Presented at the FIG Working Week 2016,
May 2-6, 2016 in Christchurch, New Zealand

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Weather Model Assessment Tool

River Forecast Centre – Alberta Environment and Parks

FIG Working Week 2016
CHRISTCHURCH, NEW ZEALAND
2–6 May 2016
Recovery from disaster

Vincent Thomas & Felix Friedmann

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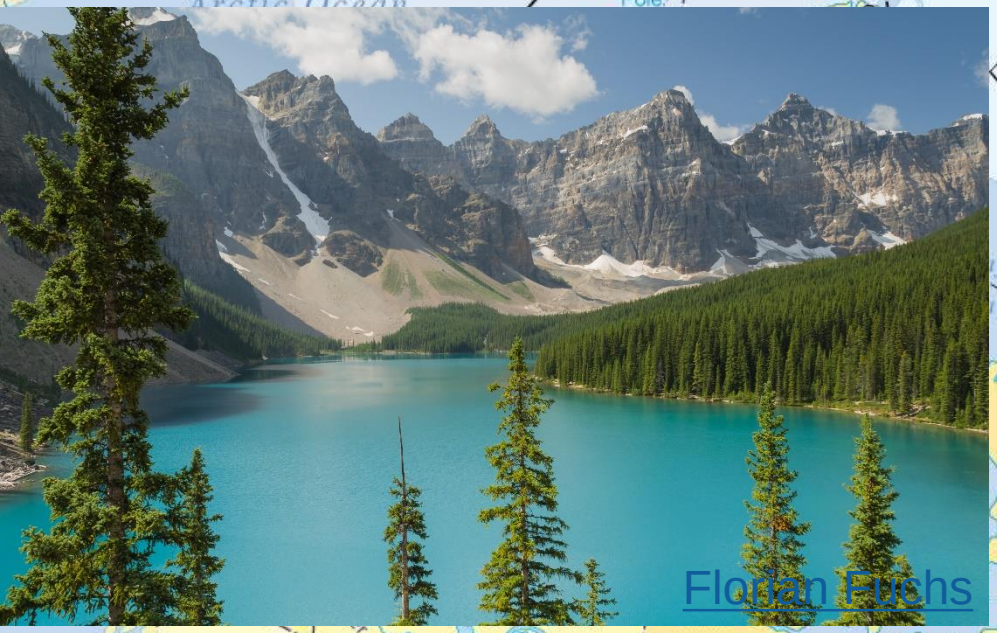

Florian Fuchs

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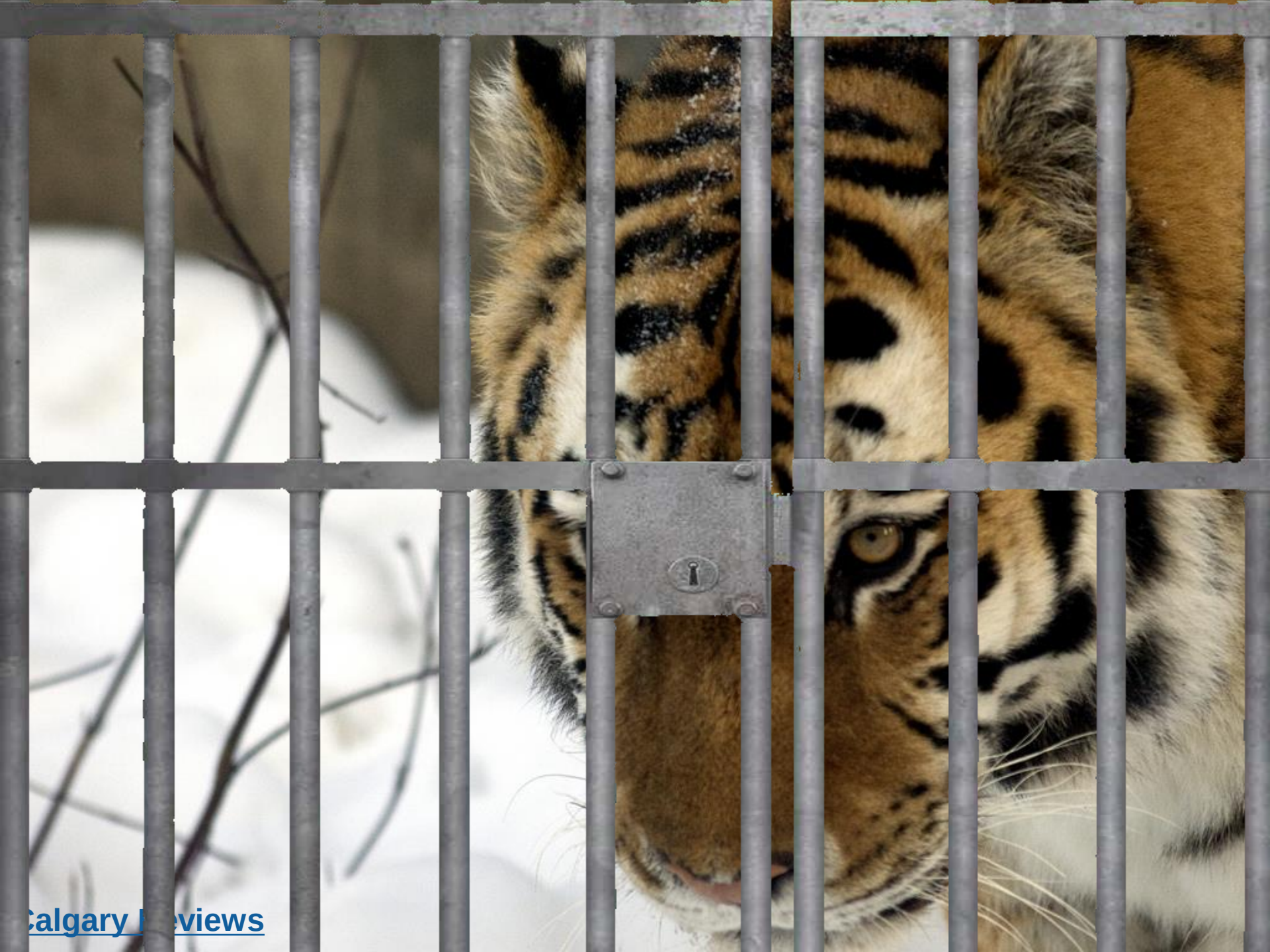
CANADA

- National capital
- Provincial capital
- City / pop. place
- Major airport
- Int. boundary
- Provincial boundary
- 200 mi Zone (EEZ)

0 300 600 900 km
0 200 400 600 mi

ROAD
CLOSED
ROAD
CLOSED

2


Calgary Reviews

Alberta weather system in June

- It is normal to have a lot of rain and storms in June in southern Alberta. Three causes:

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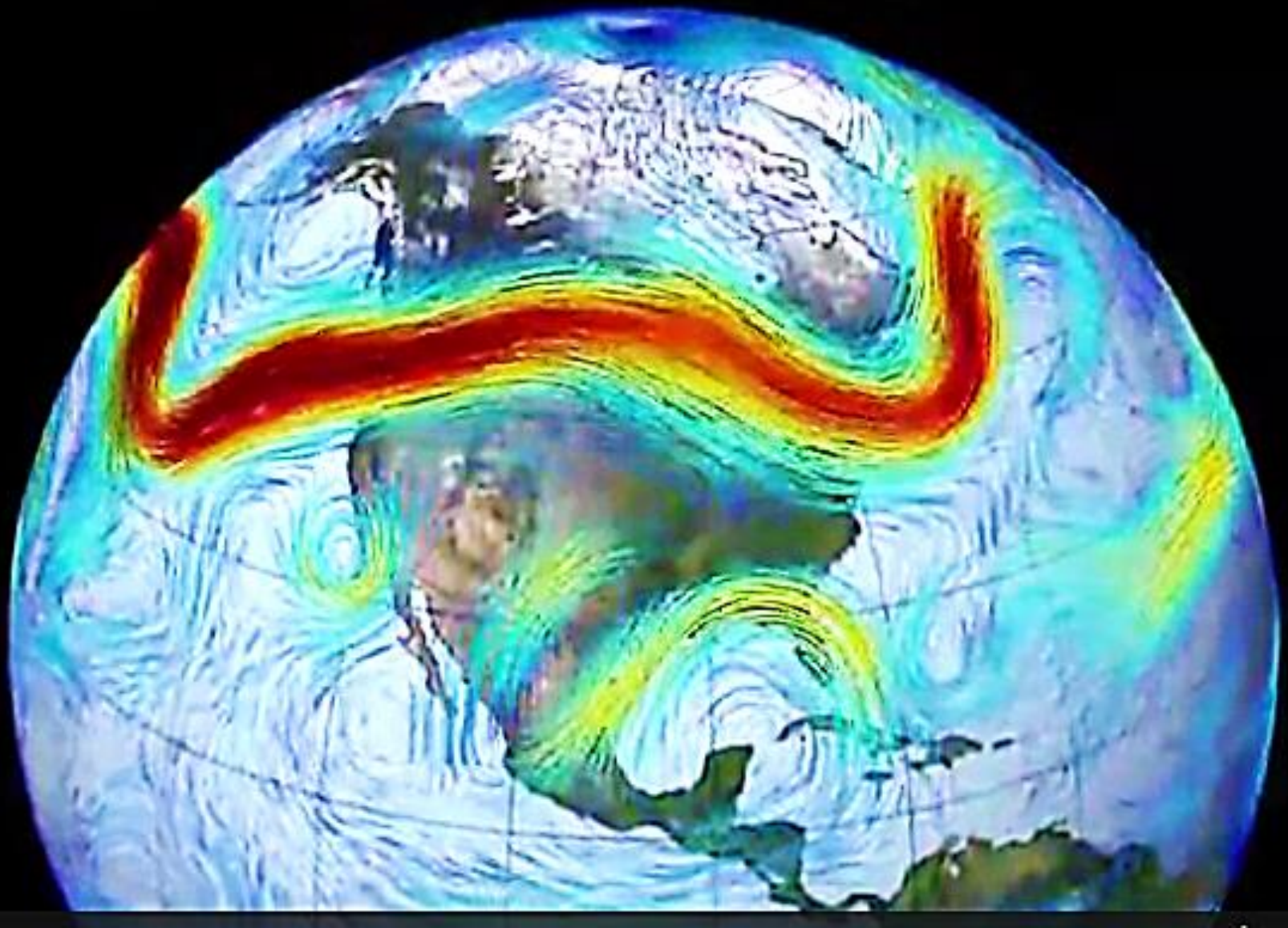
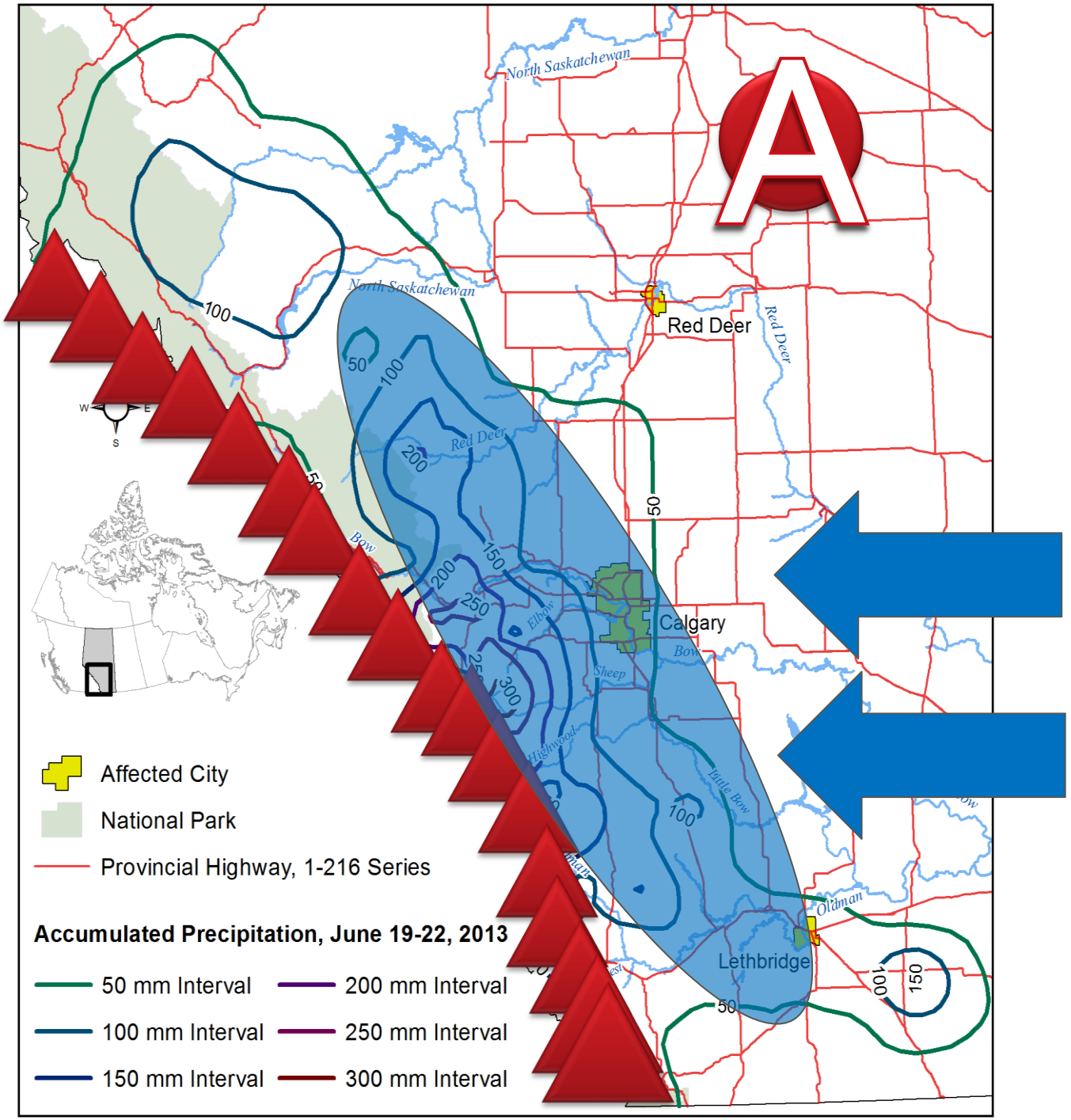
1



NASA

By Tobias Alt, Tobi 87 - Own work, GFDL,
https://commons.wikimedia.org/w/index.php?curid=3064142

3
Huffington Post



Hwy43. (2013-07-17). *2013 Alberta floods*. Retrieved from Wikipedia: https://en.wikipedia.org/wiki/2013_Alberta_floods#/media/File:2013_Alberta_floods_rainfall.png

After the floods - Mitigation Measures

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- Enhancement of building construction standards, including highways and bridges;
- Improvement of water management infrastructures;
- Support for owners who wish to relocate out of flood zones;
- Ban on building in floodway;
- Better mapping and understanding of flood risk.

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Our client: River Forecast Centre (RFC)

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- Governmental entity responsible to provide flood warnings to other agencies, the general public and industries;
- RFC wanted to supplement the current method of using local forecasts by implementing a wider watershed basins analysis;
- Needed a new tool:
  - Visualize and animate the various weather forecasting models as they become available from Environment Canada;
  - Analyze on demand weather forecast models in a selected watershed basin;
  - Keep a history of a week of weather forecasts.

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Alberta Environment and Parks

Weather Model Assessment Tool

Sign out

Tools

Home | Initial View | Weather Model Selector

Basic Tools | WMAT

Weather Model Selector

I want to...

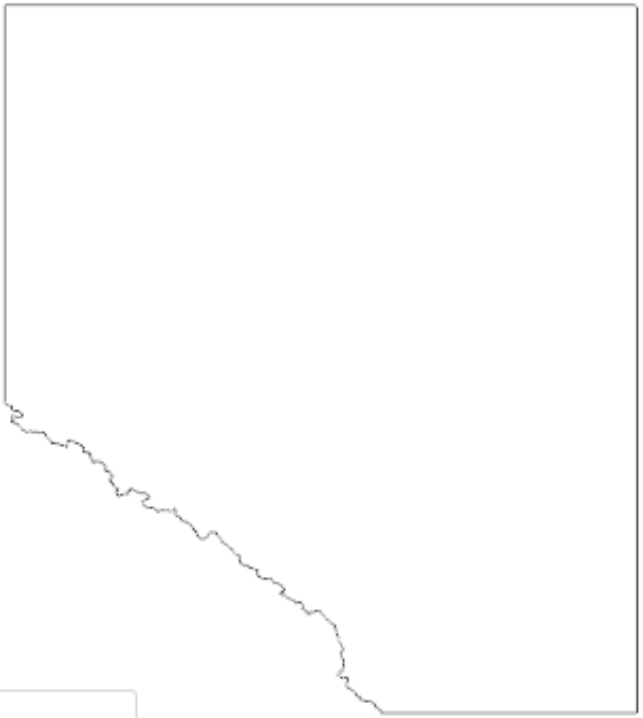
Select the date and then choose the weather data model. Click on the "Get Data" button to view and animate the chosen model. To launch a statistical precipitation analysis for a single basin, click on the "Run Basin Analysis". The result will appear in another browser tab so please make sure that pop-ups are enabled.

Date: Select Date

Model:

- Select Date
- 2016-02-15
- 2016-02-14
- 2016-02-13
- 2016-02-12
- 2016-02-11
- 2016-02-10
- 2016-02-09

- RDPS_APCP_00
- HRDPS_SNOD_18
- HRDPS_SNOD_12
- HRDPS_SNOD_06
- HRDPS_SNOD_00
- HRDPS_APCP_18
- HRDPS_APCP_12



0 100 200km

Copyright Government of Alberta

Alberta Environment and Parks

Weather Model Assessment Tool

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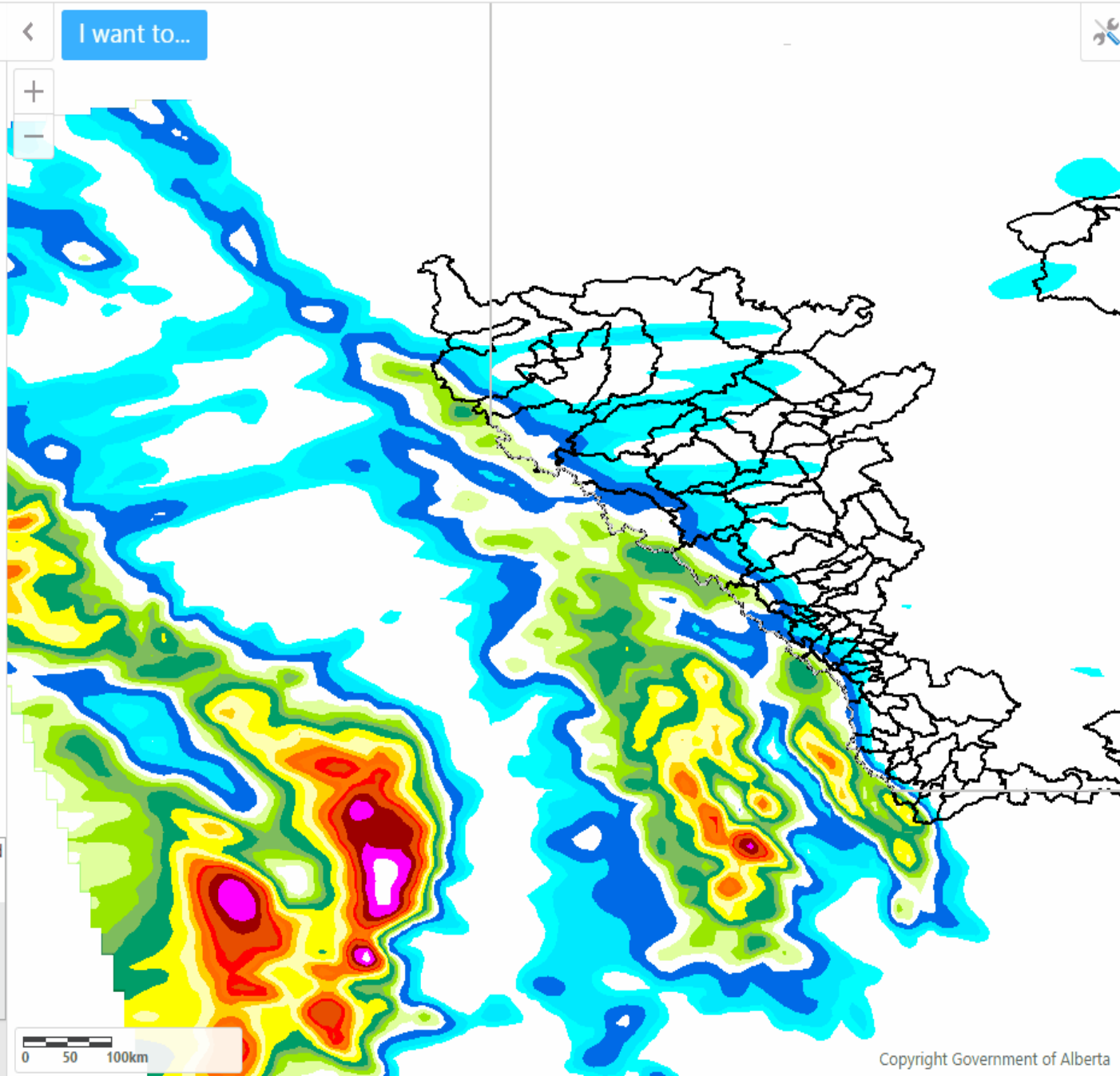
Date: 2015-11-15

Model: GDPS_APCP_12

Get Data

Run Basin Analysis



Note that 1st pass through data creates images which is used for animation on subsequent runs

Sat, 14 Nov 2015 08:00:00 (MST)

Animation Speed 0,3 Slow down

Alberta Environment and Parks

Weather Model Assessment Tool

Sign out

Weather Model Selector

I want to...

Select the date and then choose the weather data model. Click on the "Get Data" button to view and animate the chosen model. To launch a statistical precipitation analysis for a single basin, click on the "Run Basin Analysis". The result will appear in another browser tab so please make sure that pop-ups are enabled.

Date: 2015-11-15

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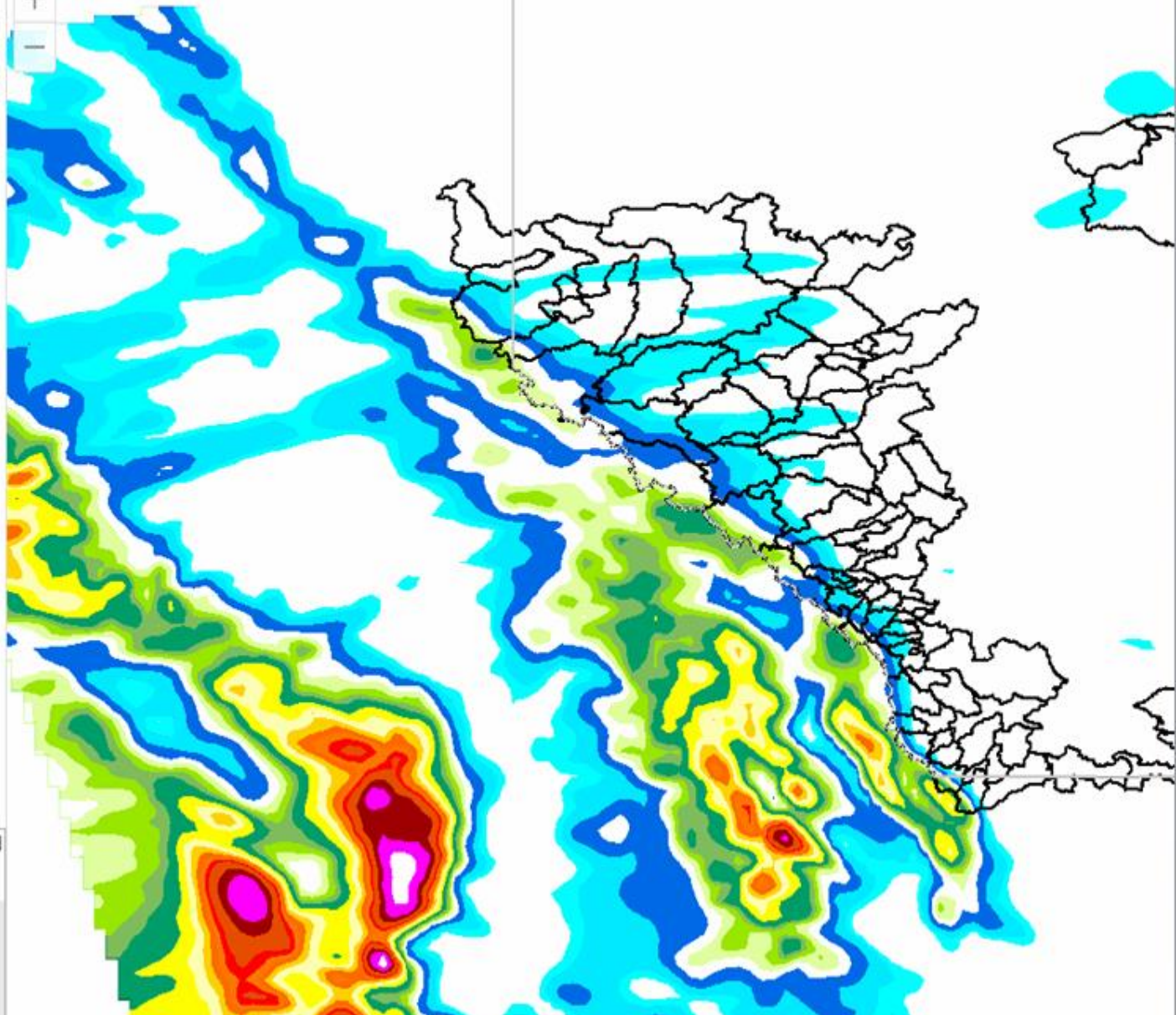
Get Data

Run Basin Analysis



mm

0 - 0.5	50 - 60
0.5 - 1	60 - 70
1 - 2	70 - 80
2 - 5	80 - 90
5 - 10	90 - 100
10 - 15	100 - 125
15 - 20	125 - 150
20 - 25	150 - 200
25 - 30	200 - 250
30 - 40	250+
40 - 50	

Note that 1st pass through data creates images which is used for animation on subsequent runs

Sat, 14 Nov 2015 08:00:00 (MST)

Animation Speed 0,3 Slow down

Water Basin Analysis

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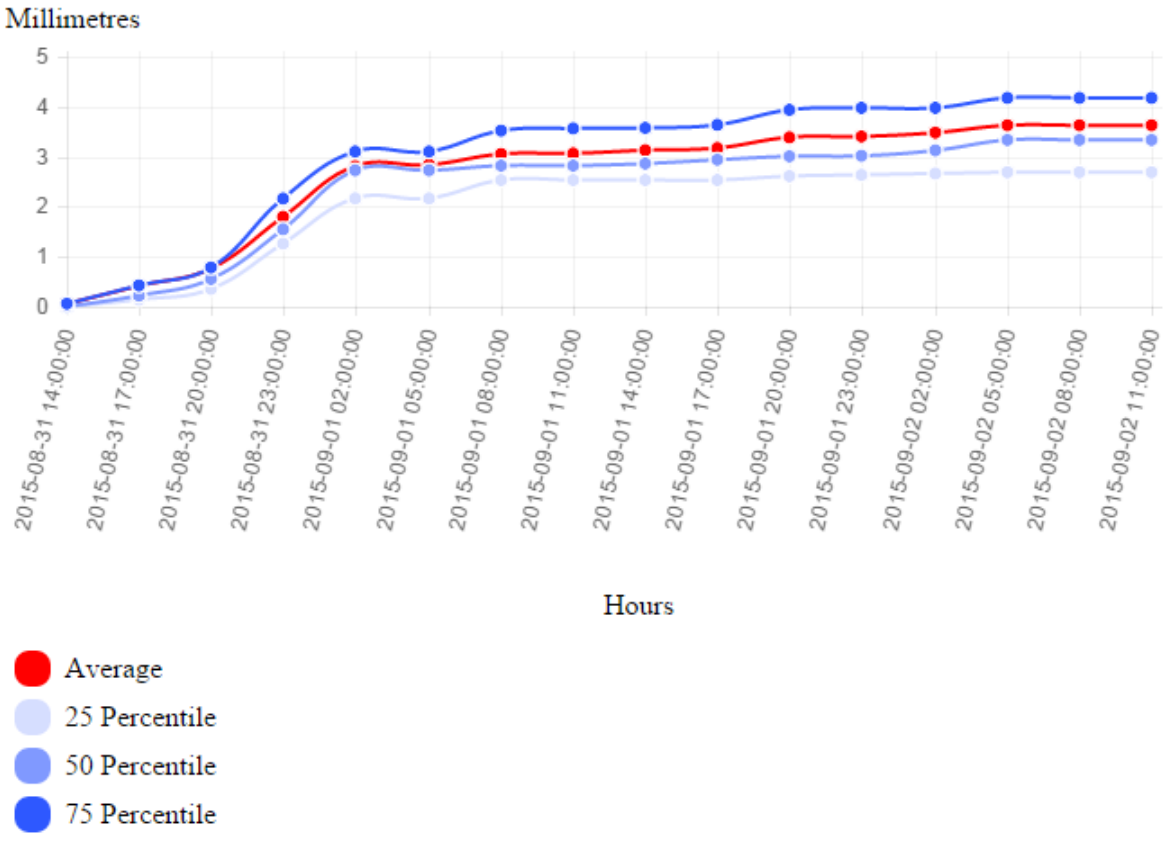
WildhayBerland Water basin

02/09/2015 2:37:59 PM

☑ Average ☑ 25 Percentile ☑ 50 Percentile ☑ 75 Percentile

Download the data in CSV

Download the data in Wiski



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Statistical Analysis

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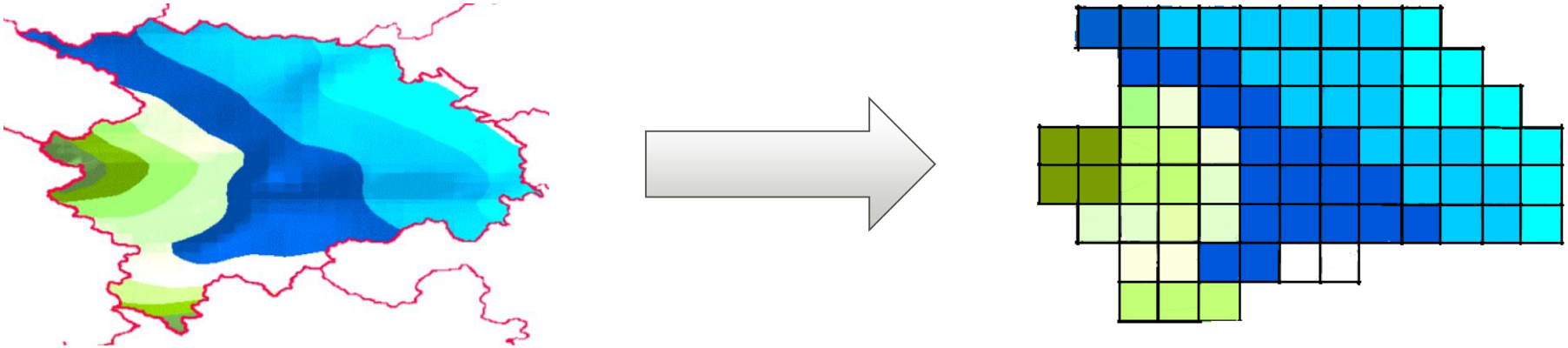
Extract by Mask



$$[23,24,54,65,65,65,68,76,375, \ldots]$$

$$\bar{x} = \left\lceil \frac{x_1 + x_2 + \cdots + x_n}{\mathrm{N}} \right\rceil \qquad n = \left\lceil \frac{P}{100}\ x\ N \right\rceil$$

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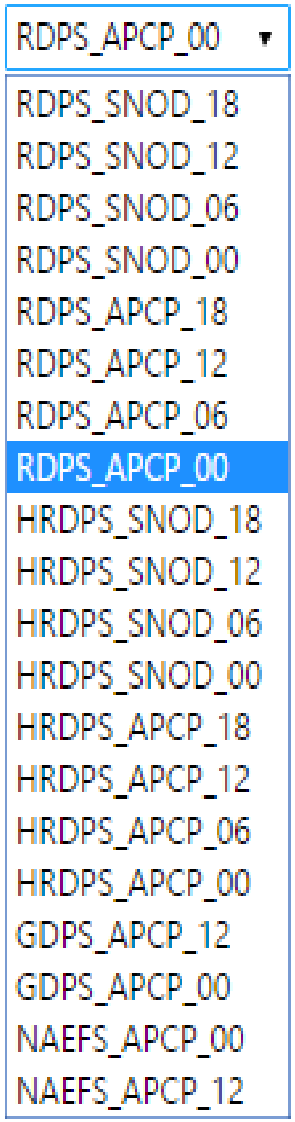
Base Data - Environment Canada

Forecast Model	Theme	Data Publication Time
HRDPS	Snow (SNOD)	00:00 06:00 12:00 18:00
	Precipitation Accumulation (APCP)	
RDPS	Snow (SNOD)	00:00 06:00 12:00 18:00
	Precipitation Accumulation (APCP)	
GDPS	Precipitation Accumulation (APCP)	0:00 12:00
NAEF (Ensemble)	Precipitation Accumulation (APCP)	0:00 12:00



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Results Highlights

- Web tool that fits RFC's needs of animating and analyzing weather forecast data based on water basins;
- Weather forecast layers available on the web application as soon as they are published by Environment Canada;
- Animation of time-aware layers in a web application;
- Raster analysis and charts generation.

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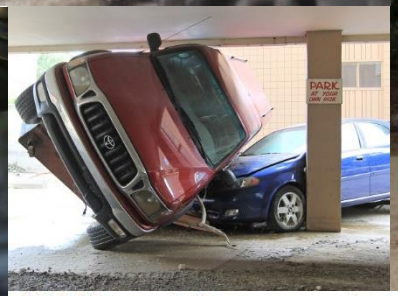
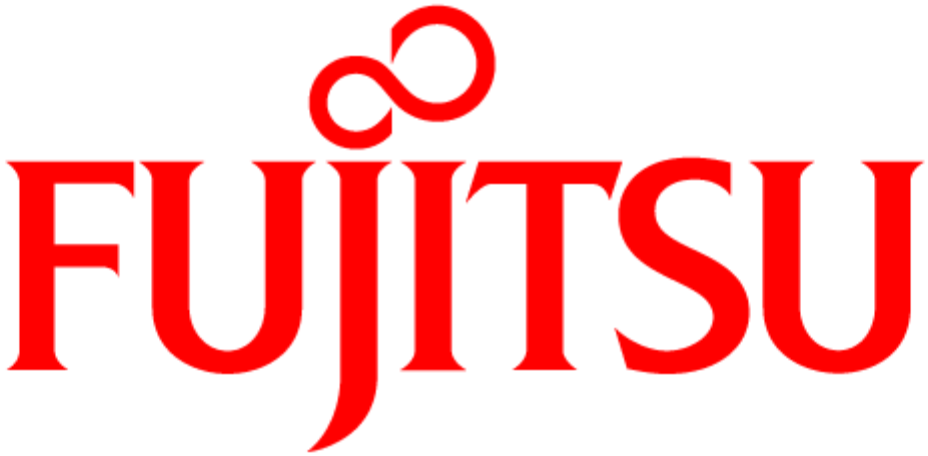


Kijiji Alberta > Calgary > community > other > Ad ID 496987407

Have spare room for flood victims

Date Listed	22-Jun-13
Address	Airdrie, AB T4B 0J9, Canada View map

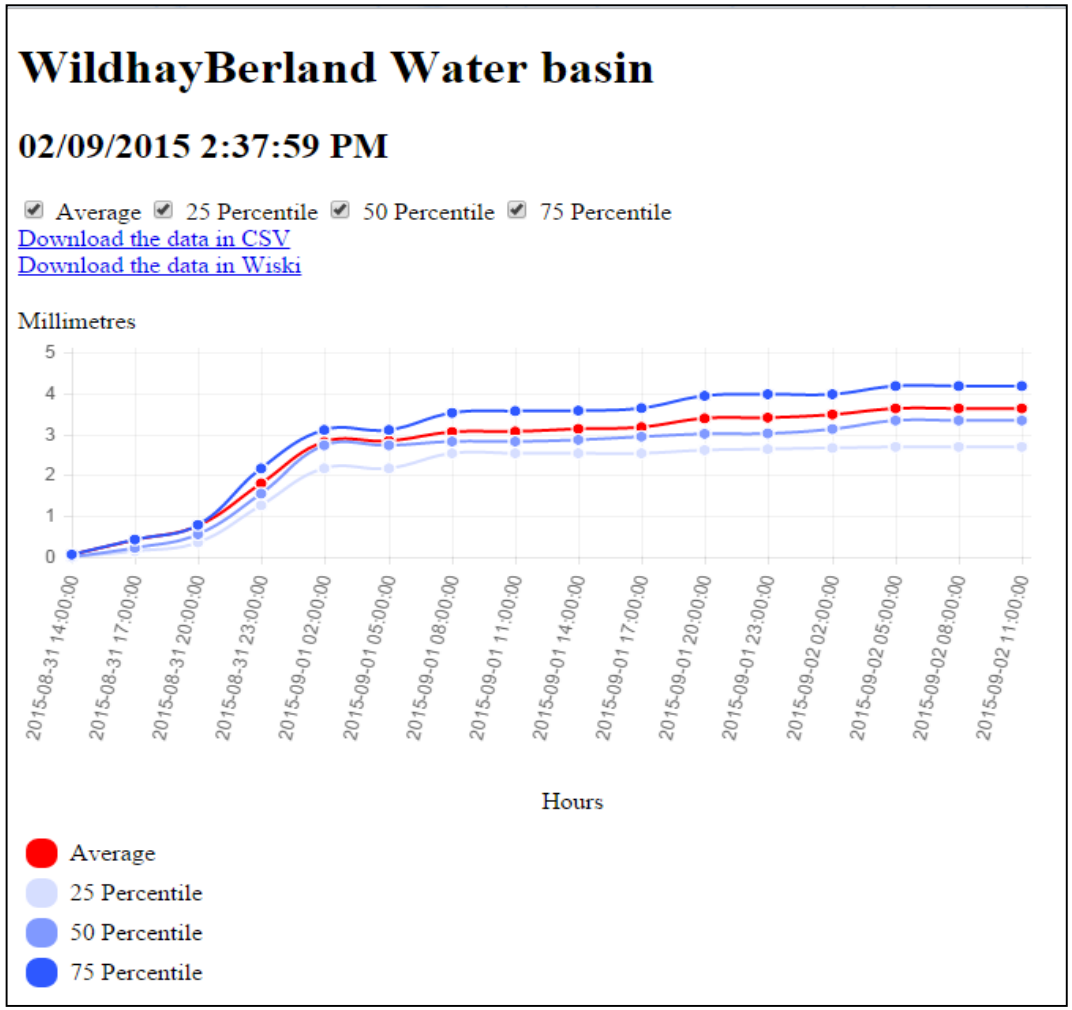
I live in airdrie. If u need help with a pace to stay due to the flood in calgary, plz contact. If u have a pet, we can accommodate.



façonnons l'avenir ensemble

Sous le capot – analyse statistique

- Les géotraitements sont codés en Python (ArcPy);
- Le graphique est généré à l'aide de l'outil Open Source Chart.js



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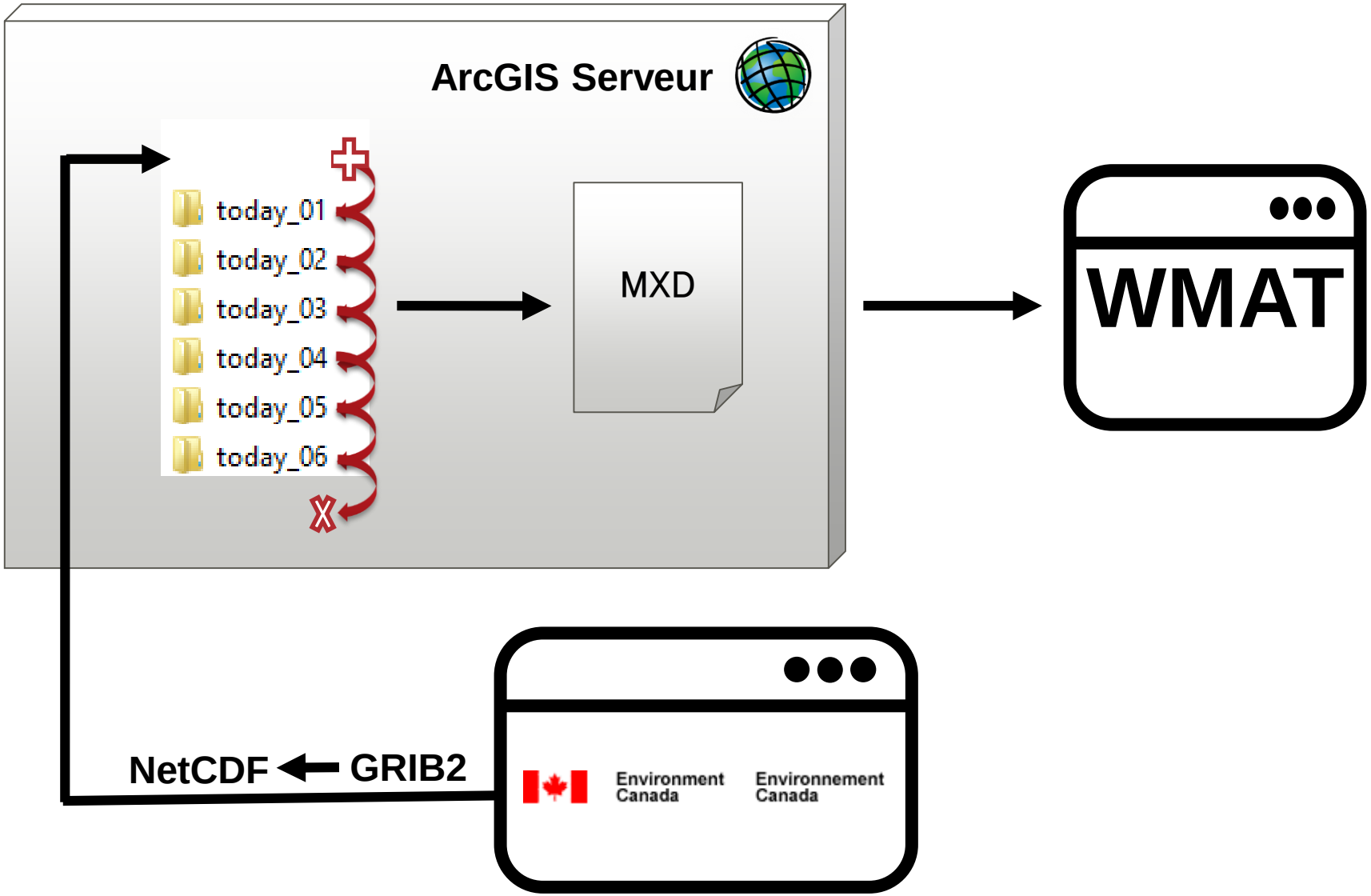
Tim Ho
CCM
BAUER

Under the hood - architecture



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Gestion de projet

- Méthodologie Agile
  - Rencontre avec les développeurs et les chargés de projet à chaque jour;
  - Implication soutenue des clients dans le projet.

- Métriques;
  - 144 j-p
  - 5 ressources
  - 125K$

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Sous le capot

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Automatiquement:

1. Téléchargement plusieurs fois par jour de fichiers GRIB2 depuis le site d'Environnement Canada;

2. Utilisation de l'outil WGRIB2 de NOAA pour convertir les fichiers GRIB2 en NetCDF et les sauvegarder dans le dossier today_00 (aujourd'hui);

3. À minuit à chaque soir, un script modifie les noms des dossiers contenant les fichiers NetCDF (today_00 devient today_01, …).

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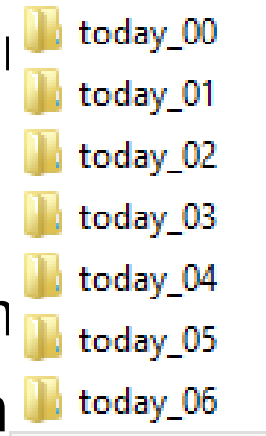
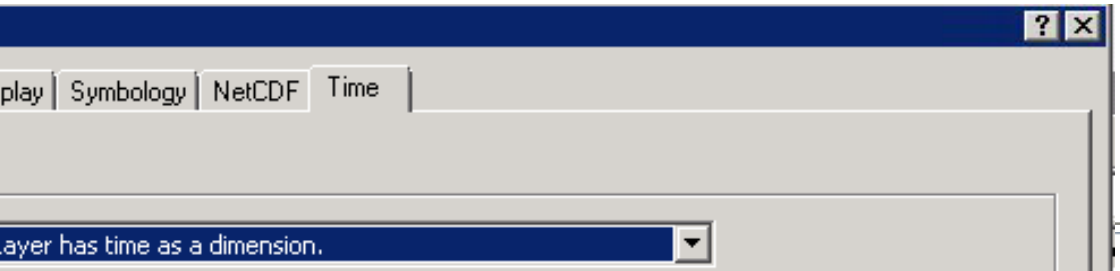
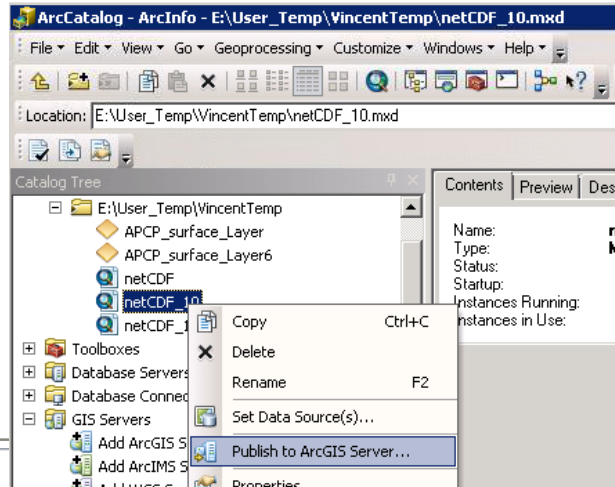
Sous le capot

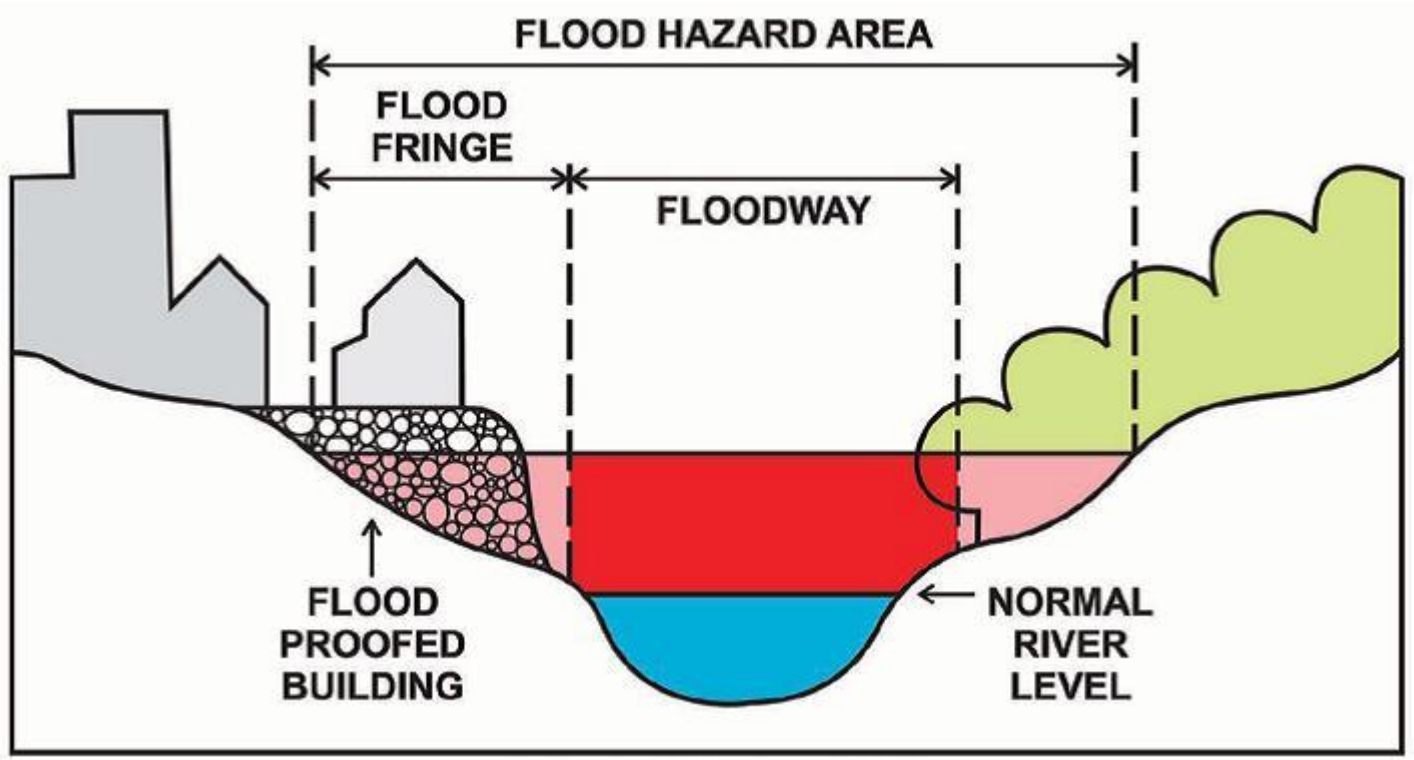
Manuellement, une seule fois:

1. Téléchargement des données GRIB2 d'Environnement Canada pour une semaine;
2. Transformatio 32 en NetCDF par l'outil WGRIB2;
3. Création d'un : toutes les combinaison possibles pour 7 jours;
4. Ajouter la com temporelle pour toutes les couches;
5. Ajuster la sym
6. Ajouter les couches de bassins versants;
7. Publier le MXD sur ArcGIS Server.









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