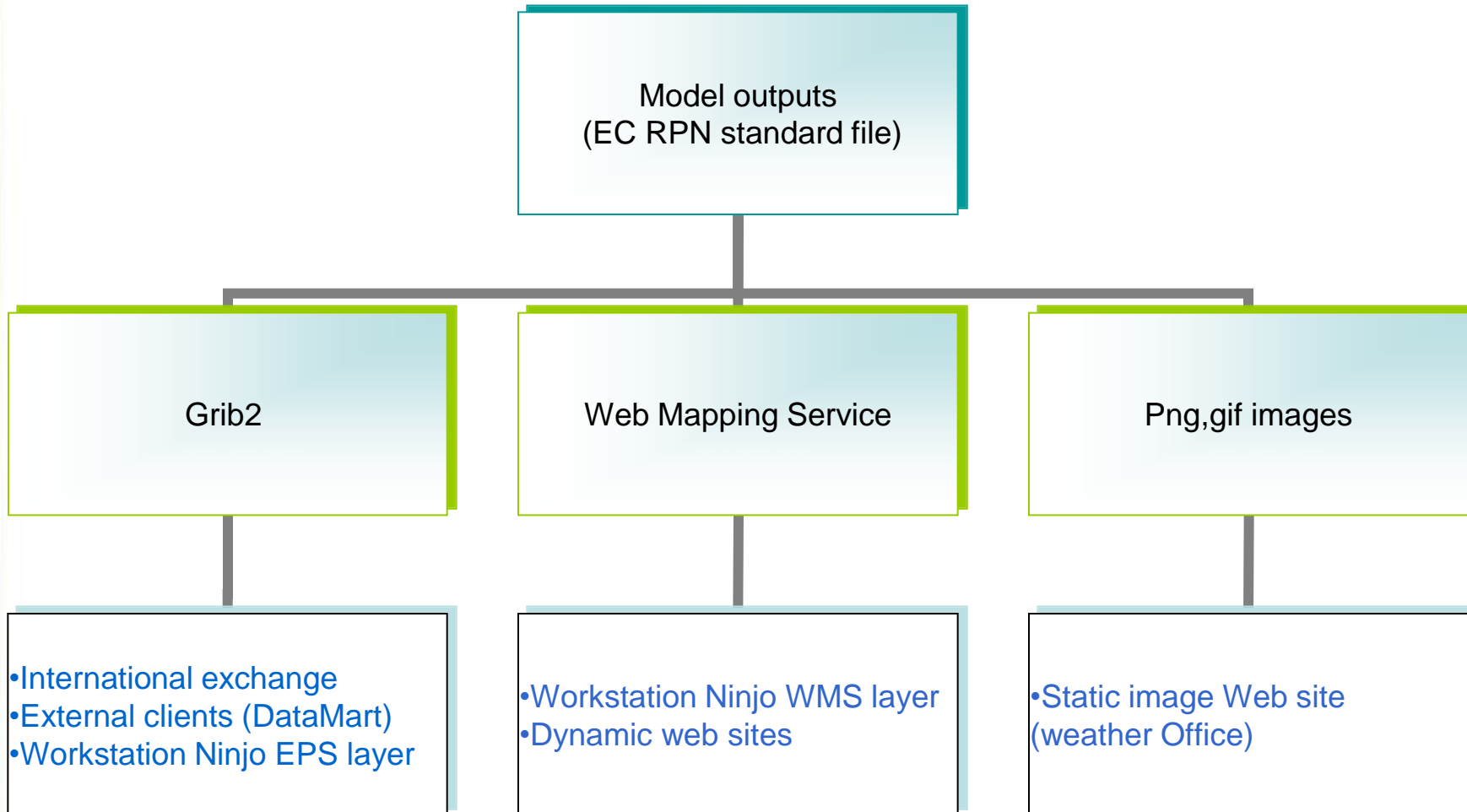
# Other useful products

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- Precipitation type charts – *planned for next winter 2012*
- Heat event
- Drought
- EFI



# EPS Product dissemination



# Links

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## Internals

<http://neige.wul.qc.ec.gc.ca/ensembles/>

[http://iweb.cmc.ec.gc.ca/cmc/CMOP/tsh/tsh\\_e.html](http://iweb.cmc.ec.gc.ca/cmc/CMOP/tsh/tsh_e.html)

[http://weg-hal-fe01.edm.ab.ec.gc.ca/WxProducts/HAL\\_Convection/RSD\\_ONT.html](http://weg-hal-fe01.edm.ab.ec.gc.ca/WxProducts/HAL_Convection/RSD_ONT.html)

## Externals

[http://meteocentre.com/tracking/index\\_e.html](http://meteocentre.com/tracking/index_e.html)

<http://www.spc.noaa.gov/exper/sref/>

<http://www.spc.noaa.gov/exper/mesoanalysis/>

