Canadian Hurricane Centre

Recent forecast operations and outreach activities at the Canadian Hurricane Center (CHC)

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Outline

Canadian Hurricane Centre

- CHC – our beginnings and current role
- Outreach activities
- Recent forecast product development
- Notes on the Canadian CMC weather model
- International collaborations

Origin of the CHC – began with experience during Hurricane Gloria 1985

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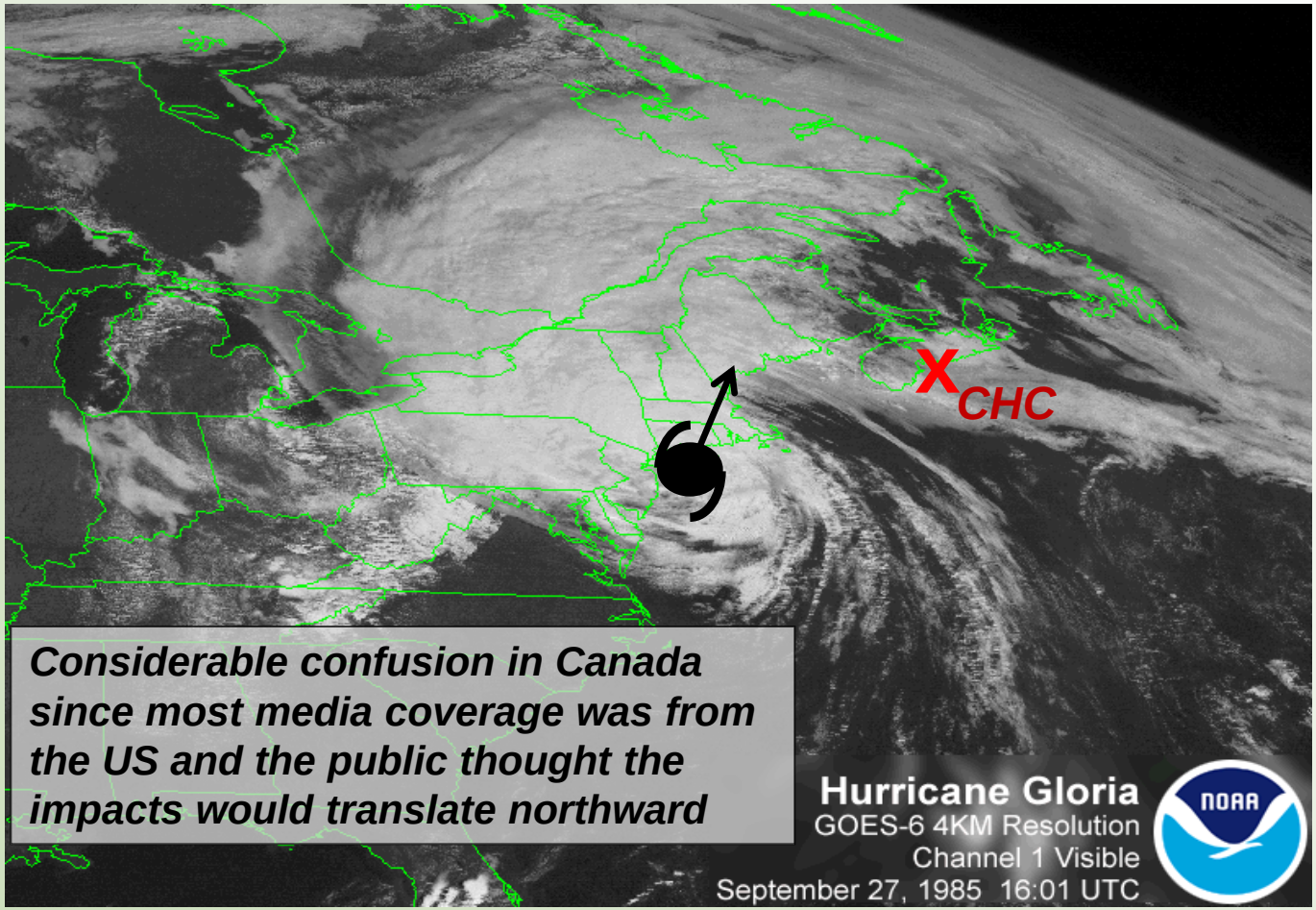

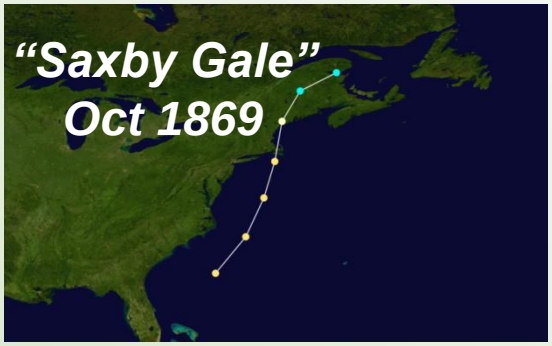

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Major events in Canada – about one "biggy" every 15 yrs

8 of 10 events before CHC established

CHC 'Response' Zone

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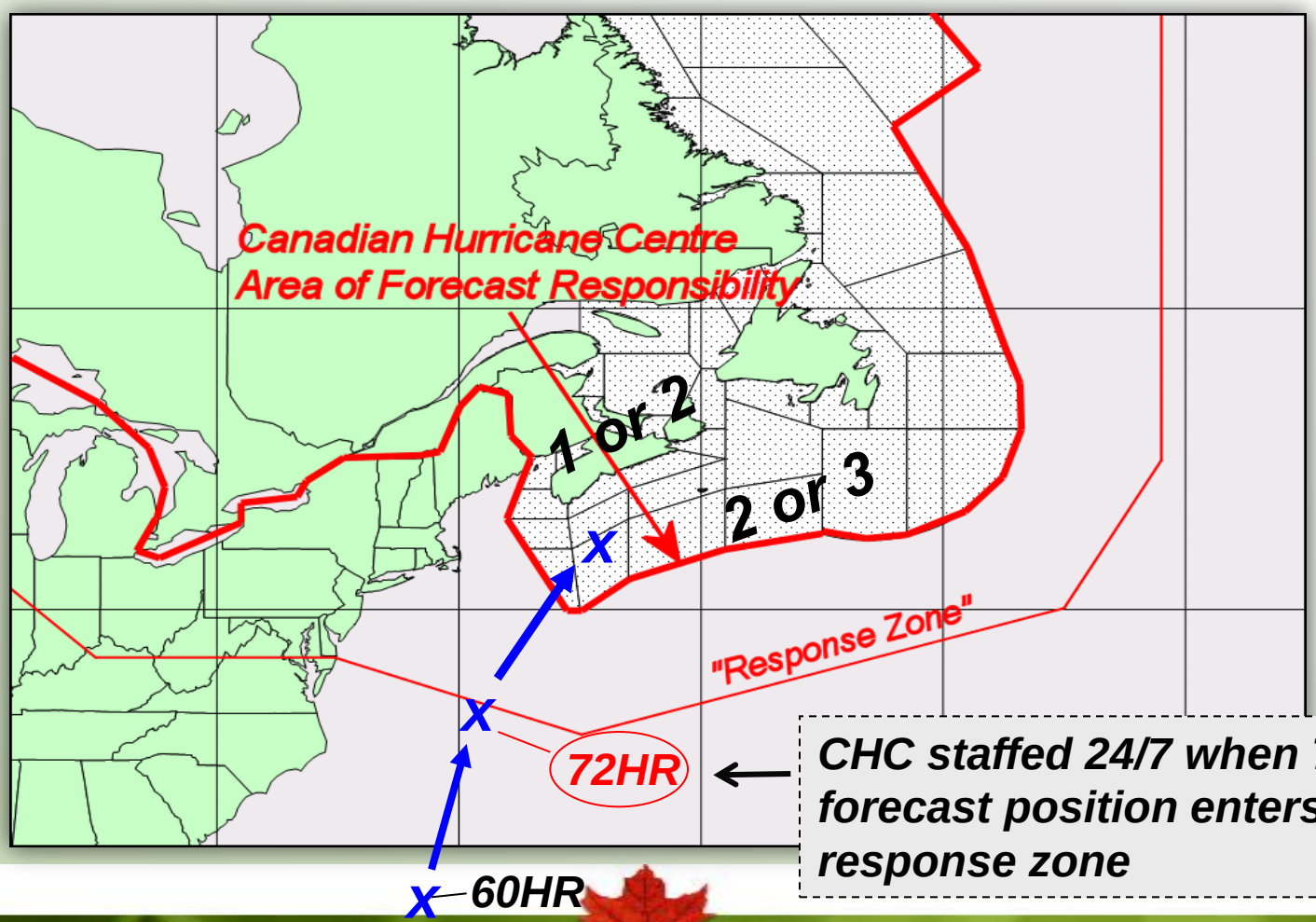
On average, 1 or 2 storms of *tropical origin* directly affect Canadian land regions each year. Another 2 or 3 typically threaten our offshore waters.



CHC staffed 24/7 when 72-HR forecast position enters response zone

Key changes over past decade affecting what we do and how we communicate…

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- Computer model (NWP) improvements (esp. long-range)
- Advances in remote sensing (satellites)
- Evolution of official forecast products

Technical
Sociological
Mix

- Surge in media attention (over increasingly longer timescales) – not just media but society in general
- Availability of forecaster tools (display of *computer models* online, weather blogs, private sector agencies)
- Users are asking more (more specific & technical) questions – they're learning too
- Changes in how forecast information is used – e.g. GIS display / users ability to display/modify "met objects"

Key changes over past decade affecting what we do and how we communicate…

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Sociological
Political factor
Tech/sociological mix

- **Increasing demand outside of the 72-hour period – demand is greater than ever for information over various timescales**
- **Updates required throughout season and more requests from media – news, feature stories to even documentaries – even outside Hurricane Season**
- **Increased visibility recognized at higher (political) levels – can complicate bottom line**
- **What hasn't changed, unfortunately, is pretty much stagnant staffing/funding commitment despite growing demands**
- **Social media role is HUGE – we're leveraging both ways – official and unofficial 'out' tweets AND as instant information source**

Outreach - Open House in early June 2013 – meeting with amateur forecasters and interested public)

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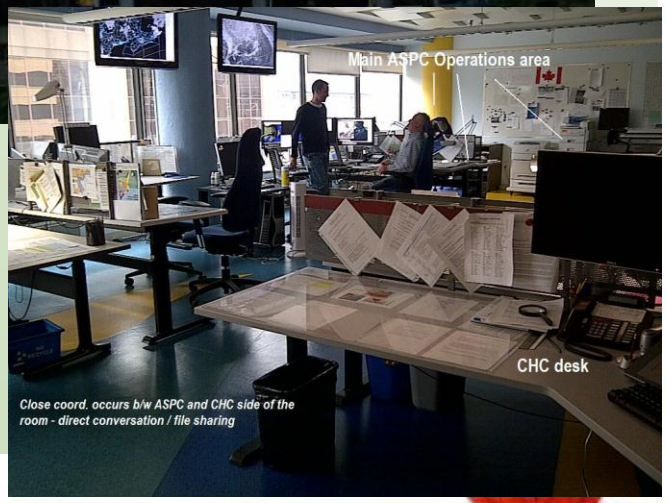

Weather balloon demo

Monitoring equipment

Hurricane forecast process demo

1200 visitors
One of the more popular venues
In city-wide 'Doors Open' event

Well advertised via multiple channels – especially social media

Interestingly same day as remnants of "Andrea" arrived

Shows genuine interest/curiosity by the public and highlights visibility of the forecast centers

Recognizing the power of communication/outreach – CHC convened a workshop to build relationship with local broadcast sector in late June 2013

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Environment Canada / Environnement Canada — Canada

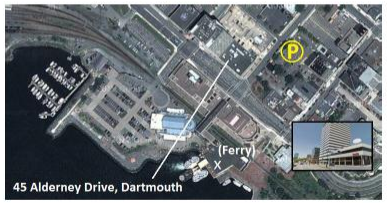
Canadian Hurricane Centre Workshop for

Media Weather Presenters

9 am to 4/4:30 pm Monday June 24, 2013 – 45 Alderney Drive, Dartmouth, 15th floor of Queen Square (Room 1524)

Presenters: Chris Fogarty, Manager, CHC and Bob Robichaud, Outreach Meteorologist

09:00 am – Introductions and Overview
09:30 am – Tropical Cyclones and Extratropical Transition Overview
10:30 am – Break
10:45 am – Forecasting Basics and Tools
12:00 pm – Lunch and CHC/ASPC Tour
01:30 pm – Discussion: Forecasting Resources and Tools
02:15 pm – Discussion: Communication Protocol and Tools
02:45 pm – Break
03:00 pm – Other discussion, Q&A, Feedback



NEWS | VIDEO | WEATHER | NEWS AT 5 | MORNING LIVE | MYNEW

Mets gather to talk about Hurricanes

- ***in-person***

- ***informal***

- ***Opportunity to build relationships***

- ***Helps build mutual respect***

- ***Specifically work toward message consistency - VERY IMPORTANT***

Quick visual communications began in 2013 – useful for twitter, email, Facebook site, etc. – ***unofficial from Fogarty (@hurrchris) –*** *also have very simple gov'mnt account but automated. Too much bureaucracy to have official account under my name –* ***many restrictions***

Useful to clarify rumors or misconceptions that run rampant in the media and social media these days

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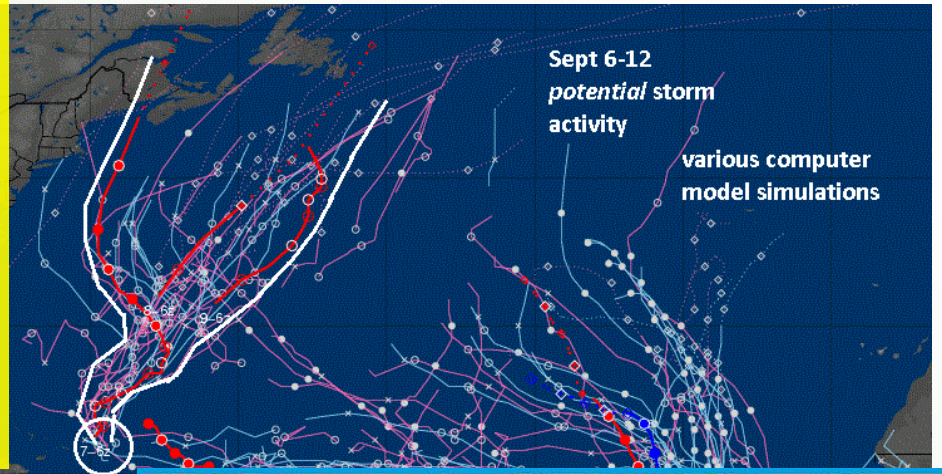
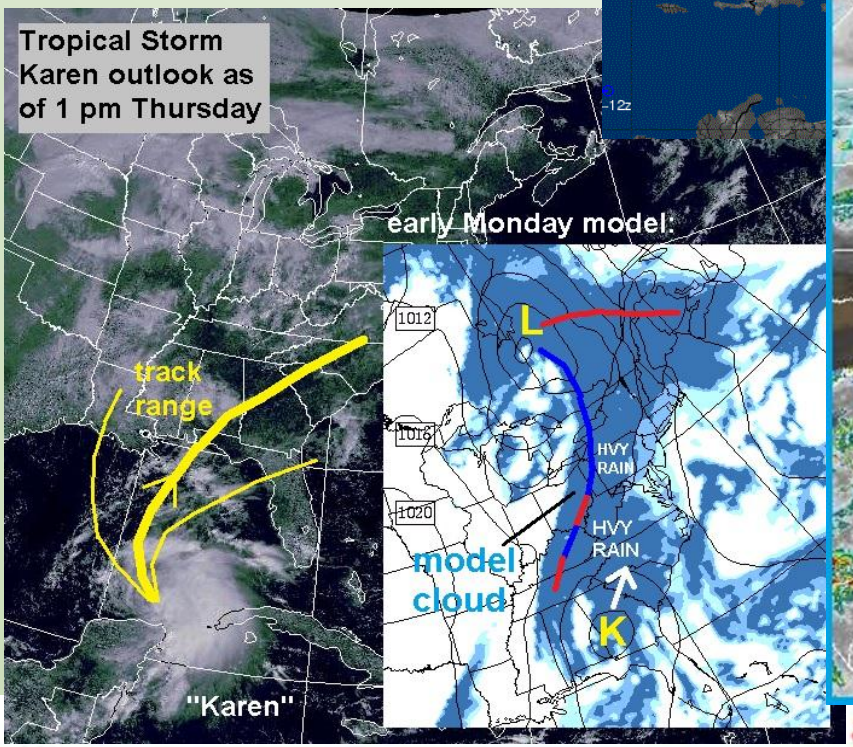
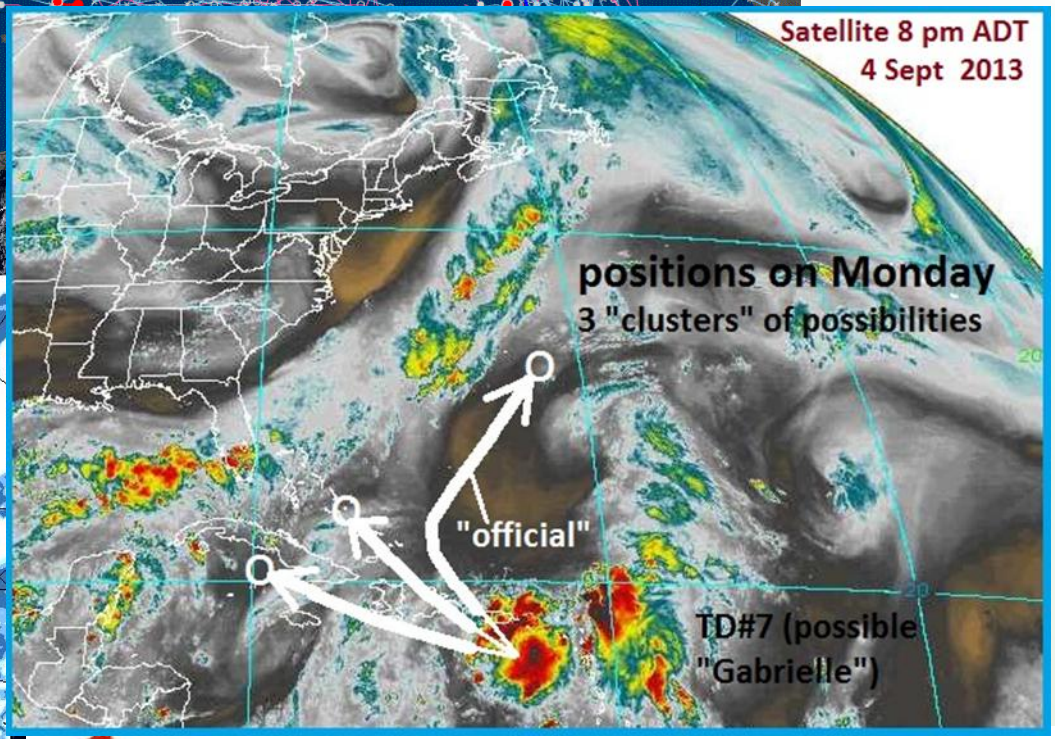
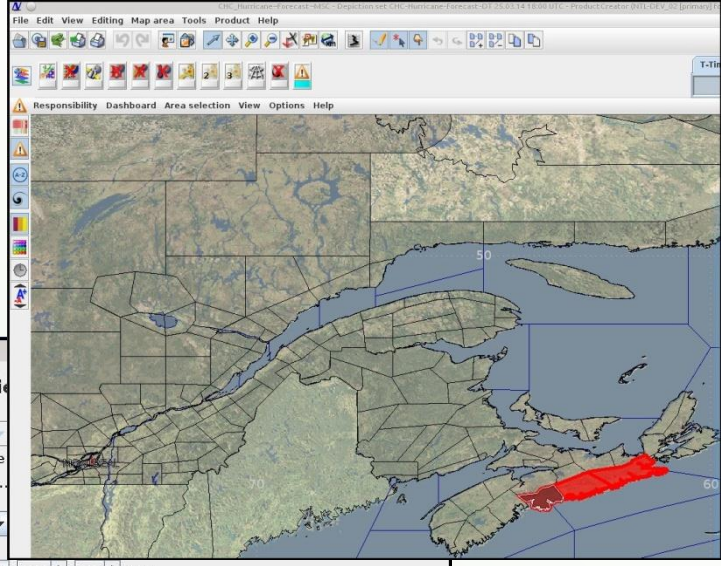






New alert production software

Promotes consistency by using pre-established phraseology



Create and send new warning

Alert Class & Alert Type

Alert Class: Warning

Alert Type: Hurricane

Alert Cause

High-Severe Winds, High Surge, Heavy Surf

Severe

Attributes

Wind Speed: 90G130E XCP 120G150C

Surge/Surf: 1.0-1.3m/7-10m

Current Storm Type: Hurricane

Name: Arthur

Time properti

Event onset: Tue. 25.03.14

Same as Issue

Fix Event Dur...

Event Duration: 1 day

Event end: Wed. 26.03.14 14: 10 UTC

Description Text (pre-translated)

English | French

Hurricane-force winds of 90 gusting to 130 km/h at exposed locations except 120 gusting to 150 km/h at the coast with surge of 1.0 to 1.3m and waves from 9 to 12m from Hurricane Arthur can be expected over parts of the above regions.

Hurricane-force winds of 90 gusting to 130 km/h at exposed locations except 120 gusting to 150 km/h at the coast with surge of 1.0 to 1.3m and waves from 9 to 12m from Hurricane Arthur can be expected over parts of the above regions.

Free Format Text

English | French

Call To Action / Impact Text

English | French

- These winds will likely topple some trees (leading to downed utility lines), damage signs and roofing materials, cladding, fences and exterior fixtures.
- These winds will topple many trees leading to downed utility lines and extended service outa damage to roofing materials, exterior cladding and light structures is likely.
- These winds could cause significant treefall and result in extended utility outages. Damage to material is likely, including structural damage in certain cases. Winds of this strength could ca large overhead highway signs.
- These winds will cause significant treefall and result in extended utility outages. Widespread roofing material is likely, including structural damage in certain cases. Winds of this strength tear-off large overhead highway signs.
- This could result in some damage to docks and breakwaters.
- This could result in moderate damage to docks and breakwaters.
- This could result in heavy damage to docks, breakwaters and other coastal infrastructure.
- This will result in damage to docks and breakwaters.
- This will result in damage to docks, breakwaters and other coastal infrastructure.

Message Properties (Vigilance)

MSC Severity: Severe

MSC Confidence: High

MSC Urgency: Future

Likelihood

Impact

Broadcast Intrusive!

Vulnerability

Dissemination

Audience

Send warning and close dialog | Send warning | Cancel

Track error visualization and editing

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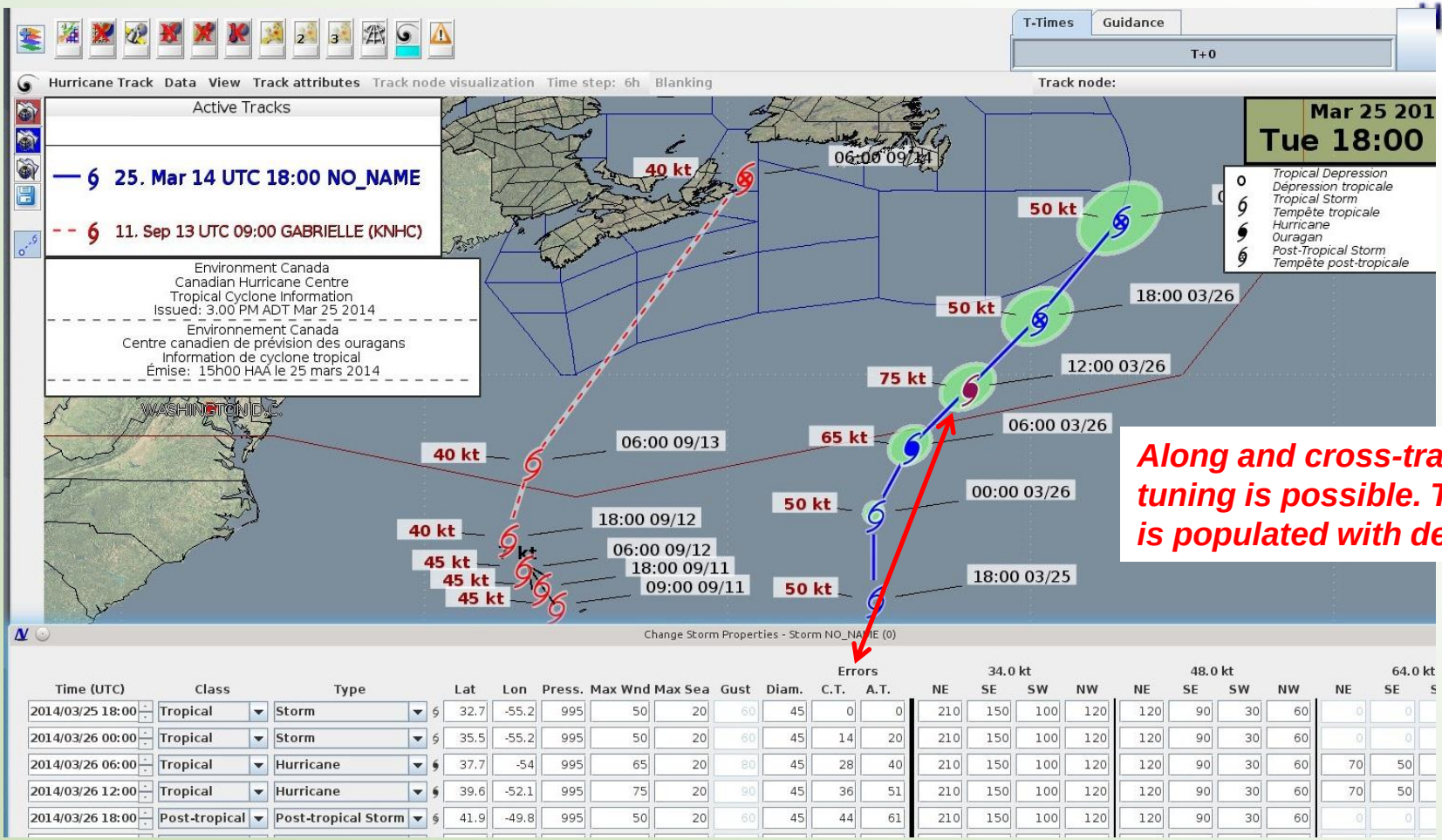
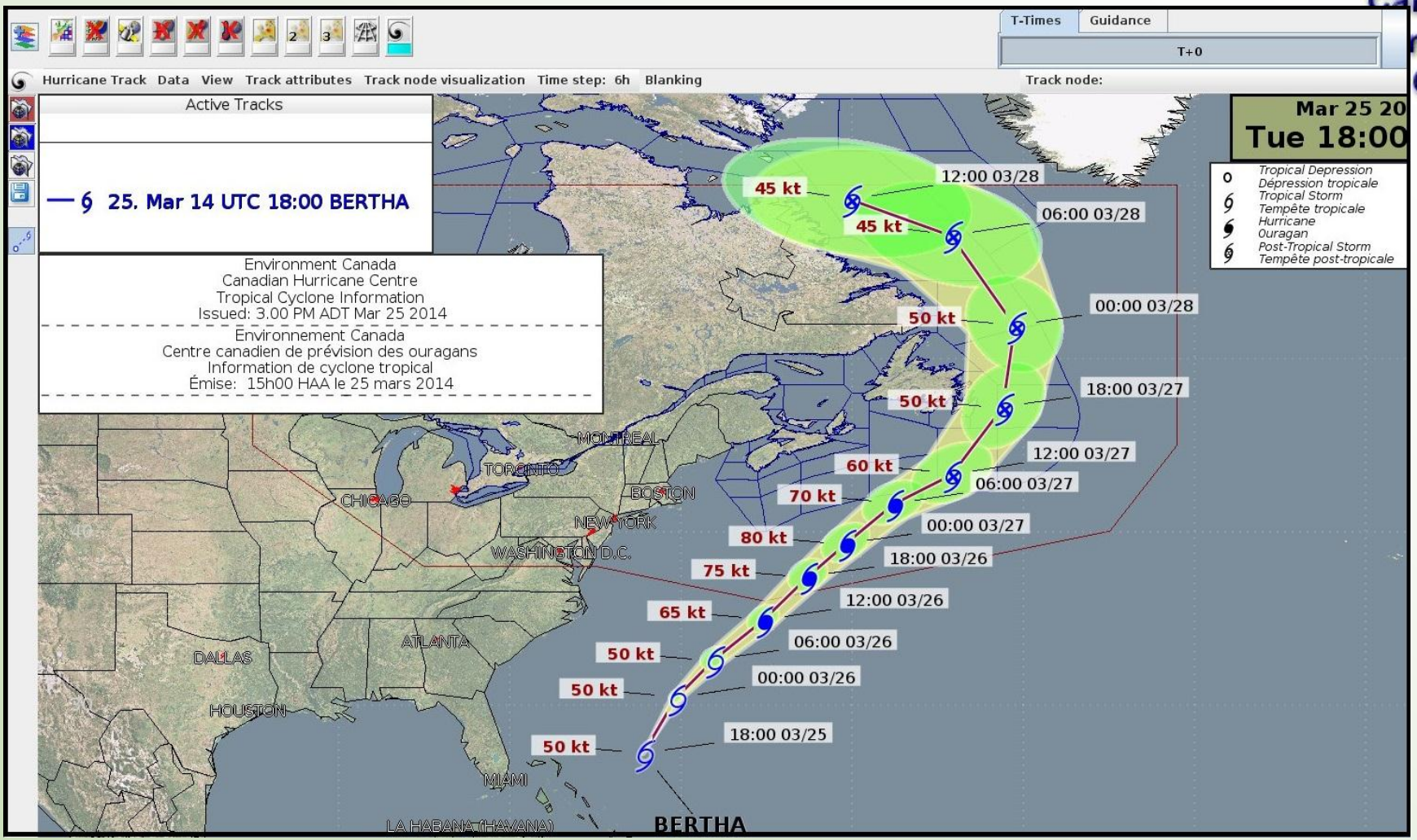


Time (UTC)	Class	Type	Lat	Lon	Press.	Max Wnd	Max Sea	Gust	Diam.	Errors C.T.	Errors A.T.	34.0 kt NE	34.0 kt SE	34.0 kt SW	34.0 kt NW	48.0 kt NE	48.0 kt SE	48.0 kt SW	48.0 kt NW	64.0 kt NE	64.0 kt SE
2014/03/25 18:00	Tropical	Storm	32.7	-55.2	995	50	20	60	45	0	0	210	150	100	120	120	90	30	60	0	0
2014/03/26 00:00	Tropical	Storm	35.5	-55.2	995	50	20	60	45	14	20	210	150	100	120	120	90	30	60	0	0
2014/03/26 06:00	Tropical	Hurricane	37.7	-54	995	65	20	80	45	28	40	210	150	100	120	120	90	30	60	70	50
2014/03/26 12:00	Tropical	Hurricane	39.6	-52.1	995	75	20	90	45	36	51	210	150	100	120	120	90	30	60	70	50
2014/03/26 18:00	Post-tropical	Post-tropical Storm	41.9	-49.8	995	50	20	60	45	44	61	210	150	100	120	120	90	30	60	0	0

Along and cross-track tuning is possible. Table is populated with defaults

Error ellipses prescribe cone of uncertainty:



Graphical wind quadrant editing

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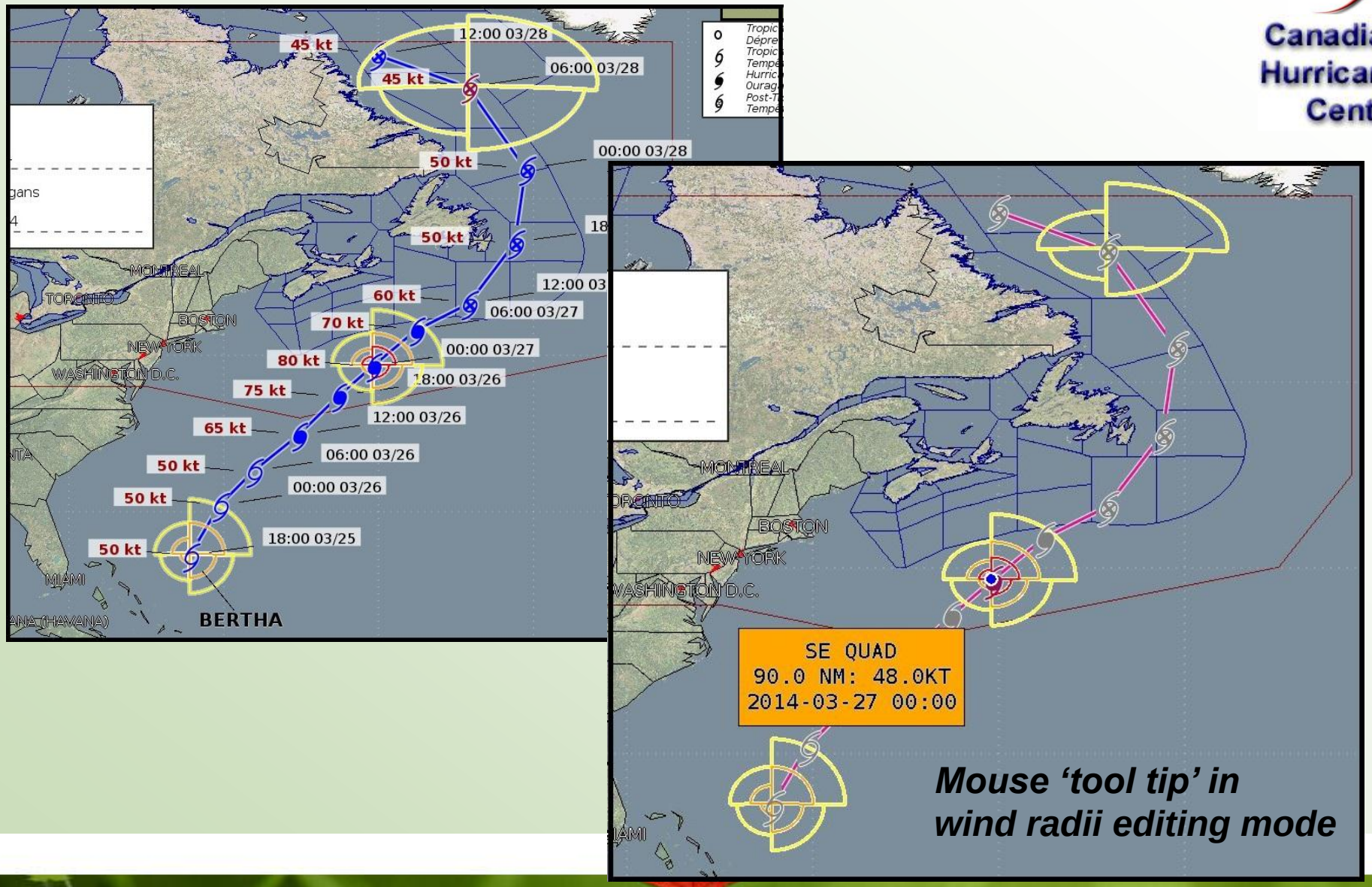
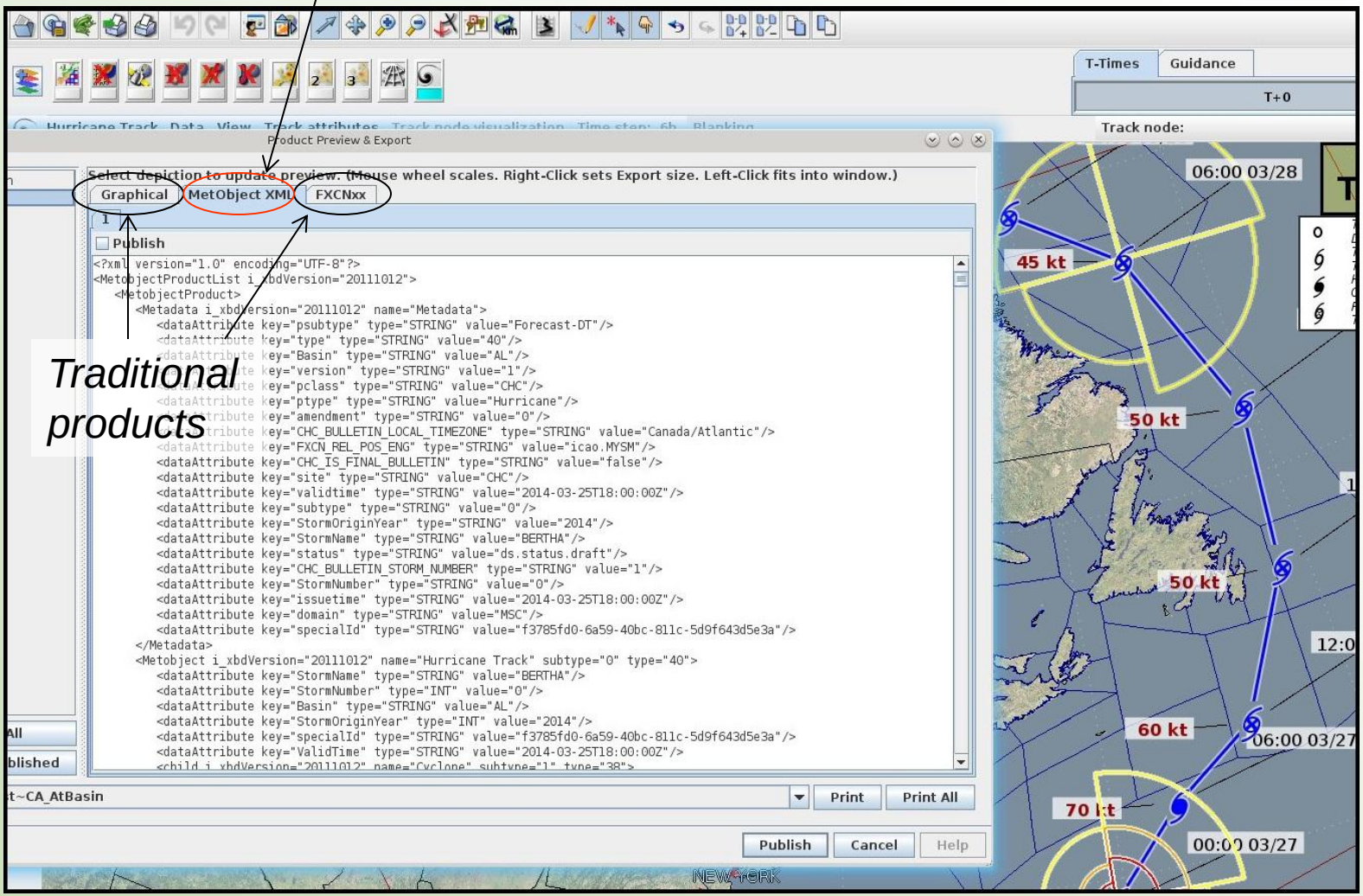


Modernized product (new)– XML format



Traditional products

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Future plans using the interface

Mock-up of met object-based depiction of threats such as wind and rainfall

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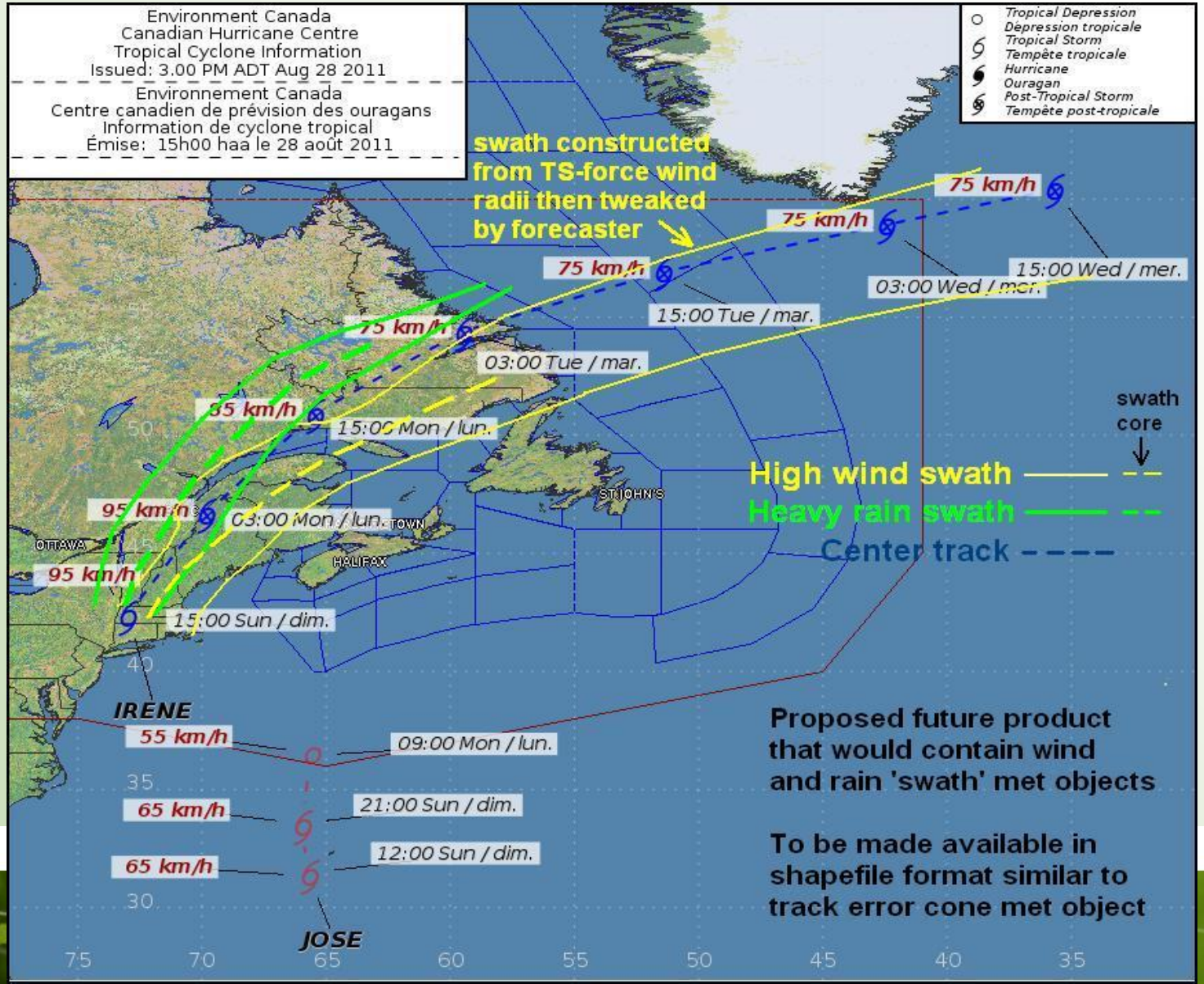

Canadian CMC GEM model

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- Uses a 4D-VAR DA scheme which works well for synoptic weather systems but not so much for TCs
- Sometimes aircraft recon data from storm are assimilated, but not consistently (dependence on trial field)
- Often tropical cyclone (TC) low pressure system initialized too-weak
- The weak TC circulation suffers from ‘spin-up’ during integration giving a *false intensification trend*
- Still have issues of false TC genesis in our longer-range model (subjectively, seemed like more false-alarms in 2013)

International Collaborations

Canadian Hurricane Centre

First Virtual US-Canada Border Conference

Agenda

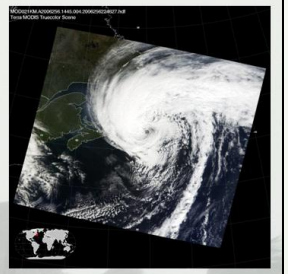
All Times are Eastern Daylight Time

3:25 pm to 3:50 pm	**Daniel P. Brown and Jack Beven,** NWS National Hurricane Center, Miami, FL; **Chris Fogarty,** EC Canadian Hurricane Centre, Dartmouth, **NS:** *Enhancements in National Hurricane Center and Canadian Hurricane Centre forecast products that have assisted in more effective communication o hurricane risk and forecast uncertainty*

Opportunity for the NHC and CHC to present to many other bordering forecast offices the success and growth of our collaborations over the past 20 years

"Post-Tropical" Terminology Adopted by NHC in 2009

- Already used by the Canadian Hurricane Center to describe cyclones that no longer met the definition of a tropical cyclone, yet still posed a significant threat to life and property
- NHC used post-tropical terminology in the final advisory for systems that were no longer tropical
- NHC did not issue post-tropical advisories, handled in high seas forecasts (Marine Prediction Center) over water and potentially the Weather Prediction Center when over land and a rainfall threat.



Typhoon Committee Meeting

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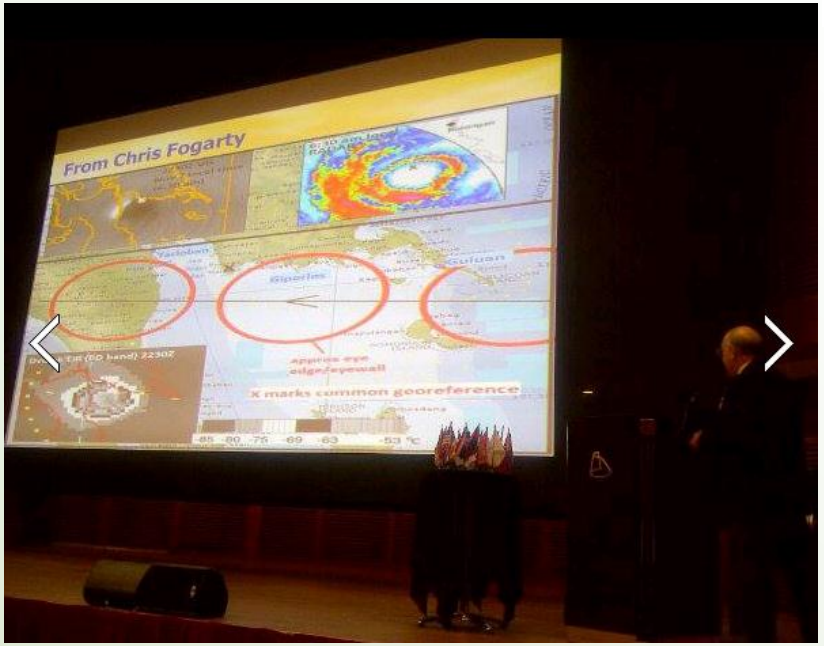
Invitation came out of Canada/China forecaster exchange program – CHC (Fogarty) invited to present extra-tropical transition forecasting techniques and forecast communication

CHC also actively involved in IWTCs over past 2 decades



CHC participates in professional email forum discussing tropical cyclones worldwide – example of contribution shown above at the typhoon Meeting (Super Typhoon Haiyan)

Summary points -

As a national forecast agency…

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- ***Recognize importance of engagement of multiple disciplines…***
- ***Help direct research and development for operational benefit, and…***
- ***Realize that international events (such as this conference and other workshops) enhance efficacy of 'electronic' communication and can lead to projects and partnerships***