

# Drought Research Initiative 1<sup>st</sup> Annual Workshop

Saskatoon, Saskatchewan - 11-12 January 2006

## Breakout Sessions

### Theme-1 - Quantify physical features of the recent Canadian Prairie drought

**Participants:** John Hanesiak (chair), Geoff Strong (rapporteur)

**Question:** What variables need to be quantified, and what data sets are required to do this?

**Data Sets:**

Priority is for *continuous* data sets; however, it is recognized that only operational (synoptic) data generally provides this, that research data sets are generally of short term non-continuous, usually from weeks to a few months, also are usually seasonal in nature. Some hydrologic and flux research data sets are an exception, such as the BERMS data (continuous since 1994), but there are limited sources for the prairies.

Quality-assured (QA) synoptic meteorological data are available from Environment Canada. Research data sets are QAed to varying degrees, while other data sets are ‘user beware’. These categories need to be identified. Streamflow data provided by Environment Canada may be only 50% QAed, but will at least have QA flags indicated. Alberta Environment streamflow are ~75% QAed.

The following table(s) summarize ‘some’ of the data sets required, with indicated data sources. These are not intended to represent an exhaustive list.

**Precipitation Data:**

VARIABLE	Data Sets	Source(s)	Location
<b>PRECIPITATION:</b>	Climate archive	Environment Canada	Edmonton, Winnipeg
	CanGrid	Environment Canada	MSC Climate
	CMC GEM model	Environment Canada	Montreal, QC
	Radar	Environment Canada	Edmonton, Calgary, Saskatoon, Winnipeg
	NCEP model (reanal.)	NOAA/NWS	Maryland, U.S.
	ERA40 (reanal.)	ECMWF	UK
	BERMS	Environment Canada	Saskatoon, SK
	FOPEX (orographic)	Environment Canada	Saskatoon, SK
	MAGS	MAGS, EC/UofS	Toronto, Saskatoon
	Cities data	EC and cities	EC/city in cities
Cryosphere	Snow – survey data	EC, AE, etc.	

	Snow – SWE data	EC, AE, etc.	
	Snow passive microwave sensors	CRD, EC	Toronto

**Soil Moisture Data:**

- few observations
- modelled data
- remote sensing data (including satellite and Manitoba Gamma flights - e.g., see <http://www.ijc.org/php/publications/html/taskforce.html#8c3> for the latter).

Modelled soil moisture data will require detailed land surface data, as well as validation data.

<b>VARIABLE</b>	<b>Data Sets</b>	<b>Source(s)</b>	<b>Location</b>
<b>Soil Moisture, ET, and other Flux data:</b>	BERMS	Environment Canada	Saskatoon, SK
	FluxNet	FluxNet Canada	Université Laval, Québec, QC
	Ameriflux	Oak Ridge National Laboratory	Oak Ridge, Tennessee
	St. Denis, SK	Environment Canada	Saskatoon, SK
	Soil Science, UofS	Les Henry, Soil Science, U. of Sask.	Saskatoon, SK
	Satellite-derived (since June/2002)		
	GRACE satellite	NASA	
	Rick Raddatz modelled soil moisture data	Rick Raddatz Soil Moisture Model	Winnipeg
<b>Land Surface Data:</b>	LDAS data	NASA, CCRS	NASA, Ottawa
<b>Crop Condition:</b>	Crop condition assessment	Stats-Canada PFRA	Web sites
	NDVI (Normalized Difference Vegetation Index)	CCRS	Ottawa

**Water Budget Data:**

Surface water and atmospheric moisture budgets will employ precipitation, surface run-off (streamflow), modelled surface (or ground-) water storage, and atmospheric profile data, the latter in both radiosonde profiles and modelled data. An important consideration for the surface water balance that caused no major concern for MAGS water budgets, is the amount of surface water usage by human consumption, agriculture, industry, and through transfer to other river

basins (e.g., from SRB to the Qu'Appelle Basin). Most reliable data for this purpose will be inter-provincial streamflow, and river/lake levels.

<b>VARIABLE</b>	<b>Data Sets</b>	<b>Source(s)</b>	<b>Location</b>
<b>Atmospheric Moisture and other profile data:</b>	Radiosonde data	Environment Canada, MAGS (+ other special research sets)	Edmonton, Toronto, Montreal
	Models (GEM, etc.)	EC/CMC, NOAA, ECMWF, etc	Montreal, etc.
	GPS moisture	UofCalgary, CMC	Calgary, Montreal
	Radiation		
<b>Clouds &amp; Storms:</b>	Satellite images	GOES, AVHRR, etc.	NOAA, CMC, etc.
	MODIS satellite	NASA	web site
	Radar images	Environment Canada, WMI (central Alberta)	Edmonton, Calgary, Saskatoon, Winnipeg, Bismark (ND)
	Radar data	Environment Canada	Edmonton, Toronto
<b>Lightning :</b>	Canadian Lightning Network	Environment Canada	Toronto
<b>Hydrologic Data :</b>	Streamflow (discharge)	Environment Canada Alberta Environment Sask. Water Corp. Other?	Toronto Edmonton Saskatoon ?
	Groundwater	Provinces & National water agencies ; DRI investigators	

#### **OTHER DATA TYPES:**

DRI also needs to consider what ‘new’ data might be required before the network ends in 2010. These might include data for modelling or for calibrating techniques such as estimating soil moisture or evapotranspiration. If fieldwork is required for this, it might be accomplished through leverage funding.

#### **DATA INVENTORY:**

A more complete data inventory than we can prepare here needs to be completed, including a comprehensive list of

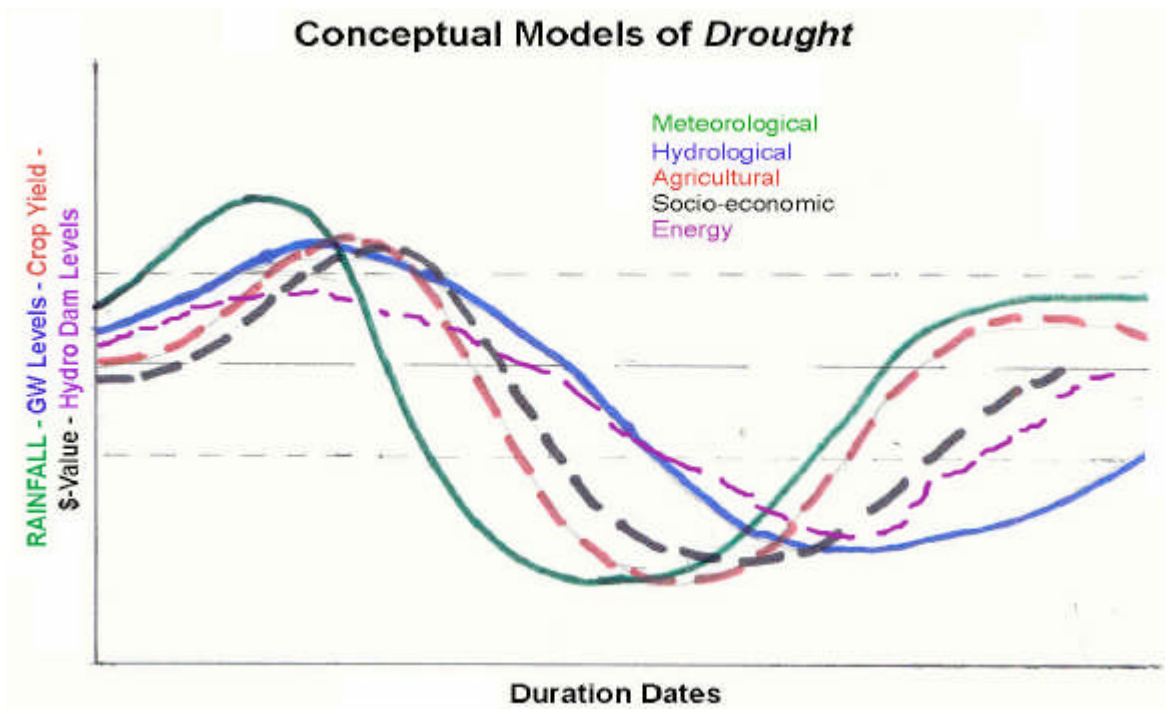
- all variables required
- data periods available
- data quality and quantity

- agency responsible
- internet links
- data policies
- etc.

This should be a major priority for the DRI Data manager (required immediately!).

### CHARACTERISTIC TYPES OF DROUGHT:

It would be useful to produce a conceptual model of the characteristic types of drought, minimally showing normal, above normal, and below normal conditions, even without quantification – A schematic illustration is shown in Figure 1, but requires more expert input (and graphics) than we can muster here. This workshop heard the terms meteorological, hydrological, agricultural, energy, and socio-economic droughts, all of which have varying relation to each other. [Some example definitions appear at [http://threeissues.sdsu.edu/three\\_issues\\_droughtfacts01.html](http://threeissues.sdsu.edu/three_issues_droughtfacts01.html)].



### MAJOR ISSUES, RECOMMENDATIONS:

The following issues and/or recommendations were identified:

1. DRI needs a Data Manager (ASAP).
2. We must accept and learn how to effectively use *non-continuous data sets*.
3. A comprehensive list of data variables and sources needs to be compiled, including *metadata* such as modelled data and remotely sensed variables.

4. We need to define what we mean by drought (variables, relative limits, etc.), including meteorological, hydrological, agricultural, socio-economic, and energy.
5. How/where should DRI data be archived? This will vary according to source, use, etc. Our web site should provide necessary links, password protection, etc.
6. We need a *data management policy*; the MAGS DMP might serve as a template.
7. Need to identify any future data sets required, including necessary fieldwork, and plan to leverage funding for same early in DRI.

It was recognized that individual studies will have other immediate and important needs that may not be addressed here.

*Group-1 Breakout Session*

*12 January 2006*

Chair: *John Hanesiak*

Rapporteur: *Geoff Strong*

=====