Space Weather Alerts and Earthquake Alerts using the Common Alerting Protocol

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Earthquake Alerts

Automatic alerts to:

- Web site
- Social media (Twitter)
- Government agencies
- Critical infrastructure operators
- Media agencies
- MASAS
Project Objective

Provide Space Weather alerts from the Canadian Space Weather Forecasting Centre … … to Canada’s Multi-Agency Situational Awareness System (MASAS)
What is Space Weather?

- Energetic Electrons
- Solar Flare Protons
- Damage to spacecraft electronics
- Ionospheric currents
- GPS Signal Scintillation
- Radiation effects on avionics
- HF Radio wave disturbance
- Induces effects in submarine cables
- Induces effects in pipelines
- Magnetic interference in exploration surveys
- Geomagnetically induced currents in power systems
Input: the Space Weather Forecast

- Based on data from multiple inputs.
- Updated every 15 minutes.
- Posted on web site and RSS.
Output: CAP-CP Alerts in MASAS

Common Alerting Protocol –

Canadian Profile (CAP-CP)

- CAP compliant,
- Canada’s official languages,
- Managed events list,
- Managed locations list.
Implementation Considerations

Mapping the Forecast data to CAP, MASAS:

- Alerting criteria  
  - Urgency, Severity, Certainty  
- Forecast periods  
  - Current, short & long term forecasts  
  - Continuously sliding time window  
- Forecast zones.  
- Geospatial presentation
Implementation Considerations (cont’d)

Implementation challenges:

- Send separate alerts for current, short term and long term forecasts?
  - If one alert is sent for the 3 periods, what is the alert Urgency, Severity & Certainty?
- How to avoid *flapping* when conditions fluctuate?
- Update (downgrade) or Cancel?
Activity level → CAP Severity

- **Major Storm (K 7+):**
  Severity = SEVERE

- **Stormy (K 5-6):**
  Severity = MODERATE

- **Active, Unsettled, Quiet (K < 5):**
  Severity = MINOR

Alert Or Update

Cancel Or Update ???
Forecast periods ➔ CAP Certainty, Urgency

<onset>
Activity > alert threshold

<expires>
Activity < alert threshold

Current conditions:
Certainty = OBSERVED
Urgency = IMMEDIATE

0-6 hours:
Certainty = LIKELY
Urgency = IMMEDIATE

6-24 hours:
Certainty = POSSIBLE
Urgency = EXPECTED
Geospatial Presentation

3 Forecast Zones
Described using:
• Geocodes
• Polygons
• Zone code
SpaceWeatherCanada Data Layer

A new CAP Layer carries additional data:
- Alert zone name and code.
- Forecast period.
- Max. activity level (nT), index (Kr).
- More data if/as needed in the future.
Questions and Issues

- Additional/related alerts from other agencies:
  - Modify the alert or send new parallel alerts?
- Cross-border alerting …
  - Need for standard data *layers* among peer agencies?
  - To facilitate automated processing, translation, etc. and ensure correct interpretation by responders.
- *Cancel* or *All-Clear Update* or *Expire*?
Thank you.