Meeting of the NetCOLOR community
Bedford Institute of Oceanography, Dartmouth Nova Scotia
February 14-15, 2017

Note: due to inclement weather, several participants were unable to travel to Dartmouth. The modified agenda and participant list are attached.

Welcome:
Marie Hélène Forget welcomed participants to the meeting and thanked the Bedford Institute of Oceanography for hosting the meeting and to researchers Emmanuel Devred and César Fuentes-Yaco for organizing the logistics for the event. She also expressed her gratitude to the Ocean Frontier Institute (OFI, Dalhousie University) for their support in offering to host the training session for students on Monday. Unfortunately, Dalhousie was closed due to the snow storm and, at the last minute, we arranged for the training to be held at the Delta Barrington.

MEOPAR – Stefan Leslie, Executive director, MEOPAR
MEOPAR's mandate is to:

- Fund and support interdisciplinary research across Canada in the fields of anticipating and responding to marine risk
- Provide training for Canada's next generation of scientific leaders
- Forge partnerships with organizations working on marine risk

The 4 primary components of the 2017-2022 program are:

- Observation- Canadian Integrated Observation System
- Prediction – advanced forecasting capabilities
- Coastal Resilience – coastal vulnerability assessments
- Marine Operations – risk assessment and mitigation

MEOPAR's network partners include 24 universities, 9 federal government ministries, industry, NGOs and coastal communities. There are also numerous international partners.

Communities of Practice (CoP) are groups of people connected by their shared interest in a particular topic who:

- Generate new knowledge to help inform government policy/regulations, community decision making or marine industry operations
- Include partners/end-users (and seek cash & in-kind funding for CoP)
- Identify research gaps and KM opportunities/challenges within the CoPs domain
- Encourage multi-disciplinary approaches and dialogue
- Provide training and mentorship opportunities for students & HQP

The CoPs will be housed in MEOPAR core focus areas and receive administrative and funding support. They will be expected to submit an application containing the following information (on templates provided by MEOPAR):

- Members of the CoP steering committee (5-8 people)
- Definition of the CoP's "domain"
- List of partners/end-users (engaged or targeted)
- List of desired outcomes (both short-term and long-term)
- List of activities in the first year

There will most likely be 6-8 CoPs supported by MEOPAR. NetCOLOR fits the definition. Debbie and Marie Hélène will further investigate this opportunity.

OCEAN Frontier Institute : Marlon Lewis – Launch Scientific Director.
The OFI was initiated in September 2016 and is headquartered at Dalhousie (61% of the funding), with additional centres at Memorial University (37%) and UPEI (2%). It incorporates ocean science, engineering, data science, ocean governance and social science. The initial focus will include changes in atmosphere-ocean interactions, sustainable aquaculture and fisheries, shifting ecosystems, ocean data analytics and marine safety. Research will be concentrated in the North Atlantic and Canadian Arctic Gateway, the region of deep water formation in the Labrador Sea. The $219.3M program is financed through CFREF ($93.7M), partners ($32.8M), other sources ($17M), in kind contributions ($75.8M) and includes the largest contribution of an individual donor in Dalhousie's history ($25M – John Risley, co-founder of Clearwater Seafoods). OFI's partners include Department of Fisheries and Oceans and the Canadian Coast Guard, Defence Research and Development Canada, Environment and Climate Change Canada, the Royal Canadian Navy and the National Film Board of Canada as well as
marine research institutions in USA, France, Germany, Ireland, and Norway. There are also many industrial partners.
Sixteen new faculty positions will be created at Dalhousie University and 11 new faculty will be hired at Memorial. University of Newfoundland. Seventeen (17) large, targeted, projects ($200K – $1M) will be funded in Phase 1 (2017-2022). A granting agency is presently being set up to 'get the money out the door' this spring. An open competition will be lauched for Phase 2 (2019-2024) funding. Projects in both phases must involve interdisciplinary teams and emerging scholars. A small seed fund ($120K/yr) will provide funding for risky and novel projects. A *New Opportunities Fund* ($430/y) will be established to take advantage of emerging technologies and opportunities. OFU will hire 16 technician/analysts at Dalhousie to support new projects. Funding will support 10 international post-doctoral fellowships at partner institutions, a visiting scholar program at Dalhousie and bilaterate graduate schools. Knowledge mobilization activities will include an Ocean school (presecondary, public outreach), support for start-ups, collaborations with government and industry (policy and commercialization) and a connection to the Centre for Ocean Ventures and Entrepreneurship (COVE – Coast Guard facilities).

In response to a question from Susanne Craig, Marlon Lewis said that there is a place for remote sensing in Phase 2, as long as it addresses issues related to the OFI program. There may also be room in the seed money category. Eric Rehm asked if there were plans to establish a connection with the Sentinel North Program at Université Laval, as some of the technology developmentns may be applicable to OFI.

Dr Lewis also explained the difference between MEOPAR & OFI, despite the synergy:

- MEOPAR isn't interested in aquaculture and fisheries
- MEOPAR is pan-Canadian, with lots of interest in Pacific waters
- MEOPAR is a facilitator, not a research institute – it has no infrastructure

Plenary presentation: Emmanuel Devred
Emmanuel presented the principle of light-matter interactions in the ocean and the benefits of ocean colour remote sensing for studying the pelagic ecosystem. The optically active components of water, what we can see in the first 10 m of depth by remote sensing, include: i) sea water, ii) phytoplankton, coloured dissolved organic matter (CDOM-yellow substances + detritus), iv) mineral particles. Phytoplankton is an important measure of primary production, health of the marine ecosystem, identification of ecologically and biologically significant areas, monitoring harmful algal blooms, inter- and intra-annual variations and biogeochemical cycles. CDOM and mineral particles are useful indicators of water quality, sediment transport, carbon export and bathymetry.

A brief explanation of how spectral information relates to satellite observations using various platforms (VIIRIS, MERIS, MODIS, PACE, HyprIRI, COCI) was provided as was the importance of temporal and spatial scales.

The Canadian aquatic colour community includes, but is not limited to, government and academic researchers at Fisheries and Oceans Canada (BIO, IML, CHS), Environment and Climate Change Canada, Canadian Space Agency, Dalhousie University, UQAR/ISMER, USherbrooke, ULaval, UOttawa, UManitoba, UVic, SFU, and UBC as well as people in private industry.

Emmanuel provided an example of the application of remote sensing in the Northwest Atlantic (Atlantic Zone Monitoring Program (AZMP) - data collected 1999-2005) and in the high Arctic (GreenEdge project):

- Decrease in sea ice concentration (SIC) in Baffin Bay (BB) and increase in Labrador Sea (LS), ice is thinner and more mobile
- Increase sea surface temperature (SST) in BB and decrease in LS due to input of cold freshwater from melting sea-ice and Greenland glaciers
- Increase in Chla in BB and decrease in LS, increased forcings from freshwater inputs – stratification and nutrients), increase in open water in BB, decrease in Lab
- Change of bloom occurrence in the Arctic, occurrence of fall bloom related to mixing (fall storms over open water due to decreasing SIC) – there is an increase of the 2-bloom signal with strong regional variations, spring ice-edge blooms are progressing northwards (from MODIS CHS time series)
- Phytoplankton functional types in Northwest Atlantic are being affected by changing climate, difference in the occurrence of diatoms in different areas- spectral information can be used to distinguish diatoms from other species (by size)

Application to fisheries management

Phytoplankton bloom is not a function of latitude, the date when 50% of shrimp eggs have hatched is correlated to the PSB maximum. Climate change can have a great impact on shellfish if bloom is delayed (high possibility of mix match). Satellite derived Chla is being added to a model to help scallop yield (meat/size ratio). The next step is to include phytoplankton community structure. Using a nested/hierarchical model, we could determine if larger phytoplankton sink faster. Diatom phenology from bi-weekly SeaWiFS images (1998-2006) is also being used to help predict haddock recruitment on the Scotian shelf.

Remote sensing of coastal water provides opportunities to study water quality, HABs, sediment transport and erosion, habitat management, and bathymetry. However, it also presents challenges such as spatial and temporal scales, atmospheric correction and adjacency effect given that the environment is optically complex.

Emmanuel presented the example about using high-resolution MODIS images (250m) to monitor the Fraser River plume in the Strait of Georgia. This area has been subject to dredging to accommodate marine traffic and is at risk for contamination by pollution and oil. It is also important tourism and recreation and is critical habitat for fish. The river flow drives the extent of the plume, while wind forcing drives the plume distribution.,

Remote sensing of water turbidity is being used to plan LIDAR bathymetric operations. If the secchi depth can be predicted, we can identify when and when the LIDAR field expedition should take place, thus saving money.

Sentinel-2, COCI and PACE and LIDAR images to provide information in the distribution of particles in the water column, under thin cloud, and at night

Assisting Fisheries Management: Water Colour in the West Coast – Mycira Costa (presented by Andrea Hilborn – UVIC)

The context: Synchrony between the primary and secondary phytoplankton bloom phenology and salmon productivity in the Salish Sea (Puget Sound, Strait of Juan de Fuca and the Strait of Georgia). An ecological approach is being used by the SPECRAL lab (Costa) at UVIC in collaboration with DFO and UBC to put together the pieces of the puzzle. Data is coming from satellites (MODIS, VIIRS, Sentinel-3), ferries, research vessels and citizen scientists. One of the issues for using ocean colour imagery from coastal water is the lack of data to validate the atmospheric correction. However, a lot of data of missing due to cloud cover. Autonomous sensors aboard of ferries is an optimal solution for collecting data to validate atmospheric correction. Ocean Networks Canada (ONC) instruments (oxygen, salinity, temperature, fluorescence, turbidity, meteorological, navigation and solar radiation sensors) have been installed on BC ferries (FOCOS project). Zwiei Wang's project involves the installation of SAS solar trackers, manufactured by Satlantic, on the Departure Bay-Horseshoe Bay and Duke Point-Tsawwassen routes. Sentinel 3 validation is being used (2900 matchups Sentenel-3/in situ tracker from June-October 2016).

Chla climatology of the north and central parts of the Salish Sea (2002-2016) shows more defined blooms in the central region, including a second bloom in October.

Water Colour application to support EBSA (Ecologically and Biologically Significant Area) – Reba McIver

An EBSA is an area of particularly high ecological or biological significance compared to other areas in the region. Its management strategy may require a greater degree of risk aversion. The identification of an ESBA does not give it special legal status or necessitate a management response. DFO is developing profiles of each ESBA to identify and prioritize management needs, including proxies for productivities (chla or PP), to identify area which can support higher biological activity. To date, the bulk of the information has been obtained in situ. Remote sensing products can provide supplemental data such as information about seasonal cycles, spatio-temporal variations in the boundaries of existing EBSAs, and persistent phytoplankton rich areas. Cluster analysis provides a robust and objective means of identifying areas of similarity. The next step is to use this technique to identify other EBSAs. In answer to a question from Marie Hélène Forget, this technique will probably not result in modifications of existing EBSAs.

Water colour applications to identify priority areas to enhance blue and northern bottlenose whale monitoring– Catalina Gomez

There is limited knowledge about the distribution, density and habitat of whales and dolphins (cetacean species) in the Northwest Atlantic. The idea is to use a database of opportunistic sightings from 1960 to present (120 789) off Nova Scotia, Newfoundland and Labrador, together with readily available broad scale environmental data as inputs to species distribution models to improve to identify priority areas to enhance and target whale monitoring activities in eastern Canada. The Northern bottle nose is a deep water feeder with about 160 individuals on the Scotian Shelf. Blue whales can eat up to 40M krill/day and has a population of about 250 individuals in the NW Atlantic. Environmental data includes ocean depth, seafloor topographic index and average summer SST derived from MODIS. Ocean colour products are used to identify and map plankton rich zones Chla and to calculate average regional Chla concentration. Four zones with similar environmental data were identified (Neritic (50-600m deep) North and South, Oceanic (>600m depth) North and South). Each region has unique oceanographic features, marine communities and food. High priority areas for blue whale monitoring include the outer margins of the eastern and western Scotian shelf and the southern portion of the Newfoundland shelf. In addition to these areas, Northern bottlenose whales can also be found on the Labrador shelf and in submarine canyons and deep basins. The model is currently being validated by the cetacean group at Dalhousie. The best predictors of whale distribution are SST, depth and spring Chla concentration. Chl was of higher importance for Blue whales, where depth was more important for Bottlenose. Comparison of these priority areas show did not coincide with existing protected areas for whales. Priority areas did overlap with high noise areas (shipping, seismic activities), which can have a major effect on whale behaviour (feeding, vocalizations, etc)

Discussion for ecosystem and fisheries management:
The question is how to integrate ocean colour into fisheries management. As more data is included, the model is modified, resulting in confusion. More time is spent adapting to the changes and learning how to interpret the results. It would be necessary to run two models side by side to see differences.
Action 1: We recognise that there is an inefficiency in knowledge transfer to management (end-user). NetCOLOR needs to provide knowledge product. We have to make products accessible, user friendly and publicize their utility. We also have to create opportunities to interact and inform managers and consult with end-users. DFO is working towards an ecosystem approach-intersectionality. We should consult different groups to make best use of products.

Stephen Parsons added that we have to know the question that needs to be answered in order to develop the RS product. George white added that more and more fishermen have advanced education and are interested in new technologies and knowledge transfer (feedback).

Lake Pulse Network – Yannick Huot (presented by Marie Hélène Forget)
The Lake Pulse Network is a NSERC Strategic Partnership Grant valued at $5.5M for five years which is looking at the health of lake systems across Canada. The network included 18 academic researchers, numerous federal and provincial government ministries as well as *Ouranos*. Canada is a large country with lots of lakes (good for limnologists) but few roads, making it difficult to access lakes for monitoring. To date, there has been no coherent and systematic effort to assess lakes due to different priorities, goals and resources of individual levels of government.
The network's objectives are to:

1. To assess the health status of Canadian lakes, to identify their key stressors, and to understand how these stressors have altered lake biogeochemical functioning.
    - Large-Scale Sampling of Lakes (LSSL) to obtain a coherent and consistent dataset across Canada complemented with Partners' datasets.
2. To forecast probable future changes in lake health status using climate and land-use scenarios.
    - Climate scenario simulations and land-use simulations with relationships derived from 1 above.
3. To develop new observational approaches, such as genomics and remote sensing, to provide managers with new stewardship tools.
    - Using LSSL data.

Sampling of 680 lakes in 11 ecozones will begin in 2018. A variety of optical, biological, chemical physical and paleolimnological variables will be measured. The network will build existing archived data from provincial partners and conduct a geomatical analyses (land use, lake colour and size…). The major deliverables for the five year program will be a mega database for Canadian lakes and an interactive website for data visualization, both of which will be publically available. for scientists and the general public.

The program will address 4 main themes:

- Assessing current lake health and function
- Identifying indicators related to lake health
- Scaling up measurements to ecozones and Canada
- Forecasting the ability of lakes to provide ecosystem services in the future

The timing coincides with the 3rd EPA National Lake Assessment in USA (1000 lakes). Lake Pulse researchers will rely on the experience of EPA scientists to align protocols, methodology and interpretation of results. The Network is currently recruiting students and Postdocs, please contact Yannick Huot!
A question was raised as to whether there will be a bias towards sampling of larger lakes and if there is a list of lakes that will be sampled. Marie Hélène will contact Yannick.

HYPERSPECTRAL SESSION

Coastal and In-land water imager (COCI) – Martin Bergeron (presented by Susanne Craig)
This is a proposed partnership between CSA, National Research Laboratory (NRL) to respond to PACE (Plankton, Aerosol, Cloud, Ocean Ecosystem). PACE is an ocean colour imager, polarimeter, scheduled for launch in 2022-2023. Despite the uncertainty for science in the USA, the PACE mission seems safe.
The COCI sensor is specifically designed for coastal and inland waters. It would be developed by CSA and the imaging pointer mechanism would be supplied by the USA. COCI will be launched on the same platform as PACE. The science questions for PACE (and COCI) are ecosystems change and the effect of changes on ecosystem function.
COCI would have a 100 m at nadir, spectral range from 360-910nm with atmospheric bands. The high performance VNIR hyperspectral imager will have ±120° tilt and ±45° cross track pointing capacity to maximize coverage. It will be equipped with dual spectrometers (128 km) to achieve a broader swath (240 km total). It will fly at an altitude of 670 km.
coverage will be prioritized in the US and Canada, but it will have a global coverage with priority regions. Revisit time is estimated at 8 days, but there would be the ability under emergency conditions to reduce revisit time to 2 days. COCI will build on existing HICO technology. Commercial systems are not foreseen for this instrument, which is intended for academic and government research purposes. The science plan is pending mission approval, which is in an advanced phase of evaluation. There will be an open call for interest made to academia, federal and provincial government and value-added industry on the activities: payload development, application and science development (through EOAU – GROP or G&C program), cal/val, and airborne demonstrations (2 flight campaigns, funded through FAST G&C program). The mission concept review will be held at NASA Goddard March 20-21, 2017). Although neither CSA nor NASA has expressed a formal commitment, a decision must be taken in the first half of 2017 to meet the PACE launch date in 2022/23.
PACE resolution: desired 100m spatial resolution, realistically 1km
COCI resolution: 10-30 m spatial resolution goal, realistically 100m

Hyperspectral remote sensing of coastal waters –Eduardo Loos
ASL Environmental has a expertise in aquatic remote sensing (spaceborne and airborne, as well as underwater) to provide services in water quality, oil spills, coastal habitat, wetland, land use, watershed management, mineral exploration. Eduardo provided numerous examples using hyperspectral RS: the thickness and extent of oil spills can be detected from hyperspectral data,

whereas multispectral only characterize the extent of the spills. Hyperspectral was used to provide classifications of different coastal and lakes regions for water quality or development purposes. HYMEX experiment was presented, with the products developed for bathymetry, Chl *a*, vegetation classification (macrophytes). The main advantage of hyperspectral is the flexibility of the wavelength being used for different applications. Limitation: low signal-to-noise ratio, and larger pixels. For hyperspectral, the derivatives may be an option to look into. Although it all depends on the spectral resolution. Could machine learning be a possible technique to work with hyperspectral? Work being done at the atmospheric level at Oxford that could be relevant to our field.

Satellite derived bathymetry at the Canadian Hydrographic Service (CHS) – Marc-André Faucher
CHS is part of DFO, and maintains and publishes the nearly 1000 nautical charts. The challenge is to increase the rate of product improvement especially for Arctic environments (importance for shipping routes). A government related initiative of the CSA is exploring the use of remote sensing for charting, using various remote sensing platforms. Preprocessing include geometric correction and radiometric corrections. Work is done in collaboration with Anders Knuby at the University of Ottawa. Different empirical models used were presented, relating estimated depth with measured depth. Under high turbidity, the accuracy decreases significantly, but in general accuracy around 40cm. Future work will include hyperspectral data in collaboration with DRDC to better resolve bathymetry and different bottom types. 'False' deep water could actually be kelp beds or seaweed. At the international level, France, UK and US have published nautical chart using satellite derived bathymetry technology. High priority areas are identified using a combination of high ship traffic and limited bathymetry confidence in these area, but could be other metrics as well. New technology such as AUV with multi-beam sonar or lidar is currently being considered for future maps.

Arctic ecosystems:

Atlantification of the Barent Sea – Laurent Oziel
The Barents Sea is very productive with complex bathymetry. Water masses were defined based on salinity-temperature properties and their spatial distribution presented. The Norwegian coastal current water creates a Polar front which is a hotspot for phytoplankton. The polar front has two branches, dominated by temperature in the north and by salinity in the south. The Barents Sea has experienced 70% loss in winter sea ice. The contribution of Atlantic water has increased over the last 15 years, and extended northward in the Barents Sea. Composite maps of high- and low-ice years were presented, showing differences in phytoplankton in cold and warm years. The climatology of the Barents Sea showed the patterns of phytoplankton blooms, ice melting, cocolithophore blooms, and other properties. Between the 2 different ice conditions, very different distribution of the spring blooms and cocolithophore blooms. There are 3 blooms in the Barents. In May, there is a large, omnipresent phytoplankton bloom, but by June, stratification and nutrient depletion limits the bloom to cocclithophores. In September, there is a smaller bloom of cocolithophores. The location of the spring bloom is dependent on the position of the ice edge and temperature, whereas the summer bloom is influenced by the polar front.

Northward expansion of phytoplankton spring bloom in the Arctic Ocean - Sophie Renaut

The 2016 summer ice extent was the lowest seen 2007. Ice extent depends on current and advection from Fram and Bering Straits, whereas ice dynamics are due to currents and wind. Albedo creates a positive feedback. According to the National Snow and Ice Data Center (NSIDC), there has been a 13% decline/decade in sea ice extent. Literature indicates an increase in primary production in the Arctic ecosystems. Between 1998 and 2015, the high productivity period increased by 47 days. The patterns of phytoplankton phenology in show a response to a longer growing season and more open-water in the Arctic Ocean, resulting in a 30% increase in Net Primary Productivity between 1998 and 2012. The number of blooms between 2003 and 2013 at the pan-arctic scale were presented. Results show an increase of Chl *a* and PP at the latitudes above the 75°N. Ice break up occurred earlier in the 2013 than in 2003. This resulted in an increase in PAR, biomass and primary production. The spring bloom moves northward by 0.1° per year. This northward progression is driven by the Barents and the Kara Sea and might result from an increased input of warm waters from the Atlantic through Fram strait, contributing to an earlier retreat of the ice cover.

Biogeochemical Argo – Katja Fennel

Argo floats are homogeneously distributed throughout the world's oceans, with the exception of the Arctic Ocean. A map was presented showing the position of the 400 Argo and biogeochemical-Argo floats that are currently deployed and transmitting data. Biogeochemical-Argo floats carry a payload including oxygen, chla fluorescence, nitrate, other biogeochemical sensors. Following a series of international initiatives over the last 10 years, a Canadian network for biogeochemical-floats was put in place and had its first meeting in January 2017. The Canadian community discussed the key science questions, such as Canada could play a leadership role in expanding the program's scope into the Arctic, and how to address carbon sequestration and exchange of oxygen, acidification and unexpected phenomena such as a warm blob in the north Pacific. There are mutually beneficial complementarities between Ocean Colour observation and Biogeochemical-Argo use. Argos extends surface observation in the vertical direction and expand the suite of observable parameters, thus improving calibration and validation of OC products, and thr potential for advances in satellite products (algorithms forexisting products such as PP and new products such as export flux etc). It was suggested that the data management should be done centrally, potentially through Coriolis. The problem with biogeochemical data is the post-processing is more complicated than the traditional temperature and salinity data.

Autonomous floats for Cal/Val – Ronnie van Dommelen

A vicarious calibration program is required to calibrate the optical sensors of satellite platforms, with data from sites such as MOBY and BOUSSOLE. Other initiatives have been developed to provide more flexible options that can be deployed in various environments. The Seabird system provide a broad spectral range, radiometric uncertainty less than 4%. The platform parks at 1000m to avoid bio-fouling. Two hyperNav sensors are supported on two arms to ensure no self-shading. Extrapolation is minimized by keeping the radiometer as close to the surface as possible. The system has been tested in Bedford Basin at UMaine in both calm (2 cm from the surface) and in choppier (15 cm from the surface) waters. It exhibits little tilt in free fall, going straight down. It is anticipated to react the same way in the open ocean. The LOV system spins during upward movement to avoid self-shading. This may be incorporated into the Seabird system. Still testing and haracterisation remain to be completed. The design and development phase should be completed by summer 2017, followed by deployment in different environments and production.

Users have expressed concern about the floats 'getting away' and wonder if the system can be tethered to the seafloor.

OLCI marine L2 products validation using moored buoy – Thomas Jaegler

The St Lawrence is characterised by productive, optically waters. The OLCI sensor was launched on Sentinel 3 in early 2016, with 21 spectral bands (440-1020nm). It is designed to monitor climate change. L2 marine validations rely on in-situ measurements. An automated processing chain was created for the St-Lawrence estuary for the array of buoys deployed by the Department of Fisheries and Oceans. Three sites were in operation in 2016 (IML4–Rimouski, IML6-Shediac, IML10-Anticosti/Newfoundland). The data characteristics were presented. Buoy shading can reduce the upwelling irradiance by 80%. Simon Bélanger developed and published an algorithm for correcting shadow and water leaving irradiance for IML4. Data was collected around solar noon. All data below a certain threshold was rejected. Tilt was restricted to 10%. Results from the match-ups between OLCI and the buoy data show good agreement and its performance is near the other sites for Cal/Val activities. The low signal due to optically complex water at the site of IML buoys may explain the high relative error. Other opportunities offered match-ups in the NW-Atlantic. Finally, a child buoy was developed and deployed by DFO in August 2016 to improve the data quality of optical data on the Viking buoy. 50% of the data was below the 10% tilt threshold and there was a good relationship with the parent buoy. DFO will extend its network of buoys (with 4 new sites in 2017 in NWA and 2 in Pacific). It was suggested to contact the atmospheric community because match up in the St Lawrence is poor in places.

Wrap-up Marie Hélène Forget

A wide variety of subjects were addressed over the course of the meeting. Marie Hélène thanks all of the speakers for their contribution. She expressed the need to promote aquatic colour products to end users, industry and stakeholders and to work in collaboration with them to produce products that meet their needs. The 10 Canadian priorities will be included in the NetCOLOR phase 1 report which will be available online and distributed to end users.

A special thank you was extended to MEOPAR and CSA for funding and to OFI and BIO for hosting the meeting.

Marie Hélène Forget
Debbie Christiansen Stowe