



CANADIAN OCEAN SCIENCE NEWSLETTER

LE BULLETIN CANADIEN DES SCIENCES DE L'OCÉAN

Newsletter Number 68, 15 December 2012

Bulletin numéro 68, le 15 décembre 2012

Contents

OCEAN SCIENCE PROGRAMS	2
Champ magnétique et changements climatiques en Patagonie.....	2
Magnetic field and climate change in Patagonia	4
The Atlantic Meridional Transect	6
New SCOR Working Groups.....	6
MEETINGS	7
GEOHAB Open Science Meeting, Paris, 25-27 April 2013.	7
1st International Ocean Colour Science Meeting, Darmstedt, Germany, 6-8 May 2013.....	7
CANADIAN JOBS.....	8
ArcticNet Mooring Instrumentation Professional, Laval, Quebec City	8
ArcticNet Ocean Instrumentation Professional, Laval, Quebec City.....	8
GENERAL.....	8
Greenhouse Gas Levels	8

If you wish to subscribe to this newsletter, please send an email to listserv@lists.mcgill.ca with the following subject line: **SUBSCRIBE OCEAN-NEWSLETTER**. If a colleague might like to subscribe, please forward this copy.

OCEAN SCIENCE PROGRAMS

Champ magnétique et changements climatiques en Patagonie

soumis par Agathe Lisé-Pronovost, UQAR-ISMER, titulaire du supplément de bourse du CNC-SCOR 2010-2012

La Patagonie est dans l'imaginaire collectif un endroit intrigant et mystérieux du bout du monde. Pour les géoscientifiques, cette région du globe est aussi et avant tout un endroit clé pour étudier l'histoire de la Terre. En effet, la pointe sud de l'Amérique du Sud est un endroit unique puisqu'avec une poignée d'îles subantarctiques, c'est la seule masse continentale entre 38°S de latitude et l'Antarctique. De plus, la Patagonie est balayée par les vents d'ouest de l'hémisphère Sud, de forts vents qui circulent tout autour du globe aux latitudes moyennes et qui entraînent au passage le courant circumpolaire antarctique de l'océan Austral. Ainsi, la Patagonie est le seul obstacle sur la trajectoire des vents d'ouest et est aussi la principale source des poussières atmosphériques déposées en Antarctique et contenues dans les fameuses carottes de glace. C'est pour ces raisons que l'équipe de recherche multidisciplinaire *Potrok Aike maar lake Sediment Archive Drilling prOject* (PASADO) dans le cadre de l'*International Continental Scientific Drilling Program* (ICDP) s'est intéressée au lac de cratère *Laguna Potrok Aike* afin d'obtenir une archive sédimentaire de la Patagonie et adresser d'importantes questions en paléoclimatologie. Mon projet de doctorat s'insère dans le grand projet PASADO-ICDP. Je m'intéresse à l'étude du champ magnétique de la Terre et aux changements climatiques en Patagonie. Ma thèse s'intitule « Paléomagnétisme, magnétostratigraphie et magnétisme environnemental de sédiments quaternaires du lac *Laguna Potrok Aike*, Patagonie » et j'ai eut la chance d'être soutenue par le supplément de bourse pour les sciences de la mer du CNC-SCOR 2010-2012.

Les sédiments du lac Laguna Potrok Aike

Le lac *Laguna Potrok Aike* (voir photo) est situé dans la steppe aride du sud de la Patagonie à 80 km au nord du détroit de Magellan et à 90 km à l'ouest de la ville côtière Rio Gallegos. La région était libre de glaciers continentaux durant la dernière glaciation et de récentes études sismiques et sédimentologiques révèlent une accumulation de plus de 300 m de sédiments avec des taux de sédimentation élevés

CNC-SCOR

Members/ Membres

Céline Guégen (Trent)
Markus Kienast (Dalhousie)
Rob Macdonald – Past Chair (DFO-IOS)
Michel Mitchell (incoming Secretary)
Alfonso Mucci (McGill)
Paul Myers (Chair, U Alberta)
Ian Perry (DFO-PBS)
Paul Snelgrove (Memorial)
Bjorn Sundby (McGill)
Martin Taillefer (Maritime Way)
Bob Wilson – Secretary
Len Zedel (Memorial)

Members Ex-Officio/

Membres d'office

Blair Greenan (IAPSO)
Helen Joseph (DFO-HQ)
Peter Bartello (CMOS)
Ian Rutherford (CMOS)
Michael Scarratt (GEOTRACES)

The Canadian National Committee of the Scientific Committee for Oceanic Research (CNC-SCOR) fosters and facilitates international cooperation. It is a non-governmental body that reflects the multi-disciplinary nature of ocean science and marine technology.

Le Comité national canadien du Comité scientifique de la recherche océanographique (SCOR) favorise et facilite la coopération internationale. Il reflète la nature multidisciplinaire de la science océanique et de la technologie marine.

(environ 1 mètre par 1000 ans). Le lac est un lac de cratère phréatomagmatique, c'est-à-dire que l'eau occupe une dépression formée par explosion lorsque le magma remontant vers la surface a atteint la nappe phréatique lors du Pliocène. Aujourd'hui, c'est le seul lac du champ volcanique Pali Aike qui ne s'assèche pas, avec une profondeur maximale de 100 m et un diamètre maximal de 3,5 km. Les opérations de carottage scientifique ont eu lieu au printemps austral 2008 (septembre à novembre). Sur le terrain, nous avons foré deux sites et obtenu une séquence composite de 107 mètres. C'est le plus long enregistrement climatique et environnemental en Amérique du Sud au sud des tropiques. Environ la moitié des sédiments sont redéposés (des mouvements de masse) à cause des pentes abruptes de la structure de type diatrème, des forts vents et possiblement de l'activité sismique. Les plus vieux sédiments lacustres obtenus datent d'il y a plus de 50 000 ans.



Vue sur le lac Laguna Potrok Aike (52°S, 70°W) au sommet du « chapeau mexicain », situé 2,3 km au sud-est.

Changements climatiques en Patagonie

Des analyses magnétiques à haute résolution (dans certains cas à intervalles de 1 cm tout au long de la carotte sédimentaire de 107 mètres!) me permettent de reconstituer l'histoire environnementale à partir des changements de la composition minéralogique et granulométrique des sédiments magnétiques. Deux articles sont en préparation concernant le magnétisme environnemental : l'un présente un traceur magnétique des vents d'ouest à 52°S en Patagonie depuis 50 000 ans, et l'autre révèle la signature magnétique des couches sédimentaires redéposées. C'est une chance de travailler dans une équipe de recherche multidisciplinaire comme PASADO. Cela m'a déjà permis de collaborer activement à 3 articles scientifiques en tant que co-auteur et me permettra d'adresser de grandes questions en paléoclimatologie. Par exemple, quelle est l'influence du climat passé en Patagonie sur le système climatique global? Quelle est la contribution des poussières atmosphériques de la Patagonie en période glaciaire et interglaciaire? La recherche en océanographie est un domaine où la multidisciplinarité est souvent la clé pour comprendre les phénomènes que l'on observe.

Le champ magnétique

Mes travaux concernant la variabilité du champ magnétique dans le sud de l'Amérique du Sud sont publiés dans la revue *Quaternary Science Reviews*¹. Reconstituer la variabilité du champ magnétique dans des endroits peu

documentés comme la Patagonie est essentielle aux géoscientifiques qui cherchent à mieux comprendre comment fonctionne le champ magnétique de la Terre. De plus, l'enregistrement paléomagnétique du lac *Laguna Potrok Aike* a été utile pour préciser la chronologie PASADO-ICDP, basée sur des datations radiocarbones. Établir une chronologie robuste est toujours un grand défi en sédimentologie et la magnétostratigraphie est souvent une méthode efficace, en particulier lorsque les méthodes traditionnelles sont difficiles ou inapplicables.

1. Lisé-Pronovost, A., St-Onge, G., Gogorza, C., Haberzettl, T., Preda, M., Francus, P. Zolitschka, B. and the PASADO science team, sous presse/in press. High-resolution paleomagnetic secular variation and relative paleointensity since the Late Pleistocene in Southern South America. *Quaternary Science Reviews*. 1-18. Disponible en ligne le 13 juin 2012/Available online June 13, 2012.

Magnetic field and climate change in Patagonia

submitted by Agathe Lisé-Pronovost, UQAR-ISMER, CNC-SCOR scholarship supplement holder 2010-2012

Patagonia in the collective mind is a mysterious land at the end of the world. For geoscientists, this region also happens to be a key place to study Earth's history. The southern tip of South America is a vantage point because, with a handful of sub-Antarctic islands, it is the only landmass located between 38°S and the Antarctic continent. In addition, Patagonia is under the influence of the southern hemisphere westerly winds, a strong wind belt over the mid-latitudes driving the circumpolar current of the Southern Ocean. Hence Patagonia is the only obstacle in the path of the westerly winds and is also the source region for the atmospheric dust deposited over Antarctica and preserved in the famous ice core archives. For these reasons, the multidisciplinary research team Potrok Aike maar lake Sediment Archive Drilling prOject (PASADO), part of the International Continental scientific Drilling Program (ICDP) drilled the Lake *Laguna Potrok Aike* to recover a sedimentary archive and investigate important paleoclimatic questions. My PhD project is part of the PASADO-ICDP great project. I am interested in global magnetic field studies and climate change in Patagonia. My thesis is entitled "Paleomagnetism, magnetostratigraphy and environmental magnetism of Late Quaternary sediments from the Lake *Laguna Potrok Aike*, Argentina" and I had the chance to be supported by the CNC-SCOR Scholarship Supplement for Ocean Sciences for the years 2010-2012.

The sediments of the Lake Laguna Potrok Aike

The lake *Laguna Potrok Aike* (see picture) is located on the dry steppe of Southern Patagonia, 80 km north of Magellan's Strait and 90 km east of the coastal city Rio Gallegos. The region was free of continental glaciers during the last glaciation. Recent seismic and sedimentological studies of the lake show more than 300 meters of sediment accumulated at a rate of approximately 1 meter per 1000 years. The lake is a phreatomagmatic lake, meaning the water occupies a depression formed by the explosion when ascending lava vaporized the groundwater during the Pliocene. Today, *Laguna Potrok Aike* is the only lake of the Pali Aike volcanic field that never dries out, with a maximum depth of 100 m and maximum diameter of 3.5 km. Scientific drilling was completed during the austral spring of 2008 (September to November). In the field, we drilled two sites and recovered a composite sequence 107 meters long, the longest climatic and environmental archive from South America south of the tropics. About half of the sediment has been re-deposited (by mass movements) because

of the combined effect of the steep slopes of the diatreme structure, strong winds over the area and probably seismic activity. The oldest lacustrine sediment recovered was over 50 000 years BP.



View of the lake Laguna Potrok Aike (52°S, 70°W) from the 'Mexican hat', located 2.3 km southeast.

Climate change in Patagonia

I used high-resolution magnetic analyses (sometimes at cm-intervals over the entire 107 meter sedimentary sequence!) to reconstruct an environmental history using changes in magnetic mineralogy and granulometry. Two scientific articles are in preparation: one presents a magnetic proxy of intensity of the Southern Hemisphere westerly winds at 52°S in Patagonia for the last 50,000 years, and the other reveals the magnetic signature of reworked sediments in *Laguna Potrok Aike*. It is for me a great pleasure and I am lucky to work within a multidisciplinary research team at PASADO. I have already had the chance to collaborate as a co-author on three publications and we will further address significant questions in paleoclimatology. For example, what is the influence of past climate change in Patagonia on the global climate system? What is the contribution of the Patagonian atmospheric dust over the last glacial and interglacial periods? Multidisciplinary research is often key in ocean sciences.

The earth's magnetic field

My work concerning the paleomagnetic record from *Laguna Potrok Aike* and the variability of the Earth magnetic field in Southern South America was published in *Quaternary Science Reviews*¹. Full vector paleomagnetic records from a poorly documented region of the globe such as Patagonia are crucial to help understand the behaviour of the Earth's magnetic field. In addition, the paleomagnetic record from *Laguna Potrok Aike* has been used to better constrain the PASADO-ICDP radiocarbon-based chronology. Magnetostratigraphy proved to be very useful for robust age control, always a major challenge in sedimentology, particularly when traditional methods are difficult or inapplicable.

1. Lisé-Pronovost, A., St-Onge, G., Gogorza, C., Haberzettl, T., Preda, M., Francus, P. Zolitschka, B. and the PASADO science team, sous presse/in press. High-resolution paleomagnetic secular variation and relative paleointensity since the Late Pleistocene in Southern South America. *Quaternary Science Reviews*. 1-18. Disponible en ligne le 13 juin 2012/Available online June 13, 2012.

The Atlantic Meridional Transect

The Atlantic Meridional Transect (AMT) programme undertakes biological, chemical and physical oceanographic research during an annual cruise between the UK and destinations in the South Atlantic. The transect crosses ecosystems ranging from sub-polar to tropical and from euphotic shelf seas and upwelling systems to oligotrophic mid-ocean gyres. AMT is the longest running Atlantic Ocean-based programme that makes repeat measurements of core parameters and informs on trends and variability in biodiversity and function of the Atlantic ecosystem. It has provided an *in-situ* observation system for the Atlantic Ocean between $\sim 50^{\circ}\text{N}$ and $\sim 50^{\circ}\text{S}$ since 1995 and has provided the longest time series of data on basin scales. This unique spatially extensive decadal dataset continues to be deposited and made available to the wider community through the British Oceanographic Data Centre (<http://www.bodc.ac.uk/projects/uk/amt/>). The programme is hosted by Plymouth Marine Laboratory (<http://www.pml.ac.uk/>) in collaboration with the National Oceanography Centre, Southampton (<http://noc.ac.uk/>) and provides an exceptional opportunity for nationally and internationally driven collaborative endeavours. An integral part of the AMT is to provide a training arena for the next generation of oceanographers. This aim has been enhanced recently through the development of the POGO-AMT fellowship programme (<http://ocean-partners.org/>) which supports the participation of students or early career professionals from developing nations. Participants in this fellowship programme benefit from working alongside experienced researchers in the development of research skills, the formation of collaborative links and capacity building for their home institutes and countries.

New SCOR Working Groups

Seven proposals for new Working Groups were submitted to SCOR for consideration at the 2012 General Meeting, which was held in Halifax. The two selected for funding will be called WG 141 and WG 142.

WG 141 on Sea-Surface Microlayers—The sea-surface microlayer (SML) is the interface between the atmosphere and ocean. The thickness of the SML typically ranges between 40 and 100 μm , and the properties of this layer are significantly different from the properties of the seawater beneath. The position of the SML at the



air-sea interface implies that this layer is probably central to a range of global biogeochemical and climate-related processes mediated by transfer across this boundary. The working group plans to develop and disseminate a multidisciplinary definition of the microlayer (taking into account physical, chemical and biological factors). It will review sampling techniques and publish detailed sampling protocols to help make it possible to compare measurements made in different locations. The group will outline the SML's role in a changing ocean. This group is co-chaired by Michael Cunliffe (UK) and Oliver Wurl (Germany)

SML sampling with the glass Plate technique. Photo: SCOR

WG 142 on Quality Control Procedures for Oxygen and Other Biogeochemical Sensors on Floats and Gliders—Argo floats have revolutionized our understanding of the physical structure of the ocean and how heat and salinity are distributed through the upper 1000 meters of the water column. This achievement is possible because of the high-quality and comparable data from the worldwide network of sensors on the floats. More recently, oxygen, nitrate, and other sensors have been deployed on Argo floats, but data from these sensors has not yet achieved the same level of reliability as for physical parameters. Gliders are increasingly used to profile ocean properties, but share many of the same constraints to instrumentation as do floats. This working group is co-chaired by Arne Körtzinger (Germany) and Ken Johnson (USA) and will help develop quality control metrics and procedures for oxygen and other biogeochemical sensors deployed on floats and gliders to make it possible to create a research-quality synthesis data product. The group will also document the readiness of the range of biogeochemical sensors that might be deployed on floats and gliders.

MEETINGS

GEOHAB Open Science Meeting, Paris, 25-27 April 2013.

The SCOR/IOC **Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB)** is planning a final Open Science Meeting for 25-27 April 2013 at UNESCO Headquarters in Paris, France ([click](#)). The SSC also is planning a series of synthesis documents to be completed in late 2013 or early 2014.

1st International Ocean Colour Science Meeting, Darmstadt, Germany, 6-8 May 2013

Registration is now open for the first **International Ocean Colour Science (IOCS)** meeting, which will take place in Darmstadt, Germany from 6-8 May 2013 ([click](#)). The primary focus of the IOCS meeting is to build and strengthen the international ocean colour community by providing a structure and mechanisms to collectively address common issues and goals. The aim is to achieve the best quality ocean colour data that meet scientific, environmental, climate and operational needs through international collaboration and scientific and technological innovation. In addition to providing a forum to develop a strong voice for the community, the meeting will also offer an opportunity to interact and collaborate with other ocean colour scientists.

The symposium is convened by the International Ocean Colour Coordinating Group (IOCCG) a SCOR partner. The program has not yet been finalized but will include talks by space agency representatives on the status of existing missions, how and where to get the data, and information on future missions. In addition there will be splinter sessions, panel discussions and talks by invited keynote speakers as well as comprehensive poster sessions to review the progress of scientific ocean colour research. The meeting will close with a session on future directions and needs. The IOCG is now accepting proposals for splinter sessions in topical areas ([click](#)).

Registration for the meeting is free, but all participants must be registered in order to attend.

CANADIAN JOBS

ArcticNet Mooring Instrumentation Professional, Laval, Quebec City

ArcticNet is seeking an individual to manage and oversee all technical aspects of its mooring program. The successful candidate will be responsible for mooring design, the management of mooring maintenance and calibration procedures, mooring data management and quality control procedures, and aspects of at-sea operations ([click](#), pdf).

The ArcticNet administrative centre is based at Université Laval in Quebec City, Canada. Despite working in a French-speaking environment, many tasks related to this job will be carried out in English. Excellent English verbal and written communication skills are essential.

ArcticNet Ocean Instrumentation Professional, Laval, Quebec City

ArcticNet is looking for an individual to take responsibility for development, installation, operation and maintenance of the *CGS Amundsen's* oceanographic instruments and to take charge of aspects of at-sea operations and data processing and reporting ([click](#), pdf).

The ArcticNet administrative centre is based at Université Laval in Quebec City, Canada. Despite working in a French-speaking environment, many tasks related to this job will be carried out in English. Excellent English verbal and written communication skills are essential.

Looking for work? Try the CMOS site ([click](#))

GENERAL

Greenhouse Gas Levels

The WMO has released a new issue of its periodic bulletin on the state of greenhouse gases in the atmosphere ([click](#), pdf). It says that atmospheric observations indicate increases in carbon dioxide, methane and nitrous oxide to concentrations 140%, 259% and 120%, respectively, of their pre-industrial levels. Atmospheric CO₂ has increased at a relatively stable rate over the last ten years. Radiative forcing by greenhouse gases increased by 30% between 1990 and 2011, with CO₂ accounting for 80% of the growth. The Bulletin continues to state that about half the atmospheric emissions of CO₂ reside in the atmosphere.

CANADIAN OCEAN SCIENCE NEWSLETTER

LE BULLETIN CANADIEN DES SCIENCES DE L'OCÉAN

Previous newsletters may be found on the CNC/SCOR web site.
Les bulletins antérieurs se retrouvent sur le site web du CNC/SCOR.

Newsletter #69 will be distributed on 15 February 2013 . Please send contributions to Michel Mitchell, michel.mitchell@dfo-mpo.gc.ca
Bulletin #69 sera distribué le 15 février, 2013. Veuillez faire parvenir vos contributions à Michel Mitchell, michel.mitchell@dfo-mpo.gc.ca

If you wish to subscribe to this newsletter, please send an email to listserv@lists.mcgill.ca with the following message: SUBSCRIBE OCEAN-NEWSLETTER.

If you wish to cancel your subscription, please send an email to listserv@lists.mcgill.ca with the following message: SIGNOFF OCEAN-NEWSLETTER.

Do you use Twitter to communicate marine science? Follow the newsletter editor @rbtwilson – I'm always looking for material.

WWW.CNCSCOR.CA