

**2010 Fifth DRI Annual Workshop
May 12-14, 2010**

Programme and Abstracts

Inn at the Forks
Winnipeg, Manitoba



Canadian Foundation for Climate
and Atmospheric Sciences (CFCAS)
Fondation canadienne pour les sciences
du climat et de l'atmosphère (FCSCA)



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GEO-DRI
DRI Annual Workshop
May 12-14, 2010

Background and Objectives:

The DRI project was launched in 2005 to study the 1999-2004/2005 drought that seriously impacted the Canadian Prairies. This five-year project, which will conclude at or near the end of 2010 had generated significant improvements in our understanding of drought on the Canadian prairies. These advances have been reported at the annual DRI workshops and later published in the formal scientific literature. This workshop is the last of the five annual workshops and will focus on the research findings and developments that serve as a basis for the DRI legacy. The work of DRI investigators and collaborators will be highlighted at this workshop.

Specific objectives for the 5th DRI workshop include:

- 1) To review the results of DRI research.
- 2) To inform agencies and the public on the success of DRI.
- 3) To identify the activities and mechanisms needed to maintain the scientific enthusiasm initiated by DRI in pursuit of future research and funding opportunities.
- 4) To develop a conceptual framework for future drought and extremes research in Canada.

DRI ANNUAL WORKSHOP AGENDA

Tuesday, May 11, 2010:

19:00 – 21:00: DRI BOD Meeting (Restaurant Alcove – Inn at the Forks)

Wednesday, May 12, 2010:

08:00 - 08:30: Breakfast/ Registration (Ballroom Foyer)

08:30 – 10:05: Session #1

Welcome and Introduction to Manitoba and overview of DRI (Ballroom)

08:30 – 08:45: Welcoming remarks

08:45 – 09:10: Introduction to DRI (John Pomeroy, Ron Stewart)

09:10 – 09:25: Introduction to CFCAS (Erica Wilson)

09:25 – 09:40: Comments from the Board of Directors (Jim Bruce)

09:40 – 09:50: Comments from the Partners Advisory Committee (Harvey Hill)

09:50 – 10:05: Overall synthesis (Ron Stewart)

10:05 – 10:30: Break (Ballroom Foyer)

10:30 – 12:00: Session #2

Synthesis Activities DRI (Ballroom)

10:45 – 11:15: Drought characterization (John Hanesiak)

11:15 – 11:30: Drought prediction (Charles Lin)

11:30 – 11:45: Drought comparisons (Barrie Bonsal)

11:45 – 12:00: Discussion

12:00 – 13:00: Lunch (Ballroom Foyer)

13:00 - 14:10: Session #3

Atmospheric Drought Processes and regional water and energy cycling during the drought (Ballroom)

13:00- 13:10: Atmospheric and Oceanic Variability associated with Droughts and Pluvials on the Canadian Prairies (Amir Shabbar, Barrie Bonsal, Kit Szeto)

13:10- 13:20: Diagnosing meteorological drought mechanisms with global and regional reanalysis data (John Gyakum)

13:20 – 13:30: Historical perspective and meteorological diagnosis of the 1999-2005 Canadian prairies drought (Lisa Hryciw)

13:30 – 13:40: Water cycling and hydroclimate extremes in the Canadian Prairies (Kit Szeto)

13:40 – 13:50: The atmosphere during drought over Edmonton (Ron Stewart/William Henson)

13:50 – 14:00: Clouds and drought: relationships from observations and a regional climate model (Henry Leighton)

14:00 – 14:10: Discussion

14:10 – 15:35: Session #4

Drought Prediction, Land Atmosphere and Hydrologic Processes (Ballroom)

14:10 – 14:25: Drought prediction: Challenges and opportunities (Charles Lin)

14:25 – 14:35: Water Cycle Prediction on the Prairies (Anthony Liu, Al Pietroniro, Brenda Toth)

14:35 – 14:45: Prairie drought surface hydrology (John Pomeroy)

14:45 – 14:55: Hydrological modeling of small basins during drought (Kevin Shook)

14:55 – 15:05: Watershed-scale modeling of groundwater and surface water interaction in the Canadian Prairies (Getachew Adem Mohammed, Masaki Hayashi)

15:05 – 15:15: Spatial variability of Evapotranspiration during the prairie's drought (Rob Armstrong)

15:15 – 15:25: On the surface-convection feedback during drought periods on the Canadian prairies (Julian Brimelow/ John Hanesiak)

15:25 – 15:35: Land cover, Orographic, and Convective Storm Links to Alberta Drought Conditions (Geoff Strong)

15:35 – 16:00: Break (Ballroom Foyer)

16:00 – 17:20: Session #4 (Continued)

Drought Prediction, Land Atmosphere and Hydrologic Processes (Ballroom)

16:00 – 16:10: Modelling soil moisture with the VIC model during drought (Lei Wen)

16:10 – 16:20: The role of soil moisture initialization in drought prediction (Aaron Berg)

16:20 – 16:30: Monitoring groundwater conditions from space during drought (Ken Snelgrove)

16:30 – 16:40: The response of groundwater levels, wetlands, and lakes in Western Canada to drought (Garth van der Kamp)

16:40 – 16:50: The consequences of drought for groundwater management in the Assiniboine Delta (Al Woodbury)

16:50 – 17:00: Summary of the Prairie Drought Hydrology Workshop (John Pomeroy)

17:00 – 17:20: Discussion

17:45 – 20:00: Session #5 (early evening)

Poster Session and Reception (River Salon Room)

Posters:

- Aaron Berg et al.: Overview of the Canadian Experiment for soil moisture – 2010
- Catherine Champagne, Heather McNairn, Aaron Berg and Alex Driedger: Monitoring soil moisture anomalies using passive microwave remote sensing
- Gordon Drewitt and Aaron Berg: A high spatial/temporal resolution soil moisture data set for the Canadian Prairies
- E. Ray Garnett, M.L.Khandekar: Identifying the solar influence on Canadian prairie droughts
- Jonas Roberts: The impact of mean seasonal synoptic forcing on hydroelectric storage in Labrador
- Jessica Vanstone, Cesar Perez-Valdivia and Dave Sauchyn: Nine hundred year streamflow reconstruction of the North Saskatchewan River
- Genong Yu et al.: Downscaling the global soil moisture from AMSR-E for drought models

Thursday, May 13, 2010:

08:00 – 08:30 Breakfast (Ballroom Foyer)

08:30 – 09:30: Session #6

Historical and Future Droughts and their impacts (Ball Room)

08:30 – 08:45: Drought and water shortage impacts on the Canadian West (Bob Sanford)

08:45 – 08:55: Everyone is Affected: Selections of drought characteristics, impacts and adaptations (Barrie Bonsal, Elaine Wheaton, Virginia Wittrock, Evan Siemens, Nick Nicolichuk)

08:55 – 09:05: Agricultural drought indicators for Western Canada (Paul Bullock, Manasah Mkhabela)

09:05 – 09:15: Increasing resilience to drought on the Canadian Prairies through structured learning from recent extreme events (Hank Venema (TBC))

09:15 - 09:25: Early 21st Century Pacific Decadal Oscillation projections (Suzan Lapp)

09:25 – 09:35: Early 21st Century Projected Southern Alberta River Discharges (Jeanine St. Jacques)

09:35 – 09:40: Discussion

09:40 – 10:30: Session #7

The 2009/2010 Drought (Ball Room)

09:40 - 09:50: Short presentation on what we know about the 2009/2010 drought (Ron Stewart)

09:50 – 10:10: Short reports of observations and analyses of the 2009/2010 drought

10:10 – 10:30: Discussion on the goals of a 2009/2010 study and the next steps in realizing such a study.

10:30 – 11:00: Break (Ballroom Foyer)

11:00 – 12:00: Session #8

Agencies and Programs with Interests in Supporting Drought Research (Ballroom)

11:00 – 11:10: Manitoba Water Stewardship (Bob Harrison)
11:10 – 10:20: Canadian Wheat Board (Bruce Burnett)
11:20 – 11:30: Saskatchewan Watershed Authority (Bart Oegema)
11:30 – 11:40: Manitoba Hydro (TBC))
11:40 – 11:50: Summary of User Workshops (Rick Lawford)
11:50 – 12:00: Results of the DEWS exercises (Phillip Harder)

12:00 -13:00: Lunch (Ballroom Foyer)

13:00 – 14:00: Session #9

Selected Reports on droughts from other parts of the world (Ballroom)

13:00 – 13:10: Drought and extremes in the GEWEX context (Ron Stewart)
13:10 – 13:20: Drought in Southeast Asia (Orn-Uma Polpanich)
13:20 – 13:30: Drought in Northern Mexico (Andrea Munoz Hernandez)
13:30 – 13:40: Drought in the USA (Richard Heim)
13:40 – 13:50: A proposed Prairie Water Supply Index (John Pomeroy)
13:50 – 14:00: Discussion

14:00 – 17:00: Session #10

Breakout Groups

14:00 – 14:10: Charge to the breakout groups

14:10 – 16:00: Breakout Groups

- Breakout Group #1: What steps need to be taken to complete the DRI Synthesis papers? (Ball Room West)
- Breakout Group #2: What should the DRI Legacy provide to scientists and stakeholders/users? (River Salon Room)
- Breakout Group #3: How can drought research inform improved approaches to agriculture and water resource management on the Canadian prairies? (Ball Room East)

(The afternoon break will be taken in conjunction with the breakout sessions.)

16:00- 17:00: Reports to Plenary and Discussion

Friday, May 14, 2010:

08:00 – 08:30 Breakfast (Ballroom Foyer)

08:30 – 09:45: Session #11

Data Systems and Satellite Data Applications (Ball Room West)

08:30 – 08:40: The DRI data legacy (Phil Harder)

08:40 – 08:50: The Data Access and Integration System (DAI) (Patrice Constanza)

08:50 – 09:00: Results of the GEO-DRI Workshop (Rick Lawford)

09:00 – 09:10: The North American Drought Monitor and AAFC drought monitoring services (AAFC representative – Aston Chipanshi?)

09:10 – 09:20: From a North American to a Global Drought Monitor (Richard Heim)

09:20 – 09:45: Discussion

09:45 – 10:15: Break (Ballroom Foyer)

10:15 – 11:00: Session #12

Discussion on needs and future opportunities for drought research (Ball Room West)

11:00 – 11:50: Session #13

The final DRI Statement and Summary: Scoping the final steps (Ball Room West)

11:50 – 12:00 Session #14

Adjournment

12:30 – 14:30: DRI Science Committee and Investigators Working Lunch and Meeting (Ball Room West)

DRI ANNUAL WORKSHOP ABSTRACTS

Session #3: Atmospheric Drought Processes and regional water and energy cycling during the drought

Atmospheric and Oceanic Variability associated with Droughts and Pluvials on the Canadian Prairies

AMIR SHABBAR¹, BARRIE BONSAI² and KIT SZETO¹

¹Environment Canada, Downsview, ON

²Environment Canada, Saskatoon, SK

With the use of Palmer Z-index, the atmospheric and oceanic variabilities associated with droughts and pluvials on the Prairies are assessed. This presentation will show the inter-relationships among several atmospheric variables including synoptic scale circulation patterns, moisture transport and cyclone frequency. Links to previous winter's global SST patterns are found to influence summer moisture availability.

Diagnosing meteorological drought mechanisms with global and regional reanalysis data

JOHN GYAKUM

McGill University, Montreal, QC

Understanding physical mechanisms of meteorological drought requires the use of both global datasets, in order to diagnose planetary-scale dynamic and thermodynamic structures. It is also necessary to understand more detailed dynamic and thermodynamic processes from the perspective of both the synoptic- and mesoscale. These details may be provided by a relatively high resolution regional reanalysis dataset.

To meet the above objectives, we utilize the National Centers for Environmental Prediction (NCEP) global reanalysis, with a horizontal resolution of approximately 250 km, and a temporal resolution of 6 hours. The NCEP global reanalysis includes the period from 1948 through the present.

Additionally, we utilize the NCEP North American Regional Reanalysis (NARR), with a horizontal resolution of approximately 32 km, and a temporal resolution of 3 hours. The NARR covers the period from 1979 through the present.

We also assess the reliability of the reanalyses in capturing the processes that are crucial to the documentation of drought life cycles.

Historical perspective and meteorological diagnosis of the 1999-2005 Canadian Prairie drought

LISA HRYCIW

McGill University, Montreal, QC

The Canadian Prairies are susceptible to droughts, which are among the most costly natural disasters in Canada in terms of socio-economic impact. The recent 1999-2005 Canadian Prairie drought, which resulted in a loss of approximately \$4-5 billion, is historically unique in that it does not conform to previously established atmospheric circulation patterns (Pacific/North American (PNA) teleconnection pattern) typically associated with Prairie drought. It is determined that there are several distinct mechanisms, or a succession of individual events, which are the cause of the synoptic-scale subsidence leading to this prolonged period of drought conditions. In addition, the meteorological severity of the 1999-2005 drought appears to be localized to certain stations such as Saskatoon, rather than having a consistent widespread signal across the Prairies. Precipitation data from several stations in Alberta, Saskatchewan, and Manitoba are analyzed, with a focus on the growing season (May to August). The two driest and wettest 30-day periods in 1999-2005, as determined from the precipitation data, are selected and scrutinized more closely with vertical cross sections of other variables. Synoptic maps are analyzed for these extreme periods to determine the differences in the flow patterns. Vertically integrated moisture divergence is also calculated from both the North American Regional Reanalysis (NARR) and the NCEP-NCAR Global Reanalysis, but inspection shows discrepancies between the reanalyses and ambiguities in terms of identifying the drought. From a historical perspective, there appears to be a disconnect between the socio-economic impacts and the meteorology in this particular drought the; drought being more economically significant than meteorologically significant; shedding light on society; increased vulnerability associated with changing agricultural practices.

Session #4: Drought Prediction, Land Atmosphere and Hydrologic Processes

Watershed-scale modeling of groundwater and surface water interaction in the Canadian Prairies

GETACHEW ADEM MOHAMMED

University of Calgary, Calgary, AB

The Paskapoo Formation, underlying southern Alberta, is the most significant supply of groundwater in the Canadian Prairies. Recently, it is under growing development pressure due to a rapidly increasing water demand from various sectors, and due to severe drought in recent years. The pressure is stronger in fully allocated watersheds where no new surface water licenses are available. In order to cope the pressure, it is vital to develop strategies and tools that minimize the negative impacts, which can arise from over using the

groundwater resource. Integrated surface water and groundwater models that attempt to incorporate all the relevant process in the hydrologic system are considered as an effective and sustainable management tool. In this study, the Versatile Soil Moisture Budget (VSMB) model is linked to the groundwater model FEFLOW to evaluate the effects of climate change and anthropogenic activities. The study is conducted in a small watershed of about 250 km² area, West Nose Creek, located north of Calgary. The study area is selected as it has a typical land-use and topography of the Canadian Prairies. VSMB is used to quantify the temporal and spatial variability of depression-focused recharge in the watershed, where the depressions are mapped based on aerial photography and ground based survey. FEFLOW is used to build a stochastic groundwater flow model based on the recharge estimated by VSMB. Thus, the objectives of the study include 1) estimation of depression-focused recharge in the watershed; 2) develop alternative conceptual models of the Paskapoo Formation to represent the spatial heterogeneity; and 3) assess the integrated VSMB-FEFLOW model for management applications using alternative scenarios of climate change and anthropogenic activities.

On the surface-convection feedback during drought periods on the Canadian Prairies

JULIAN BRIMELOW

University of Manitoba, Winnipeg, MB

Linkages between the terrestrial ecosystem and precipitation play a critical role in regulating regional weather and climate. These linkages can manifest themselves as positive or negative feedback loops, which may either favour or inhibit the triggering and intensity of thunderstorms. While the Canadian Prairie terrestrial system has been identified as having the potential to exert a detectable influence on convective precipitation during the warm season, little work has been done in this area using in-situ observations.

We present findings from a novel study designed to explore linkages between the Normalized Difference Vegetation Index (NDVI), and lightning duration (DUR) from the Canadian lightning detection network. Calculations were made for 38 Census Agriculture regions for summers (JJA) between 1999 and 2008. Specifically, correlation coefficients were calculated between pairs of standardized anomalies of DUR and NDVI by season and by month.

Correlations were also made for CARs grouped by size and/or by magnitude of the NDVI anomalies.

The main findings are: (1) JJA lightning activity is overwhelmingly below average within larger dry areas (i.e., areas with below average NDVI); that is, the linkages between NDVI and DUR increased significantly as both the area and magnitude of the dry anomaly increased. (2) In contrast, CARs having above average NDVI did not consistently experience above average lightning activity, regardless of the CAR size; (3) The lower threshold for the length scale of the dry anomalies required to affect the boundary layer sufficiently to reduce lightning activity was found to be approximately 150 km (~18 000 km²); (4) our analysis

suggests that the surface-convection feedback appears to be a real phenomenon, in which drought tends to perpetuate drought with respect to convective storms and associated rainfall, within the limits found in (1) and (3).

Role of soil moisture initialization in seasonal climate prediction

AARON BERG¹, GORDON DREWITT¹, NASIM ALAVI¹ and BILL MERRYFIELD²

¹University of Guelph, Guelph, ON

²Environment Canada, Victoria, ON

Assessment of current seasonal climate prediction systems for predictions of drought offers practical application for governments and industry. As part of the Global Ocean-Atmosphere Prediction and Predictability (GOAPP) project and the Drought Research Initiative (DRI), we are examining the role of land surface initialization and its influence on seasonal forecasts and drought conditions in the Canadian Centre for Climate Modelling and Analysis Climate model 3 (CCM3). To initialize the CCM3 we have developed a dataset of global soil moisture spanning 29-years at a 2.5 degree resolution. Estimates of the land surface initial state were used to initialize seasonal climate forecasts for 60-days using 10-member ensembles. In this paired experiment we initialized one forecast with the land surface state while the remaining forecast was initialized by a randomly shuffled year. In this presentation we will show preliminary comparison of the model forecast performance with specific regard to capturing the onset of drought conditions.

Session #5: Poster Session

Overview of the Canadian Experiment for Soil Moisture -2010 (CanEX-SM10)

AARON BERG¹, RAMATA MAGAGI², TOM JACKSON³, HEATHER MCNAIRN⁴, BRENDA TOTH⁵ and ANNE WALKER⁶

¹University of Guelph, Guelph, ON

²University of Sherbrooke, Sherbrooke, QC

³USDA, Beltsville, MD

⁴Agriculture and Agri-Food Canada, Ottawa, ON

⁵Environment Canada, Saskatoon, SK

⁶Environment Canada, Downsview, ON

The Canadian Experiment for Soil Moisture (CanEX-SM), scheduled for June 1st-June 18th, 2010, is an upcoming validation experiment in support of the European Space Agency's Soil Moisture and Ocean Salinity mission (SMOS). This initiative will be important for collection of ground truth products for validation and the development of remote sensing products from a number of sensors (SMOS, ALOS, AMSR-E RADARSAT-2) and for further development of models for NASA's Soil Moisture Active Passive mission (SMAP). The experiment will utilize two existing soil moisture mesonets located over southern Saskatchewan (operated by the University of Guelph and Environment Canada) and supply extensive ground truth data through in situ sampling campaigns.

Airborne missions with Environment Canada's L-Band radiometer and NASA's synthetic aperture radiometer (UAVSAR) flown coincident with the satellite overpasses and collection of ground data will allow for the further development and refinement of land parameter retrieval models and algorithms. This presentation will provide an overview of the experiment and future data sets available to researchers.

Monitoring Soil Moisture Anomalies Using Passive Microwave Remote Sensing CATHERINE CHAMPAGNE¹, HEATHER MCNAIRN¹, AARON BERG² and ALEX DRIEDGER

¹Agriculture and Agri-Food Canada, Ottawa, ON

²University of Guelph, Guelph, ON

The relatively short temporal record of most Earth Observation sensors makes the determination of a stable baseline for determining anomalous conditions difficult. Traditionally, climatological baselines are calculated from a normal period on a site-by-site basis, so that the typical conditions for any particular site are used to determine anomalies. This normal period is typically 30 years or longer. To compensate for the short temporal record of the AMSR-E satellite, a method to trade space for time was used in the anomaly calculation. In this technique, areas of relative homogeneity are determined, and all of the data points (in this case remote sensing pixels) within that homogeneous area are used to form the statistical baseline of the data for a particular area. This study evaluates several methods for defining appropriate homogeneous areas. The methods evaluated were based on soil survey information, EcoDistricts, and a data driven approach using a multi-resolution segmentation in Definiens software. The soil moisture anomaly framework was evaluated against in situ soil moisture values from the Alberta Ground Drought Monitoring Network, the MODIS NDVI vegetation anomalies, the North American Drought Monitor (NADM) and meteorological indices (Palmer Drought Severity Index and the Standardized Precipitation Index). Generally, soil moisture anomalies calculated from EcoDistricts show greater agreement with these data sets and is therefore recommended for anomaly calculation.

A high spatial/temporal resolution soil moisture data set for the Canadian Prairies GORDON DREWITT and AARON BERG University of Guelph, Guelph, ON

Soil moisture plays an important role in surface-atmosphere energy and mass exchange. However, accurate knowledge of the soil moisture state is very difficult to obtain due to the limitations of observation networks. This uncertainty limits our ability to initialize seasonal climate forecasts models in a realistic manner. It has been found that improved estimates of soil moisture for model initialization can lead to improved forecast skill over a range of time scales. An alternative to directly measuring soil moisture is to estimate it using land surface models. This poster will present the results of work to develop a retrospective

estimate of soil moisture over the Mackenzie Area Gewex Study (MAGS) domain. The Canadian Land Surface Scheme (CLASS) was used in combination with a bias corrected version of the North American Regional Reanalysis (NARR) meteorological dataset to produce half hourly estimates of soil moisture between 1979 and 2008. This data covers most of Western Canada and Alaska at a grid resolution of approximately 50 km. A preliminary comparison of field measurements and model estimates of soil moisture anomalies will be presented.

Identifying the solar influence on Canadian prairie droughts

E.RAY GARNETT¹ and MADHAV L. KHANDEKAR²

¹Consultant, Winnipeg, MB

²Consultant, Markham, ON

This poster examines the impact of sunspot activity on summer weather over the Canadian prairies and its implications for drought as measured by Palmer Drought Severity Index (PDSI) and spring wheat yields. The study period is 1908-2009, which takes in Solar Cycles 14-23. The study substantiates earlier findings whereby high sunspot activity appears to aggravate drought conditions by reducing the amount of cosmic rays entering the earth's atmosphere that play a role in creating ions, condensation nuclei and low level clouds (below 3.2 km). Moreover high sunspot activity has been shown to increase surface temperatures through increased solar irradiance. The solar induced drought risk appears greatest in year five through seven after the solar minimum immediately following sunspot maximum with 100 or more sunspots per month. The solar influence is probed in four different regions of the prairies. It is also noteworthy that sun is now coming out of the deepest solar minimum since 1913.

Nine hundred year streamflow reconstruction of the North Saskatchewan River

JESSICA VANSTONE, CESAR PEREZ-VALDIVIA and DAVE SAUCHYN

University of Regina, Regina, SK

A network of seven moisture sensitive tree-ring chronologies (Limber pine and Douglas fir) from the headwaters of the North Saskatchewan River are used to reconstruct streamflow. This reconstruction extends the average October through September flow back to 1100 A.D. The reconstructed streamflow is compared to a previous and less robust 1000 year reconstruction of the North Saskatchewan River. A recent study in the South Saskatchewan River detected strong multidecadal (~60 years) and interannual variability (2-6 years). Spectral analyses (Multi-taper and wavelet analyses) of the reconstructed flow are carried out to identify common cycles of variability at interannual and multidecadal scales between the North and South Saskatchewan River Basins. Results of the reconstruction suggest that longer periods of low flows have occurred in the past than have been recorded in previous instrumental records. This study provides new and more reliable information for water managers and policy makers within the North Saskatchewan River Basin and the Canadian Prairies.

Downscaling the global soil moisture from AMSR-E for Drought Models

GENONG (EUGENE) YU, LIPING DI and WENLI

George Mason University, Greenbelt, MD

Global coverage of soil moisture data are normally derived from microwave remote sensing. However, the current satellite microwave remote sensing produces coarse resolution data products that may not be in alignment with the resolution for drought models. High resolution of soil moisture is desired. In this study, a downscaling scheme for deriving high resolution soil moisture data from coarse resolution data was developed using auxiliary data including MODIS data. The base soil moisture data are those derived from AMSR-E data at a nominal scale of 25 kilometres. The resultant resolution of the soil moisture data can be as high as that of the MODIS data up to one kilometre. The data product is to be served through standard Web Coverage Service (WCS) that allows the re-scaling of the data to desired scale for drought modeling.

Session #6: Historical and Future Droughts and their impacts

Early 21st Century Pacific Decadal Oscillation Projections

SUZAN LAPP, JEANNINE-MARIE ST. JACQUES, ELAINE BARROW and DAVID SAUCHYN

University of Regina, Regina, SK

The climatology and hydrology of the Pacific Northwest display strong periodic cycles linked to the low-frequency Pacific Decadal Oscillation (PDO). The PDO's signature is seen throughout the North Pacific region, with significant impacts on hydrology and ecology in Alaska, northeastern Siberia, Manchuria, Korea and Japan. Therefore the status of the PDO in a warmer world caused by anthropogenic climate change is of great interest. We developed early 21st century projections of the PDO, using data from archived runs of the most recent high-resolution global climate models from the IPCC Fourth Assessment Report (AR4) Phase 3 of the Coupled Model Intercomparison Project. These PDO projections for 2009-2050 showed a multi-model mean shift towards more occurrences of the positive phase PDO for the A1B, B1 and A2 emissions scenarios, suggesting future declines in Pacific Northwest surface water availability, and negative impacts on agriculture, hydroelectric power generation, and West Coast salmon fisheries.

Early 21st Century Projected Southern Alberta River Discharges

JEANNINE-MARIE ST. JACQUES, SUZAN LAPP, YANG ZHAO and DAVID SAUCHYN

University of Regina, Regina, SK

The 20th century hydroclimatology of southern Alberta is heavily influenced by recurring large-scale climate patterns: the Pacific Decadal Oscillation (PDO), the El Niño-Southern Oscillation (ENSO), and the Arctic Oscillation/North Atlantic Oscillation (AO/NAO). Hence, southern Alberta river

discharge variability can be successfully modeled by regression techniques using these climate indices as predictors. We developed generalized-least-squares (GLS) regression equations which captured a large portion of streamflow variability. Using archived runs from global climate models, we projected the PDO, ENSO and the NAO for the first half of the 21st century. These projected climate indices were used as inputs into the GLS regression equations, giving projected southern Alberta river discharge for the early 21st century. These projections showed declining trends in southern Alberta surface water availability for 2009-2050 and increased inter-annual variability relative to the latter half of the 20th century.

Session #8: Agencies and Programs with Interests in Supporting Drought Research

Summary of DRI User Workshops

RICK LAWFORD

University of Manitoba, Winnipeg, MB

DRI Workshops were held with users in the three Prairie Provinces between January 2010 and April 2010. This presentation summarizes the highlights of these workshops and summarizes the recommendations that came from each one.

Results of the DEWS exercises

PHILLIP HARDER

University of Manitoba

The Drought Early Warning System (DEWS) exercise is a table top exercise that was developed in partnership with the Agri-Environment Services Branch of Agriculture and Agri-Food Canada as part of the Drought Preparedness Partnership (DPP) initiative. DEWS explores the application of DRI research results and products and their applicability to operations. Several exercises have been held between October 2008 and April 2010. Results of these experiences and future steps will be summarized.

Session #11: Data Systems and Satellite Data Applications

The DRI data legacy

PHILLIP HARDER

University of Manitoba, Winnipeg, MB

To facilitate the DRI research program a major effort was undertaken within the network to centralize identification, collection and distribution of the many datasets related to the 1999-2005 prairie drought. With the network winding down this data is being transitioned into a more permanent and accessible archive. By utilizing freeware and open source tools, such as Google

Earth and the MySQL database, the network is in the process of developing a convenient data legacy system to provide drought data to users beyond the life span of the network. Experiences and outcomes of DRI's effort will be discussed in regards to the data legacy as well as future development activities.

DRI Workshop Registered Attendees List

Name	Affiliation	Email
Brian Abrahamson	Consultant	brian.abrahamson@accesscom m.ca
Robert Armstrong	U of Saskatchewan	robert.armstrong@usask.ca
Aaron Berg	University of Guelph	aberg@uoguelph.ca
Barrie Bonsal	Environment Canada	Barrie.Bonsal@ec.gc.ca
Julian Brimelow	University of Manitoba	umbrimel@cc.umanitoba.ca
Jim Bruce	Consultant, Ottawa	jpbruce@sympatico.ca
Paul Bullock	University of Manitoba	bullockp@ms.umanitoba.ca
Bruce Burnett	Canadian Wheat Board	bruce_burnett@cwbc.ca
Matt Carter	Memorial University	mcarter@mun.ca
Patrice Constanza	McGill University	constanza.patrice@ouranos.ca
John Crawford	Manitoba Hydro	jcrawford@hydro.mb.ca
Ray Garnett	Consultant, Winnipeg	ergarnett@shaw.ca
Akinbola George	Manitoba Water Stewardship	akinbola.george@gov.mb.ca
Bill Girling	Manitoba Hydro	wcgirling@hydro.mb.ca
Seifu Guangul	Manitoba Water Stewardship	seifu.guangul@gov.mb.ca
John Gyakum	McGill University	john.gyakum@mcgill.ca
John Hanesiak	University of Manitoba	john_hanesiak@umanitoba.ca
Irene Hanuta	AAFC	irene.hanuta@agr.gc.ca
Phillip Harder	University of Manitoba	harderp@cc.umanitoba.ca
Bob Harrison	Manitoba Water Stewardship	Bob.Harrison@gov.mb.ca
Richard Heim	NOAA/NCDC, USA	richard.heim@noaa.gov
William Henson	McGill University	william.henson@gmail.com
Harvey Hill	AAFC	hillh@agr.gc.ca
Andrea Munoz Hernandez	University of Michigan	amunozhe@mtu.edu
Lisa Hryciw	McGill University	lisa.hryciw@mail.mcgill.ca
Abul Kashem	Manitoba Water Stewardship	Abul.Kashem@gov.mb.ca
Kristina Koenig	Manitoba Hydro	kkoenig@hydro.mb.ca
Ken Korporal	Canadian GEO	Kenneth.Korporal@ec.gc.ca
Suzan Lapp	University of Regina	lapp200s@uregina.ca
Rick Lawford	University of Manitoba	lawford@umbc.edu
Henry Leighton	McGill University	henry.leighton@mcgill.ca
Charles Lin	Environment Canada	Charles.Lin@mcgill.ca
Anthony Liu	Environment Canada	Anthony.Liu@EC.GC.CA
Youssef Loukili	Manitoba Water Stewardship	youssef.loukili@gov.mb.ca
Manasah Mkhabela	University of Manitoba	mkhabela@cc.umanitoba.ca
G. Mohammad	University of Calgary	gamohamm@ucalgary.ca
Bart Oegema	SWA	bart.oegema@swa.ca
Orn-Uma Polpanich	AIT, Thailand	o_polpanich@ait.ac.th
John Pomeroy	University of Saskatchewan	john.pomeroy@usask.ca

Will Pozzi	Open Geospatial Consortium	will.pozzi@gmail.com
Rick Raddatz	University of Manitoba	raddatz@cc.umanitoba.ca
Jonas Roberts	Memorial University	jonaspmr@gmail.com
Ramon Sales	Manitoba Government	ramon.sales@gov.mb.ca
Bob Sanford	Consultant	robert@rwsandford.ca
Dave Sauchyn	PARC, University of Regina	sauchyn@uregina.ca
Amir Shabbar	Environment Canada	Amir.Shabbar@ec.gc.ca
Muhammad Munir Sheikh	Pakistan	munir.sheikh@gcisc.org.pk
Kevin Shook	University of Saskatchewan	krs350@mail.usask.ca
Evan Siemens	SRC	eas321@mail.usask.ca
Karin Skill	Linköping University, Sweden	karin.skill@liu.se
Ken Snelgrove	Memorial University	ksnelgrove@mun.ca
Ronald Stewart	University of Manitoba	Ronald_Stewart@umanitoba.ca
Geoff Strong	University of Alberta	geoff.strong@shaw.ca
Jeannine St. Jacques	University of Regina	jmcheval@sympatico.ca
Kit Szeto	Environment Canada	kit.Szeto@ec.gc.ca
Efrem Teklemariam	Manitoba Hydro	eteklemariam@hydro.mb.ca
Garth van der Kamp	Environment Canada	garth.vanderkamp@ec.gc.ca
Jessica Vanstone	University of Regina	jrvanstone@gmail.com
Hank Venema	IISD	hvenema@iisd.ca
Holm Voigt	GWSP – Germany	holm@uni-bonn.de
Alfred Warkentin	Manitoba Water Stewardship	Alfred.Warkentin@gov.mb.ca
Lei Wen	McGill University	lei.wen@mcgill.ca
Elaine Wheaton	SRC	wheaton@src.sk.ca
Erica Wilson	CFCAS	wilson@cfcas.org
Al Woodbury	University of Manitoba	woodbur@cc.UManitoba.ca
Sitotaw Yirdaw-Zeleke	University of Manitoba	sitotaw@gmail.com
Genong Yu	George Mason U	gyu@gmu.edu