Agricultural Drought Monitoring and Reporting in Alberta

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Presentation Overview

- The Alberta Agricultural Drought Risk Management Plan
- Meteorological Stations expansion
- Drought Indices
- Data Quality Control and Data Filling
- Data Delivery: Agro Climatic Information Service (web)
The AB Agriculture Drought Risk Management Plan (ADRMP)

• The plan provides a framework for a coordinated, pro-active approach to mitigate the effects of drought in the agricultural areas of Alberta.

• Partners - Alberta Agriculture, Alberta Environment, AFSC, PFRA, Counties
ADRMP Plan Strategies

• Drought Monitoring and Reporting and analysis: onset, severity and extent, ending, forecast …

• Drought Preparedness — taking action before a drought to increase the level of readiness by all stakeholders.

• Drought Response — taking action during and immediately following a drought to reduce its impacts.
The Drought reporting system soon recognized the inadequacy of the existing weather data in the province.
Alberta Weather Stations Prior to 2002

Networks owned by - MSC, AENV and SRD

Mainly Measure -
• Precipitation
• Temperature
• Humidity
Near Real Time Network

- 2002 to 2003
- ARD, Fed’s
- added 36 AGDM stations
Near Real Time Network

-2003 to 2004
ARD added
11 IMCIN stations
Standard Meteorological Station

Barnwell AGDM
Parameters Measured at ARD’s Meteorological Stations:

- Soil Moisture and Temperature
- Air Temperature and Humidity
- All Season Precipitation
- Solar Radiation
- 10-m Wind Speed and Direction
- Satellite Telemetry
Near Real Time Network

- 2003
ARD and AENV added 5 AEDM stations
Near Real Time Network

-2007 to 2008
ARD, AFSC, AENV, Fed’s added 67 AGCM stations
Alberta Historical Weather Data

Snap shot of stations across time, with the completeness of each station recorded as density. For example: 0.6 implies that the station contains 60% of the data for the year, and 40% missing observations.

Station Completeness Index
- 0.05 - 0.10
- 0.11 - 0.20
- 0.21 - 0.30
- 0.31 - 0.40
- 0.41 - 0.50
- 0.51 - 0.60
- 0.61 - 0.70
- 0.71 - 0.80
- 0.81 - 0.90
- 0.91 - 1.00
Weather Data Second Generation QAQC:

Providing:

• quality assurance and quality control
• filling missing and invalid data
Station Metadata

- **Controlled** through the Station Maintenance Application (forcing database integrity) and the application is tied to QA/QC and Web delivery
<table>
<thead>
<tr>
<th>Station Metadata</th>
<th>Station Metadata</th>
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<tbody>
<tr>
<td><strong>Station:</strong> Abee AGDM</td>
<td><strong>Station Metadata</strong></td>
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<tr>
<td><strong>Name:</strong> Abee AGDM</td>
<td><strong>Location</strong></td>
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<tr>
<td><strong>Network:</strong> AGDM</td>
<td><strong>Latitude (deg):</strong> 54.2773</td>
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<tr>
<td><strong>Alias:</strong> Abee</td>
<td><strong>Longitude (deg):</strong> 112.9654</td>
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<td><strong>Commissioned:</strong></td>
<td><strong>Elevation (m):</strong> 664.00</td>
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<td><strong>Network Type:</strong> Agriculture Drought Monitoring Network</td>
<td><strong>existing:</strong></td>
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<tr>
<td><strong>Operator:</strong> Alberta Agriculture and Rural Development</td>
<td><strong>Noting:</strong> 632441.36</td>
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<td><strong>Organization:</strong> Alberta Agriculture and Rural Development</td>
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<td><strong>Province:</strong> Alberta</td>
<td><strong>Transmission Detail</strong></td>
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<tr>
<td><strong>Transmission:</strong> GOES</td>
<td><strong>Season Start:</strong></td>
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<tr>
<td><strong>Transmission Channel:</strong> 178E</td>
<td><strong>Season End:</strong></td>
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<tr>
<td><strong>Transmission Time:</strong> 18:30</td>
<td><strong>Freq:</strong> Hourly</td>
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<tr>
<td>Sensor ID</td>
<td>Sensor Type</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>5010</td>
<td>Precipitation Weighing (PR)</td>
</tr>
</tbody>
</table>

**Validation**

- Default Range validation [max=600, min=600, msg=geonor capacity exceeded (600 mm), alert tech.]
- Default Range validation [max=450, min=450, msg=geonor gauge near capacity (600 mm), alert tech.]
- Default Range validation [max=27.2, min=27.2, msg=range check, maximum intensity exceeded]
- Default Step validation [dur=1, max=27.2, min=27.2, msg=step check, recharge possible]
- Default Difference validation [diff=0, msg=difference check, sensor drift excessive]
- Default Difference validation [diff=-1, msg=difference check, sensor drift excessive]
QAQC Flow Logic Diagram: (Hourly Data)

- Raw Reading
- Missing Data
- QA/QC Application (automatic)
- Data Filling Computations
- Validation Flags
  - valid
  - invalid
- Validation Metrics
- QA/QC Operator (Human)
  - Manual over-ride?
    - yes
    - no
  - Validation Flags
    - invalid
    - valid
- QC’d Reading
Quality Control and Quality Assurance

Quality Control and Quality Assurance
Data Filling

• Attempt to fill all time series using only valid raw readings
• Flag every record
• If filling fails, leave values missing.
Filling Priority Sequence

Computed Fills
- Exclude: Wind dir, Battery Voltage

Linear Interpolation
- Gap <= 2
- Exclude P1, P6, PC

Inverse Distance Weighted (IDW)
- Exclude: soil moisture, soil temperature, snow depth, snow water, wind direction

Linear Interpolation:
- Gap > 2, max gap = 6
- Exclude PR, P1, P6, PC

End Point
- Gap <= 2
- Exclude PR, P1, P6, PC

Failed to Compute

PR Adjustment
- between valid weights (PR)

IDW Inner Ring-60 km
IDW Outer Ring-120 km

Daily Roll Up

All Sensors

24-obs. summary complete

24-obs. summary estimated: actual%=a, estimated%=b

24-obs. summary estimate suspect: actual%=a, estimated%=b, suspect%=d

24-obs. summary suspect incomplete: actual%=a, estimated%=b, suspect%=c, missing% = d

24-obs. summary estimated: actual%=a, adjusted%=b

24-obs. summary estimate suspect: actual%=a, adjusted%=b
AgroClimatic Information Service (ACIS)

Welcome to ACIS, an interactive tool that helps producers, farm consultants, and researchers create maps. These maps describe Alberta's weather, climate and related agriculture features to help with your long-term planning and decision-making throughout the growing season.

You can navigate directly to the viewers by selecting the tabs at the top of the page.

To learn more about using the viewer, choose one of the categories below.

ACIS Case Studies
Learn how you can use ACIS to find the length of the growing season, determine the driest area in the province, and monitor crop growth.

ACIS Viewers Explained
Find out about the features of each viewer and take a quick tour to learn the functions of this tool.

ACIS Help
Not sure what that rectangular button does? Want to know how to run a query? View the Help section for brief explanations on the functions of the viewers.

View case studies  Viewers explained  Help

To learn the functions of this tool, take a quick tour.

www.agric.gov.ab.ca/acis
Station Viewer

www.agric.gov.ab.ca/acis
Thank-you