



CMOS **BULLETIN**

*Canadian Meteorological
and Oceanographic Society*

SCMO

*La Société canadienne de
météorologie et d'océanographie*

June / juin 2018

Vol. 46 No. 3



Source: Phil Chadwick. Story on page 6.

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CMOS Bulletin SCMO

"at the service of its members / au service de ses membres"

Editor / Rédactrice: Sarah Knight
Director of Publications /
Directeur des publications: Douw Steyn

Canadian Meteorological and Oceanographic Society / Société canadienne de météorologie et d'océanographie

E-mail: bulletin@cmos.ca
Courriel: bulletin@scmo.ca

CMOS Office / Bureau de la SCMO

P.O. Box 3211, Station D
Ottawa, Ontario, Canada, K1P 6H7
Homepage: <http://www.cmos.ca>
Page d'accueil: <http://www.scmo.ca>

Gordon Griffith, Ing., P. Eng., FEC
Executive Director - Directeur général
Tel/Tél.: 613-990-0300
E-mail/Courriel: cmos@cmos.ca

Ms. Qing Liao
Office Manager - Chef de bureau
Tel/Tél.: 613-990-0196
E-mail/Courriel: accounts@cmos.ca

CMOS Accredited Consultant
Expert-Conseil accrédité de la SCMO

Douw G. Steyn

Air Pollution Meteorology
Boundary Layer & Meso-Scale Meteorology

4064 West 19th Avenue Vancouver,
British Columbia
V6S 1E3 Canada

Tel: 604-364-1266; Home: 604-222-1266
Email: dsteyn@eos.ubc

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

Le but de la SCMO est de promouvoir l'avancement de la météorologie et l'océanographie au Canada.

Words from the Incoming President

Tightening Up, Speaking Up, and Greening Up



Paul Kushner (left) with Ali Moridnejad at the 2017 CMOS Congress. Photo by Dan Weaver.

I'm honored and excited that I'll get to serve you, our membership, as CMOS President this year. As CMOS Vice President I have come to appreciate the Society's hard-working staff, its community of proactive volunteers across Canada, and its dedication at the local level. I've been impressed with how much time and effort the CMOS Centres devote to outreach, organization of seminar series, membership development, and other professional activities vital to our community.

But I want especially to call out those Centres serving as hosts of the annual CMOS Congress: Halifax (2018), Montreal (IUGG 2019), Ottawa (2020), and now Victoria (2021). Many of you would be amazed at the in-depth thought and organization required to take care of the myriad logistical details for local and scientific aspects. This year's Congress in Halifax featured superb advance planning and careful organization of joint activities with the MEOPAR Network.

So what does 2018-2019 hold in store for my term as CMOS President? Under the able leadership of Martin Taillefer (President, 2016-2017) and Wayne Richardson (President, 2017-2018), CMOS has completed a strategic planning review and modernization of its communication through the launch of the online open-access version of the CMOS Bulletin. I want to build on this momentum in three areas of stewardship:

1. Strengthening our financial position: As Marty and Wayne have pointed out, CMOS's annual deficit is draining our reserves and threatening the Society's financial viability. This year we took steps to address this, but our review of income and expenses has revealed other opportunities for savings and growth that we will work with Council, Centres, and you, the broader membership, to implement. I want us to be in a balanced budget position by 2021 and to return to regular surplus positions thereafter. Financial stewardship is a challenging but necessary part of ensuring our continued impact as a professional organization and learned society.

2. Promoting and enhancing our research and education mandate: This year I will focus on promotion of the Canadian atmosphere/ocean/climate science research enterprise. As part of this, the ad-hoc working group on Atmosphere-Related Research in Canadian Universities (ARRCU) became a CMOS Special Interest Group (SIG) at the Halifax Congress. In addition, a "Space" SIG on space-related activities is also in the works. I want to make sure these SIGs and our Science and Education committees have the people and resources they need to enhance our work in these areas.

3. Environmental stewardship and sustainability: Human society, all of us included, are causing rapid global warming and climate change through greenhouse gas pollution. The attendant impacts of climate change are impacting our daily lives, harming our planet's environment, and driving profound societal and political change. CMOS has a unique responsibility in Canada to communicate the scientific understanding of anthropogenic global warming, anthropogenic climate change, and its impacts. As a learned society with deep expertise in climate science, CMOS can play a constructive and vital role in the discussion and in policy development. As professionals, I believe we can play this role in full recognition of Canada's diverse economy and the political dimensions of the problem. So with a view to our unique role and responsibility, I am calling for a review of CMOS' own sustainability practice (carbon footprint evaluation, etc.). Let's make CMOS greener and do our part in working towards climate change solutions.

I will be in touch with you in future messages to expand on these themes and seek your input. Please get in touch with me anytime at the contact information below.

Sincerely,

Paul Kushner

CMOS President and Professor, Department of Physics, University of Toronto

Email: president@cmos.ca

Tel: 416-946-3683

Mot du président à venir

En 2018-2019 la SCMO se réorganise, prend la parole et passe au vert



Paul Kushner (left) with Ali Moridnejad at the 2017 CMOS Congress. Photo by Dan Weaver.

Je suis honoré et enthousiasmé de vous servir en tant que président de la SCMO cette année. Comme vice-président de notre organisme, j'ai pu constater le travail acharné du personnel de la Société et celui de ses bénévoles proactifs partout au Canada, ainsi que leur dévouement à l'échelle locale. J'ai été impressionné par le temps et les efforts que les centres de la SCMO consacrent à la sensibilisation, à l'organisation de séminaires, au recrutement de membres et à d'autres activités professionnelles essentielles à notre communauté.

Paul Kushner (sur la gauche) avec Ali Moridnejad, 2017 congrès de la SCMO. Photo par Dan Weaver.

Je remercie tout particulièrement les centres qui accueilleront prochainement le Congrès annuel de la SCMO : Halifax (2018), Montréal (UGGI 2019), Ottawa (2020) et maintenant Victoria (2021). Vous seriez étonnés de la réflexion approfondie et du travail que nécessite l'organisation de la myriade de détails logistiques touchant les aspects locaux et scientifiques de ces rencontres. Le congrès de cette année à Halifax a été l'objet d'une superbe planification et d'une organisation minutieuse d'activités conjointes avec le réseau MEOPAR.

Que me réserve la présidence 2018-2019 de la SCMO? Sous la direction compétente de Martin Taillefer (président, 2016-2017) et de Wayne Richardson (président, 2017-2018), la SCMO s'est dotée d'une planification stratégique, et a modernisé ses communications en lançant la version en ligne et à accès libre du Bulletin de la SCMO. Je souhaite maintenant tirer parti de cet élan selon trois volets :

1. Renforcer notre position financière : comme Marty et Wayne l'ont souligné, le déficit annuel de la SCMO réduit nos réserves et menace la viabilité financière de la Société. Cette année, nous avons pris des mesures pour régler le problème. De plus, notre examen des revenus et des dépenses a révélé d'autres possibilités d'économies et de croissance que nous nous efforcerons de mettre en œuvre avec l'aide du conseil d'administration, des centres et de l'ensemble des membres. Je veux que nous atteignons l'équilibre budgétaire d'ici 2021 et que nous nous retrouvions en situation d'excédent par la suite. La bonne gestion financière reste une tâche difficile mais nécessaire pour assurer notre impact continu en tant qu'organisation professionnelle et société savante.

2. Promouvoir et renforcer notre mandat en matière de recherche et d'éducation : cette année, je me concentrerai sur la promotion de l'entreprise canadienne de recherche scientifique sur l'atmosphère, les océans et le climat. En ce sens, le groupe de travail spécial sur la recherche reliée à l'atmosphère dans les universités canadiennes (ARRCU) devenu un groupe d'intérêts spéciaux (GIS) de la SCMO durant le Congrès d'Halifax. En outre, un groupe d'intérêts spéciaux traitant des activités liées à l'espace est également en cours de planification. Je veux m'assurer que ces GIS et nos comités des sciences et de l'éducation disposent du personnel et des ressources adéquates pour améliorer notre travail dans ces domaines.

3. Assurer une bonne gestion de l'environnement et la durabilité de nos activités : la société humaine (nous tous) provoque des changements climatiques et un réchauffement rapide de la planète par le rejet de gaz à effet de serre. L'incidence des changements climatiques se répercute sur notre quotidien, nuit à l'environnement de notre planète et entraîne de profonds changements sociétaux et politiques. Au Canada, il incombe particulièrement à la SCMO de communiquer sa compréhension scientifique du réchauffement planétaire et des changements climatiques anthropiques et de leurs impacts. En tant que société savante dotée d'une profonde expertise en climatologie, la SCMO se trouve idéalement placée pour apporter des informations constructives et vitales à la discussion et à l'élaboration des politiques. En tant que professionnels, nous pouvons jouer ce rôle en tenant pleinement compte de la diversité de l'économie canadienne et des dimensions politiques du problème. Étant donné nos responsabilités et notre mandat particuliers, je propose de passer en revue, par le filtre de la durabilité, les pratiques de la SCMO (évaluation de l'empreinte de carbone, etc.). Continuons de « verdier » la SCMO et efforçons-nous de trouver des solutions aux changements climatiques.

J'approfondirai ces thèmes dans les messages à venir et solliciterai vos commentaires. N'hésitez pas à communiquer avec moi en tout temps aux coordonnées ci-dessous.

Cordialement,

Paul Kushner

Président de la SCMO et Professeur, Département de physique, Université de Toronto
Email : president@cmos.ca; Tél. : 416 946-3683

Article: Eco-Artists

Eco-Artists: Reconnecting People to the Beauty of Nature

By Sarah Knight, CMOS Bulletin Editor, and Phil Chadwick, Artist and Meteorologist

I recently had the pleasure to chat with CMOS member Phil Chadwick at the CMOS congress in Halifax. Phil is a retired meteorologist and a prolific and well-known plein air artist, whose work is very much inspired by Canada's own Group of Seven. Through his active involvement in the art community with other plein air painters, Phil is observing the power of artists to re-engage a disconnected population with the beauty of nature. The following is an article based on our recent conversations.

– Note from the Editor, Sarah Knight



Plein air EcoArtists at the DRAW retreat. Photo shows Phil Chadwick painting the scene. Pictured below is one of his finished pieces of work from the retreat: Morning on Robinson Lake.

In early June, artist Aleta Karstad was recognized for her conservation efforts through art, as a recent recipient of the “Robert Bateman Award” from the Canadian Wildlife Federation (CWF). This award recognizes people who further the appreciation for Canada's wildlife and habitats through artistic expression. Aleta is the resident artist with BiotanB – a programme of the New Brunswick Museum, which invites biologists and artists to participate in an annual two-week-long biological survey. In addition to her 9-year residency with BiotanB, with support from the Canadian Parks and Wilderness Society (CPAWS) she helps to organize an artist retreat to the Dumoine River in Quebec, where artists who attend donate one painting to help raise funds for nature conservation.

Many artists draw inspiration from nature, with some so passionate about connecting with the world around them that they paint scenes *en plein*. Canvas on easel, paintbrush in hand, they stand with their feet on the ground and the sky above their heads, surrounded by the elements, as they capture the colours, feelings, and movement within the scene around them. People who create art in this way, through intense observation and connection to the precise moment that they find themselves in, are well placed to act as voice for landscapes that are under increasing pressures from human activity.

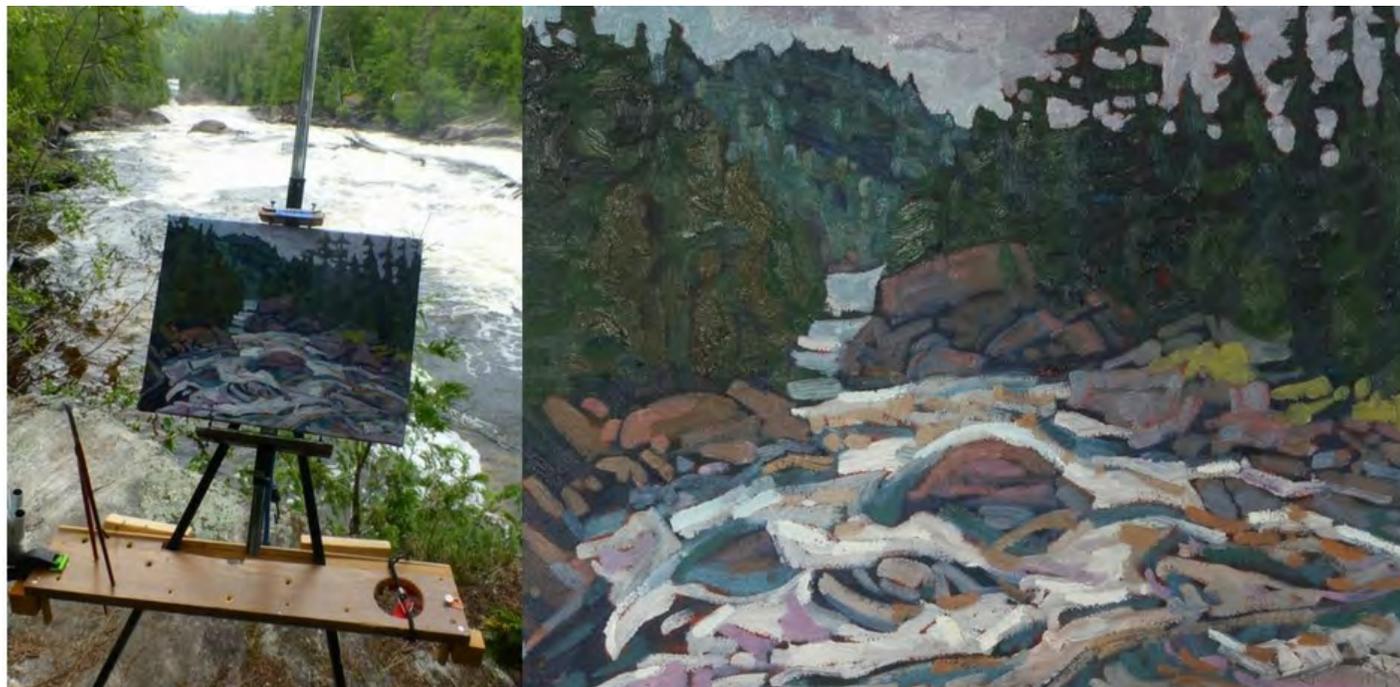
Phil “The Forecaster” Chadwick is one such *plein air* artist, who has had the opportunity to create alongside Aleta at the Dumoine River Art for Wilderness (DRAW) retreat. With his meteorological roots, connection to the land through life and art, and participation in nature art

retreats, Phil thinks that “EcoArt” is a trend gaining renewed momentum. Through art and creativity, messages about the inherent beauty and value of our environment, as well as our misuse and neglect of it, can be delivered in way that may allow for a deeper and more felt understanding of what is at risk if we continue along our current trajectory of over-consumption and environmental irresponsibility.

EcoArtists are not a new invention. AY Jackson and other members of the Group of Seven were responsible for creating and preserving Killarney from logging. Although Algonquin Provincial Park was created in 1893 before Tom Thomson painted there, his art and his story have branded the park. Artists documenting the beauty of wild Canada in an effort to preserve it for future generations continues today.

Article: Eco-Artists

Canada is on track to fail at every climate target our leaders signed on to. With a mission of preserving corridors for nature in this time of climate change, projects like DRAW and CPAWS are more important than ever as we continue to struggle as a nation to give the environment the priority attention it needs. Perhaps EcoArtists like AY Jackson, Robert Bateman, Aleta Karstad and our own Phil Chadwick can show us another way towards reconnecting with our environment, as they invite us all to pause in awe at the wonder of our natural world.



Pictured here is Phil Chadwick's "Morning on the Grand Chute", as a work in progress and the final painting completed as part of the DRAW retreat.



More about Phil and his work at:

- 1-phil-chadwick.pixels.com
- philtheforecaster.blogspot.ca
- philchadwickart.blogspot.ca
- gallerizt.com
- philtheforecaster.com/

Article: EON-ROSE

EON-ROSE: Integrating Climate Science and Earth Science

K.J.E., Boggs¹, P., Audet², D.W., Eaton³, M. Fayek⁴, J.T., Freymueller⁵, R.D., Hyndman⁶, T. James⁶, P.J., Kushner⁷, P. Myers⁸, M.G., Sideris³, P. Sullivan⁹, and M. Ulmi⁶

¹Mount Royal University, ²University of Ottawa, ³University of Calgary, ⁴University of Manitoba, ⁵University of Alaska Fairbanks, Director of EarthScope National Office, ⁶Geological Survey of Canada, NRCan, ⁷University of Toronto, President of CMOS, ⁸University of Alberta, past President of CMOS, ⁹University of Kansas

Across the globe, climate change, population growth, natural hazards and the need for long term sustainability of resource supply (including materials, energy and food) demand new approaches to Earth System Sciences.

EON-ROSE (Earth-System Observing Network – Réseau d'Observation du Système terrestreE) is an initiative representing one possible model for driving Earth System Science to support sustainable development for our planet.

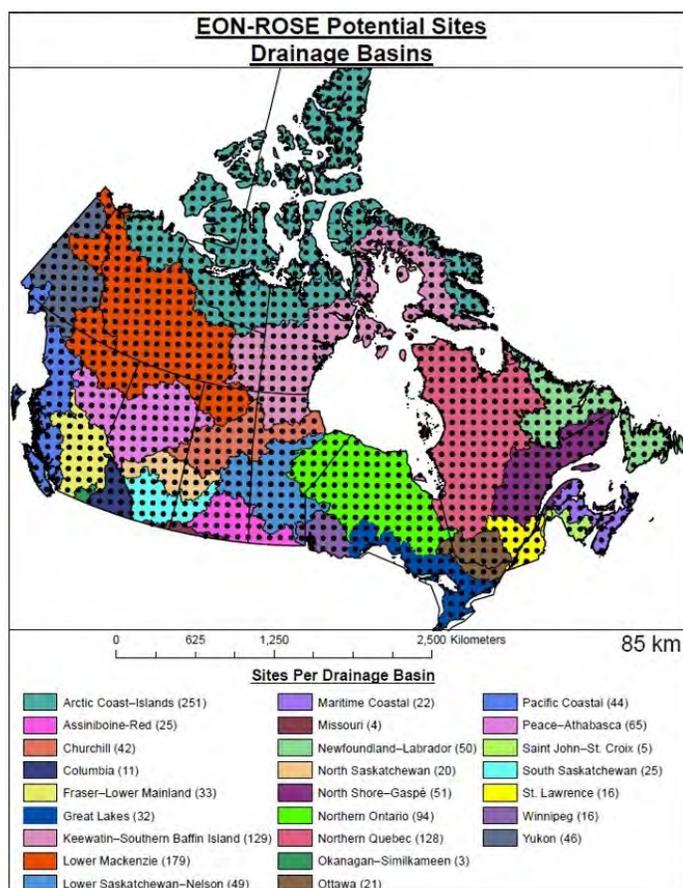


Figure 1. Proposed distribution of earth observation stations (black dots) for the pan-Canadian EON-ROSE network superimposed on major drainage basins (courtesy of T. James).

This pan-Canadian research collaboration, which aims to holistically examine Earth systems from the magnetosphere (the region of space that contains the earth's magnetic field) deep into the mantle (the layer between the earth's crust and its liquid molten core), is currently seeking additional collaborators. Groups with a focus on applications of EON-ROSE to space physics, oceanographic, atmospheric, hydrological, cryospheric and ecosystem sciences and numerical modeling including weather, Earth system, land-surface and watershed, are particularly welcome. The ultimate goal is to provide national real-time monitoring capabilities that can support improved tools for risk management, climate change adaptation strategies, ecosystem monitoring, earthquake and other disaster warning systems, and much more.

EON-ROSE seeks to be a combined effort of Canadian universities; federal, provincial and territorial government agencies; industry; and international collaborators. Its overarching vision is to deploy a network of telemetered observatories to monitor solid-Earth, environmental and atmospheric processes (Figure 1). The Canadian Cordillera Array (CCArray) is the initial phase of EON-ROSE, extending across the Cordillera from the Beaufort Sea to the U.S. border (Figure 2). A key element of the proposed EON-ROSE and CCArray initiatives involves integrating oceanography, atmospheric sciences, space physics, critical zone (extending from the vegetation canopy through the land surface to the underlying aquifer) science with the solid Earth geosciences.

At the first Symposium on EON-ROSE, which was held in Ottawa, February 21-23, 2018, the focus was on national applications related to (i) Solid Earth and Resources, (ii) Fluid Earth, Critical Zone and Environmental Monitoring, and (iii) Natural Hazards and Information Synthesis. This symposium started with a presentation by Daniel Lebel, the Director General of the Geological Survey of Canada, and an overview of the US EarthScope program by Jeff Freymueller, the Director of the EarthScope National Office in Fairbanks, Alaska (Figure 3). EarthScope deployed a coordinated west-to-east array of seismometers, geodetic, and other geophysical instruments across the continental US and into Alaska, enabling a wide range of work across the seismological and other geophysical sciences including imaging of discontinuities deep into the Earth's mantle. The scale (and scope!) of EarthScope attracted broad attention, for example being identified as the top science experiment of the decade by Popular Science in January 2011.



Figure 2. Proposed distribution of earth observation stations for CCArray at an 85km spacing. The red circles and triangles are the US TA Array stations in Alaska and northwestern Canada. The light blue circles are the ~165 proposed earth observation stations for CCArray. The various other colours and symbols are broadband seismometers from a variety of academic and federal government groups (courtesy of S. Azevedo, and R. Busby).

We note the engagement of the CMOS community in this initiative. During the “Fluid Earth, Critical Zone and Environmental Monitoring” session, Paul Kushner’s (University of Toronto and CMOS President) presentation entitled “How can EON-ROSE Integrate Climate Science and Earth Science” discussed the advantage of using carefully designed and integrated observing networks capturing atmosphere/ocean and geophysical could be coordinated through EON-ROSE. Paul Myers (University of Alberta; former CMOS President) provided slides (presented by Kushner) discussing measurements and modelling of ocean circulation and freshwater at high-latitudes. Pamela Sullivan (University of Kansas) reviewed opportunities for developing Critical Zone Observatories in Canada to enhance process understanding of the critical zone, which is the vegetation canopy-to-aquifer earth system zone that supports the terrestrial biosphere. In the subsequent discussion, Jeff Freymueller commented on how important it is to use geophysical networks to monitor environmental and geophysical processes. Calvin Klatt (Director General of the Canadian

Geodetic Survey (CGS)) presented on solid and fluid Earth applications by the CGS. Thomas James (NRCan) outlined how glacial isostatic adjustment (GIA) is critical in Canada for monitoring sea level change, seismic activity and hydrological changes across Canada. Gilbert Brunet (Director, Meteorological Research Division, Meteorological Service of Canada/Environment and Climate Change Canada) also provided slides outlining potential applications to numerical weather modeling for the EON-ROSE and CCArray initiatives.



Figure 3. Morning speakers from the EON-ROSE Symposium (February 21, 2018). From right to left: Daniel Lebel (Director General Geological Survey of Canada), Kristina Archibald (NSERC), Pascal Audet (University of Ottawa; EON-ROSE Executive), Dave Eaton (University of Calgary, EON-ROSE Director), Jeff Freymueller (University of Alaska Fairbanks, Director of EarthScope National Office), Katherine Boggs (Mount Royal University, EON-ROSE Executive).

Further details about these initiatives are available at www.ccaray.org and in Boggs et al. (2018). We welcome potential collaborators, questions or suggestions. Please contact any of the authors of this document and refer to the website – ccarray.org – for more information.

REFERENCE

Boggs, K.J.E., Aster, R.C., Audet, P., Brunet, G., Clowes, R.M., de Groot-Hedlin, C.D., Donovan, E., Eaton, D.W., Elliott, J., Freymueller, J.T., Hedlin, M.A.H., Hyndman, R.D., James, T., Kushner, P.J., Morell, K.D., Rowe, C.D., Schutt, D.L., Sideris, M.G., Ulmi, M., Vernon, F.L., and West, N., in press. **EON-ROSE and the Canadian Cordillera Array – Building Bridges to Span Earth System Science in Canada**. Geoscience Canada.

“The significant problems we face cannot be solved at the same level of thinking we were at when we created them”

-Albert Einstein

Article: Atmospheric Phenomena

Atmospheric Phenomena: from Green Flashes to Red Sprites

Jim Young, RWDI and Jim Young Atmospheric Consulting Services Inc.

Summer is here with its long warm days and clear nights, for a lot of the time. And what could be better than an atmospheric phenomenon or two to point out to your friends. You may become the hit of an evening beach party.

Phenomenon 1: Green Flash



Photo by Justin Branam. <http://www.justinunderwater.com>

The first, and the most fun of the atmospheric phenomena, is the green flash. This is a rare optical phenomenon that occurs shortly after sunset, or before sunrise, when a green spot is visible for an instant just above the sun. It is usually seen on an unobstructed horizon, such as over the ocean or a large lake.

Remember, even when the sun is setting, it is dangerous to look directly at the sun. While waiting to see the green flash at sunset, look away until only the very top of the sun is about to disappear below the horizon. It is only during this last instant that the green

flash will be visible. The green flash is seen only when it is absolutely clear all the way to the horizon – so don't expect to see it every night!

Why does the green flash happen? The basic cause of the colour is atmospheric dispersion. Light travels in straight lines in empty space but not when light interacts with matter. Refraction is what happens when you put a pencil in a glass of water at an angle. When you look at the pencil, it appears to be bent at the surface. This is the same for light in the atmosphere. The refraction of light by the air is larger for shorter wavelengths. At sunset the refractive delay of the sunset is usually a second or two longer for blue and violet than for red. So, the red image of the sun sets first, followed by the yellow, the green, the blue and finally the violet.

Someone may ask why we don't have a violet flash? This is because of atmospheric extinction. Air molecules and dust scatter the short wavelengths most strongly. This is why the sky is blue. The scattered blue light goes in all directions so we see it everywhere. At the horizon, the length of the path through the air is very long and the shortest wavelengths are almost completely removed. Usually there is just enough haze in the air that both violet and blue is completely removed, so that the last thing we see at sunset is the green.

So, watch the sunset with your friends – but be patient.

Phenomenon 2: Red Sprites and Blue Jets

Another set of summer atmospheric phenomena, red sprites and blue jets, are associated with storms. We live in a world with many different forces interacting. We have electricity, wind and atmospheric pressure. We have plasmas. And we have combinations of all of these which, when they go together in the right way, can create some very strange things in the atmosphere.

One of these strange combinations produces red sprites. Red sprites are weak but very large red flashes that occur in the sky above active thunderstorms. Many people have seen things that were probably red sprites over many years, but the first actual images were captured in 1989. Red sprites only last a few thousandths of a second. Luckily, they do not seem to occur alone but rather in clusters of three or more making them easier to see. And since this phenomenon is so new, there is still no official explanation for the cause of these flashes. The evidence points to their creation by the discharge of positive energy, left over from a cloud-to-ground lightning strike, in the decaying portions of storms.

Another combination of forces that is closely related to red sprites leads to blue jets. Blue jets are observed in the same kind of storm settings as red sprites. Blue jets are upward cones of blue light that appear to be coming out of the cloud above the thunder storm. Blue jets are not directly related to lightning as red sprites are thought to be. And blue jets occur much less frequently. Again, scientists are not sure what causes blue jets but think that they are related to the collection or discharge of energy from lightning storms. The bright blue colour is thought to be related to molecular nitrogen colliding with oxygen.

Article: Atmospheric Phenomena

Phenomenon 3: Crepuscular Rays



Photo by Johannes Plenio, source <http://www.pexels.com>

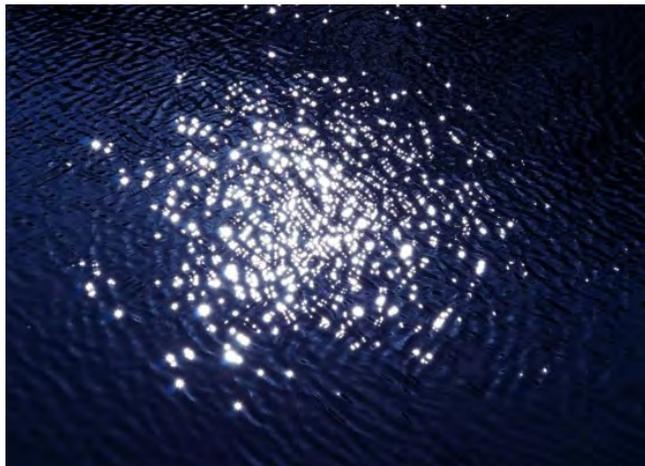
Crepuscular rays (also known as God Rays) are rays of sunlight that appear to be coming from a single point in the sky. They are often known by other names, like “sunbeams”. There is an ancient Greek belief that sunbeams can draw water into the sky and are known as “Sun Drawing Water”. This is perhaps an early explanation of evaporation. Nautically, these rays are called “Backstays of the Sun” after the name for the lines (stays) used to brace the mast of a sailing ship. There is also a Maori tale about one of their culture heroes (known for his exploits and trickery) restraining the sun with ropes to make the days last longer. They are also known as God Rays or Fingers of God because they often appear in the backgrounds

of religious pictures. And there are many other names associated with deities like Jesus Beams, Buddha’s Rays and Divine Light.

Jacob’s ladder is described in the Book of Genesis as a dream which Jacob has during his flight from his brother Esau. The early Christian Church describes it as the “ladder of ascent to God”. The Jewish Biblical philosopher Philo presents his interpretation of the ladder as souls ascending from bodies or the ups and downs of life or the continually changing affairs of humankind. The Muslim scholars see Jacob’s ladder as representing the essence of Islam, which emphasizes following “the straight path”. Our modern culture often references Jacob’s ladder – a 1980s song by Rush, a 2002 song by Chumbawamba and a 2011 song by Mark Lanegan. It is also featured in the video game RAGE by id Software.

There are three basic forms of crepuscular rays – rays coming through holes in low clouds (also known as Jacob’s ladder or Stairway to Heaven), beams of light diverging upward from behind a cloud, and pale pink or red rays that seem to come from below the horizon. They are commonly seen near sunrise or sunset and are associated with tall clouds or mountains. But they can also be seen inside churches and cathedrals with the rays shining down from high windows. Crepuscular rays are usually red or yellow in appearance caused by the scattering of blue and green components by particles in the air.

Phenomenon 4: Sun Glitter and Sylvanshine



Sun glitter is the bright, sparkling light of sunlight reflecting off water waves. Even a ripple from a thrown pebble can create a momentary glitter. Sunlight reflects from the smooth surfaces of the water. A rippled or wavy surface still has locally smooth parts. A wave will reflect the sun at a different angle at each point on the surface of the wave. If the viewer is in the right location, he/she may see many small images of the sun from the rippled surface. The exact pattern seen by the viewer depends on his/her location and the colour and length of time the glitter can be seen depends on the altitude of the sun. The lower the sun is in the sky, the redder and longer the glitter. Sun glitter can be as damaging as looking directly into the sun, so observers should be cautious when looking at it.

Sylvanshine is a summer nighttime optical phenomenon. It happens when dew covers the waxy surface of certain tree species. The dew forms beads because of the waxy surface and the light from your headlights is focused by these beads of water (acting like lenses) to a bright spot on the surface of the leaf. When this bright light is reflected back toward your car, it looks like snow-cover on the tree on a summer evening.

Article: Atmospheric Phenomena

Phenomenon 5: Fata Morgana

Fata Morgana is a type of atmospheric phenomenon that is also the name of a psychedelic alternative rock band, apparently one of the best that you can hear! Or it could be the name of an art show in New York about which Yoko Ono said “I think all women are witches, in the sense that a witch is a magical being”. Or it could be part of the war in Pakistan where FATA stands for the Federally Administered Tribal Areas. But I want to tell you about the Latin Goddess of Fate (fata).



Photo by Gerd A.T. Mueller – Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=312887>

Morgan le Fay was the fairy shapeshifting half-sister of King Arthur and her name in Italian is fata morgana. A fata morgana today is an optical phenomenon which is caused by a temperature inversion. It is usually seen in the morning after a cold night (caused by the radiation of the earth’s heat into space during a clear night). The fata morgana is a form of mirage that makes islands, or ships or cities appear elongated and elevated like fairy tale castles. In this case the object being seen is visible even though it is beyond the horizon. It was long believed that this mirage was caused by Morgan le Fay’s witchcraft. But really, it happens in calm weather when warm air lies on top of cold dense air near the surface (like over the lake). The surface between the warm layer and the cold layer acts like a refracting lens, producing an upside-down image and the distant direct image seems to hover over this lens.

The mention of this phenomenon occurred in 1818 when it was observed over the Strait of Messina, between Sicily and Calabria. This type of mirage is called a superior mirage and it is different from the inferior mirages that produce what looks like water on the road ahead. The effect is like putting a mirror just above the horizon and the object seems to be doubled – one image above and one below the mirror identical with the first.

Phenomenon 6: Mirages

Summer is the time to watch and wonder about mirages. If you like sky watching, then mirages can provide a whole new perspective for you. For years, you may have been watching superior (over the horizon) mirages (like sunsets) without even realizing what you were seeing or not seeing!

Just think of the interesting stories you could tell your children about seeing cars driving down the streets of a city that couldn’t possibly have been seen across the lake! An editor acquaintance thought himself going crazy and asked me about it. And how many UFO’s may have been seen caused by car headlights located below the horizon that may have been magnified by very strong superior mirage conditions seeming to move rapidly though the sky and just disappear as the car turned a corner? That UFO might really have been a VBH (Volkswagen Beetle Headlight)!

Now that you know what to look for, take the time to enjoy the atmosphere, especially at night when the conditions are right for mirage formation, and you may witness some amazing things. And you’ll get a feel for the things our ancestors created legends about!

About Jim



Jim has over 40 years of experience in weather and air quality studies and continues to provide services in these areas at RWDI consulting engineers and scientists He welcomes feedback on his blogs as well as requests and suggestions for future topics.



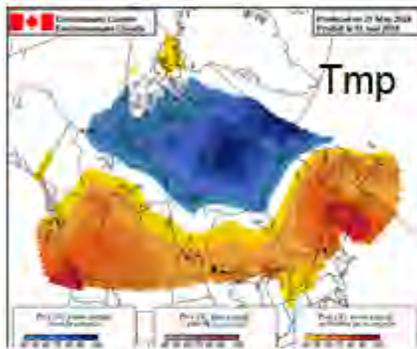
Seasonal Outlook for the summer 2018 (JJA) based on CanSIPS forecast issued on the 31st May 2018

M. Markovic, B. Merryfield and K. Gauthier

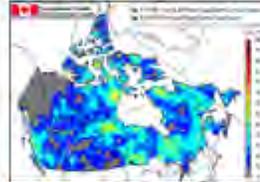


Above normal summer warmth is expected across southern Canada. The highest probabilities (70% and +) for above normal are over the southwestern BC and the Maritimes. Over AB, western SK and western QC there is also high probability of more than 60% for an above normal summer. Northern parts of Canada have a very high probability for below normal JJA reaching more than 80% chance over the Hudson Bay region.

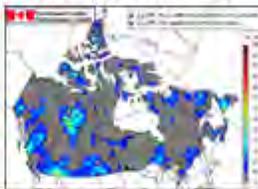
Below normal precipitation is expected over the western and central Prairies. The highest probabilities of ~60% or more are expected over southern AB. Central AB and southwestern SK also have a probability of ~50% for below normal precipitation. Central and western BC and most parts of the Maritimes have a ~40% chance for below normal JJA. Most other parts of Canada have equal chances for above/near/below normal precipitation.



Historical Skill, Tmp



Historical Skill, Pcp

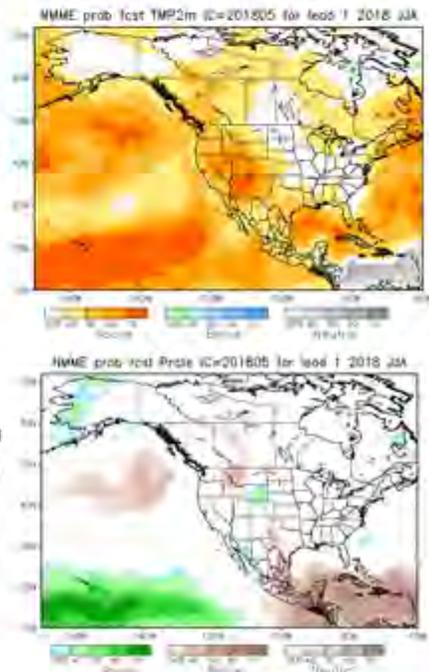


CanSIPS JJA18 forecasted Indices:
Nino3.4 = +0.5 (weak El Nino!!)
PDO = -0.6 (slightly negative, a lingering effect of last winter's weak La Nina)

What will influence the next season?
ECCC predicts weak El Nino to develop in JJA18 and to persist in the following autumn. According to the longer lead seasonal forecast issued by IRI, there is a probability of slightly less than 70% that the neutral conditions will prevail this summer.
Both NAO and PNA indices will likely stay negative until mid-June, (according to the CPC) after which the skill is low.
There is a high agreement between the forecasting centers about the below normal precipitation probabilities this summer in the western Canada and western Prairies. This precipitation signal is strongly correlated with increased probabilities for above normal temperatures over the same locations.
Therefore, we suggest a drought watch and a forest fire increased awareness in these regions for the summer 2018.

Other Centers: Temperature: There is a difference between CanSIPS and a longer lead (1 month) forecast from NMME, especially over the Northern Canada where NMME is suggesting above normal temperature probabilities. Over the central Canadian Prairies, NMME is showing near normal or equal chances for temperature this summer. For other parts of Canada, NMME forecast is in accord with the CanSIPS showing a probabilities for above normal summer.

Precipitation: According to the NMME (on the bottom figure) there is >40% probability of below normal precipitation over southern and central parts of AB. This also in accord with the precipitation forecast given by the International Research Institute. Elsewhere in Canada, NMME is suggesting equal chances for the three precipitation categories.



MAM18 Obs. Categories



MAM18 CanSIPS Catgs.



Verification MAM 2018. Not a successful forecast, especially in the Central and Eastern Canada, Maritimes and coastal BC.

*Ref: <http://www.cpc.ncep.noaa.gov/products/NMME/>



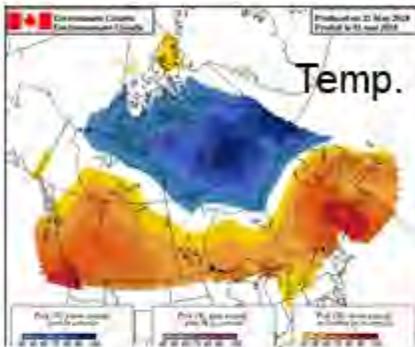
Prévision saisonnière pour l'été 2018 (JJA) par le Système SPISCan, produite le 31 mai 2018

M. Markovic, B. Merryfield and K. Gauthier

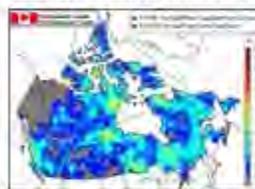


Un été plus chaud que la normale est anticipé pour tout le sud du Canada. Les probabilités les plus élevées (70% et +) au-dessus de la normale se retrouvent au sud ouest de BC et sur les Maritimes. Pour AB, l'ouest de SK et l'ouest du QC, il y a une probabilité de plus de 60% d'un été au dessus de la normale. Le nord du Canada a une très grande probabilité de température sous la normale pour JJA allant à plus que 80% pour la région de la baie d'Hudson.

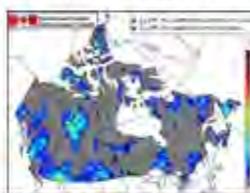
Précipitation sous la normale sont attendues pour l'ouest du Canada et les prairies centrales. Les plus hautes probabilités de ~60% ou plus sont anticipé pour le sud de l'AB. Le centre le l'AB et le sud du SK ont aussi une probabilité de ~50% de préc. sous la normale. Le centre et l'ouest de BC ainsi que la plus part des Maritimes ont des chances de ~40% sous la normale pour JJA. Les autres régions ont des chances égales pour des préc. au-dessus/près/sous la normale.



Habilitété historique, Temp.



Habilitété historique, Préc.



Les indices climatiques prévus par le SPISCan, JJA18:
Nino3.4 = +0.5 (faible El Nino)
PDO = -0.6 (légèrement négatif, un effet du faible La Nina de l'hiver dernier)

Qu'est-ce qui influencera le climat la saison prochaine?

EC3C prévoit qu'un faible El Nino se développera en JJA18 et persistera à l'automne prochain. Selon la prévision à longue échéance du IRI, il y a une probabilité de presque 70% que la condition neutre persiste cet été.

Les indices **NAO et PNA** vont probablement rester négatif jusqu'à la mi-juin, (selon le CPC) après quoi l'habileté à prévoir est basse.

Tous les centres de prévisions se mettent d'accord pour prévoir des précipitations sous la normales pour l'ouest du Canada et l'ouest des prairies cet été. Ce signal de précipitation est fortement corrélé avec les hautes probabilités de températures au-dessus la normales pour ces mêmes régions.

C'est pourquoi, nous suggérons de rester alerte pour de la sécheresse et des feux de forêts dans ces régions pour l'été 2018.

MAM18 Obs. Catégories



MAM18 SPISCan Catgs.

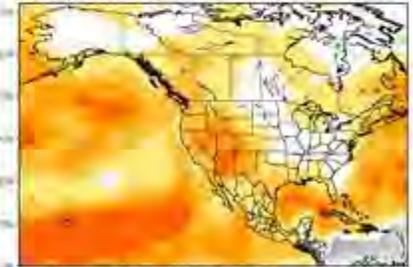


Vérification MAM 2018. Pas une bonne prévision, spécifiquement dans le centre et l'est du Canada, les Maritimes et la côte de BC.

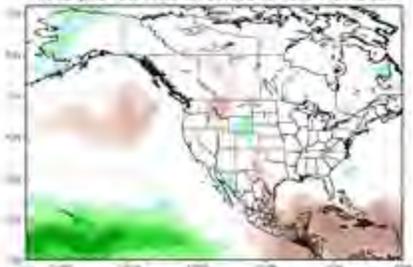
Les autres centres: Température: Il y a une différence entre SPISCan et la prévision à longue échéance (1 mois) du NMME, spécifiquement pour le nord du Canada, où NMME prévoit des probabilités températures au-dessus de la normales. Pour les prairies canadiennes centrales, NMME prévoit des probabilités près de la normale ou de chances égales pour la températures cet été. Pour le reste du Canada, NMME et SPISCan montrent tout deux des probabilités de température au-dessus de la normale cet été.

Précipitation: Selon le NMME (figure du bas) il y a une probabilité >40% de précipitation sous la normale pour le sud et le centre de l'AB. Cette prévision est en accord avec la prévision de précipitation du International Research Institute. Partout ailleurs au Canada, NMME prévoit des chances égales de précipitations pour les trois catégories.

NMME prob fcst TMP2m IC=201805 for lead 1 2018 JJA



NMME prob fcst Precp IC=201805 for lead 1 2018 JJA



*Ref: <http://www.cpc.ncep.noaa.gov/products/NMME/>

In case you missed it...

From CMOS Bulletin Volume 46, Number 2:

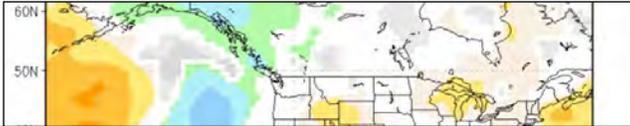


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by Katie Hayes and Peter Berry

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by John Gilbert



[Report: Seasonal Outlook for the Spring 2018 / Prévission Saisonnière pour le Printemps 2018](#)

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Richard Leduc, Ph.D.
Meteorologist

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4071, rue des Villas
Quebec, QC, Canada G1Y 1V5
418-657-4054 • 418-930-4054
rleduc@airmetscience.com

www.airmetscience.com

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der scientia

Richard Leduc, Ph.D.
Météorologiste

Recherche
et services conseils
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4071, rue des Villas
Québec, QC, Canada G1Y 1V5
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CMOS News: New CMOS Executive Committee

Toronto Takes the Torch: Meet Your New CMOS Executive Committee Volunteers

CMOS has an extremely active volunteer base in the 14 centres across the country. Every three years members of the CMOS Executive Committee change centres. 2018 marks the first year with the Executive Committee under the leadership of members from the Toronto Centre, Paul Kushner, Kimberly Strong, Amir Shabbar, Fred Conway and Alanna MacKenzie. They take over roles that were successfully occupied by members of the Ottawa Centre. I want to extend a heartfelt thank you to Fiona Robertson (Corresponding Secretary), Marie-France Gauthier (Recording Secretary), Boumy Sayavong (Treasurer), Wayne Richardson (Past-President), Martin Taillefer (Past-President) and Martha Anderson (Past-President) for their tremendous work ethic and dedication to the society.

Gordon Griffith, P.Eng., ing., FEC
CMOS Executive Director / Directeur général, SCMO

PAUL KUSHNER, PRESIDENT



Paul has been at the Department of Physics at the University of Toronto since 2004. He is the principal investigator of the Canadian Sea Ice and Snow Evolution Network (CanSISE, www.cansise.ca). Before joining the faculty at the University of Toronto, he was a research scientist in the U.S. National Oceanographic and Atmospheric Administration in Princeton NJ, and a lecturer in the Dept. of Geosciences at Princeton University.

Paul sees the Society's committed and hard-working community of proactive volunteers across Canada. As a non-profit society CMOS could not exist, and thrive, without the dedication of so many volunteers, and he feels it is a great privilege to work alongside them.

KIMBERLY STRONG, VICE-PRESIDENT



Kimberly Strong has been a Physics Professor at the University of Toronto since 1996. She has just completed a five-year term as Director of the School of the Environment, and is the incoming Chair of the Physics Department. She is the Deputy PI and a Theme Leader for the Probing the Atmosphere of the High Arctic network. She is also the founder of the University of Toronto Atmospheric Observatory, a Co-I on the ACE and Odin satellite missions, and recently completed six years as Director of the NSERC CREATE Training Program in Arctic Atmospheric Science.

Kim has been a CMOS Member for 22 years, was a former Chair of the Prizes and Awards Committee and a former Councillor-at-large, and has also been involved in CMOS through its congresses and publications. She sees CMOS as being vital to the promotion of atmospheric and oceanic science in Canada, and is pleased to have the opportunity to contribute to this effort as a new member of the Executive.

CMOS News: New CMOS Executive Committee

ALANNA MACKENZIE, CORRESPONDING SECRETARY



Alanna has worked in municipal government for over 6 years and currently spends her working hours at the City of Vaughan in the Policy Planning and Environmental Sustainability Department, helping to create an environmentally sustainable and climate resilient community. She graduated from the University of Guelph with a Bachelor of Science in Environmental Science and a major in Earth and Atmospheric Science. Alanna also holds a Certificate of Meteorology from York University.

Alanna really enjoyed her experience volunteering for the 2017 Toronto Congress as the Social Program Lead so she decided to give the Executive Committee a try. Volunteering for CMOS allows her to stay connected to the world of meteorology and meet like-minded individuals. She is always on the search for opportunities for learning and development.

FRED CONWAY, RECORDING SECRETARY



Fred retired from Environment Canada almost ten years ago, but has maintained his interest in meteorology and CMOS.

He was glad to offer his services to the incoming Toronto executive of CMOS, in the same role he filled with an earlier Toronto executive in the 1990's. It's a pleasure for him to see old familiar faces and to meet new people interested in such an interesting and important field, which sadly continues to be under pressure from so many directions.

AMIR SHABBAR, TREASURER



A graduate of the University of Toronto in meteorology, Amir has carried out research in climate variability and prediction for nearly 30 years at Environment and Climate Change Canada. Amir's specialty is in large-scale atmospheric and oceanic teleconnection as they affect the Canadian climate. Amir's research investigation of the El Nino-Southern Oscillation phenomenon forms the basis of the understanding of the impact of ENSO on the Canadian climate. He was awarded the 2006 Andrew Thomson prize in applied meteorology by the Canadian Meteorological and Oceanographic Society.

By volunteering for CMOS, Amir aims to promote meteorology in Canada, especially among the university and high school students.

CMOS News: WMO Prize for Gordon McBean

WMO Presents Top Prize to CMOS' Gordon McBean

The World Meteorological Organization has presented its top award to Gordon McBean of Canada for his outstanding work in meteorology and climatology and his leadership as a scientific researcher. Mr McBean is currently President of the International Council for Science. The IMO Prize is the equivalent of the Nobel prize for meteorology. Established in 1955 and named after the predecessor of the WMO, the International Meteorological Organization (IMO), it is awarded every year by WMO Executive Council.



Gordon McBean (centre) pictured receiving his prize with Petteri Taalas (on left), Secretary General of the WMO, and David Grimes (on right), president of the WMO.

“Doctor McBean is an outstanding scientist and most deserving of our highest award. For more than fifty years, he has been engaged in meteorology, atmospheric and climate sciences, and climate change,” said WMO President David Grimes. “From his early career as a weather forecaster and research scientist with Transport Canada and Environment Canada, Dr. McBean has built on his accomplishments as a researcher, with breakthrough discoveries in the atmospheric boundary layer and storms over the oceans; as a leader in international and national science and committees; and as an innovator in cross-disciplinary science in disaster risk reduction and climate change adaptation, and associated societal impacts,” said Mr Grimes.

On the occasion of the award ceremony, Mr McBean delivered a scientific lecture on Integrated Environmental Prediction – Addressing 2030 Global Agenda. Canada’s Ambassador and Permanent Representative to the United Nations, Rosemary McCarney, attended. He outlined how science and technology supports sustainable development, disaster risk reduction and

climate change mitigation and adaptation. The number of disasters due to floods and storms is going up and climate change is a key factor. Given that hazards are increasingly interconnected, there needs to be an integrated approach embracing physical and social scientists, engineers, economists, health experts and many others, he said.

“We need integrated assessments and information to address the combined risk and reduce the impacts of these events,” he said. “We need seamless scientific modelling and prediction across all time scales, from now to decadal and century long climate scales, and for all issues,” Mr McBean said in his lecture.

“Extending the weather forecasts to forecasts of weather, flood, ocean and ice, smog and other forecastable issues and extending the longer time scale prediction to climate, oceans, cryosphere, land ecosystems and the full environment uses shared resources and has mutual benefits,” he said.

Mr McBean led global efforts to raise awareness about climate change impacts. He was chair of the World Climate Research Programme from 1988-1994. He played a key role in the development of the Intergovernmental Panel in Climate Change (IPCC) and was awarded the Nobel Peace Prize as an IPCC contributor in 1997. As Assistant Deputy Minister at Environment Canada, he was an elected Member of WMO Executive Council from 1994-2000. During his time as the head of Canada’s meteorological service, he promoted his vision of moving from weather, water and climate forecasts to environmental predictions. After the Indian Ocean tsunami tragedy in 2004, he chaired the scoping and planning committee which led to the establishment of the Integrated Research on Disaster Risk (IRDR) Program. More recently, his work has been cross-disciplinary, addressing the challenges of integrated research on disaster risk weather and climate and the relationships between climate extremes and housing rights in communities in Africa. He has also completed a 5-year study of coastal cities at risk due to weather, climate and flooding – with teams in Bangkok, Manila, Lagos and Vancouver – in order to develop urban resilience models. His firm belief in the importance of cross-disciplinary approaches and integration of the social and physical sciences is demonstrated by his role in the merging of the International Council for Science (ICSU) and the International Social Sciences Council, which will become the new International Science Council on 4 July 2018. He has published in 72 peer-reviewed journals and contributed to 42 books and 65 other publications.

Mr McBean said an integrated, multi-disciplinary approaches would enable society to “see the future and address the 2030 Global Agenda as an issue of intergenerational and international equity and ethics. We need to do this for our children and grandchildren, around the world. Symbolically we need to build on science for their benefits, And as scientists we need to work together to support our world. Let’s move forward together and stop just reading proclamations in front of the advancing tsunami,” said Mr McBean.

Article source: <https://public.wmo.int/en/media/press-release/wmo-presents-top-scientific-prize-gordon-mcbean-of-canada>

CMOS News: CMOS Congress

Highlights from the 52nd Annual CMOS Congress in Halifax

Heather Desserud, CMOS 2018 Local Organizing Committee, Halifax

Earlier this month, the 52nd Annual Congress took place in the beautiful seaside city of Halifax, Nova Scotia. Attendees from across Canada and around the world gathered in the new downtown Convention Centre during June 10-14, participating in scientific programming and enjoying East Coast hospitality.

Each year, the Congress brings together academic researchers, professionals and partners from across Canada to share research, best practices and discuss scientific advances under a different theme and in a different city. This year's Congress was held in conjunction with the Marine Environmental Observation, Prediction and Response Network (MEOPAR), a Network of Centres of Excellence hosted in Halifax that funds research, trains marine professionals, and connects with partners and end-users in the area of marine risk and resilience. The partnership arose through the alignment of organization's mandate with this year's Congress theme of marine risks and impacts.

While June 11 was the opening day of Congress programming, early birds were rewarded the prior evening with Celtic music, Nova Scotian beer and wine, and local delicacies like donairs and oysters at the East Coast Icebreaker. Hundreds of delegates took the opportunity to visit the exhibitors' booths and visit with new acquaintances and old friends. Earlier in the day, participants attended the GOES-R Weather Satellites workshop, a student pitch talk and meet-and-greet, or explored the streets of Halifax before the Congress was underway in earnest.

The Congress ceremonies opened with a traditional prayer and drum circle led by Debbie Eisan, an elder at the Mi'kmaw Friendship Centre in Halifax. Attending dignitaries included CMOS President Wayne Richardson; David Grimes, Assistant Deputy Minister and head of Environment Canada's Meteorological Service; Bill Horne, MLA for Waverley-Fall River-Beaver Bank and Ministerial Assistant to the Minister of Natural Resources (Forestry); Dr. Alain Vézina, Regional Director of Science, Maritimes Region, Fisheries and Oceans Canada; and Wayne Mason, Deputy Mayor of the Halifax Regional Municipality.

The opening ceremonies set the scenes for a week that incorporated a focus on traditional indigenous knowledge along with scientific research and workshops. Organizers and attendees alike highlighted the indigenous focus and strong youth presence as key elements that made this year's Congress particularly memorable.

Eriel Tchekwie Deranger, Executive Director of Indigenous Climate Action, delivered one of the week's plenary talks and chaired an indigenous knowledge panel, and sessions throughout the week incorporated indigenous relations, outreach and knowledge in their subject matter and presenters. Ms. Deranger spoke eloquently on the rights of indigenous communities, highlighting the importance of speaking with First Nations early on, and listening to their knowledge and perspectives. Incoming president Paul Kushner picked up on the theme, emphasizing the need for sustainability as a model for CMOS.

Kushner was pleased to see the energetic and engaged youth contingent participating throughout the week on panels, as volunteers, and in social activities, including a student boat cruise, an employer tour and networking event, and an all-day science communication workshop. "We have a chance as an organization to address the



Left: The Fine Tuners – musical entertainment at the Icebreaker and the banquet.

Right: Debbie Eisan and colleagues from the Mi'kmaw Friendship Centre – Honour Song and drumming at the opening ceremony.

CMOS News: CMOS Congress

issues of the day—that’s what motivates young people, and that’s what will help us to keep CMOS relevant in the years to come,” Kushner said.

Each year Congress includes a public lecture, encouraging the general public to learn more about an area of study connected with CMOS. This year’s topic was the North Atlantic Right Whale crisis afflicting Canada’s eastern shores, delivered by Dalhousie University’s Dr. Chris Taggart. Presented at Halifax’s downtown public library branch to a full house, the lecture explained the difficulties in tracking right whales, the technological advances that have enabled new discoveries in right whale behaviour, and the manmade hazards that are killing an already critically endangered species.



Left: Patterson Luncheon – David Grimes presenting the Patterson medal to Bill Appleby.

Centre: Eriel Deranger’s plenary presentation on climate change and indigenous communities.

Right: Changing of the guard – CMOS Past President Wayne Richardson presents presidential medal to Incoming CMOS President Paul Kushner.

The Patterson-Parsons luncheon and the Wednesday evening banquet were, as usual, can’t-miss events. At the luncheon on Tuesday, Dr. William Appleby (Patterson Medal) and Dr. Andrew Trites (Parsons Medal) were recognized by their peers for their important work. Hundreds of lobsters (and a few chicken dinners) were accompanied by rollicking Celtic tunes from Nova Scotian musicians “The Fine Tuners,” as guests celebrated deserving award recipients and commemorated CMOS members who had passed away in the preceding year.

Other notable events throughout the week included a robust list of well-attended plenary talks, enthusiastic panels and town halls, two busy and lively poster sessions, the exhibitors’ hall, and joint programming with MEOPAR’s Annual Scientific Meeting on the last day of the Congress.

Local arrangements committee chair Dave Wartman summed up the week: “The goal of CMOS is to provide an opportunity that’s open, inviting, and safe for people to learn, express their opinions, and share their knowledge. We worked hard to provide that, especially for young people, and to share something of Halifax in the process.”



Left: An interested audience at the 2018 Public Lecture by Dr Chris Taggart on the North Atlantic Right Whale Crisis.

Right: One of the poster sessions, with lots of student engagement.

Please go to: <http://cmosarchives.ca/CongressPhotos/collage2018congress.html> to see more photos from the Congress. You may see yourself or your friends and colleagues there, and we need identification for the “?” which can be found among the names. Please let: archives@cmos.ca know if you recognize anyone.

CMOS News: CMOS Congress

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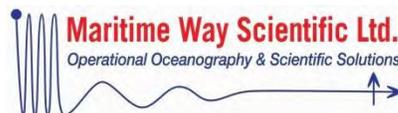
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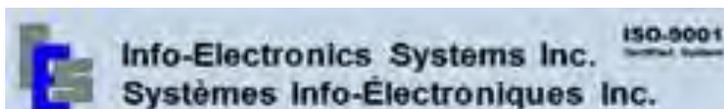
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- (2017-4) *Minding the Weather: How Expert Forecasters Think*, 2017. By Robert R. Hoffman, Daphne S. LaDue, H. Michael Mogil, Paul J. Roebber, and Gregory Trafton, The MIT Press, ISBN 978-0-262-03606-1, Hardcover, 469 pages, \$66.69
- (2017-5) *Risk Modelling for Hazards and Disasters*, 2017. By Gero Michel, Elsevier, ISBN 9780128040713, paperback, 338 pages, US\$100.00
- (2017-6) *Introduction to Satellite Remote Sensing; Atmosphere, Ocean and Land Applications*, 2017. By William Emery and Adriano Camps, Elsevier, ISBN 9780128092545, 860 pages, US\$130.00
- (2017-7) *Remote Sensing of Aerosols, Clouds and Precipitation*, 2017. By Tanvir Islam, Yongxiang Hu, Alexander Kokhanovsky and Jun Wang, Elsevier, ISBN 9780128104378, 364 pages, US\$120.00
- (2017-8) *Mixed-Phase Clouds: Observations and Modeling*, 2017. By Constantin Andronache, Elsevier, ISBN 9780128105498, 300 pages, US\$89.95
- (2018-1) *Synoptic Analysis and Forecasting, An Introductory Toolkit*, 2017. By Shawn Milrad, Elsevier, ISBN 9780128092477, 246 pages, US\$125.00
- (2018-2) *Ice Caves*, 2017. Edited by Aurel Persoiu, Elsevier, ISBN 9780128117392, 752 pages, \$225.00
- (2018-3) *Sea Ice Analysis and Forecasting: Towards an Increased Reliance on Automated Prediction Systems*, 2017. Edited by Tom Carrieres, Mark Buehner, Jean-François Lemieux and Leif Toudal Pedersen, Cambridge University Press, ISBN 9781108417426, 236 pages, \$143.95
- (2018-4) *Rainbows: Nature and Culture*, 2018. By Daniel MacCannell, The University of Chicago Press and Reaktion Books Ltd, ISBN 9781780239200, 208 pages, US\$24.95
- (2018-5) *Verner Suomi: The Life and Work of the Founder of Satellite Meteorology*, 2018. By John M. Lewis, The University of Chicago Press and the American Meteorological Society, ISBN 9781944970222, paperback, 168 pages, US\$30.00.
- (2018-6) *Ice: Nature and Culture*, 2018. By Klaus Dodds, The University of Chicago Press and Reaktion Books Ltd, ISBN 9781780239057, paperback, 224 pages, US\$24.95

***You review it, yours to keep!**

CMOS Seeks Social Media Volunteer

The Society is seeking a volunteer to support the development and management of our various social media outlets. At the moment we are vastly underusing these resources, so there is much opportunity here to really have an impact on how the messages of our Society and its members reach the world.

What is expected? Whatever you can give! We would welcome fresh ideas, and whatever level of time and energy you can dedicate to this task. The minimum expectation is to agree to manage our Twitter feed, which means at the moment posting a tweet at the request of one of our executive or council members, just a few times a month.

Who can apply? Ideally you are a CMOS member, or would like to be, with an interest in, and knowledge of, some area related to CMOS' activities (Canadian climate, ocean, and weather science).

What's in it for you? CMOS is Canada's non-profit umbrella organization for researchers and professionals working in the fields of oceanography, climatology, and meteorology. With almost 1000 members from across the academic, government and industry sectors, you will have access to a great network of knowledge and expertise. Our Society has been around for more than half a century, and over the past few years we have really been looking at how we can have an even greater positive impact on our changing planet. So if you are passionate about supporting positive environmental change, this is the place for you!

How to apply? Contact the Executive Director, Gordon Griffith - exec-dir@cmos.ca

CMOS 2017 Annual Review now available on the [CMOS website](#)

Other News

[Call for nominations of experts for the IPCC Task Group on Data Support for Climate Change Assessments \(TG-Data\)](#)



This is a call for nominations of Canadian experts to serve on the Intergovernmental Panel on Climate Change (IPCC) [Task Group on Data Support for Climate Change Assessments \(TG-Data\)](#). Nominations are being solicited for experts to serve as TG-Data Co-Chairs as well as members of the Task Group.

The purpose of TG-Data is to facilitate the availability and use of climate change related data and scenarios in support of the work programme of the IPCC, and to provide curation, transparency, traceability and stability of data and scenarios related to the reports of the IPCC.

At the 47th Session of the IPCC (March 2018), the IPCC re-named the Task Group on Data and Scenario Support for Impact and Climate Analysis (TGICA) to the Task Group on Data Support for Climate Change Assessments (TG-Data), and adopted new Terms of Reference (TORs) for the TG-Data and guidance for the IPCC Data Distribution Centre (DDC).

Application Instructions: Please submit the nomination form and a Curriculum Vitae to the IPCC Secretariat for Canada (ec.giec-ipcc.ec@canada.ca) by July 17, 2018. Members of the TG-Data will be selected by the IPCC Bureau and will be notified directly by the IPCC.

Please do not hesitate to contact the IPCC Secretariat for Canada if you have any questions.

Jaclyn Paterson

IPCC Secretariat for Canada
Science & Technology Branch
Environment and Climate Change Canada
Government of Canada
ec.giec-ipcc.ec@canada.ca

A promotional banner for CatIQ CONNECT. The background is a dark blue sky with lightning bolts over a city skyline at night. The text is white and yellow. In the top left, it says "\$100 discount for CMOS members!". The main logo is "CatIQ™ CONNECT" with "CatIQ" in a stylized font and "CONNECT" in a bold, sans-serif font. To the right of the logo is the website "www.catiq.com/connect". Below the logo, a grey banner contains the text "CatIQ's 4th Annual Catastrophe Conference" and "New name, same great event!". At the bottom, it says "SAVE THE DATE", "February 4-6, 2019", and "Metro Toronto Convention Centre".

Other News

[Polar Knowledge Canada Announces 2018-2019 Funding for its National Northern Scientific Training Program \(NSTP\): 384 students to gain northern field experience through program](#)

News release from Polar Knowledge Canada. June 14, 2018 Ottawa, ON

Polar Knowledge Canada is pleased to share the funding results of its Northern Scientific Training Program for 2018-2019. \$ 916 000 in funding will be distributed to 384 students conducting northern research in programs from 37 universities across Canada and an additional \$ 4 000 will be given for four special awards to recognize student excellence.

The purpose of the Northern Scientific Training Program is to encourage and support Canadian university and northern college students interested in northern studies and conducting thesis research, by assisting them to gain field experience and training. The NSTP fosters an exchange of information among scholars in all disciplines with an interest in the Canadian North and helps to develop a commitment to northern work.

Quotes

“Polar Knowledge Canada’s Northern Scientific Training Program helps introduce student researchers to northern field work, providing them with invaluable practical experience as they develop their understanding of the North in all its complexity. The Agency is dedicated to advancing Canada’s leadership on addressing northern issues, particularly those most important to Northern and Indigenous Canadians.”

Richard Boudreault, Chair, Board of Directors

“POLAR recognizes the exceptional value of supporting Canada’s next generation of northern researchers. It is through continued studies in this domain that we will be able to advance the creation of the new knowledge that’s needed in Canada’s rapidly changing North – to address the issues that Northerners have identified as important.”

J. Scott, PhD, President and CEO of Polar Knowledge Canada

Quick facts

- Polar Knowledge Canada (POLAR) is a federal agency responsible for advancing Canada’s knowledge of the Arctic, strengthening Canadian leadership in polar science and technology, and promoting the development and distribution of knowledge of other circumpolar regions, including Antarctica. POLAR will operate the Canadian High Arctic Research Station (CHARS) campus in Cambridge Bay, Nunavut.
- POLAR’s Northern Scientific Training Program (NSTP) supports northern college and Canadian university students interested in northern studies and research by providing them with supplementary grant funding.
- Universities and colleges whose students receive support from this program are assisted in gaining northern professional experience and training. The NSTP gives students research experience in the North and encourages them to develop a commitment to northern work and issues.
- The Northern Scientific Training Program (NSTP) is administered by Polar Knowledge Canada. It was established in 1961 to encourage Canadian universities to participate in training northern specialists to meet national needs.

Associated links

[Polar Knowledge Canada](#)

[Northern Scientific Training Program](#)

Contacts

For more information, media may contact:

POLAR Media and Communications

Polar Knowledge Canada

613-292-1759

communications@polar.gc.ca



DATA, MODELS AND ANALYSIS

The Highest Impact Articles
in Atmosphere-Ocean



Edited by
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Council / Conseil d'administration

President / Président

Paul Kushner
Department of Physics, University of Toronto, Toronto, ON
Tel.: 416-946-3683; E-mail/Courriel: president@cmos.ca

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E-mail/Courriel: vice-president@cmos.ca

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E-mail/Courriel: treasurer@cmos.ca

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E-mail/Courriel: corsec@cmos.ca

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E-mail/Courriel: recsec@cmos.ca

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- 1) Iain Russell
Director, Meteorological R&D, Pelmorex Media Inc.
Tel.: 905-829-1159 x1405; E-mail/Courriel: irussell@pelmorex.com
- 2) Robert Sica
University of Western Ontario, London, ON
Tel.: 519-661-3521; E-mail/Courriel: bobsica@purplecrowlidar.ca
- 3) Nadja Steiner
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E-mail/Courriel: nadja.steiner@canada.ca
- 4) Felicia Kolonjari
Ph.D. Student
E-mail/Courriel: Felicia.kolonjari@gmail.com

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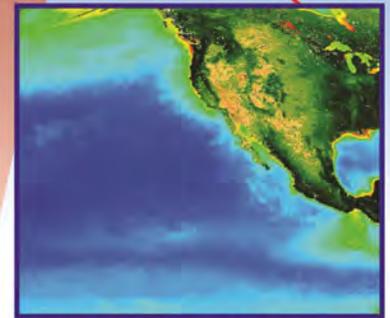
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Le *Bulletin de la SCMO* se trouve maintenant en ligne à <http://bulletin.scmo.ca/>. N'hésitez pas à soumettre notes, rapports d'atelier et nouvelles à l'adresse bulletin@scmo.ca. Nous accepterons, réviserons et publierons vos contenus sur une base continue.

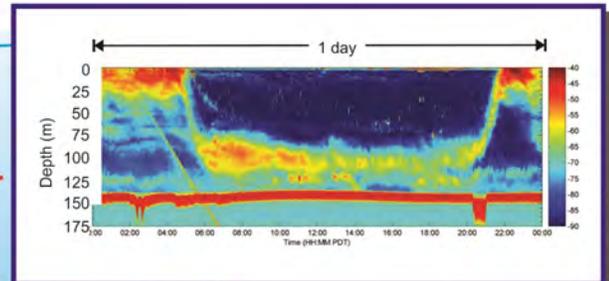
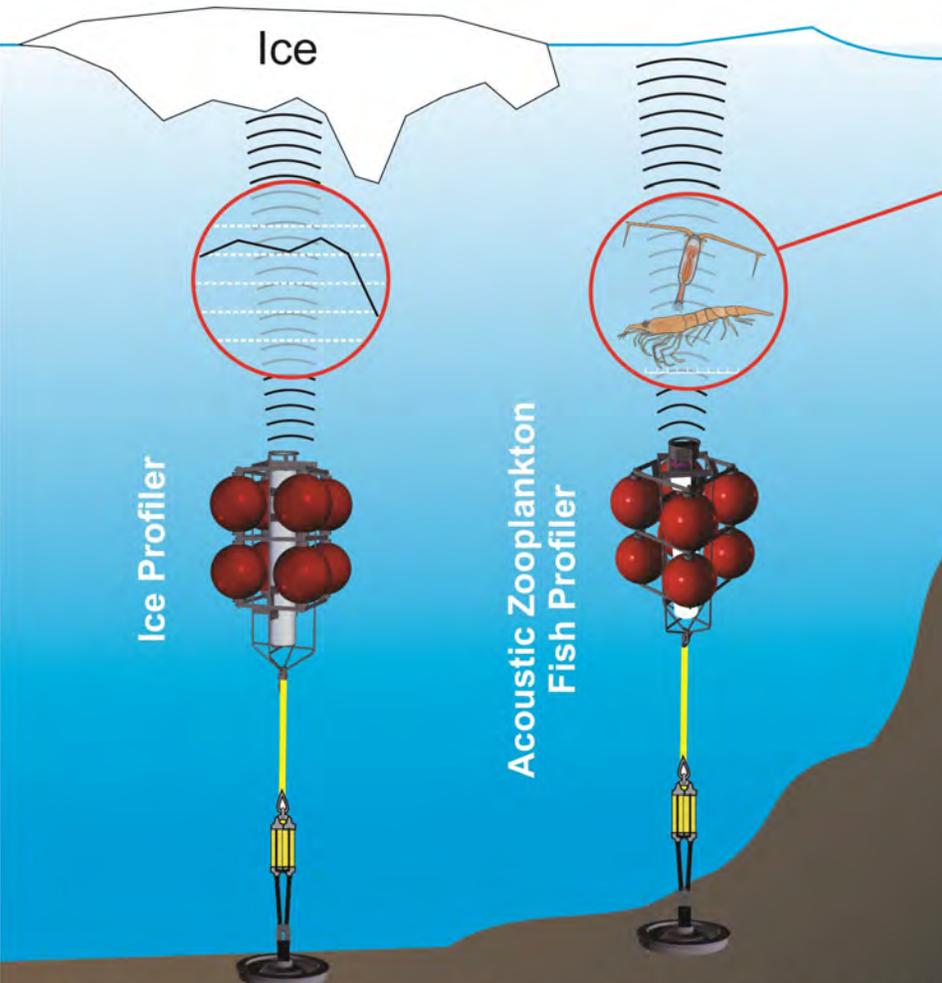
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Thank you to Bob Jones and Paul-André Bolduc, for their continued editorial assistance and guidance.

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Ocean colours are chlorophyll concentrations and land colours are NDVI



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website: www.aslenv.com