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CMOS BULLETIN SCMO

Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

August / août 2013 Vol.41 No.4

CMOS 6th Photo Contest / 6e Concours photographique de la SCMO

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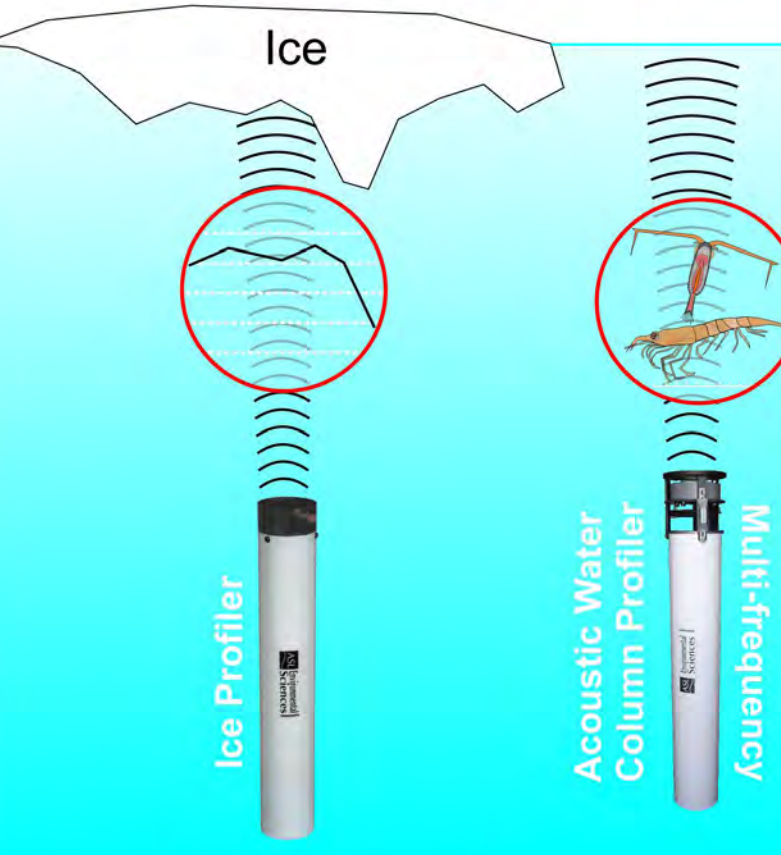

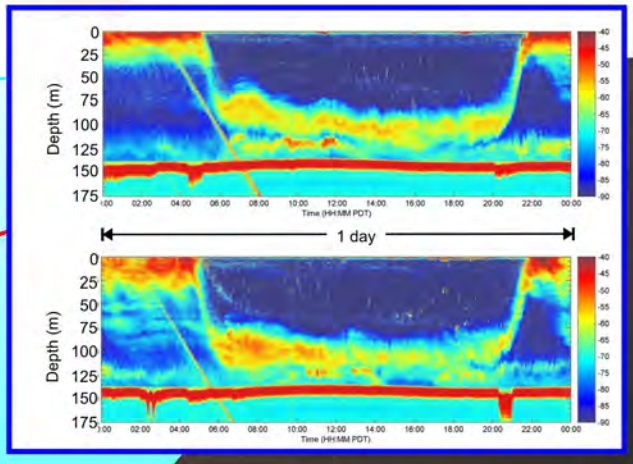

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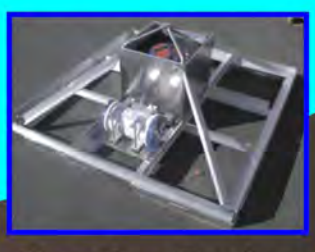

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....from the President's Desk / Allocution du président

Friends and colleagues:

Pierre Gauthier
Président de la SCMO
CMOS President

I was elected President at the last CMOS Annual General Meeting that took place on May 27 in Saskatoon during the 2013 Congress held jointly with the Canadian Water Resources Association (CWRA) and the Canadian Geophysical Union (CGU). I thank the members for their support and I will do my best to promote and defend the cause of meteorology and oceanography on your behalf. The Congress in Saskatoon was a success on all counts and I would like to thank the organizers of the event for a job well done. We had very nice weather which is very becoming for a meteorology congress. The scientific program was very interesting and stimulating with excellent presentations by the plenary speakers on topics reflecting the broad interests of the three societies.

The Honourable Peter Kent, Minister of Environment, came to present his opening address to the Joint CMOS/CGU/CWRA Congress. The importance of the Minister of Environment taking the time to do this is certainly not lost on our societies, as it recognizes the importance of environmental science in Canada. At the same time, the congress experienced an all-time low number of participants from Environment Canada and the Department of Fisheries and Oceans, a consequence of the management of travel authorizations in the government. This resulted in a significant number of last minute cancellations of presentations to the congress which disrupted the program that had been prepared. Thanks to the scientific program committee, the congress nevertheless went on to be a success. To make the minister aware of the situation, each of the three societies, CMOS, CGU and CWRA, sent him a letter to present their concerns and the consequences this has each year for the organizers of the congress who must deal with those last minute cancellations of presentations. But the congress is then also a missed opportunity for government scientists to meet with colleagues from universities and the private sector to exchange ideas, to coordinate scientific activities and build and maintain long term collaborations. The role of the government scientists is extremely important in maintaining a world class expertise in meteorology, oceanography and climate in Canada, which is so important to assess and mitigate their impact on nearly all human activities.

(Continued on page 115 / Suite à la page 115)

CMOS Bulletin SCMO
Volume 41 No.4
August 2013 — août 2013

Inside / En Bref

Articles

Reports / Rapports

Our regular sections / Nos chroniques régulières

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CMOS Bulletin SCMO
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Cover page: Shown on the cover page are the three winning photos from the 6th CMOS Annual Photo Contest. Top, 1st prize: *Lightning at Sunset* from Gabor Fricska; bottom left: 2nd prize: *Rime on Grass*, also from Gabor Fricska; bottom right: 3rd prize: *A Weatherman's Holiday* from Joe Schaefer. To learn more, please read Bob Jones' report on **page 135.**

Page couverture: Les trois photos gagnantes du 6e concours annuel de photographie de la SCMO sont présentées en page couverture. Haut: 1er prix: *Lightning at Sunset* de Gabor Fricska; en bas et à gauche: 2e prix: *Rime on Grass*, également de Gabor Fricska; en bas et à droite: 3e prix: *A Weatherman's Holiday* de Joe Schaefer. Pour en savoir plus, veuillez lire le rapport de Bob Jones en **page 135.**

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CMOS exists for the advancement of meteorology and oceanography in Canada.

Le but de la SCMO est de stimuler l'intérêt pour la météorologie et l'océanographie au Canada.

Canadian Meteorological and Oceanographic Society (CMOS)
Société canadienne de météorologie et d'océanographie (SCMO)

Executive / Exécutif

....from the President's Desk / Allocution du président
(Continued / Suite)

The recent flood in Calgary is certainly an example of the need to be able to correctly forecast weather, precipitation and how the hydrology will cope with it. In the end, we all saw the dramatic impact this has on the lives of people.

There were a number of changes to the executive for this year. First, our new vice-president is now Dr. Harinder Ahluwalia, president of Info-Electronics Systems Inc., who will bring a perspective from the private sector. Kim Strong and Denis Gilbert completed their mandate as councillors at large and I would like to thank them for their numerous contributions to the discussions of the executive and the council. To replace them, Bob Sica and Bill Merryfield were elected as the new councillors at large and already we can appreciate their ideas and advice on issues that the CMOS executive will be working on this year. There are other newcomers in CMOS committees. Prof. Adam Monahan is now chairing the scientific committee and Atmosphere-Ocean has now Dr. Hai Lin as chief editor. I look forward to working with all of them not forgetting those who are already onboard.

Pierre Gauthier
Président de la SCMO / CMOS President

Correspondence / Correspondance

From: The Honourable Christian Paradis, P.C., M.P.
Minister of Industry Canada

To: Professor Peter Bartello
Past-President CMOS

Date: June 7, 2013

Subject: Industry Canada

Dear Professor Bartello:

Thank you for your [letter] (Ref.: *CMOS Bulletin SCMO*, Vol.41, No.2, April 2013, page 44) conveying the concerns of the Canadian Meteorological and Oceanographic Society regarding the restricted operation of the proposed dot-weather top-level domain (TLD). I regret the delay in replying to you.

As you may know, the Governmental Advisory Committee (GAC) of the Internet Corporation for Assigned Names and Numbers (ICANN) met in Beijing during the week of April 4, 2013. At that meeting, Canada had the opportunity to comment on new TLDs proposed to join the ranks of dot-com and dot-org.

Canada's objectives are to support competition in online markets and to protect consumers from being misled online. Canada advised the GAC that all new TLDs, including dot-weather, should be opened to the public by default. Closed domains would be acceptable on an exceptional basis where it could be clearly demonstrated that they were in the public interest.

Several countries shared Canada's concerns regarding the impact of closed TLDs on competitive markets and consumer choice. As a result, the GAC has advised ICANN that generic TLDs, including dot-weather, should be operated in an open manner. The GAC also highlighted that access should be administered in a transparent way that does not give an undue preference or cause an undue disadvantage. For a more detailed look at the GAC's advice, I invite you to visit its website at http://gacweb.icann.org/.

I trust that this information is helpful. Once again, thank you for writing and please accept my best wishes.

Error in Table

Table 1: Comparison of citation statistics for the 10 most cited *A-O* articles according to Taylor & Francis (as of 23 April 2013)

CMOS Bulletin SCMO, Vol.,41, No.3, June 2013, page 103

Unfortunately, some of the figures shown in table on page 103 of the June issue are wrong. You will find on the next page the right values for this table. We apologize for this inconvenience.

Erreur dans le tableau

Tableau 1: Statistiques comparatives de citations pour les 10 articles les plus cités d'*A-O*, selon Taylor & Francis (jusqu'au 23 avril 2013)

CMOS Bulletin SCMO, Vol.,41, No.3, Juin 2013, page 103

Malheureusement, quelques-unes des valeurs indiquées dans le tableau de la page 103 sont en erreur. Vous trouverez à la page suivante les valeurs correctes pour ce tableau. Nos excuses pour cette inadvertance.

TITLE / TITRE	AUTHORS/AUTEURS	A-O	T&F	CITATIONS		
			Views since June 2011	CrossRef	Web of Science	Google Scholar
Sensitivity of climate simulations to the parameterization of cumulus convection in the Canadian climate centre general circulation model	*G.I. Zhang & Norman A. McFarlane*	33-3 1995	145	77	546	723
Temperature and precipitation trends in Canada during the 20th century	*Xuebin Zhang, Lucie A. Vincent, W.D. Hogg & Ain Niitsoo*	38-3 2000	683	73	211	520
The UVic earth system climate model: Model description, climatology, and applications to past, present and future climates	*Andrew J. Weaver, Michael Eby, Edward C. Wiebe, Cecilia M. Bitz, Phil B. Duffy, Tracy L. Ewen, Augustus F. Fanning, Marika M. Holland, Amy MacFadyen, H. Damon Matthews, Katrin J. Meissner, Oleg Saenko, Andreas Schmittner, Huaxiao Wang & Masakazu Yoshimori*	39-4 2001	196	41	224	322
Changes in Daily and Extreme Temperature and Precipitation Indices for Canada over the Twentieth Century	*Lucie A. Vincent & Éva Mekis*	44-2 2006	457	34	62	116
Rehabilitation and analysis of Canadian daily precipitation time series	*Eva Mekis & William D. Hogg*	37-1 1999	97	33	191	289
Gridded North American monthly snow depth and snow water equivalent for GCM evaluation	*Ross D. Brown, Bruce Brasnett & David Robinson*	41-1 2003	221	26	98	142
Documentation of a highly ENSO-related SST region in the equatorial pacific: Research note	*Anthony G. Bamston, Muthuvel Chelliah, Stanley B. Goldenberg*	35-3 1997	44	22	77	110
The 15-km version of the Canadian regional forecast system:	*Jocelyn Mailhot, Stephane Bélair, Louis Lefaivre, Bernard Bilodeau, Michel Desgagné, Claude Girard, Anna Glazer, Anne-Marie Leduc, André Méthot, Alain Patoine, André Plante, Alan Rahill, Tom Robinson, Donald Talbot, André Tremblay, Paul Vaillancourt, Ayrton Zadra & Abdessamad Qaddouri*	44-2 2006	46	22	42	59
Internal wave observations in the South China Sea: The role of rotation and non-linearity	*David Farmer, Qiang Li & Jae-Hun Park*	47-4 2009	96	21	33	47
A coupled atmosphere-ocean model for transient climate change studies:	*Gary L. Russell, James R. Miller & David Rind*	33-4 1995	122	18	176	274

Table 1: Comparison of citation statistics for the 10 most cited *A-O* articles according to Taylor & Francis (as of 23 April 2013)

Tableau 1: Statistiques comparatives de citations pour les 10 articles les plus cités d'*A-O*, selon Taylor & Francis (jusqu'au 23 avril 2013)

ARTICLES

Spatial-Temporal Rainfall Storm Characteristics

Part III: Areal Reduction Factors

by Daniel Jobin[1] and Peter Jolly[1] and Steven Chan[2]

Abstract: A series of four papers summarizes the key findings of over ten years of research in hydrometeorology using weather radar-derived rainfall data at and near the City of Edmonton, Canada. Although the initial study objective was to determine spatial characteristics of rainfall storms, subsequent analyses provided much more complex storm attributes such as areal reduction factors, "Spatial Design Storms", storm-cell spacing statistics and, "Depth-Duration-Area-Frequency" curves. These advanced spatial characteristics are of great interest to water resources professionals who are tasked with designing water-related infrastructures and currently use overly simplistic approaches in determining rainfall inputs. The breadth of the research eventually enabled the development of promising alternative methodologies for creating spatiotemporal "Design Storms"; results that could significantly impact how costly water-related structures are designed.

Résumé: Une série de quatre articles présente une synthèse des dix ans et plus de recherche en hydrométéorologie utilisant des données de précipitation radar aux alentours de la ville d'Edmonton, Canada. Bien que le but initial du projet de recherche était de seulement calculer des caractéristiques spatiales des événements pluvieux, les analyses ultérieures éventuellement abordèrent des attributs complexes notamment; des fonctions de décroissance spatiale des intensités, des 'Averses de projets', des statistiques de distances intercellulaires d'orage et, des fonctions 'Profondeur-Durée-Surface-Fréquence. Ces dernières caractéristiques d'averses sont particulièrement importantes en génie de ressources hydriques ou les professionnels utilisent maintenant que des méthodes simplistes pour évaluer l'apport pluvieux dans leurs calculs de dimensionnement d'ouvrage de drainage. L'envergure des travaux de recherche a permis éventuellement d'élaborer des méthodologies spatio-temporelles innovatrices de calculer les "Averses de projet" - des résultats qui pourraient changer de façon importante l'approche courante de concevoir l'infrastructure de drainage.

Preamble

This article is the result of over ten years of applied research and development in hydrometeorology; specifically, determining spatiotemporal characteristics of summer rainfall storms that occur at and near the City of Edmonton, Canada. Although the initial project's objective was to focus on the development of spatial characteristics of rainfall storms based on using weather radar data, the second follow-up study pushed the endeavors well beyond their intended purposes and resulted in important findings for water resources applications.

The large amount of research findings was organized into a series of four technical papers that progressively guide a reader toward more complex analysis results and, ultimately, proposed alternatives to the current simplistic "Design Storm" methodology.

The topics of the four papers are:

1. Building a Storm Database
2. General Storm Characteristics
3. **Areal Reductions Factors**
4. Alternative Design Storm Method

The impetus and objectives of this project, as well as the methodology that was developed in creating a spatial-temporal database of rainfall storm attributes, was outlined in the first paper. While the second paper presented several derived rainfall storm characteristics and statistics contained in the **Rainfall Storm Database**, this third article will focus entirely on the development of rainfall Areal Reduction Factors (ARF) using weather radar data near the City of Edmonton.

Introduction

It has long been recognized that storm rainfall intensities and total ground accumulations vary spatially throughout a storm, much more so in convective storms than in frontal storms, and what is recorded at a rain gauge is neither the average nor the maximum storm amount – except in rare cases - that occurs over a watershed or urban storm sewer basin. As a result, the rain gauge statistics underestimates the maximum total rainfall and overestimates the average rainfall for mid to large-sized watersheds, especially when considering convective rain storms that provide the highest summer rainfalls in the Edmonton region as well as many other Canadian locations. This issue is of critical importance to engineers and hydrologists that currently rely on rain

[1] Kije Sipi Ltd - RadHyPS Inc

[2] City of Edmondon

gauge statistics for determining the input rainfall statistics to water resources analyses and design.

Starting in the 1940s and 1950s, hydrologists began to use areal reduction factors to convert point (rain gauge) rainfall maxima to basin average statistics. This was done using a ratio known as Areal Reduction Factor (ARF), which is defined as the ratio of areal average rainfall total to maximum point (rain gauge) rainfall for a storm rainfall of a given duration.

It has been found that the ARF values vary directly with storm duration and inversely with the storm areal extent. Some investigations indicate that the ARFs also vary with the magnitude of the maximum point rainfall.

Many investigators have derived Areal Reduction Factor relations since the 1940s. The US Weather Bureau which obtained values from rain gauge data over the Mississippi Valley in U.S.A. obtained the first documented set of values. Using their ARF function, the factors remain relatively high across the entire domain of analysis - above 0.60. This implies a maximum 40% areal reduction in rainfall from the rain gauge maxima. The study relations were later published by the World Meteorological Organization (1969) and are widely used throughout the world. In 1960, Woolhiser and Schwalen published results that were also based on using rain gauge data; however, they related ARF versus rain duration and maximum total rainfall for convective storms that occurred within a 48 km^2 area in Arizona. Compared to the WMO ARF curve, their equation yield relatively small values of ARF (i.e. 0.20 for an area of 20 km^2). Hence not only do the ARFs vary with the type of storm but also the hydro-meteorological characteristics of the area. Furthermore, both sets of ARF functions were derived from rain gauges which very seldom record a storm maximum point rainfall and cannot be used to accurately characterize the spatial-temporal variations of rainfall storms. This latter issue is likely the root cause for the observed variations between these two studies.

This paper presents the study findings of two weather radar-based alternative approaches to developing ARF relations.

For more information, the reader is referred to the 2007 and 2012 research reports by *Kije Sipi Ltd*, entitled "*Study Report II & III - Spatial Analysis of Rainfall Over & Near Edmonton.*"

Methodology

Two hydrometeorological terms, Spatial Decay Ratio (SDR) and Areal Reduction Factor (ARF) are used to characterize the spatial reduction of the average storm rainfall depth from the storm maxima. The first term is SDR and defined as the storm spatial average rainfall for a specific rain area divided by the storm maximum (point) rainfall – independent of rainfall duration. The other term is ARF and defined as the storm spatial average rainfall for a specified rain area that occurs over a particular duration divided by the maximum point rainfall of the same duration. SDRs are calculated for each convective storm; however, ARFs are derived from many storm SDRs as a function of duration and possibly the maximum point rainfall.

AFs were developed using two approaches; however, both are based on analyzing SDRs.

The first method basically derives SDRs based on using areal average decay of the total maximum storm rainfall while the second approach uses a "per radar grid cell" method in order to preserve the subtle geospatial variations in the ground-level distribution of rainfall.

Four potential variables were initially considered in developing the SDRs/ARFs relations: 1) type of storms, 2) duration, 3) area and, 4) RMax (Maximum Storm Total Rainfall). The rainfall storm radar data were compiled into 15-minute intervals at a spatial resolution of 1 km^2 over a study area approximately 23,000 km^2 and encompasses the City of Edmonton. Also, the study area is assumed to have a homogeneous hydrometeorological regime; hence, all rainfall storm characteristics within this area are deemed part of the same data population. The following two sections will further described the approaches used in developing the given SDR/ARF.

Areal Average Approach

SDRs were calculated for this particular approach by using a circular expansion method about the storm cell maxima (locations with peak total rainfall accumulations) in order to calculate the average reduction in total rainfall as a function of increasing area. The circular expansion followed a 1 km increase in radius (i.e. 3X3, 4X4, 5X5, etc.). Each storm has a varying number of SDR data points depending on the storm's extents. Approximately 500 storms were analyzed yielding a total of approximately 5,000 SDR data points that characterize: 1) four types of storms, 2) storm area (varying from 1 to 2,561 km^2), 3) duration (0.25 to 62 hours) and, RMax (20 to 157 mm. (Note: RMax is largest total rainfall amount for a given storm).

Figures 1a, 1b and 1c present the SDR data points as a function of area, duration and RMax respectively. Figure 1a presents the anticipated decay pattern of SDR as a function of area.

Note that the segregation of points along a set number of columns represents the incremental increases in the computational area.

Figure 1b shows the variation of SDR with storm cell duration. In this case, there's an apparent general increase of SDR with duration. However, when SDR is plotted against the storm RMax (see Figure 1c), there is no obvious trend. At first glance, all three data plots seem to depict a rather large scatter of points across the entire SDR domain

(0 to 1) that might signify significant variability or errors in the underlying data. However, when the SDR data is filtered according to any number of variables, clear patterns begin to appear.

Figure 1a: SDR vs Area

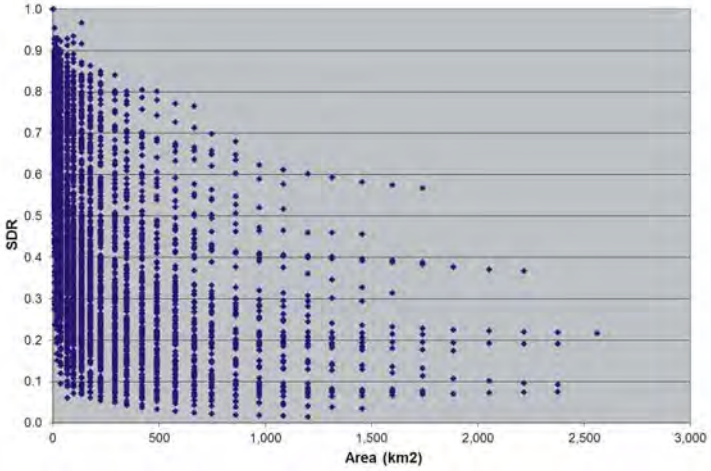


Figure 1b: SDR vs Duration

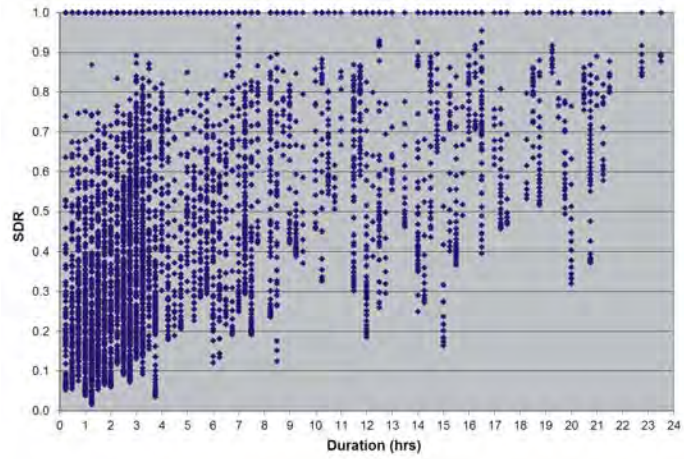


Figure 1c: SDR vs Rmax

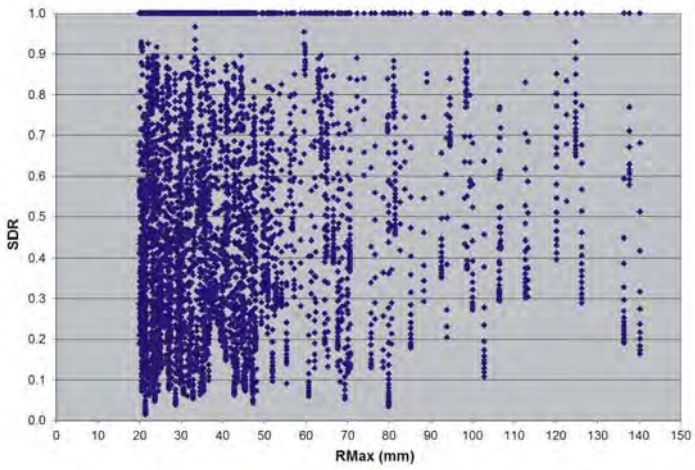


Figure 2a: SDR vs Area (SCC Storms)

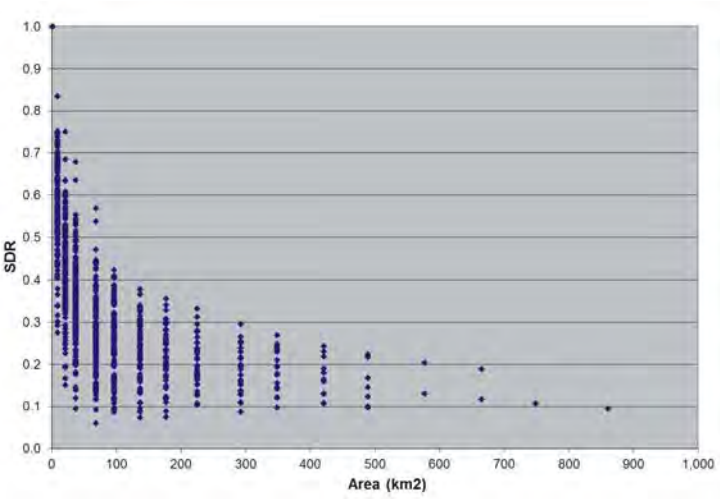


Figure 2b: SDR vs Area (Duration=< 2 hours)

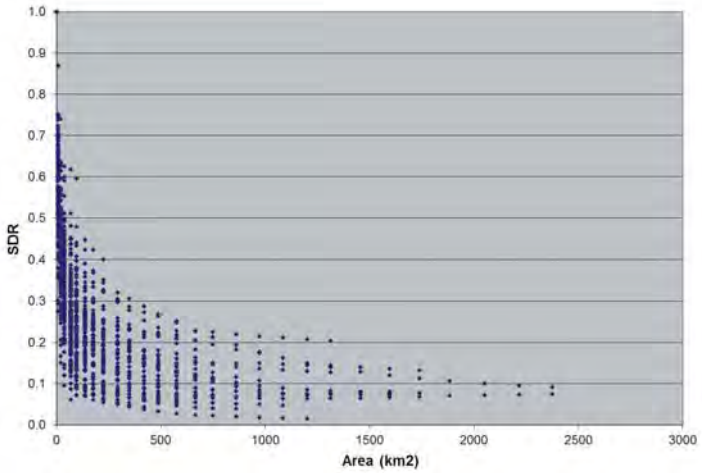


Figure 2a shows the impact of filtering the SDR data shown in Figure 1a for "Single Convective Cell" type of storms. Similar results were also obtained when filtering the data for specific durations as shown in Figure 2b for SDRs with storm durations equal or less than 2 hours.

These SDR data patterns have also been observed in several European and North American studies whereas SDRs and ARFs vary directly with storm duration and inversely with rain area and, in some cases, directly with the maximum storm rainfall total.

Generally, SDR and ARF values are higher for frontal rainfalls than for convective rainfalls and as previously stated, the maximum rainfall totals (RMax) had no significant effect on the areal reduction factors; hence, this parameter was not included in the derived equations.

Several equations were used and fitted to the SDR data using the "Simplex" method in order to develop an optimal ARF relation. The following equation was eventually

retained based on goodness-of-fit results. The equation coefficients A, B, C and D are listed in Table 1 for each of the four types of storms. The coefficient of determination of the developed equations ranged from 0.66 to 0.83 while the standard errors of estimate varied from 0.12 to 0.15.

$$ARF = \frac{A * Duration^{B}}{(C + Area)^{D}}$$

where ***Area*** is in km^2, ***Duration*** is in hr and, ***A***, ***B***, ***C*** and ***D*** are optimized coefficients.

Table 1: ARF Coefficients

A,B,C,D, Coefficient of determination (Coeff) and Standard Error (Err)

for Single Convective Cell (SCC), Cluster Convective Cell (CLCC), Single Cell in Frontal System (SCF), Clusters of Cells in Frontal System (CLCF) and All Storm Types (ALL)

Storm Type	A	B	C	D	Coeff	Err
SCC	1.1222	0.0365	0.6126	0.3057	0.80	0.13
CLCC	1.3087	0.0244	1.1284	0.3844	0.83	0.12
SCF	0.9385	0.0475	0.1854	0.1552	0.67	0.13
CLCF	0.9659	0.0807	0.7618	0.1832	0.66	0.14
All	0.9637	0.0720	0.2335	0.2398	0.71	0.15

The resulting set of ARF curves versus area for various durations between 15 min and 24 hours and for all four type of storms are presented in Figures 3 a), b), c) and d).

Figure 3a: ARF (Single Convective Cell)

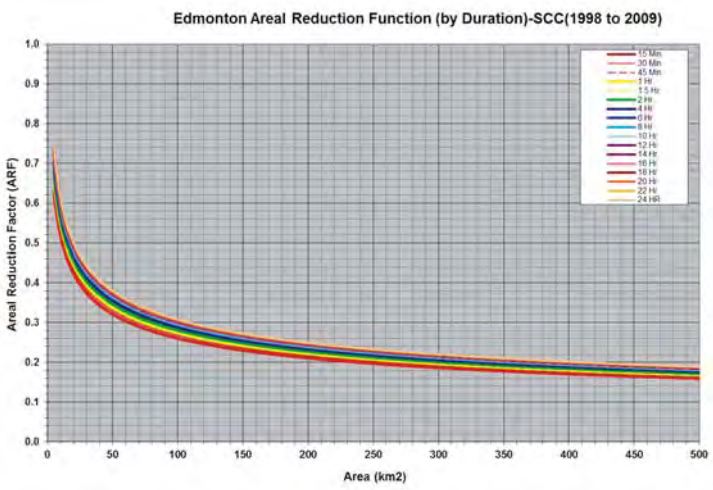


Figure 3b: ARF (Single Convective Cell in Frontal System)

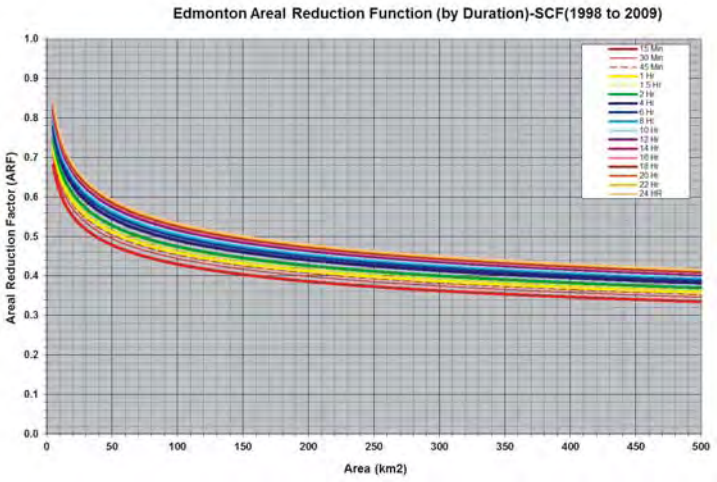


Figure 3c: ARF (Cluster of Convective Cells)

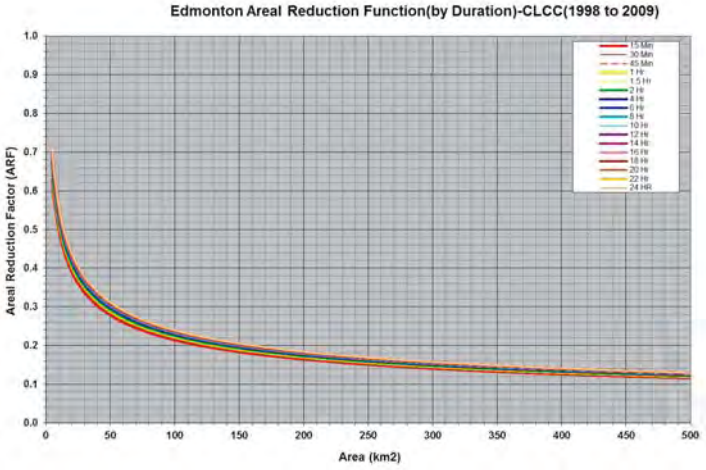
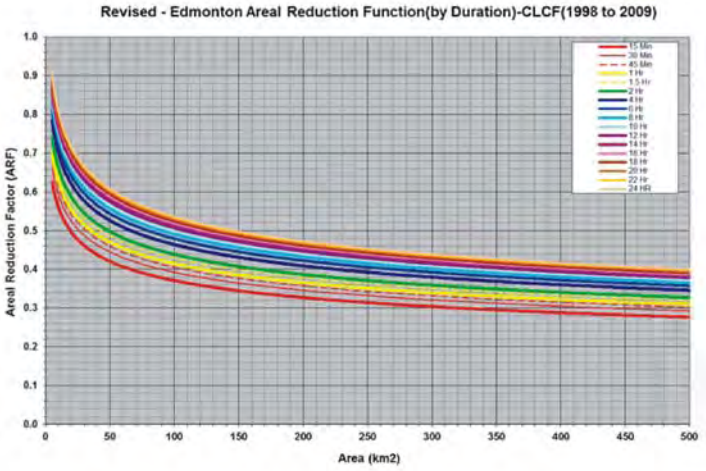


Figure 3d: ARF (Cluster of Convective Cells in Frontal System)



These ARF curves only apply to storm areas up to 500 km^2 and were developed from rainstorms data that contained at least one convective cell in which the storm maximum total rainfall occurred.

A cursory review of all four graphs indicates that the areal average storm rainfall decays rather quickly from the maximum value, revealing the relatively sharp drop in total rainfall from the storm cell's maximum rainfall location (RMax). The areal average total rainfall reaches 50% of the storm's maxima at areas of only 15 km^2 for single convective cells and single convection in clusters while 75 km^2 for convective storm cells within storm fronts. Similarly, the minimum ARF for single convective cells and single convection in clusters reaches low range values of 0.1 to 0.2 at an area of 500 km^2 while slightly larger values (0.28 to 0.4) are reached for convective storm cells within fronts.

Although the decay profiles across the four types of storms look similar, the patterns for both types of frontal convective storm cells show a slower decay rate and overall higher ARFs, as well as a greater separation of curves for different durations. However, an analysis of the different decay patterns revealed, when considering areas of 50 and 500 km^2, that single convective cells in frontal systems provided the highest combined rainfall volumes. The clusters of convective cells in frontal systems provide the next highest volumes.

This was followed by the single convective cell (not in frontal systems). Clusters of convective cells not in frontal systems provided the least volume of rainfall.

Spatially Distributed Approach

The previous method of determining ARFs uses areal averaging by applying a circular expansion technique in calculating the SDR data points. Unfortunately, this approach assumes a perfect circular symmetry in the decay function about the storm maxima - any geographic variation in the ground-level rainfall distribution is not considered. As a result, an alternative, *"Spatially Distributed Approach"* was developed and generally involved the following steps:

1. Calculate the total rainfall for each storm cell of interest on each radar grid cell (1km^2), then;

2. Normalize each radar grid cell total rainfall values to the storm's maximum value (RMax) as is shown in Figure 4 whereas the storm RMax is assigned a value of 1.0 (100%);

3. Create a database of normalized storms including RMax, duration and type of storm then;

4. "Stack" the normalize storms about RMax for analyses and develop spatially distributed ARFs for each type of storms and durations. Figure 5 schematically depicts three normalized storms whereby each storm is shifted, but not rotated, geographically such that the RMax of each storm are located at center cell; hence, the expression "Stacked".

Figure 4: Spatial SDR

-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	0.56	0.60	0.54	0.54	0.56	-	-	-	-	-
-	-	-	0.55	0.46	0.47	0.45	0.46	0.46	0.55	-	-	-	-
-	-	0.50	0.43	0.47	0.56	0.57	0.57	0.48	0.45	0.53	-	-	-
-	0.52	0.43	0.46	0.62	0.65	0.67	0.65	0.61	0.47	0.44	0.47	-	-
-	0.55	0.47	0.57	0.65	0.72	0.75	0.71	0.66	0.59	0.45	0.51	-	-
-	0.56	0.50	0.60	0.67	0.75	**1.00**	0.77	0.65	0.61	0.48	0.53	-	-
-	0.55	0.52	0.59	0.64	0.71	0.76	0.73	0.67	0.62	0.47	0.51	-	-
-	0.58	0.50	0.49	0.60	0.66	0.66	0.65	0.63	0.47	0.44	0.50	-	-
-	-	0.57	0.47	0.47	0.58	0.58	0.57	0.46	0.43	0.47	-	-	-
-	-	-	0.53	0.48	0.49	0.47	0.48	0.45	0.50	-	-	-	-
-	-	-	-	0.50	0.51	0.50	0.50	0.46	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figure 5: Stacked Spatial SDRs

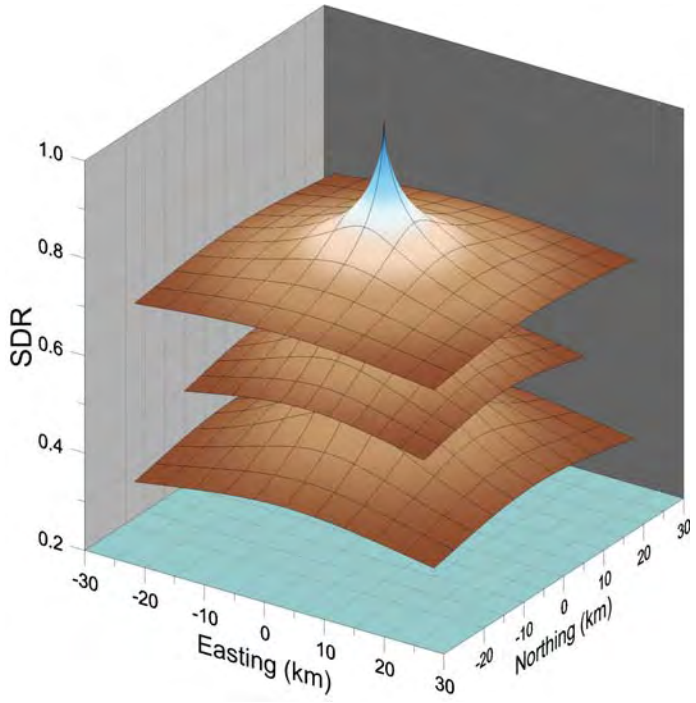


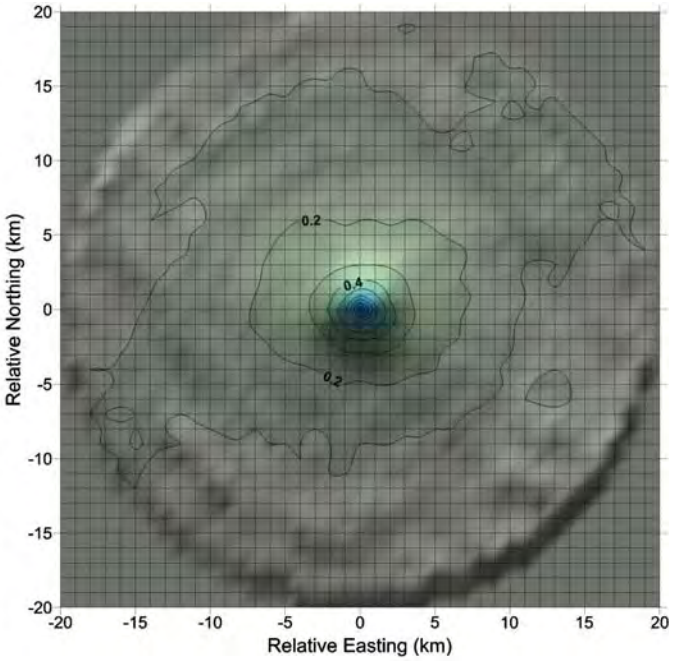
Figure 6 shows a map of the resulting spatially distributed ARFs considering the average of all types of storms and durations. The shaded ARF image is contoured in intervals of 0.2 and can also be presented in grid format such as Figure 4.

Various per grid-cell statistics were calculated as well as filtering in order to obtain similar data for different type of storms and durations. For example, Figures 7a, 7b and 7c show the difference in the spatially distributed ARF considering three durations, 2, 6 and 24 hours.

Cnsidering that the relative geographic scales in both axes are identical, longer durations lead to "flatter" structures;

whereas, the ARF decays at lesser rates from the central maxima. Also note that the data extent of each ARF marks the location with a minimum of 10 data points – there are more storms of smaller duration.

Figure 6: Spatially Distributed ARF
(All Storms and Durations)



Although the behaviour is similar to the ARF curves shown in Figure 3, spatial subtleties in the rainfall distribution patterns are noticeable as shown in Figure 8, a zoom in Figure 6. A predominantly east-west shape of persistently higher values is apparent.

Figure 7a: Spatially Distributed ARF (2-hour Storms)

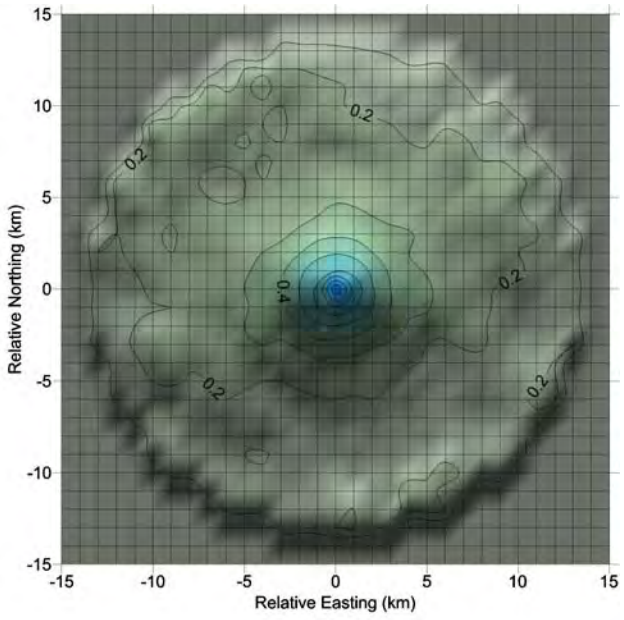


Figure 7b: Spatially Distributed ARF (6-hour Storms)

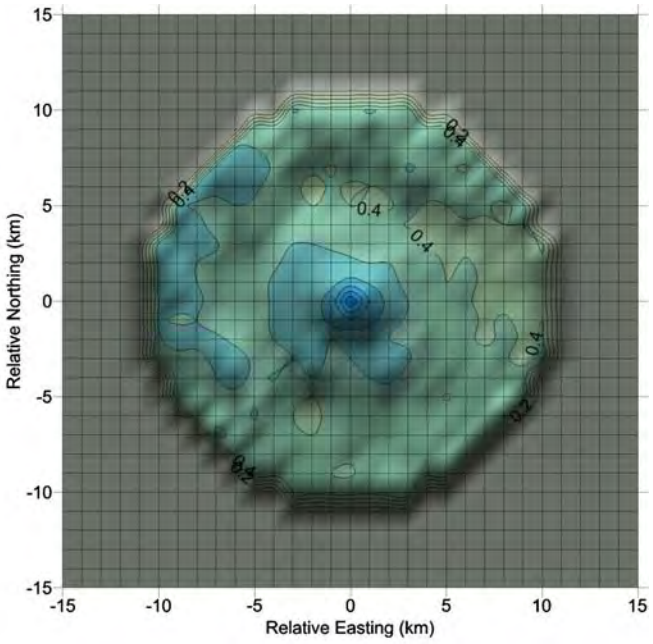
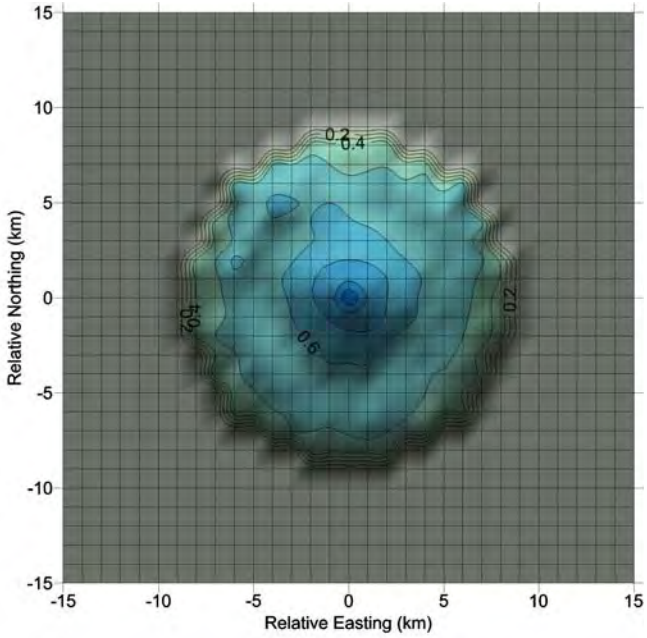


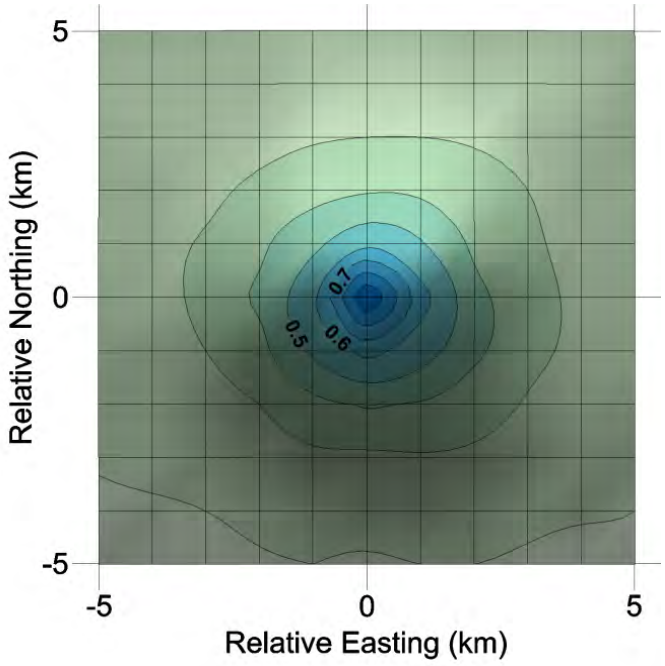
Figure 7c: Spatially Distributed ARF (24-hour Storms)



Conclusions

This paper has presented the findings of developing Areal Reduction Factors (ARFs) using weather radar data near the City of Edmonton. ARFs are particularly important to water resources engineers and hydrologists as they can be used to estimate the areal reduction of the total rainfall from the convective storm cell maxima (RMax) Unfortunately, ARFs are traditionally developed using only point rain gauge data; hence, they do not realistically denote actual storm rainfall distribution.

Figure 8: Zoom of Figure 6



Two different techniques were presented in successfully developing ARFs from weather radar data: 1) an areal average approach and, 2) a spatially distributed approach. Both methodologies were based on analyzing the 11 years of radar-derived precipitation data currently contained in the digital **Rainfall Storm Database**. The information was derived from the storm and storm-cell database that was compiled at an interval of 15 minutes and a spatial resolution of 1 km^2 over a study area of approximately 22,570 km^2 that includes the City of Edmonton. The findings indicate:

- The areal average approach was based on applying a circular expansion technique in calculating Spatial Decay Ratios (SDRs) for each of the 500 storms that was analyzed. The resulting 5,000 SDR dataset was sufficiently large to develop ARFs as a function of area, type of storm and duration.

- The anticipated SDR decay pattern as a function of area was observed. As well, the increase in SDR with duration was also revealed and was especially pronounced for clusters of convective cells within frontal systems. However, there is no obvious trend of SDR as a function of RMax.

- Generally, SDR and ARF values are higher (lesser decay) for frontal rainfalls as compared to convective rainfalls.

- An equation was successfully fitted to the SDR data in order to express ARFs as a function of Area and Duration for each type of storm.

- All ARF curves show that the areal average storm rainfall decays rather quickly from the maximum value, revealing a relatively sharp drop in the total rainfall from the storm cell's maximum rainfall location (RMax). In fact, the areal average total rainfall reaches 50% of the storm's maxima at areas of only 15 km^2 for single convective cells and single convective cells in clusters while 75 km^2 for convective storm cells within storm fronts. Similarly, the minimum ARF for single convective cells and single convection in clusters reaches low range values of 0.1 to 0.2 at an area of 500 km^2 while slightly larger values (0.28 to 0.4) are reached for convective storm cells within fronts.

- Although the decay profiles across the four types of storms look similar, the patterns for both types of frontal convective storm cells show a slower decay rate and overall higher ARFs, as well as a greater separation of curves for different durations.

- A novel approach in developing ARFs was presented using a "Stacking" technique of normalized storm total rainfall data. The resulting ARFs are spatially distributed at a 1 km^2 resolution.

- The "Stacking" technique enabled the development of spatially distributed ARFs by type of storm and duration. Grid-based ARF values can be obtained by using any number of statistical models such as average or 90th percentile. This particular analysis technique preserves the relative geographic orientation of the storm data; hence, predominate west-east rainfall deposition pattern is revealed.

- The authors believe that the application of either newly developed ARF procedure provides the means of obtaining the best estimates of spatially average rainfalls for areas of 500 km^2 or less - and possibly larger.

The fourth and last paper of the series will draw on key study findings related to the characterization of rainfall storms and present an alternative method of developing synthetic design storms for use in dimensioning various water resources structures. The new method is based on spatial – temporal storm characteristics rather than point rain gauge statistics; hence, offers a more realistic approach to design as compared to the currently used IDF approach.

References

Allen and DeGaetano, 2005 Consideration for the Use of Radar-derived Precipitation Estimates in Determining Return Intervals for Extreme Areal Precipitation Amounts, *Journal of Hydrology*

Durrans, et al, 2002, The Derivation of Depth- Area Relationships using Radar-Rain Data, *Journal of Engineering Hydrology*, ASCE

Jobin, D., Jolly, P., 2012, Study Report III - Spatial Analysis of Rainfall Over & Near Edmonton, *Kije Sipi Ltd*, 256

Jobin, D., Jolly, P., 2007, Study Report II - Spatial Analysis of Rainfall Over & Near Edmonton, *Kije Sipi Ltd*, 133

Jobin, D., Jolly, P., 2004, Study Report I - Spatial Distribution of Design Storm Rainfall, *Kije Sipi Ltd*, 80

Jolly, et al, 2008, Weather Radar derived Rainfall Areal reduction Factors, *IAhS Publication, Weather Radar and Hydrology*

Lombardo, et al, 2006, On the Use of Radar Reflectivity for Estimation of the Areal Reduction, *Natural Hazards and Earth System Sciences*

Stewart, 1989, Areal Reduction Factors for Design Storm Construction: Joint Use of Rain Gauge and Radar Data *IAHS Proceeding No. 181*

Technical Guide: Development, Interpretation and use of rainfall intensity-duration-frequency (IDF) information; Guideline for Canadian water resources practitioners, *CSA PLUS 4013 (2nd edition pub 2012)*, 214

Vernon-H-TZ, 2000: Advances in the Application of radar to Urban Hydrology, *IAH Publication #351 Weather Radar and Hydrology Application*, 595-600

Woolhiser, D. A., and H. C. Schwalen., 1960. Area-Depth-Frequency Relations for Thunder-storm Rainfall in Southern Arizona, Technical Paper 527. *Tucson: Arizona Agricultural Experiment Station, The University of Arizona*.

World Meteorological Organization, 1969., Manual for Depth-Area-Duration Analysis of Storm Precipitation, Geneva, Switzerland

Books in search of a Reviewer (Partial list)
Livres en quête d'un critique (Liste partielle)

Latest Books received / Derniers livres reçus

2011-34) *Modeling Methods for Marine Science*, David M. Glover, William J. Jenkins and Scott C. Doney, Cambridge University Press, Hardback, 571pages, US$85.

2012-03) *Ocean Dynamics and the Carbon Cycle, Principles and Mechanisms*, by Richard G. Williams and Michael J. Follows, Cambridge University Press, ISBN 978-0-521-84369-0, Hardback, 404 pages, US$ 73.

2012-08) *Dryland Climatology*, by Sharon E. Nicholson, Cambridge University Press, ISBN 978-0-521-51649-5, Hardback, 516 pages, US$150.

2012-10) *Phytoplankton Pigments, Characterization, Chemotaxonomy and Applications in Oceanography,* Edited by Suzanne Roy, Carole A. Llewellyn, Einar Skarstad Egeland and Geir Johnsen, 2011, Cambridge University Press, ISBN 978-1-107-00066-7, Hardback, 845 pages, US$140.

2012-12 *Buoyancy-Driven Flows*, Edited by Eric P. Chassignet, Claudia Cenedese and Jacques Verron, 2012, Cambridge University Press, ISBN 978-1-107-00887-8, Hardback, 436 pages, US$120.

2012-18) *Chemistry and the Environment*, by Sven E. Harnung and Matthew S. Johnson, Cambridge University Press, ISBN 978-110-768257-3, Paperback, 427 pages. CDN$76.95.

2012-19) *Understanding the Earth System, Global Change Science for Application*, Edited by Sarah E. Cornell, I. Colin Prentice, Joanna I. House and Catherine J. Downy, Cambridge University Press, ISBN 978-1-107-00936-3, Hardback, 267 pages, CDN$81.95.

2013-01) *Introduction to Chemistry of the Sea*, by Michael, E.Q. Pilson, Cambridge University Press, ISBN 978-0-521-88707-6, Hardback, 524 pages, CDN$81.95.

2013-02) *Mesoscale-Convective Processes in the Atmosphere*, by Robert J. Trapp, Cambridge University Press, ISBN 978-0-521-88942-1, Hardback, 346 pages, CDN$86.95.

2013-03) *Antarctica, Global Science from a Frozen Continent*, Edited by David W.H. Walton, Cambridge University Press, ISBN 978-1-107-00392-7, Hardback, 342 pages.

Next Photo Contest

Keep your cameras at the ready. Plans are under way for the 7th Annual Photo Contest to celebrate the artistic and creative talents of CMOS members.

Volunteer Rainfall Observers Provide Important Public Service

by Rory Sweeting[1]

Manitoba farmer Garry Kube, recently retired, still has one job on his farmstead in Morden, Manitoba that he performs each and every day, 365 days a year, without fail. It's a task he thoroughly enjoys as it plays to his personal interest in the weather. It also helps him get some fresh air each night.

"*My dog and I go outside in the evenings, and I take a rainfall reading and then enter it in the computer*," Kube explains. "*I'm very careful and I never miss a day – it's very important to have a precise, consistent record*."

He takes his measurement routine very seriously, he says, since he's not just feeding his own curiosity, he's also performing an important public service. 65-year-old Kube is a volunteer with ***CoCoRaHS***, an international precipitation monitoring program with over 100 observers in Manitoba and Saskatchewan, and more than 16,000 in the United States.

Short for **Co**mmunity **Co**llaborative **Ra**in, **H**ail and **S**now, ***CoCoRaHS*** is a non-profit, grass-roots, volunteer network of weather enthusiasts of all ages and backgrounds. Each observer takes daily readings and enters them through the program website, www.cocorahs.org/canada.aspx.

CoCoRaHS began in Colorado in the 90's, launched in Manitoba in 2011, and is seeking new volunteer recruits as it expands further through the Prairies and the rest of Canada. Kube heard about the program on the radio last year and registered right away.

"*Being a farmer, I always wanted to know what we got for rain out on the farm*," he says. "*Farmer friends, I tell them about it and they're quite interested – I try my best to convince them*."

Kube says he had a very easy time getting started and he learned everything he needed to know from the simple online tutorials on the website. These are two very important factors for recruiting volunteers, says ***CoCoRaHS*** Canadian volunteer coordinator Alison Sass.

"***CoCoRaHS*** *places an emphasis on training and education for all their volunteers, and data users*," Sass says, "*so both observers and data users can be confident in the accuracy of the measurements obtained from* ***CoCoRaHS****. Volunteers can receive their training through online videos, slideshows, guidebooks and in-person sessions*."

CoCoRaHS rain gauge

Along with their training, ***CoCoRaHS*** provides observers with a good quality monitoring kit which includes an official CoCoRaHS rain gauge with a spare measuring cylinder, a heavy duty snow measuring stick, and a snow paddle. Volunteers pay $30 for the kit, a price that has been subsidized by the program sponsors. Each day they input their measurements through the website, which are then available to the general public through an interactive map. Those interested in the measurements include far more than just weather buffs, according to Sass.

"*Data from* ***CoCoRaHS*** *is used by flood forecasters, meteorologists, farmers, schools, gardeners, engineers, insect control, and many more*," she says. "*Often* ***CoCoRaHS*** *fills in many of the gaps that exist between automated stations, giving a better indication of localized precipitation events*."

Measuring the precipitation

In the U.S., the National Weather Service, National Oceanic and Atmospheric Administration, U.S. Department of Agriculture and National Science Foundation are all supporters and/or users. Canadian groups include Environment Canada, Agriculture and Agri-Food Canada, Farm & Food Care Foundation, Manitoba Infrastructure

[1] Weather INnovations Consulting

& Technology, the Saskatchewan Water Security Agency and many local watershed management bureaus.

Cliff Greenfield of Manitou, Manitoba, is the manager of the Pembina Valley Conservation District and also a ***CoCoRaHS*** volunteer. He has his gauges outside the office and checks them when he first comes in each morning. He contributes his measurements and uses the website's collection of data as part of the District's management of their 5,000 km^2 watershed.

"*I thought it would be a good thing for us to be doing, right here at the office*," Greenfield says. "*It's not always about the amount of water; it's also about the timing. When it happens too quickly or not at all – those are the big concerns for farmers, especially. When you enter your data and look at the rest of the map where the hot points are, what areas aren't getting any rain… it really helps with the general management of what we do*."

As an active proponent of ***CoCoRaHS***, Greenfield has also recruited other observers in the area. With 8 currently, he hopes to soon double that to have 16 throughout their district. He and his recruits enjoy both contributing their measurements and seeing the bigger picture through the interactive map.

"*The different coloured dots, the different amounts of rain that we received*," he explains, "*that's something we look forward to looking at every day.*"

It's also a great source of conversation material, says Garry Kube.

I check it quite often, I like to see what's going on," Kube says. "*I'm at the coffee shop usually twice a day and it's great to always have something to chat about*."

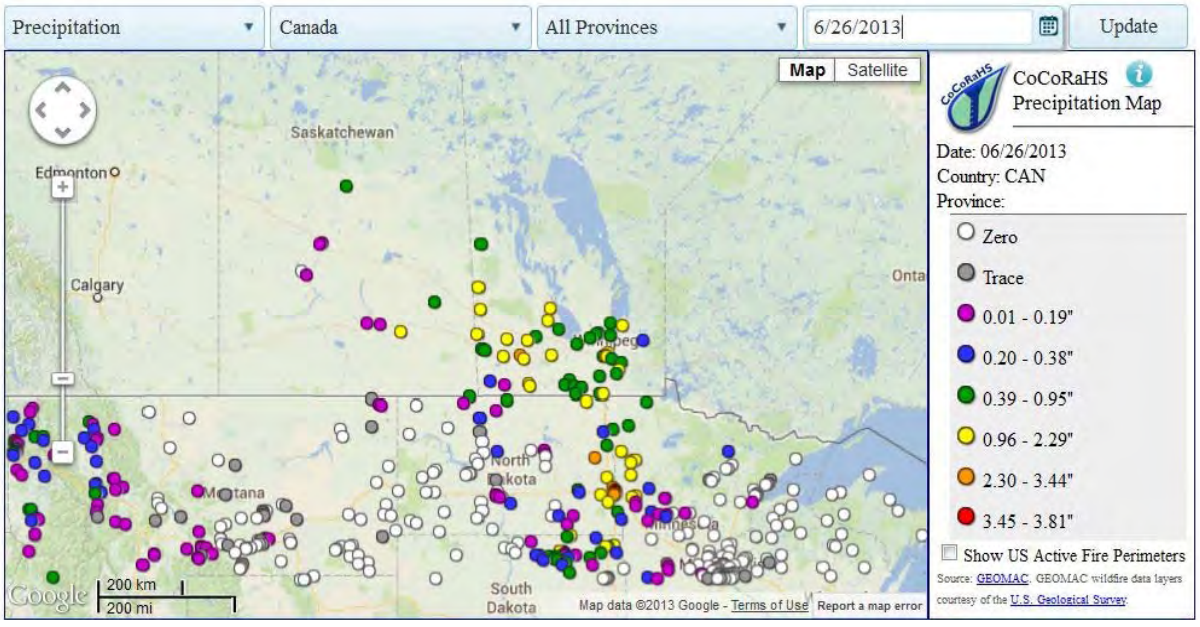
Farmers are always concerned about the rain, of course, he says, and ***CoCoRaHS*** helps them with hard numbers.

"*We had a big flood several weeks ago*," Kube recalls, *"but nothing since then and we're extremely dry right now. A friend just planted seed corn into a field that was completely dry – it will have a very difficult time germinating*."

Major flooding in Manitoba and Saskatchewan in 2011 is actually what prompted the expansion of ***CoCoRaHS*** into Canada, says Alison Sass.

"*It was the worst flooding in centuries*" she says, "*resulting in hundreds of millions of dollars in damages to homes, farmland, and infrastructure. Authorities need as much accurate precipitation data as possible, to assist them in their decision-making when responding to these types of emergencies. You can be part of the solution by becoming a* ***CoCoRaHS*** *volunteer*."

Sass says they are always looking for new observers and anyone interested in signing up or learning more can send an email Canada@cocorahs.org, call 855-999-8858, or apply directly through the website at www.cocorahs.org/canada.aspx. The program is running full-tilt in Manitoba and Saskatchewan, and plans are in the works for expanding to other provinces shortly.



CoCoRaHS Precipitation Map June 26, 2013

Reports / Rapports

47th CMOS Annual Congress Saskatoon, SK 47e Congrès annuel de la SCMO

Parsons 2013 Medal Award Presentation

At the annual congress of the Canadian Meterological and Oceanographic Society in Saskatoon, on May 28, Dave Gillis, Director-General of Ecosystem Science, DFO, presented the 2013 Parsons Medal in Multidisciplinary Ocean Science from Fisheries and Oceans Canada to **Dr. Paul Snelgrove,** Professor at Memorial University of Newfoundland.

Professor Paul Snelgrove

DFO established the Timothy R. Parsons Award in 2004 to pay tribute to excellence in Canadian ocean sciences and honour a scientist for either outstanding lifetime contributions or for a recent exceptional achievement in multidisciplinary facets of ocean sciences, while working within a Canadian institution. The first award was presented to Dr. Parsons himself who was also a recipient of The Order of Canada.

Dr. Snelgrove received his B.Sc. Honours degree in Biology from Memorial, a Master's degree in Oceanography from McGill, and a Joint Ph.D. from the Massachusetts Institute of Technology and the Woods Hole Oceanographic Institution. After postdoctoral fellowships in New Jersey and at Dalhousie, he returned to Newfoundland as an NSERC Industrial Chair in Fisheries Conservation, prior to his current position as Canada Research Chair in Boreal and Cold Ocean Systems.

A specialist of marine ecology, Dr. Snelgrove has authored and co-authored over 100 scientific papers on subjects ranging from marine community ecology to hydrodynamic effects on communities and populations, to biodiversity, to disturbance and anthropogenic impacts. His work has been cited over 2100 times in scientific publications, with an average total citation of 76 times per year.

A full professor at Memorial University in Newfoundland, Paul is a tireless promoter of a multi-disciplinary and cross-sector approach to ecosystem-level concerns. He holds the Canada Research Chair in Boreal and Cold Oceans Systems, which focuses on the role of larval transport, behaviour, and mortality in regulating benthic populations and communities in marine sediments and fishes, how different forms of disturbance regulate patterns of biodiversity in marine sediments, and the role of biodiversity in the delivery of key ecosystem services in sediments.

Dr. Snelgrove is the Network Director for the Canadian Healthy Oceans Network (CHONe), a network of over 65 scientists and 100 students from 14 universities, DFO, and seven other government laboratories, which focuses on biodiversity science for the sustainability of Canada's three oceans.

In addition, he has headed several other initiatives in the development of interdisciplinary science regionally, nationally, and internationally. For example, he played key roles in the development of a new marine biology program in the Department of Biology and the creation of a new Department of Oceans Sciences at Memorial, as well as in the establishment of a marine protected area in Newfoundland.

Internationally, Paul is recognized as a leader for his work in the Census of Marine Life, for which he was chair of the Synthesis Group and a member of the Scientific Steering Committee. He wrote *"Discoveries of the Census of Marine Life: Making Ocean Life Count*", the book that summarised key results of the program, integrating the work of some 2700 researchers from more than 80 nations which has fundamentally changed how scientists view marine biodiversity and greatly improved our understanding of ocean ecosystems. As a result of this work, Dr. Snelgrove was invited to give a TED talk which has been seen by over 170,000 people.

Paul continues to play a leading role in the international effort to identify how to fill the remaining gaps in our knowledge of marine diversity. Most recently, he has contributed to the improvement of Canadian ocean science programs as a core member of the Canadian Council of Academies' review of Ocean Science Research Needs and Priorities for Canada.

He has been invited to serve on numerous national and international review panels that consider science funding priorities, such as the Natural Sciences and Engineering Research Council of Canada, the European Commission and European Science Foundation, and the National Oceanic and Atmospheric Administration in the United States.

He currently sits on the editorial boards of five journals, including Marine Ecology and Endangered Species Research.

Besides his research output and his leading and managing of large research programs, Paul remains dedicated and supportive of young scientists and technicians. He continues to teach graduate and undergraduate courses every year, something not required of a Canada Research Chair.

Note from the Editor: Unfortunately, Dr. Snelgrove could not be in Saskatoon to receive his medal. Paul will receive the Parsons' medal at another time.

Congratulations to Professor Paul Snelgrove from all the CMOS Community.

2012 Patterson Medal Award Presentation

The Patterson Distinguished Service Medal, first presented in 1954, is considered the pre-eminent award recognizing outstanding work in meteorology by residents of Canada. This award is named in honour of Dr. John Patterson, a meteorologist who was Director and Controller of the Meteorological Service of Canada from 1929 to 1946, a crucial period in the development of Canada's weather service.

In Saskatoon, on May 28, David Grimes, Assistant Deputy Minister, Meteorological Service of Canada and President of the World Meteorological Organization (WMO), presented the medal to two scientists: **Barry Goodison** and **John Wilson**.

The Patterson Medal is awarded to **Dr. Barry Goodison** for his work as research scientist and research manager in hydrometeorology, climate processes and earth observation. His research focused on developing new knowledge and technology for the measurement of snowfall and snow cover using advanced satellite and ground based methods. Dr. Goodison has managed major field studies, major national programs, co-authored over 100 papers, and participated on countless advisory groups and panels. He has been, and continues to be a leader in advancing knowledge of cold region science and technology. Over the past decade, he has been actively involved in the development and management of national and international polar observation and research activities and was highly involved in activities related to the International Polar Year.

Note from the Editor: Dr. Barry Goodison was not present at the Saskatoon medal presentation. The Patterson Medal will be presented to Barry at a later date.

The Patterson Medal is also awarded to **Dr. John Wilson** for his widely-cited contributions in micrometeorology, covering theory, field experimentation and numerical modelling. Main research areas have been an examination of the utility of calculating disturbed near ground winds (e. g. windbreak flows) using the Reynolds-averaged Navier-Stokes equations; and the theory and application of "Lagrangian stochastic" trajectory models. The latter are now used by meteorological institutions to track contaminants such as volcanic ash or radionuclides.

David Grimes and John Wilson (Photo credit: Rosanna Parry)

Dr. Wilson has also pioneered a method for measuring surface-air exchange, now an international standard for measuring local greenhouse gas emissions in the agricultural science community. He was a member of the editorial board of Boundary-Layer Meteorology for almost 20 years, remains a member of the board of Agricultural and Forest Meteorology, and has served on the NSERC and CFCAS grant selection committees.

Congratulations to both recipients, Drs. Barry Goodison and John Wilson, from all the CMOS Community.

Note from the Editor:

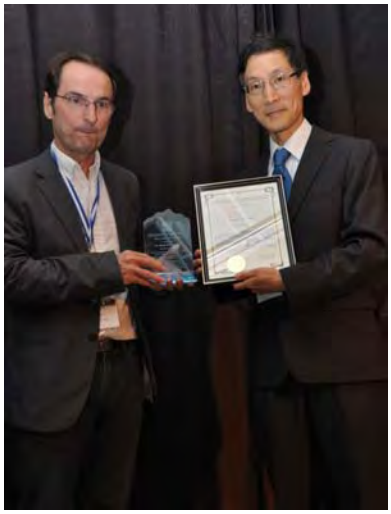
The year number for the Parsons medal is the year of presentation of the medal to its recipient.

The year number for the Patterson medal is the year before the year of presentation of the medal to the recipient.

CMOS Prizes and Awards announced at the 47th Annual Banquet
Remise des prix et récompenses de la SCMO au 47e banquet annuel

Centennial A, Teachers' Credit Union Place, Saskatoon, Saskatchewan
May 29, 2013 / 29 mai 2013

President's Prize
may be awarded each year to a member or members of the Society for a recent paper or book of special merit in the fields of meteorology or oceanography. The paper must have been accepted for publication in *Atmosphere-Ocean*, the *CMOS Bulletin SCMO* or another refereed journal.


Peter Bartello and William Hsieh accepting the prize for Rich Pawlowicz

Awarded in 2012 to **Richard Pawlowicz** of the University of British Columbia for his outstanding contribution in developing the new seawater standard TEOS-10. His novel contributions provide greater accuracy in estimating the physical properties of seawater. The groundbreaking publication was: Pawlowicz, Wright and Millero (2011), *The effects of biogeochemical processes on ocean conductivity/salinity/density relationships and characterization of real seawater*, Ocean Sci. 7, 363-387.

Tully Medal in Oceanography
may be awarded each year to a person whose scientific contributions have had a significant impact on Canadian oceanography.


Peter Bartello and Howard Freeland

Awarded in 2012 to **Howard Freeland**, of the Institute of Ocean Sciences for his outstanding research and leadership in the international and Canadian implementation of, and use of observations from, project Argo.

Andrew Thomson Prize in Applied Meteorology
may be awarded to a member or members of the Society for an outstanding contribution to the application of meteorology in Canada. Unfortunately, the prize was not awarded for 2012.

The **François J. Saucier Prize in Applied Oceanography** may be awarded each year to a member or members of the Society for an outstanding contribution to the application of oceanography in Canada.


Peter Bartello and William Hsieh accepting the prize for Susan Allen

Awarded in 2012 to **Susan Allen** of the University of British Columbia for her application of fluid dynamics to better understand biological and chemical processes in the ocean and, in particular, for her recent groundbreaking work in developing a robust method for forecasting spring blooms in the Strait of Georgia.

The **Rube Hornstein Medal in Operational Meteorology**
may be awarded each year to an individual for providing outstanding operational meteorological service in its broadest sense, but excluding the publication of research papers as a factor, unless that research has already been incorporated into the day-to-day performance of operational duties. The work for which the medal is granted may be cumulative over a period of years or may be a single notable achievement.


Peter Bartello and Mike Howe

Awarded in 2012 to **Mike Howe**, of Environment Canada for his leadership in the Air Quality prediction program. He is a "true leader and enabler" that influenced so many.

Roger Daley Postdoctoral Publication Award

Patrick Sheese, accepting the prize for Cristen Adams, and Peter Bartello. Patrick was last year's recipient and was at that time unable to attend!

to be made annually to a candidate who, at the time of nomination, is working in Canada in a non-permanent position as a postdoctoral fellow or research associate, and is within 5 years of having received a doctoral degree. The award is to be based on the excellence of a publication in the fields of meteorology or oceanography that has appeared, or is in press, at the time of nomination.

Awarded in 2012 to **Cristen Adams** for the GRL article *Severe 2011 ozone depletion assessed with 11 years of ozone, NO_2, and OCIO measurements at 80° N* (Doi:10.102912011GOL050). Cristen was the lead author and driving force behind this exceptional research in the understanding of ozone depletion events.

The **Tertia M.C. Hughes Memorial Prize**
may be awarded for contributions of special merit by graduate students registered at a Canadian university or by Canadian graduate students registered at a foreign university. Two prizes were awarded in 2012.

1) Awarded to **Marie-Ève Gagné**, University of Toronto, for her excellent thesis entitled Understanding oxygen photochemistry in CO_2-dominated planetary atmospheres.

2) Also awarded to **Clark Richards**, now at Woods Hole but for work done while at Dalhousie University, for his excellent thesis entitled *Energetics of shoaling internal waves and turbulence in the St. Lawrence Estuary*.

Neil J. Campbell Medal for Exceptional Volunteer Service
may be awarded each year to a member who has provided exceptional service to CMOS as a volunteer. The award may be made for an exceptional contribution in a single year or for contributions over an extended period. The contribution should have resulted in an important advancement for CMOS and/or its aims, nationally or locally. Unfortunately, the medal was not awarded this year.

Citations
One or more Citations may be awarded each year to an individual, group or organization which has, in the previous year, made some outstanding contribution towards promoting public awareness of meteorology or oceanography in Canada. Two citations were awarded in 2012.

Peter Bartello presenting the citation to the Senes Group

1) A citation is awarded to the **Senes Consultants Group** for delivering the 2012 Toronto's Future Weather and Climate Driver Study, which interprets the meaning of climate model predictions for the fine scale geographical regions of the city of Toronto. Team members of the Senes Consultants Group are Kim Theobald, Svetlana Music, Bosko Telenta, Zivorad Radonjic and Dr James Young.

Peter Bartello presenting the citation to, Jim Bruce and Gordon McBean

2) A citation is also awarded to **Elizabeth May** in recognition of her leadership, contributions and impact on important environmental issues. As an activist, lawyer and writer, she has been effective in providing environmental policy advice and raising public awareness about protection of the ozone layer and climate change issues.

The **CMOS Undergraduate Scholarship**
for students planning a career in atmospheric, hydrological, oceanographic or limnological sciences. Only one scholarship was awarded this year.

A $500 scholarship was awarded to **Émilie Benoit**, University of British Columbia, for academic excellence.

Iain Russell of the Weather Network announcing the scholarship to Émilie Benoit

The **CMOS Weather Network / Météomédia Scholarship** offered to a Canadian female student enrolled in the 3rd or 4th year of an atmospheric science degree program at a Canadian university and with career aspirations as a forecast meteorologist, on-air meteorologist or meteorological briefer. It consists of a cheque for $1500. The scholarship is funded by an annual donation from Pelmorex Inc., the parent company of The Weather Network and Météomédia.

The $1500 scholarship was awarded to **Émilie Benoit**, University of British Columbia, for academic excellence.

The **CMOS Daniel G. Wright Undergraduate Scholarship** awarded to a Canadian undergraduate student entering his/her final year of a B.Sc. Honours program in Mathematics and/or Physics, or a related discipline, at a Canadian university who intends to pursue graduate studies in physical oceanography or a related field. Unfortunately, the prize was not awarded for 2012.

The **CMOS CNC/SCOR NSERC Scholarship Supplement** provides a supplement of $5000 to a holder of an NSERC Postgraduate Scholarship or Canada Graduate Scholarship. It is renewable for a second year provided the Scholarship continues to be held.

The Scholarship supplement is awarded to **Jesse McNichol**, MIT-Woods Hole Institute, for his PhD studies: *Quantifying Energy Metabolism and Associating Function with Taxonomy for Chemolithoautotrophic Communities at Deep-Sea Hydrothermal Vents.*

Cara Manning, last year's recipient, MIT-Woods Hole Institute, for *Study biological productivity and air-sea gas exchange as controls on CO_2 fluxes during sea ice retreat (in the Bras d'Or lakes of Nova Scotia and Canada's Arctic)* is eligible for the second year supplement.

The **CMOS Weather Research House / NSERC Scholarship Supplement in Atmospheric or Ocean Sciences** provides a supplement of $5000 to a holder of an NSERC Postgraduate Scholarship or Canada Graduate Scholarship. It is renewable for a second year provided the Scholarship continues to be held. Note that this scholarship supplement is awarded by this private firm for the 16th year.

Cette année, le supplément est octroyé à **Yannick Lévesque**, Université du Québec à Rimouski, Institut des Sciences de la mer, pour ses études de troisième cycle: *Étude de l'évolution et de la variabilité inter-annuelle de la polynie des eaux du Nord (modélisation numérique).*

Michael Optis, last year's recipient, held only a one-year scholarship. He is not eligible for the second year supplement.

Three Poster Prizes

Claude Labine announcing the recipient of Campbell Scientific's Best Poster Prize

1) **The Campbell Scientific Best Student Poster Prize in Meteorology** is awarded to **Katarzyna Tokarska**, Simon Fraser University, for her poster entitled: *The role of net-negative CO_2 emission scenarios in stabilizing Earth's climate.*

2) **ASL Environmental Sciences Best Student Poster Prize in Oceanography** is awarded to **Jan-Erik Tesdal**, University of Victoria for his poster entitled: *The spatial and temporal distribution of oceanic dimethylsulfide and its effects on marine aerosols.*

David Fissel presenting ASL Best Poster prize to Jan-Erik Tesdal

3) **CMOS Best Poster Prize** is awarded to **Zilefac Elvis Asong**, University of Saskatchewan, for his poster entitled: *Regionalization of Canadian Prairies using precipitation-sensitive large-scale atmospheric covariates.*

CMOS Fellows may be granted to members of the Society who have provided exceptional long term service and support to the Society and/or who have made outstanding contributions to the scientific, professional, educational, forecasting or broadcasting fields in atmospheric or ocean sciences in Canada.

Peter Bartello presenting the certificate to the new Fellow, Tom McElroy

A Fellow is awarded in 2012 to **Dr. Charles Thomas (Tom) McElroy** for his contributions to ozone measurements and monitoring both in Canada and globally, and for his contributions to the community through leadership in CMOS and in national and international organizations.

Congress delegate Mar Martinez de Saavedra with the photographer, Rosanna Parry

Photos credit: All photographs shown in the above section are courtesy of Rosanna Parry of the Saskatoon Market (www.rosannaparry.com).

Remerciement pour les photos: Toutes les photos illustrées dans cette section ont été prises par Rosanna Parry du Saskatoon Market (www.rosannaparry.com).

Report on CMOS Congress 2013

Saskatoon SK, May 30, 2013. The 47th CMOS Congress (held jointly with the Canadian Geophysical Union and the Canadian Water Resources Association) wrapped up a successful week of meetings and scientific presentations (oral and poster) at the downtown Convention Centre (TCU Place). Over 670 delegates from the three groups attended. The number of participants was lower than organizers had expected because fewer people from government departments were sent, and because several who had planned to attend did not receive timely travel authority.

On Monday May 27, the Congress was officially opened by the Minister of the Environment, Peter Kent. The smaller number of attendees did not dampen the excellent exchange of scientific knowledge through presentations and posters covering topics in many disciplines. Water was a major theme of many sessions. Plenary speakers discussed water security in Western Canada; dramatic changes in Arctic ice cover and amount of fresh water in the Arctic Ocean; climate change impacts on ocean circulation; new discoveries about ice-age glacial runoff; earthquake and tsunami risks on the West Coast; progress on Canada's unique Saskatchewan project to capture and store large amounts of CO_2 underground; and new ways to model and predict hydrological stream flows in the light of changes in climate and land use. An early session speaker concluded that climate change is irreversible even if all CO_2 emissions were stopped now.

An interesting workshop was held on the state of Lake Winnipeg. It proposed ways to reduce the runoff of pollutant nutrients, especially phosphorus, in order to reduce recent algal blooms. The public lecture was given by Paulette Fox (aka Holy Waking Woman or Naatowaawaawahkaki or Tiyoahkimi or Beaver Woman) of the Blackfoot People who talked about integrating traditional indigenous knowledge systems with our existing systems to improve the natural environment.

CMOS held business meetings during the Congress. Some significant results can be reported. At its inaugural meeting, the newly-formed Arctic Special Interest Group made good progress on defining its role and future plans. The CMOS Annual General Meeting (AGM) approved a new form of governance which will involve a smaller Council to be elected by members at the 2014 AGM. More details on these initiatives can be seen in present and future CMOS Bulletins.

Paulette M. Fox

Many prizes and awards were announced during the Congress. Please see details of these awards, including winners, presented at the Patterson / Parsons Luncheon on May 28 and at the Congress banquet on May 29. There were two winners of the Meteorological Service of Canada Patterson Medal for 2012: Barry Goodison and John Wilson. Paul Snelgrove won the Department of Fisheries and Oceans 2013 Parsons Medal.

Bob, Jones, CMOS Webmaster

Scientific Program Committee

Comité du programme scientifique

Geoff Strong, CMOS Co-chair
Rod Blais, CGU Co-chair
Bob Halliday, CWRA Co-chair
Garth Van der Kamp
Paul Myers
Norman McFarlane
Sam Butler
Bob Kochtubajda
Russell Boals
Karl-Erich Lindenschmidt
Abdel-Zaher Kamal Abdal-Rasek

Local Arrangements Committee

Comité local organisateur

Craig Smith - Chair
Jaime Hogan - Audio-Visual Liaison
Virginia Wittrock - Communications & Publications
Joe Eley - Educator's Day Coordinator
Kyle Hodder - Educator's Day Support
Oscar Koren - Exhibits
Barrie Bonsal - Facilities & Accomodations
Gord Bell - Facilities Support
Brenda Toth - Facilities Venue
Chris Spence - Local Exhibits Lead
John Paul Cragg - Media Liaison
Curtis Hallborg - Member-at-Large
Anna Cole - Program Book
Ron Hopkinson - Registration Lead
Aston Chipanshi - Signage
Stephnie Watson - Social Program Lead
Garry Mak - Social Program Support
Dwight Clarke - Sponsorship Lead
Ray Pentland - Sponsorship Support
Cherrie Westbrook - Student Awards Coordinator
Bruce Davison - Treasurer
Warren Helgason - Volunteers Lead
David Waldner - Webmaster

A special thanks to all members of the Scientific and Local Arrangements Committees. Without their precious help, the Saskatoon Congress could not have been held!

Un grand merci à tous les membres du comité scientifique et du comité local organisateur. Sans leur aide précieuse, le congrès de Saskatoon n'aurait pas eu lieu!

2013 Student Bursary Recipients at Saskatoon Congress

Récipiendaires 2013 des bourses de voyage pour étudiants au congrès de Saskatoon

Dana Ehlert - Simon Fraser University
Karine Guinard - Institut national de recherche scientifique
Amin Haghnegahdar - University of Waterloo
Hakase Hayashida - Memorial University
Yukari Hori - University of Toronto
Torkaska Katarzyna - Simon Fraser University
Michelle Kula - McMaster University
David Themens - McGill University
Laura Gillard - University of Alberta
Kinson Leung - University of Toronto

Next CMOS Congress in 2014

The next CMOS Congress will be held in Rimouski, Quebec, June 1-5, 2014. The selected theme is *"Northern Exposure: The implication of changes in cold environments*". This theme follows the successful 36th Congress, *The Northern Environment*, which was held in Rimouski in 2002. The scientific program committee composed of Canadian oceanographers and atmospheric scientists is putting together an exciting schedule which will permit **scientists, professionals and students** to share the results of their recent work in the north. Among the subjects to be discussed: climate change and variation, meteorological prediction in the north, climate modelling, *in situ* and remote observing systems, pollution in cold environments, ocean-ice-atmosphere-continent interactions, impacts on northern communities and ecosystems, and much more.

Located on the south shore of the St. Lawrence Estuary, Rimouski is a coastal destination where nature has a special place. Within a 30 km radius, one can find the beautiful *Bic Provincial Park*, the *Portes de l'Enfer (Hell's Gate)* canyon, the *Reford Gardens*, and the *Pointe-au-Père maritime historic site*, featuring the submarine *Onondaga* and the *Empress of Ireland* museum. The Local Organising Committee and the Scientific Program Committee welcome you to Rimouski, the happiest city in Quebec (http://www.indicedebonheur.com/) !

Prochain Congrès de la SCMO en 2014

Le prochain congrès de la SCMO se tiendra à Rimouski, Québec, du 1er au 5 juin 2014. Le thème choisi est "*Le Nord vulnérable: Implication des changements dans les environnements froids*". Le comité scientifique, composé d'océanographes et de météorologues canadiens, s'affaire à mettre en place un programme scientifique des plus attrayants pour les **scientifiques, professionnels et étudiants** qui partageront les résultats de leurs plus récentes découvertes en lien avec le Nord. Au programme : changements et variabilités climatiques, prévisions météorologiques dans le nord, modélisation climatique, systèmes d'observations in situ et satellitaires, pollution environnementale en milieu froid, interactions océan-glace-atmosphère-continent, impacts sur les communautés nordiques et sur les écosystèmes, et bien plus.

Située sur la rive sud de l'estuaire du Saint-Laurent, Rimouski est une destination à caractère maritime où la nature occupe une place privilégiée. On y trouve dans un rayon de 30 kilomètres, le Parc national du Bic, le Canyon des Portes de l'Enfer, les jardins de Métis, le site historique maritime de la Pointe-au-Père où l'on peut visiter le sous-marin Onondaga ainsi que le musée *Empress of Ireland*. C'est avec grand plaisir que le Comité organisateur local et le Comité du programme scientifique vous accueilleront à Rimouski, ville du bonheur

(http://www.indicedebonheur.com/) !

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **October 2013.** Please send your articles, notes, workshop reports or news items before **September 6, 2013** to the address given at the top of page 114. We have an URGENT need for your written contributions.

Sixth CMOS Annual Photo Contest - 2013

And the Winners are ...

1st Prize ($100): *Lightning at Sunset*, by Gabor Fricska;

2nd Prize ($50): *Rime on Grass,* also by Gabor Fricska;

3rd Prize ($25): *A Weatherman's Holiday*, by Joe Schaefer.

Twenty-four photos were submitted to this year's contest. Photos were displayed during the Saskatoon Congress and on CMOS web site. Voting was open from 21 May to 21 June. 37 electronic ballots and 21 paper ballots were cast.

As for earlier contests, a point system was used to determine the winning photos. Three points for first choice; two points for second choice and one point for third choice.

Qing Liao, CMOS Office Manager, helped with the vote counting, verification and tabulation.

Results

First prize, a clear winner with 55 points, is *Lightning at Sunset*, taken by **Gabor Fricska**, Kelowna, BC on August 10, 2011.

Gabor Fricska is a meteorologist based in Kelowna, BC. This was his first time entering the CMOS photo contest, and he duplicated the feat achieved by Patrick McCarthy in the last contest (2011) by winning the first two prizes. This is a clear indication that his photographic expertise truly appeals to CMOS members.

Contributing Photographers
In addition to **Gabor Fricska** and **Joe Schaefer**, we wish to thank the following photographers for their excellent photos which were widely seen and appreciated during the contest period: **Paul-André Bolduc**, **Frédéric Fabry**, **Wolf Read**, **Jeffery Smith** and **Richard Verret**.

Second prize, with 33 points, also by **Gabor Fricska**, is titled *Rime on Grass*, taken in the Okanagan Valley, BC on February 8, 2012.

Third prize, with 30 points, taken by **Joe Schaefer**, is titled *A Weatherman's Holiday*, New Smyrna, Florida. It was taken on June 18, 2011, and was followed fifteen minutes later by a tornado at nearby Cocoa Beach, FL.

Joe Schaefer is a long-time member of CMOS who resides in Norman, Oklahoma. He, too, was a first-time entrant and, in fact, submitted only one photo which won the third prize.

The first prize was graciously donated by **Lou Ranahan**, a CMOS Ottawa Centre member. Lou has developed his web site (www.meteorology.ca) which serves as a portal for meteorology web sites around the world, and you are invited to visit.

*CMOS Annual Photo contest results are reported by **Bob Jones**, CMOS Webmaster, 27 June 2013.*

47th CMOS Congress Photo Memories

Souvenirs photographiques du 47e Congrès de la SCMO

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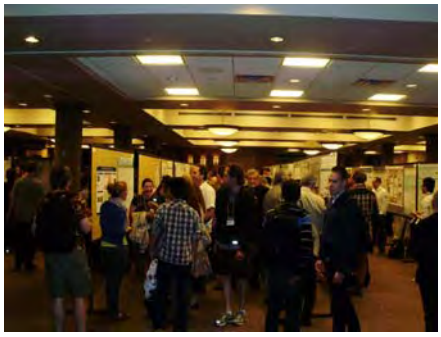

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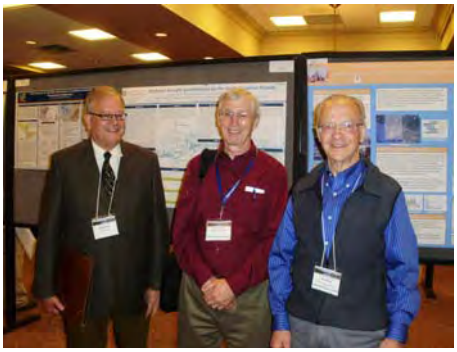

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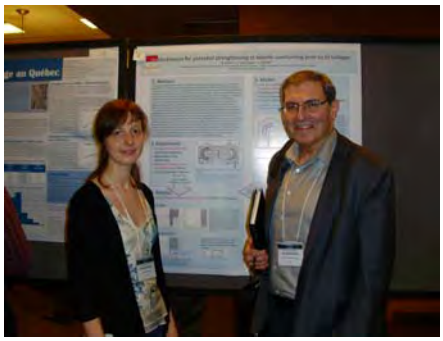

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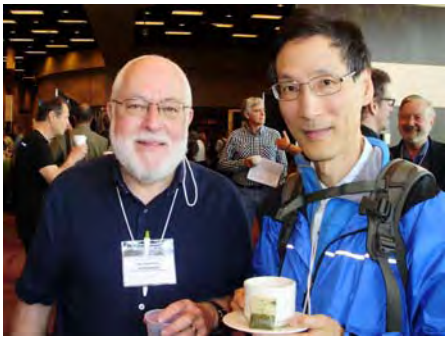
9

Photos description on next page with more photos!
Vous trouverez la description des photos à la page suivante avec encore plus de photos!

The fifteen photos shown on this page and next are courtesy of the Editor, *CMOS Bulletin SCMO*, 29 May 2013.
Les quinze photos illustrées sur cette page et la suivante sont la gracieuseté du rédacteur, *CMOS Bulletin SCMO,* 29 mai 2013.

 10	 11	 12
 13.	 14	 15

Photos legend (from left to right, top to bottom)

1. **Jim Abraham**, **Martin Taillefer**, Maritime Safeway Scientific and **David Fissel**, from ASL and former CMOS President (2010).	2. **Louise Glenn** from Taylor & Francis and **Richard Asselin**. Director of Publications.	3. **Harinder P.S. Ahluwalia**, incoming CMOS Vice-President from Info-Electronics System and **Tom Mc.Elroy**, Toronto Centre Chair.
4. A well-attended poster session; des affiches bien populaires.	5. 47th Congress Scientific Committee three Co-Chairs: **Bob Halliday** (CWRA), **Geoff Strong** (CMOS) and **Rod Blais** (CGU).	6. **Jim Bruce** (CMOS Member) with **Margareth** and **Ron Hopkinson**, Chair of the Audit Committee.
7. **Shallima Maharaj** (Global News Saskatoon Reporter) with **Virginia Wittrock** (Saskatchewan Centre Chair and Communications and Publications Lead for the LAC).	8. **Dana Ehlert** (Postdam Institute for Climate Impact Research, Germany) presenting her poster to **David Fissel** , Board Chair ASL and Senior Oceanographer.	9. **Pierre Gauthier** (incoming CMOS President) and **Peter Bartello** (outgoing CMOS President) after being interviewed on local TV.
10. **Richard Asselin**, **Sheila Bourque**, Rédactrice technique pour A-O et **Mabrouk Abaza**, étudiant au doctorat à l'Université Laval devant le kiosque de la SCMO.	11. When oceanography meets meteorology: **David Greenberg**, oceanographer at BIO and **William Hsieh**, former Editor-in-Chief for A-O.	12. From Saskatoon to Rimouski, **Craig Smith** (Chair, LAC Saskatoon Congress) and **Simon Bélanger** (Chair, LAC Rimouski Congress).
13. **Michel Mitchell**, Nouveau secrétaire du SCOR, **Simon Bélanger**, Président du comité organisateur de Rimouski, **Denis Lefaivre**, océanographe de l'IML et **Cédric Jamet**, Directeur associé pour A-O le mercredi soir après le banquet.	14. **Qing Liao**, CMOS Office Manager and **Nacéra Chergui**, CMOS Treasurer on Wednesday night after banquet.	15. **Ian Rutherford**, CMOS Executive Director and **Peter Bartello**, outgoing CMOS President. [Job well done!]

CMOS BUSINESS / AFFAIRES de la SCMO

Call for Papers in a Special Issue of *Atmosphere-Ocean*

Summary

Atmosphere-Ocean plans to publish a special issue entitled "*Dynamics of the Gulf St. Lawrence System and its Influence on the Ecosystem: Past, Present and Future*" in 2014. The Gulf of St. Lawrence is a semi-enclosed sea connected to the Grand Banks and the Scotian Shelf through Cabot Strait, and to the Labrador and northeastern Newfoundland Shelves through the Strait of Belle Isle. The Gulf of St. Lawrence is a unique marine ecosystem characterized by large freshwater runoff from rivers; landward flow of the North Atlantic waters in the deep layer along the Laurentian Channel, large seasonal changes in hydrography, high biological productivity and diversity of marine life. This special issue will focus on the latest advances in understanding of physical, chemical, biological and geological processes in the Gulf of St. Lawrence and adjacent waters based on observational, numerical, and climate studies. Please submit your papers online at http://mc.manuscriptcentral.com/a-o, indicating the special issue "*Gulf of St. Lawrence and Adjacent Waters*".

Tentative Schedule

- Submission of the full manuscript: February 2014.
- Completion of Review: August 2014.
- Publication: January 2015 or earlier.

Guest Editors

1) Dr. Jinyu Sheng, Professor and LRF Chair, Department of Oceanography, Dalhousie University, 1355 Oxford Street, PO Box 1500, Halifax, Nova Scotia, CANADA, B3H 4R2. Tel: (902) 494-2718; E-mail: Jinyu.Sheng@Dal.Ca

2) Dr. Denis Lefaivre, Research Scientist, Operational Oceanography, Ecosystem Dynamics, Pelagic and Ecosystem Science Branch, Regional Science Directorate, Quebec Region, Fisheries and Oceans Canada, Maurice Lamontagne Institute, 850 route de la Mer, C.P. 1000, Mont-Joli (Qc), CANADA, G5H 3Z4.
Tel: (418) 775-0568, Email: denis.lefaivre@dfo-mpo.gc.ca

Proposed Title and Abstract of your Paper

If you are interested in publishing your paper in this special issue, please contact the guest editors (Jinyu.Sheng@Dal.Ca or denis.lefaivre@dfo-mpo.gc.ca) with a proposed title and abstract and an indication whether you can meet the suggested deadline.

Appel de communications pour un numéro spécial d'*Atmosphere-Ocean*

Aperçu

Nous envisageons de publier en 2014 un numéro d'*Atmosphere-Ocean* intitulé "Dynamics of the Gulf of St. Lawrence System and its Influence on the Ecosystem: Past, Present and Future" (*Dynamique du système du golfe du Saint-Laurent et son incidence passée, présente et future sur l'écosystème*). Le golfe du fleuve Saint-Laurent est une mer semifermée, reliée aux Grands bancs et à la plateforme Scotian via le détroit de Cabot, ainsi qu'au Labrador et à la plateforme du nord-est de Terre-Neuve via le détroit de Belle Isle. Le golfe du Saint-Laurent constitue un écosystème unique, caractérisé par un important ruissellement d'eau douce, provenant de divers cours d'eau; par un écoulement vers le continent des eaux de l'Atlantique Nord via le courant profond du chenal Laurentien; par de grandes variations hydrographiques saisonnières; par une production biologique abondante, et une grande diversité de la faune et de la flore marines. Ce numéro spécial portera sur les dernières avancées de la compréhension des processus physiques, chimiques, biologiques et géologiques du golfe du Saint-Laurent et des eaux adjacentes, étayées par des observations, des simulations numériques et des études climatologiques. Veuillez soumettre vos articles en ligne à l'adresse http://mc.manuscriptcentral.com/a-o, en mentionnant le numéro spécial : *"Gulf of St. Lawrence and Adjacent Waters* ".

Dates préliminaires

- Soumission du manuscrit complet : février 2014.
- Fin de la révision : août 2014.
- Publication : janvier 2015 ou plus tôt.

Rédacteurs en chef invités

1) Jinyu Sheng (Ph. D.), professeur et titulaire de la chaire LRET, Département d'océanographie, Université Dalhousie, 1355, Oxford Street, C. P. 1500, Halifax (Nouvelle-Écosse), Canada, B3H 4R2. Tél. : 902 494-2718.
Courriel : jinyu.sheng@dal.ca.

2) Denis Lefaivre (Ph. D.), chercheur, Direction générale de l'océanographie opérationnelle, de la dynamique des écosystèmes, des sciences des milieux pélagiques et des écosystèmes, Direction régionale des sciences, Région du Québec, Pêches et Océans Canada, Institut Maurice-Lamontagne, 850, route de la Mer, C. P. 1000, Mont-Joli (Québec), Canada, G5H 3Z4. Tél. : 418 775-0568. Courriel : denis.lefaivre@dfo-mpo.gc.ca.

Titre proposé et résumé de votre communication

Si vous êtes intéressés à publier votre communication dans ce numéro spécial, prière de contacter les rédacteurs en chef invités (Jinyu.Sheng@Dal.Ca ou denis.lefaivre@dfo-mpo.gc.ca) en mentionnant le titre proposé et le résumé de votre communication. Prière d'indiquer également si vous pouvez rencontrer la date butoir.

Amended Page Charge Policy for *Atmosphere-Ocean*

First-time authors

In its quest to expand the scope and to increase the number or articles published in *Atmosphere-Ocean*, in 2010 CMOS announced a policy of waiving page charges for papers by first-time Canadian authors (for details, see: http://www.cmos.ca/Ao/waivingpagecharges.html). It is proposed to modify this policy as explained below.

The main intent of the policy is to introduce young authors to *Atmosphere-Ocean*, let them experience the quality of service and friendliness of our journal and entice them to publish again. This policy has indeed attracted several new authors and contributes to our goal of publishing 100 papers per year, but it will take longer to determine whether it has had the desired long term effect.

Invited Review papers

Recently, the editorial board of *Atmosphere-Ocean* decided to invite distinguished scientists to submit significant review papers. *Invited review papers* would broadly cover a research area, describing the evolution of the main ideas and highlighting important discoveries, including the fundamental contributions made by the author(s) and co-workers. These papers will be subject to normal peer review. In recognition of the effort required, publication fees will be waived, up to a maximum of 30 pages.

This new initiative is designed to attract high numbers of citations, and thereby to contribute to raising the impact factor (currently 1.673 © 2013 Thomson Reuters).

The Editorial Board already has a number of topics that it would like to see reviewed. In order to finalize a list, CMOS members are invited to recommend interesting areas to review and potential authors (or teams of authors). Please write to publications@cmos.ca

Amended policy

Waiving of fees constitutes an expense on the *Atmosphere-Ocean* budget. To provide the incentive for invited review papers and still balance the budget, the fees for first-time authors will be waived for the first 10 pages only, and the remaining pages will be charged at the regular rate of $100 per page. This amendment will apply starting in 2014, for papers submitted after 1 August 2013. Papers already submitted will continue to benefit from the full waiving of fees.

Modification de la politique relative aux frais de publication dans *Atmosphere-Ocean*

Nouveaux auteurs

Afin d'élargir la portée d'*Atmospere-Ocean* et d'augmenter le nombre d'articles publiés, la SCMO a annoncé en 2010 une politique servant à dispenser des frais de publication les nouveaux auteurs canadiens (détails à l'adresse : http://www.cmos.ca/Ao/waivingpagecharges.html). Nous nous proposons de modifier cette politique selon ce qui suit. La politique vise principalement à augmenter la visibilité d'*Atmosphere-Ocean* auprès des jeunes auteurs, ainsi qu'à leur faire connaître la qualité du service et la cordialité associées à la revue, afin de les inciter à y publier d'autres articles. Cette politique a effectivement réussi à attirer plusieurs nouveaux auteurs et contribue à notre objectif de publier 100 articles par année. Toutefois, il faudra quelque temps pour déterminer si l'effet à long terme escompté se matérialise vraiment.

Sollicitation d'articles de synthèse

Le comité de rédaction d'*Atmosphere-Ocean* a décidé récemment d'inviter d'éminents scientifiques à soumettre des articles de synthèse pertinents. Les *articles de synthèse sollicités* couvriraient de façon générale un domaine de recherche, en décrivant l'évolution des principales idées s'y rapportant et en soulignant les découvertes importantes, y compris les contributions fondamentales des auteurs et de leurs collègues. Ces articles seraient aussi soumis à une évaluation par les pairs. Afin de reconnaître l'effort consenti par les auteurs, ces derniers seront dispensés des frais de publication, jusqu'à concurrence de 30 pages.

Cette nouvelle initiative servira à accroître le nombre de citations et contribuera ainsi à augmenter le facteur d'impact (actuellement de 1,673, © 2013 Thomson Reuters).

Le comité de rédaction a déjà choisi des sujets pour lesquels il souhaiterait publier des articles de synthèse. Afin de compléter la liste, il invite les membres de la SCMO à recommander des sujets intéressants et des auteurs (ou des équipes) potentiels aptes à passer ces sujets en revue. Veuillez faire parvenir vos suggestions à publications@cmos.ca

Modification à la politique
La dispense des frais de publication constitue une dépense en ce qui a trait au budget réservé à *Atmosphere-Ocean*. Pour être en mesure de financer les auteurs des articles de synthèse sans grever le budget, les nouveaux auteurs seront dispensés des frais de publication pour les 10 premières pages seulement. Les frais habituels de 100 $ par page s'appliqueront aux suivantes. Cette modification s'appliquera en 2014 pour les articles soumis après le 1er août 2013. Les articles déjà soumis bénéficieront de la dispense complète des frais de publication.

Atmosphere-Ocean 51-3 Paper Order

Applied Research / Recherche appliqué

AO-2013-0016
Integral Profile Estimates of Latent Heat Flux under Clear Skies at an Unconsolidated Sea-Ice Surface
R. L. Raddatz, R. J. Galley, L. M. Candlish, M. G. Asplin and D. G. Barber

AO-2012-0059
A Validation of CloudSat and CALIPSO's Temperature, Humidity, Cloud Detection, and Cloud Base Height over the Arctic Marine Cryosphere
Lauren M. Candlish, Richard L. Raddatz, Geoffrey G. Gunn, Matthew G. Asplin and David G. Barber

AO-2012-0031
Dynamical Downscaling over the Gulf of St. Lawrence using the Canadian Regional Climate Model
Lanli Guo, Will Perrie, Zhenxia Long, Joël Chassé, Yaocun Zhang and Anning Huang

CMOS SCMO Taylor & Francis Taylor & Francis Group
Atmosphere-Ocean
ISSN 0705-5900

Fundamental Research / Recherche fondamentale

AO-2012-0044
Validation of Strategies using Clustering Analysis of ECMWF EPS for Initial Perturbations in a Limited Area Model Ensemble Prediction System
Fundamental Research / Recherche fondamentale

AO-2012-0028
Shallow Water Dissipation Processes for Wind Waves off the Mackenzie Delta
Fumin Xu, William Perrie and Steve Solomon

AO-2012-0055
The Changing Length of the Warming Period of the Annual Temperature Cycle in the High Latitudes Under Global Warming
John Bye, Klaus Fraedrich and Xiuhua Zhu

AO-2012-0038
Sensitivity of the Simulated Kingston Basin—Lake Ontario Summer Temperature Profile using FVCOM
Miles C. Wilson, Jennifer A. Shore and Yerubandi R. Rao

BRIEF NEWS / NOUVELLES BRÈVES

400 PPM

CO_2 at NOAA's Mauna Loa Observatory reached new milestone

On May 9, the daily mean concentration of carbon dioxide in the atmosphere of Mauna Loa, Hawaii, surpassed 400 parts per million (ppm) for the first time since measurements began in 1958. Independent measurements made by both NOAA and the Scripps Institution of Oceanography have been approaching this level during the past week. It marks an important milestone because Mauna Loa, as the oldest continuous carbon dioxide (CO_2) measurement station in the world, is the primary global benchmark site for monitoring the increase of this potent heat-trapping gas.

Carbon dioxide pumped into the atmosphere by fossil fuel burning and other human activities is the most significant greenhouse gas (GHG) contributing to climate change. Its concentration has increased every year since scientists started making measurements on the slopes of the Mauna Loa volcano more than five decades ago. The rate of increase has accelerated since the measurements started, from about 0.7 ppm per year in the late 1950s to 2.1 ppm per year during the last 10 years.

"*That increase is not a surprise to scientists*," said NOAA senior scientist Pieter Tans, with the Global Monitoring Division of NOAA's Earth System Research Laboratory in Boulder, Colo. "*The evidence is conclusive that the strong growth of global CO_2 emissions from the burning of coal, oil, and natural gas is driving the acceleration*."

NOAA's Mauna Loa Observatory in Hawaii
(Photo credit: NOAA)

Before the Industrial Revolution in the 19th century, global average CO_2 was about 280 ppm. During the last 800,000 years, CO_2 fluctuated between about 180 ppm during ice ages and 280 ppm during interglacial warm periods. Today's rate of increase is more than 100 times faster than the increase that occurred when the last ice age ended.

It was researcher Charles David Keeling of the Scripps Institution of Oceanography, UC San Diego, who began measuring carbon dioxide at Mauna Loa in 1958, initiating now what is known as the "Keeling Curve." His son, Ralph Keeling, also a geochemist at Scripps, has continued the Scripps measurement record since his father's death in 2005.

"*There's no stopping CO_2 from reaching 400 ppm,"* said Ralph Keeling. "*That's now a done deal. But what happens from here on still matters to climate, and it's still under our control. It mainly comes down to how much we continue to rely on fossil fuels for energy*."

NOAA scientists with the Global Monitoring Division have made around-the-clock measurements there since 1974. Having two programs independently measure the greenhouse gas provides confidence that the measurements are correct.

Moreover, similar increases of CO_2 are seen all over the world by many international scientists. NOAA, for example, which runs a global, cooperative air sampling network, reported last year that all Arctic sites in its network reached 400 ppm for the first time. These high values were a prelude to what is now being observed at Mauna Loa, a site in the subtropics, this year. Sites in the Southern Hemisphere will follow during the next few years. The increase in the Northern Hemisphere is always a little ahead of the Southern Hemisphere because most of the emissions driving the CO_2 increase take place in the north.

Once emitted, CO_2 added to the atmosphere and oceans remains for thousands of years. Thus, climate changes forced by CO_2 depend primarily on **cumulative emissions**, making it progressively more and more difficult to avoid further substantial climate change.

Source:
http://researchmatters.noaa.gov/news/Pages/CarbonDioxideatMaunaLoareaches400ppm.aspx

NOAA carbon dioxide data:
http://www.esrl.noaa.gov/gmd/ccgg/trends/weekly.html

Scripps Institution of Oceanography carbon dioxide data: http://keelingcurve.ucsd.edu

A Tale of Two Cities

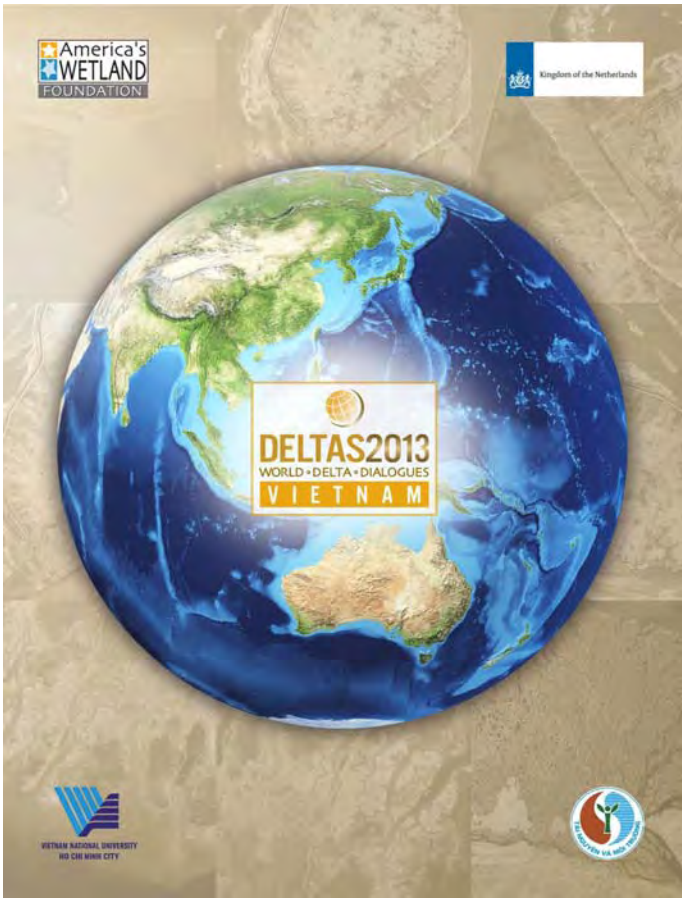
Ho Chi Minh City, Vietnam -- A half day apart on opposite sides of the world, experts from the U.S. and Vietnam learned of the challenges faced by two river cities, Ho Chi Minh City (formerly Saigon) and New Orleans, as DELTAS2013:VIETNAM continued, an international conference sponsored by the America's WETLAND Foundation of Louisiana, Viet Nam National University and the government of the Netherlands.

New Orleans, which has endured hurricanes and manmade disasters like the BP oil spill, is surrounded by a deteriorating ecosystem as wetland loss continues to increase its vulnerability. Ho Chi Minh City shares an extremely high rate of sea level rise and subsidence like its American counterpart and views increased storm activity as an omen for the future.

Both cities are seeking greater protection and resiliency for urban populations and the need for adaptation strategies has planning experts searching for ways to better live with water and the natural processes of the rivers.

"*We cannot fight nature because nature will have its way*," said David Waggonner of Waggonner and Ball Architects of New Orleans. "*Our vision for New Orleans is to build a water city – to start at the roots of the city, founded as a port. We are now an island city surrounded by a great wall. We stay dry but we lose ground. The real opportunity for New Orleans is its outfall canals. We should not bury the*

treasure, but use the canals to allow water to be part of the city."



In Ho Chi Minh City, with a population of 10 million, climate change is evident with increased flooding, more intense storms, and rain now occurring at different times of the year than the norm, according to Vu Thuy Linh, Vice Manager of the Climate Change Bureau for Ho Chi Minh City. "*Through an MOU with the Dutch, we are able to involve more stakeholders, learn from the local perspective, and build capacity to address the impacts*," she said.

Dutch water experts are working on adaptation plans for the city at a time when decisions are being considered to protect the population with large dykes. "*We are working on an integrated flood management plan to reduce flood risk hazards and vulnerabilities and to incorporate strategies to cope with the impacts of flooding*," said Frits Dirks of the Dutch firm of Royal Haskoning DHV and project leader for the Flood and Inundation Management Programme in Ho Chi Minh City. "*We include "no regret" measures, like immediately reducing groundwater extraction and upgrading the city's drainage system*."

David Hoeferlin of Washington University in Saint Louis, MO, recently completed a series of design charrettes in which architects and planners looked at the Mississippi River around Illinois and Missouri and envisioned scenarios for allowing the river to be a resource, not a threat.

"*It's about the long term. It's about living with rivers,*" Hoeferlin said. "*Water is the most politicized commodity on earth but water itself is not political – it flows where it wants. We have a chance now for delta urbanism to get the fundamentals right. We can no longer continue to dominate the landscape with hard structures*."
The Mississippi and Mekong Deltas face urgent decisions based on new projections that sea level rise is outpacing predictions, with these two coastal regions at the highest ends of the predictive scales for rising waters. Considering the presentations and charrette discussions during the conference, R. King Milling, chair of the America's WETLAND Foundation, said, *"Unfortunately, we don't enjoy the luxury of time in addressing these issues. Only consider the rise of insurance rates in South Louisiana and you realize we can't afford to keep doing what we have been and expect different results*."

The goal of the exchange among conference participants is to offer a Communiqué of Cooperation to be embraced by delta regions worldwide.

For more information, please contact **John Hill**, America's WETLAND Foundation. E-mail: talktojhill@aol.com

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ArcticNet Annual Science Meeting

9-13 December 2013, Halifax, NS

The 9th ArcticNet Annual Scientific Meeting (ASM2013) will be held from 9 to 13 December 2013 at the World Trade and Convention Centre (WTCC)in Halifax, Nova Scotia.

As the largest annual Arctic research gathering held in Canada, the annual meeting is the ideal venue to present results from all fields of Arctic research and stimulate networking and partnership activities.

Building on the success of previous ASMs, the 2013 meeting welcomes researchers, students, policy makers, stakeholders and the media to address the global challenges and opportunities brought by climate change and modernization in the Arctic.

Detailed information on the meeting, registration, call for abstracts and sponsor/exhibitor opportunities will be available soon.

Réunion scientifique annuelle d'ArcticNet 9-13 décembre 2013, Halifax, N-É

La 9e réunion scientifique annuelle d'ArcticNet (ASM2013) se tiendra du 9 au 13 décembre 2013 au World Trade and Convention Centre (WTCC) à Halifax, Nouvelle-Écosse.

Étant la plus importante réunion annuelle sur la science arctique au Canada, l'ASM est le moment idéal pour présenter les résultats de recherche et pour stimuler le réseautage et le partenariat.

Suite au succès des réunions scientifiques annuelles précédentes, l'ASM2013 invite les chercheurs, les étudiants, les décideurs, les représentants d'organisations gouvernementales et privées à aborder les défis et les opportunités amenés par les changements climatiques et la modernisation dans l'Arctique.

Plus de détails sur la réunion, les modalités d'inscription, les différentes possibilités pour commanditaires et exposants ainsi que l'appel aux conférenciers seront disponibles prochainement.

Personnel on the move

Dr. Charles Hannah at sea

Dr. Charles Hannah is taking over as Head, State of the Ocean Section in the Ocean Sciences Division at DFO's Institute of Ocean Sciences (IOS), Sidney, BC. Charles comes to IOS from the Ocean Sciences Division at the Bedford Institute of Oceanography, where he has held several positions as Research Scientist, Section Head and Acting Division Manager.

Charles is a native of British Columbia, having grown up on the coast and doing his university/post-graduate education at UBC. As a PhD student, Charles worked on the circulation of BC north coast before he headed east to start a most productive 20-year career at BIO.

In Memoriam

Tribute to Dr. Chi-Shing Wong

Dr. Chi-Shing Wong, known by most of his associates as CS, and widely recognized as one of Canada's leading ocean geochemists, passed away on 6 June 2013.

Dr. Chi-Shing Wong

He came to Canada's west coast in the early 1970s and set up an atmosphere-ocean CO_2 facility, initially within Environment Canada but soon transferred to Fisheries and Oceans where he remained until he retired in 2009. CS had an exceptional capability to recognize an important science problem, to engage with the international community working on it, and to find the funding to support a meaningful contribution to that problem by Canada. In those early years, when few of us worried about time series, CS recognized the opportunity afforded by the west-coast weather-ships to initiate the first atmospheric CO_2 time series at an oceanic station (Station Papa). Perhaps this would be no surprise to those who knew him well, given that two of his heroes were Roger Revelle and Charles Keeling. This atmospheric time series was accompanied by an ocean chemistry time series, the value of which has grown exponentially with time.

While maintaining the carbon-cycle work in the NE Pacific Ocean, CS recognized the emerging revolution in ocean trace-metal geochemistry toward the end of the 1970s. With impeccable foresight, he included a cutting-edge clean room as part of design of the chemistry wing in the new Institute of Ocean Science at Patricia Bay, and immediately

initiated elemental research using mesocosm enclosures moored in Saanich Inlet – bag work, as it was frequently termed. This enclosure work, led by Tim Parsons, presented the opportunity of researching metal cycles as they affected – or were affected by – biological cycles. CS recognized clearly the extraordinary opportunity presented by this setting, not only to research the cycles of metals in constrained ocean systems, but also to attract a community of leading international scientists from, for example, Japan, Germany, Britain, and the USA. From this basis, CS brought about a NATO Advanced Research Institute in 1981 out of which came a turning-point book – "*Trace Metals in Sea Water*;" His chosen co-editors formed a cadre of who's who in ocean geochemistry, including Ed Goldberg, Ed Boyle, Ken Bruland and JD Burton. If one pages through the papers included in that NATO book, one will find virtually the entire community who produced the first real understanding of elemental cycling in world oceans.

In the early 1980s another quiet revolution was occurring consequent to the development of sequential sediment trap technology, which presented some of the first glimpses of rapid connectivity between upper ocean and abyss mediated by particle flux. Again, CS recognized the value of collecting a time series at Station Papa and, against all fiscal odds, managed to maintain that observatory from 1982 to 2006. Establishing this observatory was prescient, given the changes now occurring in the ocean's CO_2 system, and it well illustrates CS's astute geochemical eye and remarkable tenacity; CS authored or co-authored well over 100 papers spanning several oceans and far more topics than are highlighted here.

He received numerous awards including *Fellowship of the Royal Society of Canada* (*FRSC*, 1999), but perhaps his favourite would have been the *AAAS Newcomb Cleveland Prize* for the most outstanding paper in *Science* (Quay, Tilbrook and Wong, 1991). This particular paper could not have been written without the time series on carbon isotopes collected by CS at Station P. Looking back on all these accomplishments, I think it fair to say that CS has firmly established himself as an icon in Canadian ocean science.

Note from the Editor:
For those interested in CS Wong work, please visit:
http://cdiac.ornl.gov/oceans/wong.html

Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **octobre 2013.** Prière de nous faire parvenir avant le **6 septembre 2013** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée au haut de la page 114. Nous avons un besoin URGENT de vos contributions écrites.

CMOS 2014 Photo Contest

All members with a photographic bent are invited to participate in the 2014 Photo Contest. Please submit your own original image files, either in colour or black and white, from scans of prints or digital capture of a meteorological or oceanographic subject, event, or phenomenon. Details on the photo contest can be found on the CMOS Web Page at:

http://www.cmos.ca/photocontest.html

Concours photographique 2014 de la SCMO

Tous les membres qui ont une passion pour la photographie sont invités à participer au concours de photographie 2014 de la SCMO. Prière de soumettre vos photos numériques originales, soit en couleur, soit en noir et blanc, à partir de copie papier ou de fichier numérique portant sur des sujets ou phénomènes météorologiques ou océanographiques. Les détails du concours se trouvent sur le site web de la SCMO à l'adresse:

http://www.cmos.ca/photocontest.html

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48e congrès SCMO

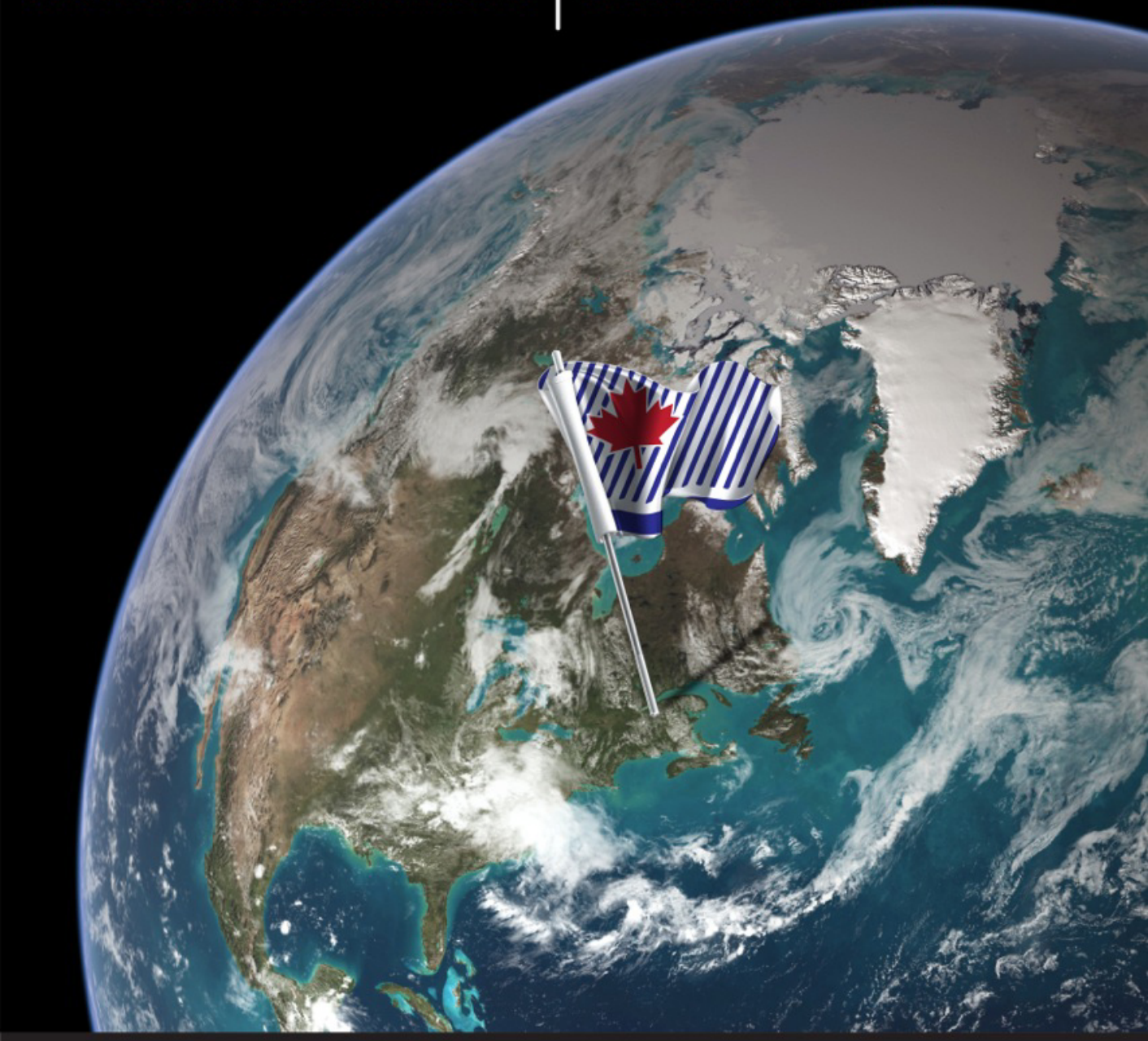
La Société canadienne de météorologie et d'océanographie

48th CMOS Congress

Canadian Meteorological and Oceanographic Society

Le Nord vulnérable : Implication des changements dans les environnements froids

Northern Exposure: The implication of changes in cold environments



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