

**CANADIAN OCEAN SCIENCE NEWSLETTER
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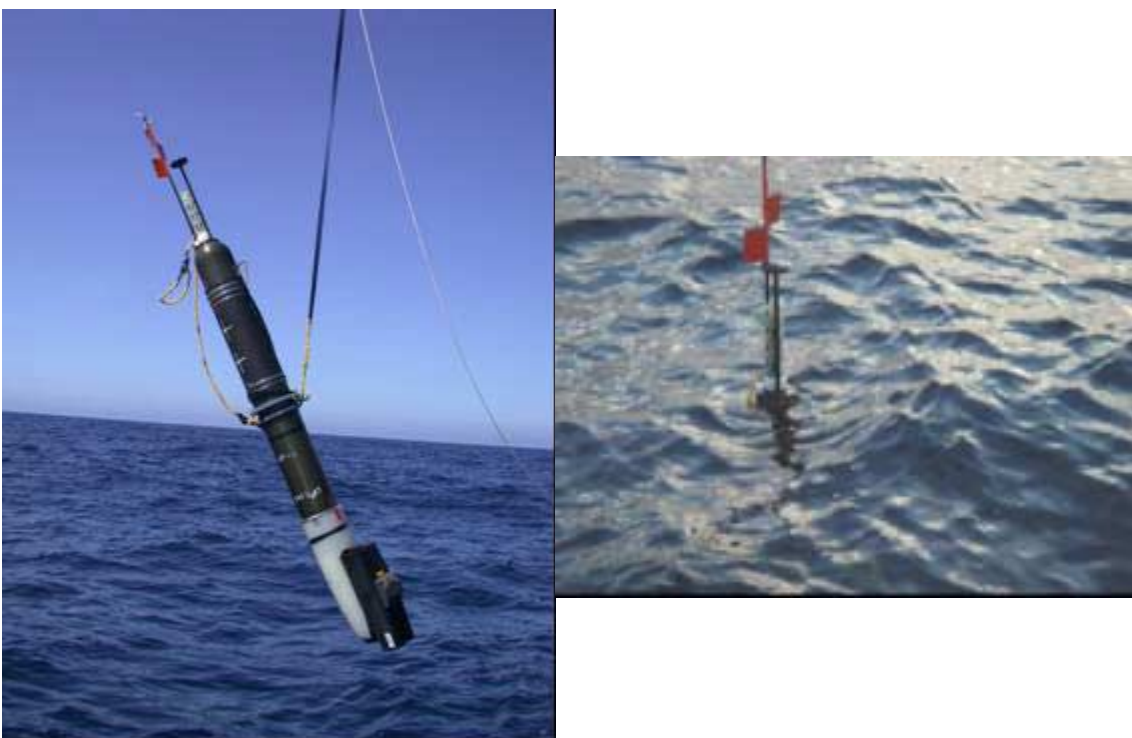
Integration and Deployment of a New Drifter: the SOLO and Laser-Optical Plankton Counter (LOPC)

Report by: Alex Herman, HermanA@mar.dfo-mpo.gc.ca, Brian Beanlands, BeanlandsB@mar.dfo-mpo.gc.ca

Ocean monitoring programs, e.g., Global Ocean Observing System (GOOS), Gulf of Maine Ocean Observing System (GoMOOS), and Ocean Research Interactive Observatory Networks (ORION) are undergoing dramatic growth to meet the data needs of the oceanographic community. Activities are focused on development of new technologies such as drifters and gliders providing autonomous operation and continual data monitoring and telemetry. Scripps

Institution of Oceanography (SIO) in 2003 initiated the development of a new drifter, the SOLOPC, under NSF funding with the collaboration of Brooke Ocean Technology Ltd., and the Department of Fisheries and Oceans, Maritimes. The project team (PI's & co-PIs) consisted of D. Checkley(SIO), R. Davis(SIO), A. Herman(BIO), & G. Jackson(TAMU). The SOLOPC consists of the integration of two current technologies, the SOLO drifter floats produced by SIO and the LOPC (designed to count and size zooplankton) developed at the Bedford Institute of Oceanography and licensed by DFO to Brooke Ocean Technology Ltd., in Dartmouth, NS. The first SOLOPC was successfully tested in a recent field deployment in California coastal waters Region - California Co-Operative Fisheries Investigation (CalCOFI) during September 27 – October 1, 2005, using the SIO-based research vessel, R/V Sproul. Dr. Alex Herman and Brian Beanlands from the Ocean Physics Section, OSD-DFO participated in the cruise and provided the development/technology for LOPC. In order to integrate with the SOLO drifter, the standard LOPC required considerable redesign of optics/sampling tunnel for payload-weight reduction, power reduction and data compression for transmission to an IRIDIUM satellite.

Photos SOLOPC being deployed from the R/V Sproul (first photo below) with the LOPC mounted at the base of SOLO (black sampling tunnel seen outside base) while the SOLO antennas (RDF and IRIDIUM) and CTD are mounted on top. Once deployed (second photo), the device telemeters its data to the IRIDIUM satellite. The SOLOPC "team" on R/V Sproul is pictured in the last photo. The SOLOPC typically begins its deployment at surface where it powers up the LOPC and begins to descend while LOPC acquires and stores its data. Once the SOLOPC reaches its prescribed depth (100 m, approximately, in seven minutes) its internal microcomputer begins communicating with the LOPC internal microcomputers. The LOPC then begins the process of data compression and data transfer to the SOLO. If the time to the next profile is long (hours-days), the SOLOPC and LOPC then go into "sleep mode" and stay at depth while continually drifting. Once awakened, SOLOPC commences its ascent to the surface, transmits its data to IRIDIUM after its antennas break surface, and then begins the next descent profile. In all SOLOPC drifted and profiled successfully for three days acquiring and telemetering 64 profiles before it was recovered. Scripps has begun building a second SOLOPC destined for long-term deployment in 2006 for 6months. In addition to the knowledge of this new drifter technology, DFO will gain considerable benefit in applying this type of satellite telemetry to its SeaHorse moored profiler used in AZMP(Atlantic Zonal Monitoring Program), ICYCLER and other applications.





Impacts of Eddies and Mixing on Biogeochemical cycling in the Open Ocean

Report by Blair Greenan, GreenanB@mar.dfo-mpo.gc.ca

The currents, fronts and eddies that comprise the oceanic mesoscale (10s to 100s of kilometres), sometimes referred to as the "internal weather of the sea", are highly energetic and ubiquitous features of ocean circulation. Dynamical consequences of these phenomena include perturbation of the physical, chemical and biological environment that can dramatically impact biogeochemical cycling in the ocean. The processes that regulate this response are extraordinarily complex, challenging us to understand how the physical, biological and chemical processes are functionally related.

Recent evidence suggests that mesoscale eddies are an important vertical transport mechanism for nutrients in the oligotrophic waters of the main subtropical gyres. Numerical simulations and satellite-based statistical estimates indicate that the magnitude of the eddy-driven nutrient flux could be sufficient to balance geochemical estimates of new production, which far exceed that which can be sustained by traditional mechanisms of nutrient supply. Relatively few direct observations of this mechanism are available, owing to the spatial and temporal intermittency of the events which drive it.

During the summer 2005, the Ocean Sciences Division led by Dr. Blair Greenan participated in the Eddies Dynamics, Mixing, Export, and Species composition (EDDIES) field program to study the impact of eddies in the Sargasso Sea. The program was funded by the U.S. National Science Foundation and also involved scientists from Woods Hole Oceanographic Institution (program lead), Rutgers University, University of Miami, University of Washington, University of California at Santa Barbara, Virginia Institute for Marine Sciences and the Bermuda Biological Station for Research. An anti-cyclonic mode-water eddy, which was approximately 150 km in diameter and centered 200 km southwest of Bermuda, was studied during the period of 20 June – 14 Sept 2005. Subtropical mode water is formed by convection each winter in an

east-west band at the northern edge of the subtropical gyre, just south of the Gulf Stream. High resolution surveys of the eddy were carried out with an undulating towed instrument which included a Video Plankton Recorder, a Fast Repetition Rate Fluorometer, and an *in situ* spectrophotometer. This suite of instruments facilitated simultaneous assessment of photosynthetic rates and the species assemblage of phytoplankton and zooplankton. These measurements were accompanied by discrete water sampling of biogeochemical properties in sets of stations along cross-sections of the eddy. Export was measured at selected locations within the mesoscale structure using neutrally-buoyant sediment traps. Rates of mixing between the surface mixed layer (order 10m) and waters at the base of the euphotic zone (order 100m) will be inferred from two methods, one involving the measurement of a tracer ^3He and the other with an SF_6 tracer release. Dr. Greenan participated in the SF_6 tracer release experiment by deploying a drifting SeaHorse moored profiler to make finestructure (meter-scale) CTD and current meter measurements. These finestructure measurements will allow us to make estimates of vertical mixing in the eddy and will be compared to the results of the SF_6 tracer release.

Taken together, this set of observations should be sufficient to test the hypothesis that eddy-induced upwelling increases photosynthetic rates, changes community structure and increases upper ocean particulate export from the euphotic zone, thereby playing an important role in biogeochemical cycling of the subtropical oceans. Further information on this field program is available at http://science.whoi.edu/users/mcgillic/eddies/EDDIES_Project.html

Arctic Change and Coastal Communities, Tuktoyaktuk, Northwest Territories, August 14-18, 2006

Arctic Change and Coastal Communities is the seventh conference in a biennial series, sponsored by the Canada Coastal Zone Association. This is the first of the series to be located on the Arctic coast. For additional details see: <http://www.czc06.ca/e/home.html>

The intent of the Coastal Zone Canada 2006 conference is to raise awareness about the unique challenges faced by residents of the Arctic coastal zone in the face of rapid changes occurring in Arctic marine ecosystems. While the focus is on coastal and ocean issues in the north, we encourage contributions from coastal areas around the world, recognizing that many of the drivers of coastal change, and the adaptation of people to them, are common to many parts of the world.

The Arctic Council of eight circumpolar nations has recently proposed an Arctic Marine Strategic Plan to address common marine issues in the Arctic Ocean and its seas. Building upon the Arctic Marine Strategic Plan, the Coastal Zone Canada Association intends to highlight Canadian and Circumpolar experience in marine and coastal management, building a bridge between the communities of the Inuvialuit Settlement Region of Canada – to those of Nunavut, Nuvavik, the Labrador Inuit Settlement Area and beyond Canada – to coastal communities throughout the circumpolar Arctic.

International Conference on Arctic Research Planning, ICARP II

Report by Geoff Holland, hollandg@shaw.ca

The second International Conference on Arctic Research Planning, ICARP II, takes place in Copenhagen ,10-12 November, 2005. More than 400 researchers, planners and experts from all

corners of the world have arranged to participate in the conference designed to plot the principal directions for international research cooperation in the Arctic for the next 10-15 years.

Polar research has captured the headlines in recent years, there is general agreement that climate change is most forcefully revealing itself in the Arctic area and that research results from here - like the canary in the old coal mines - can act as a warning about what we can expect in the future.

Canadians have been prominent in the planning for the Conference with Barry Goodison of Environment Canada and Geoff Holland, 2WE Associates Consulting Ltd., members of the Steering Group and Terry Prowse, Environment Canada, Chair of the Working Group on Cryosphere and Hydrologic Processes and Systems. There are 11 Working Groups spanning the natural and social sciences and many other Canadians are included amongst the 140 experts that have been preparing the research plans that will be discussed during the Conference.

ICARP II is seen as an important precursor to the International Polar Year 2007/8 and many of the scientists involved in the Planning for that event will be attending the Conference and holding parallel meetings over the same period. The conference's recommendations will influence international and national programmes over the next decade or so, not least in relation to the International Polar Year (IPY) in 2007-8.

IPY: Favourable Announcement

On September 21, 2005, the Deputy Prime Minister announced new Federal Government funding in the amount of \$150 million to enable Canada to carry out an innovative, interdisciplinary program for International Polar Year (IPY). The major focus of the program will be on polar science and research activities to address two priority areas: science for climate change impacts and adaptation, and the health and well-being of northern communities. This will fill scientific research needs beyond the capacity of existing programs, building on and supporting existing networks and facilities.

The challenge that lies ahead is to develop a transparent and comprehensive proposal review process within a very limited timeframe. These funds will be available to government, university and community researchers alike through a competitive peer review process in which proposed projects will be evaluated against strict criteria. A National Call for Proposals is currently being developed to be issued before Christmas 2005, with a deadline anticipated for March, 2006.

Approximately \$98M of the \$150M will be dedicated to the National Call for Proposals, of which almost \$80M will be awarded for research in the two key IPY research seasons (2007/08 and 2008/09). The remaining funding will be allocated to program delivery and ensuring key research elements (such as logistics, data management, communications and outreach) are effectively enabled.

In addition to the new \$150M being invested by Canada, the Natural Science and Engineering Research Council (NSERC) recently announced a dedicated \$6M fund for IPY research – funds available to the university research community. The deadline for NSERC submissions is November 28, 2005.

More than 1000 pre-proposals have been submitted to IPY International Program office. For those researchers that have engaged in the international and national pre-proposal processes, existing linkages and established plans will be useful as the national process is enabled. The Canadian secretariat is encouraging researchers to contact potential partners and collaborators refine existing and develop new full proposals by January 2006.

This announcement has provided Canada with an international leadership role for arctic research and participation in IPY. Canada was noted at the recent International Conference on Arctic Research Planning (ICARPII) in Copenhagen to be well ahead of other nations in terms of planning and securing funding for IPY. Much work remains to enable an effective and meaningful program and to follow through on Canada's leadership role. The announcement is just the beginning.

The National Call for Proposals is anticipated to be very widely distributed and the COSN will track the IPY developments closely. The Canadian secretariat website is a valuable source of information for researchers and students alike and can be found at (<http://www.ipy-api.ca/>). This site will also provide all necessary links and updates to the international program activities.

Oceanographic Photos

The August 2005 Newsletter reported on the initiation of a project to archive Canadian ocean science photos. Since that time response has been rather limited, but there have been some very interesting photos added to the site. To see the latest additions please visit www.cncscor.ca and look at the second entry listed as "Historical Oceanographic Photos". The site now has a dedicated search engine to better help find individuals. And of course if you have access to any interesting photos for the site, particularly group photos, please send them along to Dick Stoddart at dick.stoddart@sympatico.ca

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Newsletter #20 will be distributed on January 25, 2006. Please send contributions to dick.stoddart@sympatico.ca
Bulletin #20 sera distribué le 25 janvier 2006. Veuillez faire parvenir vos contributions à dick.stoddart@sympatico.ca

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