Print

Beaufort Gyre Exploration Project: Overview

Both icebreakers and air-supported ice camps were considered as platforms for performing the field deployment and recovery operations, and it was determined that icebreaker operations would be more practical, cost-effective, and safe. Therefore, arrangements were made to deploy these moorings in August 2003 from the Canadian Coast Guard Icebreaker *Louis S. St-Laurent* on a Joint Western Arctic Climate Study (JWACS) cruise, with Bon van Hardenburg (Institute of Ocean Sciences, IOS, Canada) as Chief Scientist. This began a long-term collaboration between researchers at WHOI and Fisheries and Oceans Canada at the Institute of Ocean Sciences to study the Beaufort Gyre.

Enlarge Image

Caravan for buoy deployment, 2003 field work. (courtesy Bon van Hardenburg)

JWACS is a scientific collaboration of researchers from Canada, the United States, Japan and China, spanning the Canadian Basin and the Mackenzie Shelf examining the impacts of climate variability on living and physical ocean processes. Research topics include atmospheric science, oceanography, climate change, potential effects of oil and gas exploitation and and biological observations. JWACS was supplanted by Joint Ocean Ice Study (JOIS) in 2005, JOIS is a scientific collaboration among researchers primarily from Canada, the United States and Japan. The field program began in 2002, and is expected to continue for six years.

2003

Three WHOI scientists were responsible for deploying the mooring systems in 2003 with help from IOS technicians and Coast Guard personnel: Andrey Proshutinsky, principal investigator, coordinated the effort and conducted ancillary observations, Willie Ostrom led the deployment operation, and Rick Krishfield prepared the instrumentation and assisted the deployment. A full survey of the hydrography and chemistry was also conducted by scientists from IOS and the Japan Marine Science and Technology Center (JAMSTEC). More detailed information on the 2003 cruise is available under the 2003 Dispatches and 2003 Deployment Procedure headings. Click here to read cruise report.

2004

In August 2004, all three moorings were successfully recovered during a JWACS cruise again on the *Louis St. Laurent*, and an enormous dataset retrieved from the instruments. After cleaning and re-powering, the systems were redeployed for another year, and a prototype Ice-Tethered Profiler was deployed in conjunction with an Ice-Mass Balance buoy. Richard Krishfield, John Kemp, and Kris Newhall from WHOI were responsible for the mooring and buoy operations, and provided updates and photos during the cruise on this website. Hydrography was again performed by IOS, headed by Sarah Zimmermann who was the Chief Scientist for the 2004 cruise. For more information about the mooring deployments, read the 2004 Deployment Procedure. Click here to read cruise report.

2005

Despite an unexpected week-long critical ship repair, the summer 2005 cruise was a great success. Chief Scientist Sarah Zimmermann and lead IOS technician Doug Sieberg headed the hydrography effort. The WHOI mooring team redeployed three deep-water Beaufort Gyre Observing System (BGOS) moorings and added a fourth. The 4 mooring systems form the core of the Beaufort Gyre Observing System (BGOS), which will continue to be maintained on a yearly basis at least until 2008. Two new ice-tethered profilers were deployed on thick ice floes. In addition, a mooring was deployed on the Beaufort shelf edge as an extension of WHOI Investigator Bob Pickart's array of instruments from the Shelf-Basin Interactions (SBI) project. For more information on the SBI mooring field work (2002-2004), visit the Edge of the Arctic Shelf website. Photographer/writer Chris Linder posted the 2005 dispatches. Click here to read cruise report.

2006

Chief Scientist Sarah Zimmermann led the 2006 expedition. Rick Krishfield, Will Ostrom, and Kris Newhall recovered and redeployed the four deep mooring systems that compose the Beaufort Gyre Observing System (BGOS). They will be redeployed again in 2007 and finally recovered in 2008. In addition, Bob Pickart's shelfbreak mooring was recovered and the CABOS mooring was be recovered and redeployed. Three ice-tethered profilers were deployed on the ice. Click here to read cruise report.

2007

This year, Sarah Zimmerman again lead the expedition on the icebreaker *Louis-St-Laurent*. We recovered and re-deployed the four moorings that compose the Beaufort Gyre Observing System. As part of projects associated with the International Polar Year, several instruments were added to the moorings, including sensors to measure the variability in the deepest waters of the Canada Basin and a set of sediment traps. We also deployed three ice-tethedered profilers and a bottom pressure recorder. Click here to read cruise report.

2008

In 2008, our BG project became a part of the Arctic Observing Network (AON) program of NSF. Four bottom-tethered moorings (which were deployed in 2007) were recovered, data was retrieved from the instruments, refurbished, and three were redeployed at "A", "B," and "D" (click here to see mooring sites) locations in August 2008 from the *CCGS Louis S. St. Laurent* during the JOIS 2008 Expedition. In addition, five Ice-Tethered Profiler (ITP) buoys were deployed, three in combination with SAMS Ice Mass Balance Arrays (SIMBA), one with an Ice Mass Balance buoy (IMB), and two with Arctic Ocean Flux Buoys (AOFB). Ocean hydrographic and geochemistry samples were collected at 73 CTD stations and 103 XCTD casts. Click here to read cruise report.

2009

Differing from previous years, the 2009 JOIS expedition was conducted from mid-September through mid-October. Lead again by Sarah Zimmermann on the *CCGS Louis S. St. Laurent*, the scientific parties were sometimes challenged by the weather which became increasingly wintry throughout the cruise. However, we still managed to perform nearly all of the scheduled hydrographic and geochemical stations, recover and redeploy all 3 BGOS moorings, redeploy the CABOS system, deploy 4 ITPs (one as part of an Ice-Based Observatory (IBO) including an IMB, AOFB, and atmospheric chemistry buoy (O-buoy)), and recover 2 ITPs. Click here to read cruise report.

2010

Bill Williams led the 2010 JOIS expedition, which was conducted in September to October on the *CCGS Louis S. St. Laurent.* Hydrographic and geochemical measurements were again acquired by the IOS team and collaborators, the 3 BG moorings were again serviced and replaced, and 4 more ITPs were deployed (2 as part of IBOs). Click here to read dispatches from the cruise. Click here to read cruise report.

2011

After 2-years of early fall field programs, the JOIS Expedition returned to a summer schedule in 2011, again led by Chief Scientist Bill Williams on the *CCGS Louis S. St. Laurent.* During July and August, IOS and collaborators again acquired hydrographic and geochemical measurements, the 3 BG moorings were again serviced and replaced, and 4 more ITPs were deployed (2 as part of IBOs). Click here to read dispatches from the cruise. Click here to read cruise report.

2012

2012 marked the 10th year of BGOS & JWACS/JOIS collaborations on expeditions to the Beaufort Gyre onboard the *CCGS Louis St. Laurent*. Bill Williams was again the Chief Scientist on the cruise, which occupied all of August and the first week of September. IOS and collaborators again acquired hydrographic and geochemical stations, the 3 BG moorings were again recovered, refurbished and redeployed, and 4 ITPs were deployed -- some with IMBs, AOFBs, O-buoys, and other automated measuring devices. In addition, 2 new mooring systems were deployed west of the BGOS array in collaboration with the National Institute of Polar Research (NIPR) and Tokyo University of Marine Science and Technology (TUMSAT) in Japan, and a JAMSTEC shallow water mooring on the Chukchi Abyssal Plain was recovered. Click here to read dispatches from the cruise. Click here to read cruise report.

2013

BGOS & JOIS collaborations to the Beaufort Gyre were again conducted onboard the *CCGS Louis St. Laurent* on a 5 week expedition beginning in August 2013 with Bill Williams again leading the science party. The 3 BG moorings were recovered, refurbished and redeployed, and 4 ITPs were deployed, along with IMBs, AOFBs, O-buoys, and other automated measuring devices. Hydrographic and geochemical stations throughout the region were again acquired by IOS and collaborators, and the 2 mooring systems deployed last year west of the BGOS array in collaboration with NIPR and TUMSAT in Japan were recovered. Click here to read dispatches from the cruise. Click here to read cruise report.

2014

Once again, ship scheduling caused our cruise to the Beaufort Gyre to conduct BGOS & JOIS collaborations on the *CCGS Louis St. Laurent* to be delayed until the end of summer. Our expedition began in mid-September, and lasted 4 weeks with Bill Williams again head of the science party. The 3 BG moorings were again successfully recovered, refurbished and redeployed, and 3 ITPs were deployed, along with IMBs, and O-buoys. IOS and collaborators again acquired hydrographic and geochemical stations throughout the region, although due to the reduced cruise duration less stations were able to be occupied than previous years. The 2 mooring systems recovered last year west of the BGOS array in collaboration with NIPR and TUMSAT in Japan were refurbished over the past year and redeployed. Click here to read dispatches from the cruise. Click here to read cruise report.

2015

This year's cruise to the Beaufort Gyre to conduct BGOS & JOIS collaborations on the CCGS Louis St. Laurent will begin in mid-September and last 4 weeks with Bill Williams leading the science party. The 3 BG moorings will again be recovered, refurbished and redeployed, and 2 ITPs are scheduled for deployment at stations, along with IMBs, an AOFB, and O-buoys. IOS and collaborators will acquire hydrographic and geochemical stations throughout the region. One of the 2 mooring systems deployed last year west of the BGOS array in collaboration with NIPR and TUMSAT in Japan will be recovered on this cruise (the other has already been recovered by a Korean research vessel). Dispatch information coming soon!

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