



Newsletter for the Canadian Antarctic Research Network

Bulletin pour le Réseau de Recherches Antarctiques du Canada

Welcome to the second edition of the CARN newsletter for 1996. CARN is composed of members who have an interest in Canadian involvement in Antarctic research in the past, present and future. If you would like to be more directly involved in CARN activities please contact a member of the Executive Committee (addresses on p.2).

Bienvenue à cette deuxième édition du bulletin pour RRAC en 1996. RRAC se compose de membres qui ont manifesté un intérêt sur l'implication passée, présente et future du Canada en Antarctique. Si vous voulez être impliqué plus directement dans les activités de RRAC, veuillez communiquer avec le comité exécutif (adresses à la p.2).

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- Canada to apply for full SCAR membership in 1998. The Canadian Polar Commission sees the promotion of bipolar science as a major objective: letter from the chairman, p.3.
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- RRAC est en pleine expansion! Nous vous encourageons de participer à la planification du Programme de Recherches en Antarctique du Canada: lettre du président de CARP/PRAC, p.2.
- Le Canada demandera de faire partie du SCAR en 1998. La Commission Canadienne des Affaires Polaires voit la promotion de la science bipolaire comme une priorité importante: lettre du président, p.3.
- Quelle est la position du Canada? Malgré notre performance favorable jusqu'à présent, il y a des inquiétudes au niveau international parce que le Canada joue un rôle important dans l'industrie du tourisme en Antarctique. Il n'a cependant pas encore ratifié le Protocole Environnemental de l'Antarctique, p.4.
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*To the Canadian Antarctic Research Community from Peter Suedfeld,
Chairman of the Executive Committee, CARP/PRAC*

It seems that the Canadian Antarctic Research Network is flourishing. More Canadian scientists, and others interested in Antarctica, have joined the Network and are receiving the Newsletters and other information, and the directory of CARN members is up to date and available. The development of the Canadian Antarctic Research Program is also making progress, although still slowly. This slow pace is a necessary outcome of the structural and financial parameters of our operations.

CARP is not analogous to most national Antarctic programs. The latter are efforts by national governments, which support with money, infrastructure, and personnel one or more loci of Antarctic activity, whether stations, vessels, or both. Most managers of these operations are full-time government employees, whose job assignment is to keep the activity going and enable the scientists of that nation to engage in research in Antarctica. Offices, staff, supplies, transportation, equipment, and so on are primarily financed from the budget of the program.

CARP, by contrast, is run by a small Executive Committee of volunteers whose primary positions are not within the program. Most are academics or private consultants, whose involvement with the Committee is essentially donated by them because they are committed to the idea of Canadian participation in Antarctic research. Our funding comes almost entirely through the generosity of the Canadian Polar Commission, and suffices to cover the telephone, postage, and stationary costs of the Committee plus occasional additional funds for travel to important meetings. There is no question of funding actual research, or any research site, in Antarctica. This not only hampers our constituency, but also makes it impossible for us to deal as equals with the national programs of other countries.

Nevertheless, we have been quite busy. Our newly appointed Environmental Officer, Olav Loken, has attended international meetings related to the protection of the Antarctic environment, and Canada was represented at the recent meetings of SCAR (by Whit Fraser, Chairman of the Canadian Polar Commission), COMNAP (by Peter Suedfeld), and SCALOP (by Dennis Stossel). An overview of Canadians involved in Antarctic and bipolar scientific activities is near completion and will be available soon. All of this participation was supported by the CPC, and is reported on more fully elsewhere in this Newsletter.

We are pleased to announce that in spite of the overall difficult funding situation, the Polar Continental Shelf Project and CARP have established a joint Canadian Arctic-Antarctic Exchange Program (see announcement below). We are also happy to note that two Canadian tour operators offer very significant in kind support for Canadian scientists interested in working in Antarctica (see p.5). These offers are greatly appreciated.

The Canadian government is committed to seeking full membership in SCAR in the reasonably near future (we are now Associate Members) and to participation in Antarctic environmental agreements. Although we fully support these commitments, a visible interest in Antarctic research by Canadians — moving forward from a promising start, the new Arctic-Antarctic Exchange Program of the Polar Continental Shelf Program — would be gratifying. One helpful step would be an actively vocal group of scientists, other than the Executive Committee, who could get involved in the running of CARN and CARP, organize focused Antarctic research initiatives, volunteer to represent Canada in the SCAR Working Groups, and help to persuade the funding agencies and other arms of government that Antarctic research by Canadians is worthy of serious support. We would love to hear from such colleagues!

Canadian Arctic-Antarctic Exchange Program

This is a new program jointly administered by the Polar Continental Shelf Project & Canadian Antarctic Research Program. Its aim is to encourage collaboration among Canadian Arctic and non-Canadian Antarctic scientists wishing to undertake joint studies in the respective polar regions. Beginning with the 1997 Arctic field season, Polar Continental Shelf Project (PCSP) has been accepting applications from Canadian scientists wishing to "sponsor" Antarctic partners to work in the Arctic. If a proposal is approved by the Canadian Antarctic Research Program (CARP) Executive Committee and PCSP's Scientific Screening Committee, the non-Canadian collabo-

rators would be eligible for the same type of logistics support from PCSP as are Canadian scientists. In turn, the Antarctic partners involved in such programs must demonstrate a firm commitment to provide logistics support in kind to their Canadian partners while working in Antarctica; this exchange commitment is a key selection criterion for the CARP and PCSP review committees. Application details are available from CARP/PRAC or PCSP. The deadline for the next competition (for the 1998 Arctic season) will be late October 1997. Information about PCSP and its logistics services is available through the Worldwide Web at <http://www.nrcan.gc.ca/gsc/pcsp/pcsp.html>

Canada's Position on SCAR Membership

Whit Fraser, Chairman, Canadian Polar Commission

The issue of Canada's participation in Antarctic research might be characterized more accurately as a "non-issue"; Canadian scientists are keen to play a larger role in the south polar region, and the Canadian Polar Commission is prepared to assist in that effort.

It is worth noting that Canada has a long and distinguished history of Antarctic research upon which to build. Canadians have taken part in Antarctic operations and research since Hugh Evans was part of the first over-wintering party on the continent at the turn of the century. Since then several others have participated, notably Dr. Fred Roots, the doyen among Canadian Antarctic scientists. Dr. Roots has been a driving force in developing polar science in Canada.

Traditionally, our polar scientific activities have focused on the North. It is home to some 80,000 Canadians, half of the Aboriginal people who derive their livelihood - both their material and spiritual needs - from the northern lands and seas. While this emphasis is likely to remain, emerging issues of a bipolar and global nature have also underscored the need for closer links with the Antarctic scientific community. As an important step in that direction, the Canadian Polar Commission applied for associate membership status in the Scientific Committee on Antarctic Research (SCAR) at the organization's Rome meeting in 1994. Full membership, contingent upon the existence of a recognized national program for Antarctic research, will be sought in 1998. The Canadian Antarctic Research Network (CARN) has set the establishment of the Canadian Antarctic Research Program (CARP) as its primary goal.

Along with the need for a sharper focus on scientific activities, the Commission is aware of the future demands imposed on all Treaty countries as a result of the Environmental Protocol, and the new responsibilities these place on the government to ensure appropriate knowledge

and expertise are available. We believe this can be achieved through the support of scientific research and have, accordingly increased support for CARN's efforts to develop a national program. Jointly we pursue a number of initiatives.

We are compiling an overview of Canadian scientists currently involved in Antarctic work. With the current emphasis on modelling, satellites and remote-sensing aircraft, and modern telecommunications technology, the nature of Antarctic science has changed. The overview will provide a survey of current interests and capabilities, and these, together with an assessment of future needs, will form the basis for developing the Canadian Antarctic Research Program. Of course, this will be done in full recognition of the research activities already underway in Antarctica, and of how Canada can best contribute to the overall science effort.

On the inevitable question of funding, we are all cognizant of the current constraints and know it will not be easy. But until we have a detailed program - in other words, a "product" to promote - we will be unable to gauge accurately the full extent of this task. It is too early to suggest the nature of our future program, but we know it will not be centrally run out of a single research institute. We want to preserve our current diversity with a series of smaller centres of expertise while, at the same time, ensuring an effective level of co-ordination. Thus, the Canadian voice at international fora such as SCAR will be representative of the entire community of Canadian Antarctic scientists.

The Commission sees the promotion of bipolar science as a major objective; as a part of this, we are developing means to make it easier for foreign scientists to conduct field work or obtain training in northern Canada. When fully established, the system will allow Canadian scientists access to a variety of Antarctic research facilities through reciprocal arrangements.

27th Arctic Workshop, University of Ottawa, February 27- March 2, 1997

We expect a number of scientists/students interested in Antarctic issues will attend this workshop and CARN will arrange an opportunity to discuss the development of a Canadian Antarctic Research Program. Look for further details in the second Workshop Circular expected in January 1997.

Further details about the Arctic Workshop also can be obtained from the website address: <http://www.science.uottawa.ca/arctic97/> or by contacting Dr. Antoni Lewkowicz (Email: alewkowi@uottawa.ca), Chairperson, Department of Geography, University of Ottawa, Ottawa, Ontario, Canada K1N 6N5 Tel: 613-562-5704 Fax: 613-562-5145

Canada and ratification of the Environmental Protocol

Canada's environmental performance in Antarctica has been good. A Canadian consulting company carried out the first comprehensive environmental impact study of a major Antarctic construction project (Rothera airstrip, for the UK) using techniques and criteria borrowed from the Arctic. A Canadian tour company (Marine Expeditions Inc.) presented the first detailed Initial Environmental Assessment of seasonal tourist operations, which, although not without its critics, became a prototype distributed by the ATCM. A Canadian NGO organized teams of volunteers to clean up and remove debris from a Russian Antarctic research station, and Russia reported on this to the ATCM as a "Joint Russian-Canadian Ecological Project"; all expenses were covered from private, mostly Canadian, sources. In view of these kinds of actions by Canada in Antarctica, it would appear very fitting that Canada would give political expression to its ongoing environmental concerns by ratifying the Protocol on Environmental Protection to the Antarctic Treaty.

Despite our favourable environmental performance to date, there is some unease at the international level because Canada is the host country for a high percentage of private tourist voyages and expeditions to Antarctica that promote tours to sensitive areas such as penguin rookeries and seal breeding grounds. Yet, the Canadian government has no formal means of control or action should new, less responsible operators start up in Canada or should financial stress cause present operators to relax their environmental standards. This situation led the XX ATCM last May to adopt a statement in its Final Report aimed specifically at Canada:

"85. Furthermore, the Meeting called upon non-Consultative Parties with a particular interest in, or responsibility for, tourist companies operating in Antarctica to ratify the Protocol and its Annexes at the earliest opportunity and to introduce any necessary domestic legislation to ensure compliance."

Also, the most influential Antarctic non-governmental organization, the Antarctic and Southern Ocean Coalition in its formal presentation to the ATCM urged Canada "to take the necessary legal steps to ratify the Protocol and bring it into force". The NGO's were even more blunt in a stand-alone paragraph in their newspaper ECO, published during the ATCM and distributed to all delegates and journalists:

"And when will Canada, home of the largest tourist operator, ratify the Protocol?"

The Protocol has many features that are relevant to the Arctic, because of the similarities in environmental conditions and the extreme sensitivities of polar ecosystems. Also, to achieve effective protection of the Arctic environment, international cooperation on a circumpolar basis is essential, just as it is in the Antarctic. The Arctic Environmental Protection Strategy is one expression of this, and thus it was a natural development that links and exchanges between the ATCM and the AEPS should be established with Canada as the "messenger" for the first exchanges. The Arctic Council, likewise, has from the beginning considered that one of its main functions should be the facilitation of political means for international co-operation in protection of the northern polar environment. This is the function, in the southern polar region, of the Protocol on Environmental Protection.

In view of Canada's leadership in developing the means for environmental protection in the Arctic through the Arctic Council, it is very appropriate that Canada should signal its commitment and leadership in protection of the Antarctic environment by ratifying the Protocol that it helped to draft and which it signed in 1991.

Since 1991, no objection or formal obstacles to the Protocol are known to have arisen. The Canadian industries that would be most affected have already stated publicly that they support the Protocol and already conduct their operations accordingly. That the protocol has not yet been ratified appears to be due to the absence of interest within the government, lack of a "champion", and the fact that those who deal with it have been pre-occupied with other urgent subjects. Ratification would appear to be straight forward in a policy sense and relatively simple, but to pass implementing legislation would require a more comprehensive legal preparation. However, announcement of a decision to proceed with ratification would in itself be of substantial benefit to Canada, and according to some opinion, would help move some Consultative Parties to proceed with their own ratification and thus help coming into force of the Protocol. It would reinforce, in a bipolar sense, the legal position Canada has promoted successfully in creating the Arctic Council.

For further details contact: Dr. F. Roots, Fax (819) 997-5813.

Adventure Network International (ANI) - Offer of support

Adventure Network International is a Canadian company that for 11 consecutive seasons has offered flights to a great variety of private expeditions to the interior of Antarctica. The company operates a base camp near a blue ice runway at Patriot Hills (approx. 80°S, 81°W, alt. 60m) during the field season, generally from early November to mid-January.

ANI will offer support to a Canadian scientist wanting to do research at the base camp. Proposals should be submitted by the end of February, and a suitable candidate will be chosen by early June. The successful candidate may be asked to assist with ANI's ongoing environmental studies in and around the camp. Candidates should apply in writing, and submit references to the UK branch office: Adventure Network International, Canon House, 27 London End, Beaconsfield, Bucks. HP9 2HN, U.K., Tel.: (44) 1494 671808, Fax:(44) 1494 671725.

ANI would supply flights from Punta Arenas, Chile to Patriot Hills and return. All meals would be provided at the base camp and radio communications would be made available. Up to 100 lb of equipment would be included in the free passage. The scientist would cover all travel from Canada to and from Punta Arenas and all expenses while awaiting the flight to Patriot Hills. All clothing and personal and scientific equipment would be supplied by the scientist.

Canadian Contributions to Antarctic and Bi-polar science - A bibliography

We plan to compile a bibliography of scientific and technical publication written or co-authored by Canadians. We already have some, but we request you to send us a list of all your relevant publications at your earliest convenience. Please address them to: Olav H. Loken c/o Canadian Polar Commission, Suite 1710, Constitution Square, 360 Albert St., Ottawa, ON, K1R 7X7 Fax. (613) 943-8607.

Marine Expeditions Inc. - Offer of support

Marine Expeditions operates a fleet of five small ice-rated expedition vessels in the Peninsula region and the South Shetlands Islands. The cruises are all educationally focused, with expert naturalists and historians accompanying each voyage. As a supporting member of IAATO, Marine Expeditions prides itself on its environmental record, and teaches and promotes environmentally responsible travel in Antarctica. In 1994 Marine Expeditions completed an Initial Environmental Evaluation of its Southern Ocean operations, the first of its kind by a tour operator. Since 1996, MEI has in co-operation with the other International Association of Antarctic Tour Operators (IAATO) members, participated in the industry-wide study of cumulative environmental impacts of tourist activities in Antarctica.

Over the past four years, Marine Expeditions has supported and promoted a number of environmental and scientific initiatives, including support of Project Antarctica of Cambridge University, The Oceanitis Site Inventory and the VIEW Foundation's clean-up projects at Arctowski and Bellinghausen Stations.

Scientists interested in logistic support from Marine Expeditions' vessels should apply in writing to Patrick Shaw, Vice President Operations, 30 Hazelton Avenue, Toronto, Ont., M5R 2E1.

Canadians in Antarctica - summer 1996/97

Only two Canadian scientists are known to be working in Antarctica this season:

Dr. Kathy Conlan, Canadian Museum of Nature, in co-operation with US colleagues, started a two year program to study the effects of sewage outflow from McMurdo Station on marine biota.

Dr. Caren Garrity, Microwave Group-Ottawa River Inc. will be on the German research vessel R/V Polarstern in the Weddell Sea, working for SeaSpace, Corp., San Diego, Cal.. The company recently installed a new satellite receiving and processing system and Caren will familiarize the ship's officers with the use of the system, and prepare a user-manual based on the experience.

VIEW Foundation, Toronto, will continue the Joint Russian-Canadian Ecological Project to clean up at Bellingshausen Station. This season, the participants will spend more time on the site and they will be living onboard the expedition vessel while working at the station.

The twentieth ATCM Meeting

The XX Antarctic Treaty Consultative Meeting was held in Utrecht, Netherlands, 29 April - 10 May, 1996.

As with the two previous meetings, this one was also dominated by discussions and problems connected with the Protocol on Environmental Protection, and its ratification and preparation for implementation once it comes into force. The first half of the meeting was devoted to parallel sessions. The first was a Transitional Environmental Working Group that considered preparations needed and actions to be taken, from designation of protected areas to environmental assessments of research programs, when the Protocol comes into force. The second dealt with the legal liability for transgressions of environmental regulations in areas without national jurisdiction. The Protocol will enter into force when all 26 Consultative Parties have ratified it. To this date (Oct.-96), 23 have done so. Canada signed the Protocol in 1991 but has not yet ratified it; however, as a non-Consultative party, our ratification is not necessary for it to come into force.

An innovative feature of the two last ATCM's has been an agenda item on "Relevance of Developments in the Arctic and the Antarctic." At XIX ATCM, Canada was given responsibility for bringing information about developments in the Antarctic to the meeting of Ministers for the Arctic Environmental Protection Strategy. This was done at the AEPS meeting in Inuvik, NWT in March 1996, and in turn, Canada presented information on Arctic developments to the XX ATCM in Utrecht.

Other highlights of a busy, information-filled two weeks (more than 200 documents tabled for discussion) included how to cope with the explosive growth of tourism, in which Canadian companies are leaders; inspections of Antarctic facilities; research on the response of Antarctica to global change; ozone and regional contamination, and new scientific developments including the exciting problem of how to investigate "Lake Vostok" beneath the ice-cap without contaminating its million-year-old waters.

Parallel with the continued involvement of Canadians in scientific research and tourist operations in Antarctica, Canada is participating actively in the development of Antarctic policy through the ATCM. There is little doubt that in the political field, Canada is accepted by other countries as a member of the bi-polar and Antarctic "family". Tasks ahead for Canada, arising from the recent meeting, are to proceed expeditiously with ratification of the Environmental Protocol; to give serious consideration to becoming a member of the CCAMLR Commission; to develop more effective communication and organization among Canadian Antarctic researchers and from that basis consolidate our membership in SCAR; to continue to facilitate Arctic-Antarctic exchange via the ATCM and the Arctic Council; and to develop a long-term plan regarding our intentions for Consultative status.

The XXI ATCM will be held in Christchurch, New Zealand, 19-30 May 1997.

For further information, contact: Dr. Fred Roots, Fax 819 997-5813

Report on 1996 COMNAP Meeting

The Council of Managers of National Antarctic Programs (COMNAP) is comprised of the managers of every Antarctic program around the world and meets annually. Canada has sent official representatives in two years, both when the meeting immediately preceded the meeting of national delegates to SCAR. In 1996, the COMNAP meeting was held Aug. 4-9, with the SCAR meeting starting the next day. Along with the program managers, there are meetings of two subsidiary groups: the Standing Committee on Antarctic Logistics and Operations (SCALOP), and the new network of Environmental Officers. The Canadian representatives in 1996 were Whit Fraser (SCAR), Peter Suedfeld (COMNAP), and Dennis Stossel (SCALOP and the EOs, where he stood in for Olav Loken). The reports of Whit and Dennis appear elsewhere in the Newsletter.

The COMNAP meeting took up three full days, and involved the dissemination of over 40 reports and position papers. A major development was the transfer of the Secretariat from the US to Australia; other major concerns were issues concerning legal liability for damage, especially environmental damage, in Antarctica; the establishment of a central master databank of scientific information to supplement national databanks; the monitoring of environmental problems in the Antarctic (including the surrounding waters); and the impact of ever-growing numbers of tourists. Representing the Antarctic tourist industry, Anne Kershaw of Adventure Network International (a Canadian company) gave a report emphasizing the safeguards being followed (and new ones being instituted) in the latter regard.

Reports were also received from special working groups and from each national program. The Brazilian program, in particular, provided detailed information about alternate energy developments for Antarctic stations — most interestingly, wind (of which Antarctica has plenty) to produce electricity. Reports of station closings and modifications were also received. Last, there was a discussion with members of the SCAR Working Group on Human Biology and Medicine regarding the development of a common medical kit to be kept on every station and vessel, as well as shared guidelines for the selection of Antarctic personnel.

In addition to the formal sessions, there were many small-group and person-to-person discussions. I was again impressed by the good will and eagerness with which many program managers view the potential of collaboration with Canada. In a time when every program is in financial difficulty, international collaboration is likely to become the rule rather than the exception in Antarctic activities — everyone hopes that we will both share in that development and contribute proportionately to it.

Peter Suedfeld

Chairman of the Executive Committee, CARP/PRAC

Report on VII SCALOP Meeting, August 5-9, 1996

The annual meeting of the Standing Committee on Antarctic Logistics and Operations was held in Cambridge, U.K. Antarctic air operations is of major interest to SCALOP, since the International Civil Aviation Organization (ICAO) pays little attention to the Antarctic given that there is no scheduled air traffic. Discussions focused on further refinements to the Antarctic Flight Information Manual (AFIM) published by COMNAP. It is also of interest to two Canadian charter companies with significant Antarctic activities. A subsidiary of a Canadian company (Adventure Network International) plans to start a new airlink between Cape Town and Dronning Maud Land beginning in Dec. 1996 using C-130 Hercules aircraft landing on a blue ice runway. Tourist operations are regarded as environmental and operational concerns as they are conducted by non-governmental groups and SCALOP/COMNAP formed a new working group to consider related issues.

The VII Symposium on Antarctic Logistics and Operations, and a Trade Exhibition on Polar Technology were held in conjunction with the SCALOP meeting. At the Symposium a series of 28 technical papers were presented. They dealt with a wide range of topics such as the use of GIS for logistic operations; remote sensing technology; the use of High Resolution Weather Satellite Imagery; wind energy; and dismantling and clean-up at a research station.

Twenty eight companies, among them six Canadians, from 10 countries participated in the Trade Exhibition. The Canadian exhibitors were:

- Adventure Network International, Vancouver B.C.
- ENFOTEC Technical Services Inc., Ottawa, Ont.
- First Air, Ottawa, Ont.
- Gulf Canada Resources Ltd., Calgary, Alb.
- Kenn Borek Air Ltd., Calgary, Alb.
- Weatherhaven Resources Ltd., Burnaby, B.C.

For details contact: Dennis Stossel, Tel. and Fax. 204 275-0747

UV-B Radiation Planning Workshop

An important workshop on 'The effects of UV-B radiation on different ecosystems at different latitudes', funded by the InterAmerican Institute for Global Change Research (IAI), was held in Ensenada, Mexico from September 15-19, 1996. This workshop, organized jointly by Serge Demers, Institute National de Recherches Scientifiques - Océanologie, Rimouski, Québec, Stephen de Mora (Workshop Chair), Université du Québec à Rimouski, Maria Vernet Scripps Oceanographic Institute, California, and Helmut Maske, Centre di Investigacion Cientifica y de Education Superior de Ensenada, Mexico, was sponsored by the Inter-American Institute Global Change Programme. Forty researchers from different disciplines and countries (Canada, United States, Mexico, Argentina, Brazil and Chile) discussed the formulation of a research strategy concerning potential problems relating to UV-B radiation enhancement following ozone depletion.

The meeting was divided into two parts, the first part was dedicated to oral presentations on different topics by invited speakers. These presentations were to establish the state of the art concerning the effects of UV-B and to evaluate the impact of such radiation on marine ecosystems. The second part was mainly discussion in small groups in order to develop research strategies. The goals of this meeting were firstly, to elaborate a strategy for a Phase II research proposal, secondly to establish a research network and thirdly to publish a book which will be edited by Stephen de Mora, Serge Demers and Maria Vernet. An Internet site will be prepared in order to share information concerning the UV-B problem.

For details, contact Dr. Serge Demers, Tel: 418-724-1483, Fax. 418 723-7234

IAATO -NSF meeting, July 11, 1996, Washington, D.C.

The International Association of Antarctic Tour Operators (IAATO) and the National Science Foundation (NSF) meet annually in a public forum to exchange information about last season's operations, to outline plans for the next season, and for NSF to update IAATO members on recent developments within the US Antarctic Program. All the tour operators, including the Canadian Adventure Network International (ANI) and Marine Expeditions Inc.(MEI), and representatives from the Antarctic Programs in Canada, Chile and the U.K, participated.

A record 9212 seaborne passengers visited Antarctica during the 1995/96 season. They travelled on 15 different vessels that made 113 separate voyages. In total the passengers made 1007 landings at 88 different locations. Most passengers visited the Antarctic Peninsula. The US Palmer Station is a popular stop, but as station personnel spend significant time and effort as hosts for the visitors, the number of visits is strictly limited. Some 30% of

all the seaborne passengers travelled on voyages arranged by MEI, Toronto. ANI flew 155 tourists to its base camp at Patriot Hills and onwards, e.g. to Emperor penguin rookeries, the South Pole, and climbing locations. The Australian Qantas Airlines made nine overflights over parts of Antarctica, carrying some 2960 passengers.

According to industry projections, about 6 500 seaborne tourists will visit Antarctica next season. The drop is expected because M/V Marco Polo, the largest vessel in the trade, will not be going to Antarctica this season.

Private yachts and the yacht operators are of concern to the IAATO, because the crews are often unaware of the applicable rules. One yacht operator has joined IAATO as an associate member and IAATO continues its out-reach effort toward this group.

For details contact: Olav Loken, Tel.&Fax. (613) 225-4234

IUCN Workshop on Cumulative Environmental Impacts in Antarctica

To implement the environmental assessment process established in the Environmental Protocol, the Treaty Parties must have (1) a common understanding of the meaning of some key terms, e.g. 'minor and transitory impacts' and 'cumulative impacts' and 2) timely access to the tools and means of evaluating these impacts. To promote the development of a consensus on 'cumulative impacts', the World Conservation Union (IUCN), which has a longstanding interest in Antarctic issues, sponsored a workshop in Washington, D.C., Sept. 18-21, 1996. Thirty participants from 11 countries took part, including Ms. Sylvie Dupuis of the Canadian Environmental Assessment Agency and Olav Loken representing CARP.

Discussions focused on: the concept of cumulative impacts; the ecological and historical knowledge needed to evaluate them; current 'hotspots' where cumulative impacts may be particularly important; and on the adequacy of the current information exchange mechanisms. Areas affected by many operators are of special concern, and timely and effective exchange of information among operators is essential. The current mechanisms should be reviewed. Recommendations from the workshop were presented in draft form to the World Conservation Congress in Montreal, Oct. 1996. A final report will be published later and submitted to the next Antarctic Treaty Consultative Meeting in May 1997, and to several other groups.

For further details, contact:
Olav H. Loken, Tel. & Fax (613) 225-4234

Recent Canadian Contributions to Antarctic and Bipolar Science

(N.B. Names of Canadian co-authors are underlined.)

de Mora, S.J., P.A. Lee, A. Grout, C. Shell, and K.G. Heumann. 1996: "Aspects of the biogeochemistry of sulphur in glacial melt water ponds on the McMurdo Ice Shelf, Antarctica". *Antarctic Science*, 8 (1), 15-22.

James, T., and E.R. Ivins. 1995: "Present-day Antarctic ice mass changes and crustal motion". *Geophys. Res. Lett.*, 22, 973-976.

Kriwoken, L.K., M. Haward, D. VanderZwaag, and B. Davis (eds.). 1996: *Ocean Law and Policy in the Post-UNCED Era: Australian and Canadian Perspectives*. Kluwer Law International, London/Dordrecht/Boston. 453 p. (17 chapters, two dealing with respectively Arctic and Antarctic environmental protection.)

Vincent, W.F. (ed.). 1996: *Environmental Management of a Cold Desert Ecosystem: The McMurdo Dry Valleys*. Desert Research Institute, University of Nevada, U.S.A. Special Publication, 57 pp.

CANADIAN ANTARCTIC RESEARCH PROGRAM EXECUTIVE COMMITTEE

For further information or suggestions regarding the activities of CARP/PRAC, please contact any of the following committee members.

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