

Brief Biographic Sketch (November, 2009)

R. W. Macdonald

Not Relevant

EDUCATION

Ph.D. Dalhousie University, 1972

B.Sc. (Hon). Dalhousie

University Medal in Chemistry

Society of Chemical Industry Merit Award

Chemical Institute of Canada Prize

BRIEF RESUME

My oceanographic and geochemical research during the past 35 years falls under three major subjects: the cycling of organic carbon in the ocean, the cycling of freshwater in the Arctic Ocean, and contaminant pathways in temperate and polar aquatic systems. During the past decade, the boundaries between my fields of research have somewhat collapsed: it has become clear to me that organic carbon, freshwater and contaminants all interact with one another in ways that sometimes provide simplicity, sometimes complexity, but always reveal key processes where climate change can operate.

For organic carbon, much of my research is founded in the application of biomarkers (e.g., lignins, alkanes, PAH, sterols), stable isotopes ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) and $\Delta^{14}\text{C}$ to determine sources, mechanisms of transport, mechanisms of change, budgets and historical records of organic deposition. This research led to the production of a book in 2004, co-edited with Rudy Stein, that has since set the benchmark for organic carbon cycling in the Arctic Ocean. Organic carbon is also central to the cycling of almost every other element in the periodic table, but especially so for the redox elements whose release or capture depends critically on organic metabolism and its effect on oxygen or sulphate. Indeed, it is this connectivity that provides the potential to apply redox elements as paleo-proxies. Accordingly, I have also been researching processes that consume organic carbon, the effect of that consumption on the cycling of other elements, and the development of these other elements as windows into carbon metabolism.

For freshwater processing in the ocean, I have focused almost all of my attention on northern oceans and seas where runoff interacts with ice formation & melting with important consequences to ocean stability, convective overturning, shelf-basin exchange, organic carbon production and transport of material. The challenge of having two means by which freshwater is manipulated in the Arctic Ocean (sea ice and runoff) provides an exceptional opportunity for the application of stable isotope composition ($\delta^{18}\text{O}$) of water, which has the capacity to distinguish between runoff and ice melt/freezing. I have applied $\delta^{18}\text{O}$ measurements in the Arctic Ocean and Hudson Bay specifically to work out freshwater pathways and residence times over the shelves and to determine processes affecting stratification and water storage in both these locations. Along the way, I developed isotopic records in seasonal landfast ice as a proxy for winter oceanographic processes over shelves. Recently, the $\delta^{18}\text{O}$ work has been conducted in the context of understanding organic carbon processing in ice-covered waters, and the prospects for the control of light penetration into the ocean shifting to coloured organic matter (C-DOM) with loss of sea ice due to warming.

Finally, I have studied a wide range of contaminants (organochlorines, radionuclides, hydrocarbons, metals including mercury, ethoxylates) in west coast and Arctic waters. Much of the work has been aimed at revealing large-scale transport processes or investigating generic

processes that conspire to focus and concentrate contaminants in special places that put ecosystems at risk. These processes include physical phenomena, like the air-water exchange over the Bering Sea that 'chromatographs' certain pesticides and thereby decides whether these contaminants enter the Arctic in the atmosphere within days, or take perhaps a decade to get there via ocean currents. These processes also include biological phenomena like biomagnification or migration which, in the case of west-coast salmon, result in the mass transfer of PCBs out of the upper Pacific Ocean and into salmon nursery lakes. This latter process surprisingly circumvents all of the physical pathways normally considered to dominate large scale transport of semi-volatile contaminants.

Through the conduct of system science, as outlined above, I have become recognized for thinking about environmental systems at the large scale and for making connections between disciplines, which has resulted in frequent invitations on committees or to develop and/or lead assessments for contaminants and organic carbon. In these assessments, I have focussed mostly on physical and biogeochemical processes that provide the bottom-up underpinning for larger biota like fish or whales. Rather than thinking about contaminants as 'toxic chemicals', I have tended to apply them as elegant and varied tracers of environmental processes and pathways. These pathways have inevitably led me to my most recent research which has been to couple contaminant and organic carbon cycles and thus project some of the consequences that climate change will have on contaminant exposure and vulnerability in ecosystems. Similarly, I have shown that climate variability cannot be neglected when interpreting complex contaminant time series (e.g., persistent organic pollutants in seals or whales, or sediment core records of Hg). The work that I initiated on interactions between contaminants and climate change in 2003 has now become a major thematic focus for many ongoing national and international studies.

Although I have expended most of my energy studying the Arctic, I have not neglected my west-coast neighbourhood. Accordingly, I have worked my way through a series of studies to determine contaminant pathways and budgets in the Strait of Georgia, and the sources and processes affecting organic carbon. I've also examined connections between the Pacific Ocean, the west coast of North America and interior lakes in the context of contaminant loadings, relying heavily on lake sediment core records. In my work, I have applied a wide range of techniques and tools including sediment coring and dating, watermass analysis, particle flux into sediment traps, multivariate statistical analyses and box modeling.

I have directed/led multidisciplinary environmental programs: NOGAP B.6 (Beaufort Oceanography; 1986-1992); Arctic Environmental Strategy, Northern Contaminants Program (Long Range Transport to the Canada Basin; 1991- present); Greenplan Toxic Chemicals Program (Strait of Georgia Assessment Project; 1993-continuing); Fraser River Action Plan (Long-range transport of contaminants to the Fraser Basin; 1993-continuing), ArcticNet Themes 1&3 (2003-present) and supervised, co-supervised or served on committees for many graduate students.

The research has been conducted in collaboration with over 250 scientists from a wide variety of disciplines as recognized by co-authorship on publications. Among these collaborators are included some of the very best: physical oceanography (K. Aagaard, E. Carmack, H. Loeng); marine geochemistry (A. Chen, E.P. Jones, K.K. Liu, P. Schlosser, J.N. Smith, L.G. Anderson, M. Whitticar); atmospheric chemistry (L. Barrie, J. Pacyna; W. Schroeder; J. Fyfe); limnology and terrestrial geochemistry (J. Smol; J. Blais, B. Finney, D. McGuire, M.S.V. Douglas); contaminants (D.C.G. Muir; S. Eisenreich, T. Bidleman; J. Dachs; T. Harner; K.C. Jones; J.W. Readman); organic geochemistry (R. Stein, M. Goni, M. Yunker, L. Snowdon, R. Harvey; L. Guo; T. Eglinton); sediment geochemistry (E. Crecelius, C. Gobeil, T.F. Pedersen, B. Sundby); geology (B. Bornhold, A.S. Naidu, S. Solomon) and modeling (K. Denman; D. Mackay; A. Omstedt; F. Wania; F. Saucier).

SUMMARY OF ACCOMPLISHMENTS

Publication of ~160 papers in the journal literature, 30 papers in refereed proceedings/book chapters, over 50 technical/data reports and one co-edited book (The Organic Carbon Cycle in the Arctic Ocean, Stein & Macdonald). Co-authored or authored work has been cited over 4700 times (h index = 37). Participation in over 50 field trips, 29 chief scientist, 20 to the Arctic Ocean using departmental vessels, icebreakers and ice-capable aircraft.

MAJOR AWARDS

Elected a Fellow of the American Geophysical Union (2010).

Elected a 'Fellow International' of The Explorers Club (2007).

Mirosław Romanowski Medal of the Royal Society of Canada (2005)

Fellow of the Royal Society of Canada (FRSC) (2004)

Head of the Public Service Prize co-recipient (2001)

President's Prize of the Canadian Meteorological and Oceanographic Society (2000)

Fellow of the Chemical Institute of Canada (FCIC) (1989)

MINOR AWARDS AND DISTINCTIONS

DFO Distinction Award "In recognition of developing stable isotopes as a method to track where fish have been caught", team leader, 2010.

DFO Prix d'Excellence, co-recipient, 2008.

DFO Distinction Award "In recognition of dedication, commitment and outstanding scientific contribution related national and international climate change research" (2007).

Elected to Faculty Member of the Faculty of 1000 Biology for the "Ecosystem Ecology" Section(2007).

Best Paper award for articles published in Science of the Total Environment during 2004 and 2005

Biographed in the Canadian Who's Who (2005)

Biographed by the American Biographical Institute (2005)

Deputy Minister's Prix d'Excellence (2004)

Assistant Deputy Minister's Commendation (2003)

Vancouver Island Section Award for Outstanding Contributions to Chemistry (1997)

Biographed in American Men and Women in Science (19th Edition) (1995)

Canadian Coast Guard Commissioner's Commendation (1994)

United States Coast Guard Arctic Service Medal (1994)

RECENT APPOINTMENTS AND COMMITTEES

Chair of the Canadian National Committee for SCOR (CNC-SCOR) for 2009-2011.

Canadian IPY Science Review Committee – co Chair.

Ocean-Atmosphere-Ice-Interaction Science Steering Committee. (a component of the National Science Foundation (US) Arctic System Science (ARCSS) program (cf. Codispoti et al., 2001). (2001-2004)

Polar Research Board (United States) of The National Academies (2001-04)

Canadian Arctic Shelf Exchange Study (CASES) science steering committee. (2000-present)

Canadian IPY Steering Committee: Comprises a Canadian team to put forward Canada's International Polar Year science plan.

Continental Margins Task Team: Comprises an international team with the task to assess the contribution of continental margins and seas to CO₂ sequestration and horizontal flux of carbon, nitrogen and phosphorus across the ocean-continental margin boundaries (cf. Liu et al., 2000). My particular role is to lead the assessment of the Arctic Margins.

Canadian National Committee member for the Scientific Committee on Oceanic Research (CNC/SCOR) (2003-2007); (Chair for 2009-)

Committee on A Science Plan for the North Pacific Research Board (NPRB: 2002-2005).

Member of the Editorial Boards for *The Science of the Total Environment*, *Environmental Reviews* and the *Water Pollution Research Journal of Canada*

Guest Editor for a special edition of *Marine Environmental Research* volume 66 (Benthic processes, organic carbon cycling and contaminants in the Strait of Georgia, Canada), 2008

Guest Editor for *The Science of the Total Environment*, 2000 (254(2-3)) and 2005 (Contaminant Pathways)

Adjunct Professor at University of Victoria (CEOR), University of Manitoba (Department of Environment and Geography), and professor invite à Institut National de la Recherche Scientifique (Québec).

Current Projects and Funding

Metro Vancouver Monitoring Programme, \$150,000/year, 2008-2012

ArcticNet Theme 3, Co-PI with Stern, \$158,000/year, 2008-2011

Organic carbon flux and change in Canada's marginal seas, Co-PI with Gobeil, \$150,000/year, 2008-2010.

PCBs in Arctic Ocean Water, co-PI with Stern, \$27,000, 2008-09.

PUBLICATIONS (R.W. Macdonald)

JOURNAL ARTICLES

Grant, P.B.C., Johannessen, S.C., Macdonald, R.W., Yunker, M.B., Sanborn, M., Shaw, P., Dangerfield, N., Wright, C., Ross, P.S., 2011. Stuck in the mud: divergent depth-related marine sediment PCB and PBDE profiles explained by BDE-209. *Environmental Toxicology and Chemistry* accepted subject to revision.

Pučko, M., Stern, G.A., Macdonald, R.W., Barber, D.G., Rosenberg, B., 2011. The influence of the atmosphere-snow-ice-ocean interactions on the levels of hexachlorocyclohexanes (HCHs) in the Arctic cryosphere. *Journal of Geophysical Research* in press.

Kuzyk, Z.A., Macdonald, R.W., Stern, G.A. and Gobeil, C., 2011. Inferences about the modern organic carbon cycle from diagenesis of redox-sensitive elements in Hudson Bay. *Journal of Marine Systems*, in press.

Miller, L.A., Papakyriakou, T.N., Collins, R.E., Deming, J.W., Ehn, J., Macdonald, R.W., Mucci, A., Owens, O., Raudsepp, M. and Sutherland, N., 2011. Carbon dynamics in Sea Ice: A Winter Flux Time Series. *Journal of Geophysical Research*, 116: C02028 (doi:10.1029/2009JC006058).

Guo, L., Cai, Y., Belzile, C. and Macdonald, R.W., 2011. Sources and export fluxes of organic and inorganic carbon and nutrient species from the seasonally ice covered Yukon River. *Biogeochemistry*, in press.

McClelland, J.W., R.M. Holmes, K.H. Dunton and R.W. Macdonald, 2011. The Arctic Ocean estuary, *Estuaries and Coasts*, 2011 (doi:10.1007/s12237-010-9357-3).

Torres, M.E., Zima, D., Falkner, K.K., Macdonald, R.W., O'Brien, M.C., Schöne, B.R. and Siferd, T., 2011. Hydrographic changes in Nares Strait (Canadian Arctic Archipelago) in recent decades based on $\delta^{18}\text{O}$ profiles in bivalve shells. *Arctic*, in press.

2011

Pučko, M., Stern, G.A., Macdonald, R.W. and Barber, D.G., 2010. α - and γ -hexachlorocyclohexane (HCH) measurements in the brine fraction of sea ice in the Canadian High Arctic using a sump-hole technique, *Environmental Science and Technology*, 44:9258-9264 (doi:10.1021/es102275b).

Beaudin, L., Johannessen, S.C. and Macdonald, R.W., 2010. Coupling laser ablation and atomic fluorescence spectrophotometry: an example using mercury analysis of small sections of fish scales. *Analytical Chemistry*, 82:8785-8788 (doi: 10.1021/ac1021387).

McGuire, A.D., Macdonald, R.W., Schuur, E.A.G., Harden, J.W., Hayes, D.J., Christensen, T.R. and Heimann, M., 2010. The carbon budget of the northern cryosphere region *Current Opinion in Environmental Sustainability* 2: 231-236 (doi: 10.1016/j.cosust.2010.05.003).

Wang, F., Macdonald, R.W., Stern, G.A. and Outridge, P.M., 2010. When noise becomes the signal: Chemical contamination of aquatic ecosystems under a changing climate. *Marine Pollution Bulletin*, 60: 1633-1635.

Hare, A.A., G.A. Stern, Z.A. Kuzyk, R.W. Macdonald, S.C. Johannessen and F. Wang, 2010. Natural and anthropogenic mercury distribution in marine sediments from Hudson Bay, Canada, *Environmental Science and Technology*, 44(15):5805-5811 (doi:10.1021/es100724y).

Kuzyk, Z.A., R.W. Macdonald, S.C. Johannessen and G.A. Stern, 2010. Biogeochemical controls on PCB deposition in Hudson Bay, *Environmental Science and Technology* 44(9): 3280-3285 (doi:10.1021/es903832t).

Pospelova, V., S. Esenkulova, S.C. Johannessen, M.C. O'Brien, R.W. Macdonald, 2010. Organic-walled dinoflagellate cyst production, composition and flux from 1996 to 1998 in the central Strait of Georgia (BC, Canada): a sediment trap study, *Marine Micropaleontology*, 75(1-4): 17-37.

Macdonald, R.W. and Loseto, L.L., 2010. Are Arctic Ocean ecosystems exceptionally vulnerable to global emissions of mercury? A call for emphasized research on methylation and the consequences of climate change. *Environmental Chemistry*, 7:133-139 (doi:10.1071/EN09127).

Pučko, M., Stern, G.A., Barber, D.G., Macdonald, R.W. and Rosenberg, B., 2010. The International Polar Year (IPY) Circumpolar Flaw Lead (CFL) System Study: the importance of brine processes for α - and β -hexachlorocyclohexane (HCH) accumulation/rejection in the sea ice. *Atmosphere-Ocean*, 48(4):244-262. (doi:10.3137/OC318.2010).

Kuzyk, Z.A., Macdonald, R.W., Tremblay, J.-É. and Stern, G.A., 2010. Elemental and stable isotopic constraints on river influence and patterns of nitrogen cycling and biological productivity in Hudson Bay. *Continental Shelf Research* 30(2):163-176 (10.1016/j.csr.2009.10.014).

Carrie, J., Stern, G.A., Sanei, H., Macdonald, R.W., Outridge, P. and Wang, F., 2010. Increasing contaminant burdens in an Arctic fish, burbot (*Lota lota*), in a warming climate. *Environmental Science and Technology*, 44(1):316-322 (10.1021/es902582y).

2010

Brimble, S.K., Foster, K.L., Mallory, M.L., Macdonald, R.W., Smol, J.P. and Blais, J.M., 2009. High Arctic ponds receiving bio-transported nutrients from a nearby seabird colony are also subject to potentially toxic loadings of As, Cd and Zn. *Environmental Toxicology and Chemistry*, 28(11):2426-2433.

Lavoie, D., Denman, K. L., and Macdonald, R. W., 2009. Effects of future climate change on primary productivity and export fluxes in the Beaufort Sea. *Journal of Geophysical Research*, 115, C04018 (doi:10.1029/2009JC005493).

Yunker, M.B., Macdonald, R.W. and Snowdon, L.R., 2009. Glacial to post-glacial transformation of organic input pathways in Arctic Ocean basins. *Global Biogeochemical Cycles*, 23, GB4016, (doi:10.1029/2009GB003503).

Belicka, L.L., Macdonald, R.W. and Harvey, H.R., 2009. Trace element and molecular markers of organic carbon dynamics along a shelf-basin continuum in sediments of the western Arctic Ocean. *Marine Chemistry*, 115:72-85 (doi: 10.1016/j.marchem.2009.06.007).

Irvine, J.R., R.W. Macdonald, R. J. Brown, L. Godbout, J. D. Reist, E. C. Carmack, Beyond BASIS (Bering-Aleutian Salmon International Surveys) - salmon in the Arctic. *North Pacific Anadromous Fish Commission Bulletin* 2009, 5, 39-50.

Johannessen, S.C. and R.W. Macdonald, 2009. Effects of local and global change on an inland sea: the Strait of Georgia, British Columbia, *Climate Research*, 40:1-21 (doi: 10.3354/cr00819).

Kuzyk, Z. A., R. W. Macdonald, S. C. Johannessen, C. Gobeil, and G. A. Stern. 2009. Towards a sediment and organic carbon budget for Hudson Bay. *Marine Geology*, 264:190-208 (doi: 10.1016/j.margeo.2009.05.006).

Granskog, M. A., R. W. Macdonald, Z. Z. A. Kuzyk, S. Senneville, C. Mundy, D. G. Barber, G. A. Stern, and F. Saucier (2009), Coastal conduit in southwestern Hudson Bay (Canada) in summer: Rapid transit of freshwater and significant loss of colored dissolved organic matter, *Journal of Geophysical Research* 114, C08012, doi:10.1029/2009JC005270.

Smith, J. N., K. Lee, C. Gobeil, and R.W. Macdonald. 2009. Natural rates of sediment containment of PAH, PCB and metal inventories in Sydney Harbour, Nova Scotia. *Science of the Total Environment*, 407:4858-4869 (doi:10.1016/j.scitotenv.2009.05.029).

Michelutti, N., Liu, H., Smol, J. P., Kimpe, L. E., Keatley, B. E., Mallory, M. L., Macdonald, R. W., Douglas, M. S. V., and Blais, J. M., 2009. Accelerated delivery of polychlorinated biphenyls (PCBs) in recent sediments near a large seabird colony in Arctic Canada, *Environmental Pollution*, 157:2769-2775 (doi:10.1016/j.envpol.2009.04.025).

McGuire, A.D., L.G. Anderson, T.R. Christensen, S. Dallimore, L. Guo, D.J. Hayes, M. Heimann, T.D. Lorenson, R.W. Macdonald and N. Roulet, 2009. Sensitivity of the carbon cycle in the Arctic to climate change, *Ecological Applications*, 79(4):523-555 (cover article).

Macdonald, R.W., Forsland, V., Withler, R.E., Patterson, D.A. and Demsky, A., 2009. The use of stable oxygen isotope composition in sockeye salmon (*Oncorhynchus nerka*) body fluid to determine whether a fish has been caught in fresh water. *North American Journal of Fisheries Management*, in press.

Krümmler, E.M., Scheer, M., Gregory-Eaves, I., Macdonald, R.W., Kimpe, L.E., Smol, J.P., Finney, B. and Blais, J.M., 2009. Historical analysis of salmon-derived polychlorinated biphenyls (PCBs) in lake sediments. *Science of the Total Environment*, 407:1977-1989 (doi:10.1016/j.scitotenv.2008.11.028).

Lavoie, D., K.L. Denman and R.W. Macdonald, 2008. Primary productivity and export fluxes on the Canadian shelf of the Beaufort Sea: a modelling study. *Journal of Marine Systems*, 75:17-32 (doi:10.1016/j.jmarsys.2008.07.007).

2009

Macdonald, R.W., Wang, F., Stern, G.A. and P. Outridge, 2008. Mercury in the Arctic: are we overlooking the ocean? *Integrated Environmental Assessment and Management*, 5(1): 6-8.

Michelutti, N., B.E. Keatley, S. Brimble, J.M. Blais, H. Liu, M. S.V. Douglas, M.L. Mallory, R.W. Macdonald, J.P. Smol, 2008. Seabird-driven shifts in Arctic pond ecosystems. *Proceedings of the Royal Society B: Biological Sciences*, 276:591-596 (doi:10.1098/rspb.2008.1103).

Macdonald, R.W., Wang, F., Stern, G.A. and Outridge, P.M., 2008. The overlooked role of the ocean in mercury cycling in the Arctic. *Marine Pollution Bulletin*, 56:63-65 (doi:10.1016/j.marpolbul.2008.09.003).

Johannessen, S.C., Macdonald, R.W., Burd, B. and van Roodselaar, A., 2008. Biogeochemical cycling in the Strait of Georgia. *Marine Environmental Research*, 66:S1-S2 (doi:10.1016/j.marenvres.2008.10.001)

Johannessen, S.C., G. Potentier, C. A. Wright, D. Masson, and R.W. Macdonald. 2008. Water column organic carbon in a Pacific marginal sea (Strait of Georgia, Canada). *Marine Environmental Research*, 66:S49-S61 (10.1016/j.marenvres.2008.07.008).

Burd, B., R.W. Macdonald, S.C. Johannessen and A. van Roodselaar, 2008. Responses of subtidal benthos of the Strait of Georgia to ambient sediment conditions and natural and anthropogenic depositions. *Marine Environmental Research*, 66:S62 (doi:10.1016/j.marenvres.2008.08.009).

Macdonald, R.W., Johannessen, S.C., Gobeil, C., Wright, C.A., Burd, B., van Roodselaar, A. and Pedersen, T.F., 2008. Sediment redox tracers in Strait of Georgia sediments – can they inform us of the loadings of organic carbon from municipal wastewater? *Marine Environmental Research*, 66:S112-S120 (doi:10.1016/j.marenvres.2008.08.001).

Burd, B., Macdonald, R.W., van Roodselaar, A. and Wright, C.A., 2008. *Axinopsida serricata* shell encrustation as a geochemical indicator of organic enrichment conditions in sediments in the southern Strait of Georgia, British Columbia, Canada. *Marine Environmental Research*, 66:S101-S111 (doi:10.1016/j.marenvres.2008.08.008).

Johannessen, S.C., R.W. Macdonald, C.A. Wright, B. Burd, D.P. Shaw and A. van Roodselaar, 2008. Joined by geochemistry, divided by history: PCBs and PBDEs in Strait of Georgia sediments *Marine Environmental Research*, 66:S112-S120 (doi:10.1016/j.marenvres.2008.03.003).

Ross, P.S., Couillard, C.M., Ikononou, M.G., Johannessen, S.C., Lebeuf, M., Macdonald, R.W., Tomy, G., 2008. Large and growing environmental reservoirs of deca-BDE present an emerging health risk for fish and marine mammals. *Marine Pollution Bulletin*, 58:7-10 (doi:10.1016/j.marpolbul.2008.09.002).

Hare, A., Stern, G.A., Macdonald, R.W., Kuzyk, Z.A. and Wang, F., 2008. Contemporary and pre-industrial mass budgets of mercury in the Hudson Bay marine system: The role of lateral sediment recycling transport. *Science of the Total Environment*, 406:190-204 (doi:10.1016/j.scitotenv.2008.07.033).

Kuzyk ZA, Goni MA, Stern GA, Macdonald RW, 2008. Sources, pathways and sinks of particulate organic matter in Hudson Bay: evidence from lignin distributions. *Marine Chemistry*, 112:215-229 (10.1016/j.marchem.2008.08.001).

Chapman PM, Cullen J, Garrett C, Littlepage J, Pedersen TF, Varela D, Macdonald, R.W., Thomson, R., Parsons, T., 2008. Sewage treatment wasted - The Victoria (BC, Canada) example. *Marine Pollution Bulletin*, 56, 1815-1816 (10.1016/j.marpolbul.2008.05.015).

Outridge, P.M., R.W. Macdonald, F. Wang, G.A. Stern and A.P. Dastoor, 2008. A mass-balance inventory of mercury in the Arctic Ocean, *Environmental Chemistry*, 5, 89-111 (doi:10.1071/EN08002).(cover article).

Carmack, E.C. and Macdonald, R.W., 2008. Water and ice related phenomena in the coastal region of the Beaufort Sea: some parallels between native experience and western science. *Arctic*, 61(3):265-280.

Couillard, CM, RW Macdonald, SC Courtenay and V P Palace, 2008. Interactions between toxic chemicals and other environmental factors affecting the risk of impacts on aquatic organisms: A review with a Canadian perspective – Interactions affecting exposure, *Environmental Reviews*, 16, 1-17 (doi:10.1139/A07-007).

Couillard CM, Courtenay SC, Macdonald RW, 2008. Interactions between toxic chemicals and other environmental factors affecting the risk of impacts on aquatic organisms: A review with a Canadian perspective - Interactions affecting vulnerability. *Environmental Reviews*; 16:19-44 (doi:10.1139/A07-008).

Kuzyk, Z.A., R.W. Macdonald, M.A. Granskog, R.K. Scharien, R.J. Galley, C. Michel, D. Barber, and G. Stern, 2008. Sea ice, hydrological, and biological processes in the Churchill River estuary region, Hudson Bay, *Estuarine and Coastal Shelf Science*, 77/3, 369-384 (doi:10.1016/j.ecss.2007.09.030).

2008

Schiedek, D., B. Sundelin, J.W. Readman and R.W. Macdonald, 2007. Interactions between climate change and contaminants, *Marine Pollution Bulletin*, 54:1845-1856 (doi:10.1016/j.marpolbul.2007.09.020).

Hickie BE, Ross PS, Macdonald RW, Ford JKB, 2007. Killer whales (*Orcinus orca*) face protracted health risks associated with lifetime exposure to PCBs. *Environmental Science and Technology* 41(18), 6613-6619 (doi:10.1021/es0702519).

Guo, L. , C.-L. Ping* and R. W. Macdonald, 2007. Mobilization pathways of dissolved and particulate organic carbon across the arctic land/ocean interface in a changing climate, *Geophysical Research Letters*, 34, L13603 (doi:10.1029/2007G1030689).

Granskog MA, Macdonald RW, Mundy CJ, Barber DG, 2007. Distribution, characteristics and potential impacts of chromophoric dissolved organic matter (CDOM) in the Hudson Strait and the Hudson Bay. *Continental Shelf Research*; 27, 2032-2050 (doi:10.1016/j.csr.2007.05.001).

Bidleman TF, Kylin H, Jantunen LM, Helm PA, Macdonald RW, 2007. Hexachlorocyclohexanes (HCHs) in the Canadian Archipelago. 1. Spatial distribution and pathways of α -, β - and γ -HCHs in surface water. *Environmental Science and Technology* 2007;41(8), 2688-2695 (doi:10.1021/es062375b).

Gregory-Eaves I, Demers MJ, Kimpe L, Krümmel EM, Macdonald RW, Finney BP, Blais JM., 2007. Tracing salmon-derived nutrients and contaminants in freshwater food webs across a pronounced spawner density gradient. *Environmental Toxicology and Chemistry*, 26(6), 1100-1108.

Blais JM, Macdonald RW, Mackay D, Webster E, Harvey C, Smol JP., 2007. Biologically mediated transport of contaminants to aquatic systems. *Environmental Science and Technology*, 41(4), 1075-1084 (critical review), doi:10.1021/es061314a.

Drenzek NJ, Montluçon DB, Yunker MB, Macdonald RW, Eglinton TI., 2007. Constraints on the origin of sedimentary organic carbon in the Beaufort Sea from coupled molecular ^{13}C and ^{14}C measurements. *Marine Chemistry*; 103(1-2),146-162.

Leitch DR, Carrie J, Lean D, Macdonald RW, Stern GA, Wang F., 2007. The delivery of mercury to the Beaufort Sea of the Arctic Ocean by the Mackenzie River. *Science of the Total Environment*, 373, 178-195.

2007

Wrona FJ, Prowse TD, Reist JD, Hobbie JE, Levesque LMJ, Macdonald RW, Vincent WF, 2006. Effects of ultraviolet radiation and contaminant-related stressors on Arctic freshwater ecosystems. *Ambio*;35(7):388-401.

Williams, W.J., E.C. Carmack, K. Shimada, H. Melling, K. Aagaard, R.W. Macdonald, R.G. Ingram, 2006. Joint effects of wind and ice motion in forcing upwelling in Mackenzie Trough, Beaufort Sea, *Continental Shelf Research*, 26(19):2352-2366 (doi:10.1016/j.csr.2006.06.012).

Guo L, Macdonald RW, 2006. Source and transport of terrigenous organic matter in the upper Yukon River: evidence from isotope ($\delta^{13}\text{C}$, $\delta^{14}\text{C}$ and $\delta^{15}\text{N}$) composition of dissolved, colloidal and particulate phases. *Global Biogeochemical Cycles*, 20, GB2011 (doi:10.1029/2005GB002593).

Carmack, E.C., D. Barber, J. Christensen, R.W. Macdonald, B. Rudels and E. Sakshaug, 2006. Climate variability and physical forcing of the food webs and the carbon budget on panarctic shelves, *Progress in Oceanography*, 71:145-181 (doi:10.1016/j.pocean.2006.10.005).

O'Brien MC, Macdonald RW, Melling H, Iseki K., 2006. Geochemistry and physical forcing of sediment transport and deposition in the Canadian Beaufort Sea. *Continental Shelf Research*, 26:41-81 (doi:10.1016/j.csr.2005.09.007).

Johannessen, S.A., D. Masson and R.W. Macdonald, 2006. Distribution and cycling of suspended particles inferred from transmissivity in the Strait of Georgia, Haro Strait and Juan de Fuca Strait, *Atmosphere-Ocean*, 44(1):17-27.

2006

Krümmler EM, Gregory-Eaves I, Macdonald RW, Kimpe LE, Demers MJ, Smol JP, Finney B, Blais JM, 2005. Concentrations and fluxes of salmon--derived polychlorinated biphenyls (PCBs) in lake sediments. *Environmental Science and Technology*, 39:7020-7026 (doi:10.1021/es050657g).

Christensen, J.R., M. MacDuffee, R.W. Macdonald, M. Whittcar and P.S. Ross, 2005. Pacific salmon deliver persistent organic pollutants to British Columbia grizzly bears, *Environmental Science and Technology*, 39(18):6952-6960 (doi:10.1021/es050749f).

Scott BF, Macdonald RW, Kannan K, Fisk A, Witter A, Yamashita N, Durham L, Spencer C, Muir DCG, 2005. Trifluoroacetate (TFA) profiles in the Arctic, Atlantic and Pacific Oceans, *Environmental Science and Technology*, 39(17):6555-6560 (doi:10.1021/es047975u).

Johannessen SA, Macdonald RW, Eek M, 2005. Mercury in Strait of Georgia sediments: A story of contamination and mixing. *Environmental Science and Technology*, 39(12):4361-4368 (doi:10.1021/es04535i).

Stern GA, Macdonald RW, 2005. Biogeographic provinces of total and methyl mercury in zooplankton and fish from the Beaufort and Chukchi Seas: Results from the SHEBA drift. *Environmental Science and Technology*, 39:4707-4713 (doi:10.1021/es0482278).

Yunker, M.B., L.L. Belicka, H.R. Harvey and R.W. Macdonald, 2005. Tracing the inputs and fate of marine and terrigenous organic matter in Arctic Ocean sediments: A multivariate analysis of lipid biomarkers, *Deep-Sea Research, Part II*, 52:3478-3508.

Macdonald, R.W., 2005. Climate change, risks and contaminants: A perspective from studying the Arctic. *Human and Ecological Risk Assessment*, 11: 1099-1104 (doi:10.1080/10807030500346482).

Johannessen, S.C., M.C. O'Brien, K.L. Denman and R.W. Macdonald, 2005. Seasonal and spatial variations in the source and transport of sinking particles in the Strait of Georgia, Canada. *Marine Geology*, 216:59-77 (doi:10.1016/j.margeo.2005.01.004).

Macdonald, R.W., T. Harner and J. Fyfe, 2005. Recent climate change in the Canadian Arctic and its impact on contaminant pathways, *Science of the Total Environment*, 342:5-86 (doi:10.1016/j.scitotenv.2004.12.059).

Steffen, S., W. Schroeder, R.W. Macdonald, L. Poissant and A. Konoplev, 2005. Mercury in the arctic atmosphere: an analysis of eight years of measurements of GEM at Alert (Canada) and a comparison with observations at Amderma (Russia) and Kuujjuarapik (Canada). *Science of the Total Environment*, 342:185-198 (doi:10.1016/j.scitotenv.2004.12.048).

Li, Y.-F., and R.W. Macdonald, 2005. Sources and pathways of selected organochlorine pesticides to the Arctic and their impacts to the existence of these pesticides in the Arctic environment: A review. *Science of the Total Environment*, 342:86-106 (doi; 10.1016/j.scitotenv.2004.12.027).

Bidleman, T.F., R.W. Macdonald, and J.P. Stow, 2005. Sources, Occurrence, Trends and Pathways of Contaminants in the Arctic Physical Environment: Introduction to the Special Issue, *Science of the Total Environment*, 342:1-4 (doi; 10.1016/j.scitotenv.2004.12.026).

Goñi, M.A., M.B. Yunker, R.W. Macdonald and T.I. Eglinton, 2005. The supply and preservation of ancient and modern components of organic carbon in the Canadian Beaufort Shelf of the Arctic Ocean, *Marine Chemistry*, 93:53-73.

2005

Carmack, E.C., R.W. Macdonald and S.E. Jasper, 2004. Pelagic phytoplankton productivity on Canadian shelf of the Beaufort Sea. *Marine Ecology Progress Series*, 277, 37-50.

Belicka, L.L., R.W. Macdonald, M.B. Yunker and H.R. Harvey, 2004. The role of depositional regime on carbon transport and preservation in Arctic Ocean sediments, *Marine Chemistry*, 86, 65-88.

McLaughlin, F.A., E.C. Carmack, R.W. Macdonald, H. Melling, J.H. Swift, P.A. Wheeler, B.F. Sherr and E.B. Sherr, 2004. The juxtaposition of Atlantic and Pacific-origin waters in the Canada Basin, 1997-1998: A Basin in Transition, *Deep-Sea Research I*, 51, 107-128.

Li, Y.-F., R.W. Macdonald, J.M. Ma, H. Hung, and S. Venkatesh 2004. Historical a-HCH budget in the Arctic Ocean: The Arctic mass balance box model (AMBBM). *The Science of the Total Environment*, 324, 115-139.

Gallagher, L., R.W. Macdonald and D.W. Paton, 2004. The Historical Record of Metals in Sediments from Six Lakes in the Fraser River Basin, British Columbia, *Water, Air and Soil Pollution*, 152, 257-278.

2004

Krümmel, E., R.W. Macdonald, L. E. Kimpe, I. Gregory-Eaves, M.J. Demers, J.P. Smol, B. Finney, J.M. Blais, 2003. Anadromous PCB transport via Salmon migration, *Nature*, 425, 255-256.

Yunker, M.B. and R.W. Macdonald, 2003. Petroleum biomarker sources in suspended particulate matter and sediments from the Fraser River Basin and Strait of Georgia, *Organic Geochemistry*, 34, 1525-1541.

Macdonald, R.W., B. Morton and S. C. Johannessen, 2003. A Review of marine environmental contaminant issues in the North Pacific: the dangers and how to identify them?, *Environmental Reviews*, 11(2), 103-139.

Yunker, M.B. and R.W. Macdonald, 2003. Alkane and PAH depositional history, sources and fluxes in sediments from the Fraser River Basin and Strait of Georgia, *Organic Geochemistry*, 34, 1429-1454.

Codispoti, L., Hawkey, J., Perovich, D., Barrie, L., Darby, D., Delworth, T., Eicken, H., Macdonald, R.W., Matrai, P., Ogilvie, A., Shepson, P., Steele, M., Thompson, D., Tynan, C., and Weatherly, J. 2003. Investigating the Arctic marine environment during a period of rapid change: Development, accomplishments, and outlook for OAI. *Arctic Research of the United States* 17: 9-17.

Macdonald R.W., D. Mackay, Y.-F. Li and B. Hickie, 2003. How will global climate change affect risks from long-range transport of persistent organic pollutants? *Human and Ecological Risk Assessment* 9(3), 643-660.

Smith J.N., S.B. Moran and R.W. Macdonald, 2003. Shelf-basin interactions in the Arctic Ocean based on ²¹⁰Pb and Ra isotope tracer distributions. *Deep-Sea Research Part I*, 50(3), 397-416.

Johannessen, S.C., R.W. Macdonald, and D.W. Paton, 2003. A sediment and organic carbon budget for the greater Strait of Georgia. *Estuarine and Coastal Shelf Science*, 56(3-4), 845-860.

2003

Macdonald, R.W., F.A. McLaughlin and E.C. Carmack, 2002. Freshwater and its sources during the SHEBA drift in the Canada Basin of the Arctic Ocean, *Deep-Sea Research Part I*, **49(10)**, 1769-1785.

Macdonald R. W., D. Mackay, and B. Hickie 2002. Contaminant amplification in the environment: Revealing the fundamental mechanisms. *Environmental Science and Technology*, **36(23)**, 457A-462A (cover article).

Strain, P.M., and R.W. Macdonald, 2002. The Design and Implementation of a Program to Monitor Ocean Health, *Ocean and Coastal Management*, **45**, 325-355.

Belicka, L.L., R.W. Macdonald, and H.R. Harvey, 2002. Sources and transport of organic carbon to shelf, slope, and basin surface sediments of the Arctic Ocean, *Deep-Sea Research Part I*, **49(8)**, 1463-1483.

Li, Y.-F., R.W. Macdonald, L.M.M. Jantunen, T. Harner, T.F. Bidleman and W.M.J. Strachan, 2002. The transport of β -hexachlorocyclohexane to the western Arctic Ocean: a contrast to α -HCH. *The Science of the Total Environment*, **291(1-3)**, 229-246.

McLaughlin, F.A., E.C. Carmack, R.W. Macdonald, A. Weaver, and J. N. Smith, 2002. The Canada Basin 1989-1995: Upstream events and far-field effects of the Barents Sea, *Journal of Geophysical Research*, **107(C7)**, 10.1029/2001JC000904, pp 19-1 – 19-20.

Yunker, M.B., S.M. Backus, E. GrafPannatier, D.S. Jeffries and R.W. Macdonald, 2002. Sources and significance of alkane and PAH hydrocarbons in Canadian arctic rivers. *Estuarine and Coastal Shelf Science*, **55**, 1-31.

Carmack, E.C., and R.W. Macdonald, 2002. Oceanography of the Canadian shelf of the Beaufort Sea: A setting for marine life. *Arctic*, **55** (Supp. 1), 29-45.

Yunker, M.B., R.W. Macdonald, R. Vingarzan, R.H. Mitchell, D. Goyette, and S. Sylvestre, 2002. PAHs in the Fraser River basin: a critical appraisal of PAH ratios as indicators of PAH source and composition. *Organic Geochemistry*, **33**, 489-515.

2002

Chen, C.-T. A, K.-K. Liu and R.W. Macdonald, 2001. Continental margins and seas as carbon sinks, *Global Change NewsLetter*, **46**, 11-13.

Gobeil, C., R.W. Macdonald, J.N. Smith, and L. Beaudin, 2001. Lead contamination in Arctic basin sediments tracks Atlantic water flow pathways. *Science*, **293**, 1301-1304.

Gobeil, C., B. Sundby, R.W. Macdonald and J.N. Smith, 2001. Recent change in organic carbon flux to Arctic Ocean deep basins: Evidence from acid volatile sulfide, manganese and rhenium discord in sediments. *Geophysical Research Letters*, **28(9)**, 1743-1746.

2001

K.-K. Liu, L. Atkinson, C.-T.A. Chen, S. Gao, J. Hall, R.W. Macdonald, L. Talaue McManus, R. Quiñones, 2000. Exploring Continental Margin Carbon Fluxes in Global Context. *Eos, Transactions, American Geophysical Union*, **81(52)**, 641, 642, 644.

Naidu, A.S., L.W. Cooper, B. P. Finney, R.W. Macdonald, C. Alexander and I.P. Samiletov, 2000. Organic carbon isotope ratios ($\delta^{13}\text{C}$) of arctic Amerasian continental shelf sediments, *International Journal of Earth Sciences*, **89**, 522-532.

Macdonald, R.W., L.A. Barrie, T.F. Bidleman, M.L. Diamond, D.J. Gregor, R.G. Semkin, W.M.J. Strachan, Y.F. Li, Wania, F., M. Alaee, L.B. Alexeeva, S.M. Backus, R. Bailey, J.M. Bowers, C. Gobeil, C.J. Halsall, T. Harner, J.T. Hoff, L.M.M. Jantunen, W.L. Lockhart, D. Mackay, D.C.G. Muir, J. Pudykiewicz, K.J. Reimer, J.N. Smith, G.A. Stern, W.H. Schroeder, R. Wagemann, M.B. Yunker, 2000. Contaminants in the Canadian Arctic: 5 years of progress in understanding sources, occurrence and pathways, *The Science of the Total Environment* (special issue), **254 (2-3)**, 93-236.

Lockhart, W.L., R.W. Macdonald, P.M. Outridge, P. Wilkinson, J.B. DeLaronde and J.W.M. Rudd, 2000. Tests of the fidelity of lake sediment core records of mercury deposition to known histories of mercury contamination. *The Science of the Total Environment*, **260**, 171-180.

Goñi, M., M.B. Yunker, R.W. Macdonald and T.I. Eglinton, 2000. Distribution and sources of organic biomarkers in arctic sediments from the Mackenzie River and Beaufort Shelf, *Marine Chemistry*, **71**, 23-51.

Harner, T., L.M.M. Jantunen, T.F. Bidleman, H. Kylin, W.M.J. Strachan, R.W. Macdonald, L.A. Barrie, 2000. Microbial degradation is a key elimination pathway of hexachlorocyclohexanes from the Arctic Ocean, *Geophysical Research Letters*, **27(8)**, 1155-1158.

Burd, B., R.W. Macdonald and J. Boyd, 2000. Punctuated recovery of sediments and benthic infauna: A 19 year study of tailings deposition in a British Columbia fjord, *Marine Environmental Research*, **49(2)**, 145-175.

2000

Gobeil, C., R.W. Macdonald and J.N. Smith, 1999. Mercury profiles in sediments of the Arctic Ocean basins, *Environmental Science and Technology*, **33**, 4194-4198.

Macdonald, R.W., E.C. Carmack, F.A. McLaughlin, K.K. Falkner and J.H. Swift, 1999. Connections among ice, runoff and atmospheric forcing in the Beaufort Gyre, *Geophysical Research Letters*, **26 (15)**, 2223-2226 (cover article).

Shang, D.Y., R.W. Macdonald, M.G. Ikonou, 1999. The persistence of nonylphenol ethoxylate surfactants and their primary degradation products in sediments from near a municipal outfall in the Strait of Georgia, British Columbia, Canada, *Environmental Science and Technology*, **33 (9)**, 1366-1372.

Macdonald, R.W., E.C. Carmack and D.W. Paton, 1999. Using the $\delta^{18}\text{O}$ composition in landfast ice as a record of arctic estuarine processes. *Marine Chemistry*, **65 (1-2)**, 3-24.

Shang, D.Y., M.G. Ikonou and R.W. Macdonald, 1999. Quantitative determination of nonylphenol polyethoxylate surfactants in marine sediment using liquid chromatography - electrospray mass spectrometry, *Journal of Chromatography A*, **849 (2)**, 467-482.

Yunker, M.B., R.W. Macdonald, D. Goyette, D.W. Paton, B.R. Fowler, D. Sullivan and J. Boyd. 1999. Natural and anthropogenic inputs of hydrocarbons to the Strait of Georgia. *The Science of the Total Environment*, **225 (3)**, 181-209.

Bright, D.A., W.J. Cretney, R.W. Macdonald, M.G. Ikonou and S.L. Grundy, 1999. Differentiation of polychlorinated dibenzo-p-dioxin and furan sources to Howe Sound and the Strait of Georgia, coastal British Columbia. *Environmental Toxicology and Chemistry*, **18 (6)**, 1097-1108.

1999

Kulikov, E.A., E.C. Carmack and R.W. Macdonald, 1998. Flow variability at the continental shelf break of the Mackenzie Shelf in the Beaufort Sea. *Journal of Geophysical Research*, **103 (C6)**, 12,725-12,741.

Macdonald, R.W., M. G. Ikonou and D. W. Paton, 1998. Historical inputs of PCDDs, PCDFs and PCBs to a British Columbia interior lake; the effect of environmental controls on pulp mill emissions. *Environmental Science and Technology*, **32**, 331-337.

Macdonald, R.W., S.M. Solomon, R.E. Cranston, H.E. Welch, M.B. Yunker and C. Gobeil, 1998. A sediment and organic carbon budget for the Canadian Beaufort shelf. *Marine Geology*, **144(4)**, 255-273.

1998

Carmack, E.C., K. Aagaard, J.H. Swift, R.W. Macdonald, F.A. McLaughlin, E.P. Jones, R.D. Perkin, J. Smith, K. Ellis, L. Kilius, 1997. Changes in temperature and tracer distributions within the Arctic Ocean: results from the 1994 Arctic Ocean section, *Deep-Sea Research II*, **44 (8)**, 1487-1502.

Swift, J.H., E.P. Jones, K. Aagaard, E.C. Carmack, M. Hingston, R.W. Macdonald, F.A. McLaughlin and R.G. Perkin, 1997. Waters of the Makarov and Canada Basins, *Deep-Sea Research II*, **44(8)**, 1503-1529.

Gobeil, C., R.W. Macdonald and B. Sundby, 1997. Diagenetic separation of cadmium and manganese in suboxic continental margin sediments. *Geochimica et Cosmochimica Acta*, **61**, 4647-4654.

1997

Pfirman, S., P. Schlosser and R.W. Macdonald, 1996. Assessment of contaminant risks in the Arctic. *Arctic Research of the United States*, **10**, 11-23.

Odhaimbo, B.K., R.W. Macdonald, M.C. O'Brien, J. Harper and M.B. Yunker, 1996. Transport and fate of mine tailings in a coastal fjord of British Columbia as inferred from the sediment record. *Science of the Total Environment*, **191**, 77-94.

Aagaard, K., L.A. Barrie, E.C. Carmack, K. Garrity, E.P. Jones, D. Lubin, R.W. Macdonald, J.H. Swift, W.B. Tucker, P.A. Wheeler, R.H. Whitner, 1996. U.S., Canadian Researchers explore the Arctic Ocean. *Eos, Transactions, American Geophysical Union*, **77 (22)**, 209, 213.

Macdonald, R.W. and J.M. Bowers, 1996. Contaminants in the Arctic Marine Environment: Priorities for Protection. *ICES Journal of Marine Science*, **53**, 537-563.

Macdonald, R.W. and M.C. O'Brien, 1996. Sediment trap evaluation of mine tailings transport. *Marine Georesources and Geotechnology*, **14**, 97-109.

Yunker, M.B., L. R. Snowdon, R.W. Macdonald, J.N. Smith, M.G. Fowler, D.N. Skibo, F.A. McLaughlin, A.I. Danyushevskaya, V.I. Petrova and G.I. Ivanov, 1996. Polycyclic aromatic hydrocarbon composition and potential sources for sediment samples from the Beaufort and Barents Seas, *Environmental Science and Technology*, **30**, 1310-1320.

Macdonald, R.W., 1996. Awakenings in the Arctic, *Nature*, **380**, 286-287.

McLaughlin, F.A., E.C. Carmack, R.W. Macdonald and J.K.B. Bishop, 1996. Physical and geochemical properties across the Atlantic/Pacific water mass front in the southern Canadian Basin, *Journal of Geophysical Research*, **101 (C1)**, 1183-1197.

1996

Carmack, E.C., R.W. Macdonald and R.G. Perkin, F.A. McLaughlin and R. Pearson, 1995. Evidence for warming of Atlantic water in the southern Canadian Basin of the Arctic Ocean: Results from the Larsen-93 Expedition, *Geophysical Research Letters*, **22(9)**, 1061-1064.

Yunker, M.B. and R.W. Macdonald, 1995. Composition and origins of polycyclic aromatic hydrocarbons in the Mackenzie River and on the Beaufort Sea shelf, *Arctic*, **48(2)**, 118-129.

Yunker, M.B., R.W. Macdonald, D.J. Velkamp and W.J. Cretney, 1995. Terrestrial and marine biomarkers in a seasonally ice-covered Arctic estuary -- integration of multivariate and biomarker approaches, *Marine Chemistry*, **49**, 1-50.

Gobeil, C., W.K. Johnson, R.W. Macdonald and C.S. Wong, 1995. Sources and burden of lead in St. Lawrence estuary sediments: isotopic evidence, *Environmental Science and Technology*, **29**, 193-201.

Macdonald, R.W., D.W. Paton, E. C. Carmack and A. Omstedt, 1995. The freshwater budget and under-ice spreading of Mackenzie River water in the Canadian Beaufort Sea based on salinity and $^{18}\text{O}/^{16}\text{O}$ measurements in water and ice, *Journal of Geophysical Research*, **100 (C1)**, 895-919.

1995

Falkner, K.K., R.W. Macdonald, E.C. Carmack and T. Weingartner, 1994. The potential of barium as a tracer of Arctic water masses, 63-76, In: *The polar oceans and their role in shaping the global environment: the Nansen centennial volume* (Eds., O.M. Johannessen, R.D. Muench, J.E. Overland), Geophysical Monograph **85**.

Omstedt, A., E.C. Carmack and R.W. Macdonald, 1994. Modeling the seasonal cycle of the oceanographic conditions in the Mackenzie Shelf estuary; fresh water content and salinity, *Journal of Geophysical Research*, **99**, 10,011-10,021.

Macdonald, R.W., E.C. Carmack and C.H. Pharo, 1994. Sediment Records of Man's Activities in the

- Kootenay Lake Drainage Basin, *Water Pollution Research Journal of Canada*, **29**, 103-116.
- 1994
- Yunker, M.B., R.W. Macdonald, and B.G. Whitehouse, 1993. Phase associations and lipid distributions in the seasonally ice-covered Arctic Estuary of the Mackenzie Shelf, *Organic Geochemistry*, **3-5**, 651-670.
- Macdonald, R.W., E.C. Carmack, and D.W.R. Wallace, 1993. Tritium and radiocarbon dating of Canada Basin Deep Waters, *Science*, **259**, 103-104.
- Yunker, M.B., R.W. Macdonald, W.J. Cretney, B.R. Fowler, and F. A. McLaughlin, 1993. Alkane, terpene and PAH geochemistry of the Mackenzie River and Mackenzie shelf: Riverine contributions to Beaufort Sea coastal sediment, *Geochimica et Cosmochimica Acta*, **57**, 3041-3061.
- 1993
- Macdonald, R.W., W.J. Cretney, N. Crewe and D. Paton, 1992. A history of OCDD, 2,3,7,8, TCDF and PCB 77 contamination in Howe Sound, British Columbia, 1992. *Environmental Science and Technology*, **26**, 1544-1550.
- Forbes, J.R., R.W. Macdonald, E.C. Carmack, K. Iseki and M.C. O'Brien, 1992. Zooplankton retained by sequential sediment traps along the Beaufort Sea shelf break during winter, *Canadian Journal of Fisheries and Aquatic Science*, **49**, 663-670.
- 1992
- Macdonald, R.W., and E.C. Carmack, 1991. Age of Canada Basin Deep Waters - A way to estimate primary production for the Arctic Ocean, *Science*, **254**, 1348-1350.
- Macdonald, R.W., D.M. Macdonald, M.C. O'Brien and C. Gobeil, 1991. The accumulation of heavy metals (Pb, Zn, Cu, Cd), carbon and nitrogen in sediments from Strait of Georgia, B.C., *Marine Chemistry*, **34**, 109-135.
- Macdonald, R.W., and D.J. Thomas, 1991. Chemical interactions and sediments; The western Canadian Arctic Shelf, *Continental Shelf Research*, **11**, 843-864.
- Yunker, M.B., R.W. Macdonald, B.R. Fowler, W.J. Cretney, S. Dallimore, and F.A. McLaughlin, 1991. Geochemistry and fluxes of hydrocarbons to the Beaufort Sea shelf: a multivariate comparison of fluvial inputs and coastal erosion of peat using principal components analysis, *Geochimica et Cosmochimica Acta*, **55**, 255-273.
- Yunker, M.B., W.J. Cretney, B.R. Fowler, R.W. Macdonald, F.A. McLaughlin, and B.G. Whitehouse, 1991. On the distribution of dissolved hydrocarbons in natural water, *Organic Geochemistry*, **17**, 301-307.
- Macdonald, R.W., and E.C. Carmack, 1991. The role of large-scale under-ice topography in separating estuary and ocean on an Arctic shelf, *Atmosphere-Ocean*, **29**, 37-53.
- Macdonald, R.W., and T.F. Pedersen, 1991. Chemical interactions of sediments; Western Canadian Continental Shelves, *Continental Shelf Research*, **11**, 717-736.
- Minagawa, M., K. Iseki and R.W. Macdonald, 1991. Carbon and nitrogen isotope composition of organic matter in the Arctic food web, *La mer*, **29**, 209-211.
- 1991
- Jinxia, Li, Du Ronggui, Zhang Gongxun, C.S. Wong, R.W. Macdonald and W.K. Johnson, 1990. The pathway and fate of the heavy metal mixture in Xiamen marine experiment enclosures, *Acta Oceanologica Sinica*, **9**, 389-403.
- 1990
- Macdonald, R.W., E.C. Carmack, F.A. McLaughlin, K. Iseki, D.M. Macdonald, and M.C. O'Brien, 1989. Composition and modification of water masses in the Mackenzie Shelf Estuary, *Journal of Geophysical Research*, **94**, 18,057-18,070.
- Carmack, E.C., R.W. Macdonald, and J.E. Papadakis, 1989. Water mass structure and boundaries in the

- Mackenzie Shelf Estuary, *Journal of Geophysical Research*, **94**, 18,043-18,055.
- Yunker, M.B., F.A. McLaughlin, R.W. Macdonald, W.J. Cretney, B.R. Fowler, T.A. Smyth, 1989. The Measurement of Natural Trace Dissolved Hydrocarbon by In Situ Column Extraction : an Intercomparison of Two Adsorption Resins, *Analytical Chemistry*, **61**, 1333-1343.
- Whitehouse, B.G., R.W. Macdonald, and K. Iseki, M.B. Yunker, and F. McLaughlin, 1989. Organic Carbon and colloids in the Mackenzie River and Beaufort Sea, *Marine Chemistry*, **26**, 371-378.
- Pedersen, T.F., R.D. Waters, and R.W. Macdonald, 1989. On the Natural Enrichment of Cadmium and Molybdenum in the Sediments of Ucluelet Inlet, British Columbia, *The Science of the Total Environment*, **79**, 125-139.
- 1989
- Macdonald, R.W., and Li Jinxia, 1988. The Preparation and Use of Reference Marine Sediment, *Marine Science Bulletin*, **7**, 75-82.
- 1988
- Macdonald, R.W., C.S. Wong, and P. Erickson, 1987. The Distribution of Nutrients in the Southeastern Beaufort Sea: Implications for Water Circulation and Primary Production. *Journal of Geophysical Research*, **92**, 2939-2952.
- 1987
- Thomas, D.J., R.W. Macdonald, A.B. Cornford, 1986. Geochemical Mass-Balance Calculations for the Coastal Beaufort Sea, N.W.T., Canada. *Rapp. P.-v. Reun. Cons. Int. Explor. Mer.*, **186**, 165-184.
- Macdonald, R.W., F.A. McLaughlin, and C.S. Wong, 1986. The Storage of Reactive Silicate Samples by Freezing. *Limnology and Oceanography*, **31**, 1139-1142.
- Macdonald, R.W., and M.C. O'Brien, 1986. Extending the Use of Certified Reference Sediments for Assessment of Accuracy in Determinations of Trace Metals. *Analytica Chimica Acta*, **177**, 81-91.
- 1986
- Iseki, K., R.W. Macdonald, and C.S. Wong, 1984. The Effect of Wood Waste Dumping on Organic Matter in Seawater and Surficial Sediments of Alberni Inlet, B.C., *Journal of the Oceanographic Society of Japan*, **40**, 213-220
- 1984
- Macdonald, R.W., 1982. An Examination of Metal Inputs to the Southern Beaufort Sea by Disposal of Waste Barite in Drilling Fluid. *Ocean Management*, **8**, 29-49.
- Macdonald, R.W., and F. McLaughlin, 1982. The Effect of Storage by Freezing on dissolved inorganic Phosphate, Nitrate and Reactive Silicate for Samples from Estuarine and Coastal Waters. *Water Research*, **16**, 95-104.
- 1982
- Macdonald, R.W., 1981. The Value of an Ecosystem, *Marine Pollution Bulletin*, **12**, (letter).
- 1981
- Thompson, J.A.J., R.W. Macdonald, and C.S. Wong, 1980. Mercury Geochemistry in Sediments of a Contaminated Fjord of Coastal B.C., *Geochemical Journal*, **14**, 71-82.
- 1980
- Macdonald, R.W., 1977/78. The Interaction of Chlorine and Sea Water, with Special Reference to the Four Liquid Chlorine Tank Cars Lost in B.C. Coastal Waters, *Journal Hazardous Materials*, **2**, 51-75.
- 1977
- Macdonald, R.W., 1976. Distribution of Low Molecular Weight Hydrocarbons in the Southern Beaufort

Sea, *Environmental Science and Technology*, **10**, 1241-6

1976

Macdonald, R.W., and N. North, 1974. The Effect of Pressure on the Solubility of CaCO_3 , CaF_2 and SrSO_4 in Water. *Canadian Journal of Chemistry*, **52**, 3181-9

1974

Macdonald, R., and K.E. Hayes, 1969. Reaction Products in the Silver Catalyzed Oxidation of Ethylene, *Journal of Catalysis*, **15**, 301-4

Macdonald, R.W. and K.E. Hayes, 1972. Glass wool as an oxidation catalyst, *Journal of the Chemical Society, Chemical Communications*, 1030.

BOOKS/EDITED REPORTS

- Ross, P.S., Couillard, C.M., Ikonomou, M.G., Johannessen, S.C., Lebeuf, M., Macdonald, R.W. and Tomy, G., 2008. Polybrominated diphenylethers (PBDEs) in the Canadian marine environment: An emerging health risk for fish, marine mammals and their habitat. Canadian Science Advisory Secretariat (CSAS), Research Document 2008/036, Department of Fisheries and Oceans, Ottawa. 27pp.
- Macdonald, R.W., 2007. Review of The Oceans and Marine Geochemistry, 2003. (ed. H. Elderfield), Vol. 6, Treatise on Geochemistry (eds. H.D. Holland, and K.K. Turekian), Elsevier-Pergamon, Oxford, 646p. Geochemistry, Exploration, Environment, Analysis, 7(3): 379-380.
- Bidleman, T.F., R.W. Macdonald and J. Stow (Editors), 2005. Sources, occurrence, trends and pathways of contaminants in the Arctic, *Science of the Total Environment*, 342(1-3), 313 pp.
- Stein, R. and R.W. Macdonald (Eds), 2004. *The Organic Carbon Cycle in the Arctic Ocean*, Springer Publishing Company, Berlin – New York, 363pp, 194 illus, Hardcover.
- Macdonald, R.W., Harner, T., Fyfe, J., Loeng, H., Weingartner, T., 2003. The Influence of Global Change on Contaminant Pathways to and within the Arctic, the Second AMAP Assessment, 65pp.
- Bidleman T. F., Macdonald R. W., and Stow J. (Eds), 2003. Canadian Arctic Contaminants Assessment Report II: Sources, Occurrence, Trends and Pathways in the Physical Environment, 332pp. Indian and Northern Affairs Canada.
- Macdonald, R.W. (Editor), 2003. The Influence of Global Change on Contaminant Pathways to and within the Arctic, the Second AMAP Assessment, 65pp.
- Macdonald, R.W. (Editor), 2000. Sources Occurrence and Pathways of Contaminants in the Canadian Arctic: A Review, *Science of the Total Environment*, 254 2/3, 244pp.
- Macdonald, R.W. (Ed.). Proceedings of a Workshop on the Kitimat Marine Environment: Can. Tech. Rep. Hydrogr. Ocean Sci. 18, 218pp.
- Marine Chemistry into the Eighties, (Thompson et al., Eds) May 31-June 1, 1979.

PROCEEDINGS, BOOK CHAPTERS, TECHNICAL REPORTS

- Macdonald, R.W., Stern, G.A., Kuzyk, Z.A., Delaronde, J., MacHutchon, A. and Fuchs, C., 2009. PCBs in Arctic ocean seawater. In: S. Smith, J. Stow and J. Edwards (Editors), *Synopsis of Research Conducted under the 2008-2009 Northern Contaminants Research Program*. Department of Indian and Northern Affairs, Ottawa, pp. 232-239.
- Macdonald, R.W., 2009. Rivers and lakes in the ocean - the other hydrological cycle. In: K.L. Young and W. Quinton (Editors), *17th International Northern Research Basins Symposium and Workshop*. York University, Eastern Canadian Arctic (Iqualuit-Pangnirtung-Kuuujuaq), pp. 207-216.
- 2009
- Macdonald, R.W., 2008. Consequences of warming in the Arctic with reference to northern security. In: J. Dhanapala, J. Harriss and J. Simons (Editors), *Arctic Security in the 21st Century*. School for International Studies, Simon Fraser University, Vancouver, pp. 20-26.
- 2008
- Macdonald, R.W. et al., 2007. Carbon cycling and contaminant fate in the Hudson Bay marine system. In: S. Smith and J. Stow (Editors), *Synopsis of Research Conducted under the 2006-2007 Northern Contaminants Research Program*. Department of Indian and Northern Affairs, Ottawa, pp. 163-174.
- 2007
- Macdonald RW, Stern GA, Delaronde J, Kuzyk ZA, Hare A., 2006. Carbon Cycling and Contaminant Fate in the Hudson Bay Marine System. In: Smith S, Stow J, editors. In *Synopsis of Research Conducted under*

the 2005-2006 Northern Contaminants Research Program, No. R71-19/76-2006E. Department of Indian and Northern Affairs, Ottawa, 2006, pp. 136-143.

Couillard CM, Macdonald RW, Courtenay SC, 2006. Interactions between toxic chemicals and other environmental factors - *A key issue for an effective management of the risk related to toxic chemicals in fish.*, Ottawa: Department of Fisheries and Oceans, 97pp.

2006

Macdonald, R.W., 2005. Contaminants, Global Change and Cold Regions. In "Arctic-Alpine Ecosystems and People in a Changing Environment" (ed. J.B. Orbaek et al.), Springer Verlag, Berlin, pp 305-327.

Macdonald RW, Anderson LG, Christensen JP, Miller LA, Semiletov IP, Stein R., 2006. The Arctic Ocean: budgets and fluxes. In: Liu KK, Atkinson, L, Quinones, R., Talaue-McManus, L., editor. Carbon and Nutrient Fluxes in Continental Margins: A Global Synthesis, The IGBP Series. Springer, Berlin, pp. in press.

Johannessen SC, Macdonald RW, 2005. Transport and fate of contaminants in the Strait of Georgia. In: Pringle JD, Murray L, Verrin SM, editors. Habitat, Oceans and Fishery Management: Contributions through environmental sciences research (1997-2002), Canadian Manuscript Report of Fisheries and Aquatic Sciences 2726. Department of Fisheries and Oceans, Sidney, BC, pp. 12-17.

McLaughlin FA, Macdonald RW, 2005. Arctic Ocean exploration: Climate and contaminants. In: Pringle JD, Murray L, Verrin SM, editors. Habitat, Oceans and Fishery Management: contributions through environmental sciences research (1997-2002), Canadian Manuscript Report of Fisheries and Aquatic Sciences 2726. Fisheries and Oceans Canada, Sidney, BC, pp. 18-21.

Shapiro, L., Arrigo, K., Bowen, D., Hannesson, R., Hare, S., Karl, D., Konar, B., Macdonald, R., Maslowski, W., McCreary, J., Pungowiyi, C., Raadchenko, V., 2005. Final comments on the Science Plan for the North Pacific Research Board, National Research Council, National Academies Press, Washington, 33 pp.

Wrona, F., Prowse, T. and J. Reist (Lead Authors), Beamish, R., Gibson, J.J., Hobbie, J., Jeppesen, E., King, J., Korhola, A., Macdonald, R.W., Power, M., Skvortsov, V., Koeck, G., Vincent, W., Levesque, L., 2005. *Impacts of climate change and UV radiation on freshwater Arctic ecosystems*, Arctic Climate Impact Assessment (ACIA) Chapter 7, in press.

Macdonald RW, Yu Y., 2005. The Mackenzie Estuary of the Arctic Ocean. In: Wangersky PJ, editor. Estuaries, Handbook of Environmental Chemistry Vol. 5. Springer-Verlag, Heidelberg, pp 91-120, doi:10.1007/698_5_027.

2005

Macdonald, R.W., E. Sakshaug and R. Stein, 2004, The Arctic Ocean: Modern status and recent climate change. Chapter 1.2 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York, pp 6-21.

Stein, R. and R.W. Macdonald, 2004. Organic and inorganic geochemical proxies used for organic carbon source identification in Arctic Ocean sediments, Chapter 1.4 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York, pp 24-32.

Stein, R. and R.W. Macdonald, 2004. Organic carbon in Arctic Ocean sediments: A general introduction. Chapter 7.1 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York, pp 169-176.

Macdonald, R.W., A.S. Naidu, M.B. Yunker, C. Gobeil, 2004. The Beaufort Sea: Distribution, sources, variability and burial of carbon. Chapter 7.2 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York, pp 177-193.

Stein, R., C. Schubert, R.W. Macdonald, K. Fahl, H.R. Harvey, D. Weiel, 2004. The central Arctic Ocean: Distribution, sources, variability and burial of organic carbon. Chapter 7.9 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York.

Stein, R. and R.W. Macdonald, 2004. Arctic Ocean organic carbon accumulation and its global significance. Chapter 8 in *The Organic Carbon Cycle in the Arctic Ocean*, (Eds., R. Stein and R.W. Macdonald), Springer Publishing Company, Berlin – New York.

Stein R, and R.W. Macdonald, 2004. Organic carbon in Arctic Ocean sediments: Sources, variability, burial, and paleoenvironmental significance. Chapter 7.1 in *The Organic Carbon Cycle in the Arctic Ocean* (Stein R, Macdonald RW, editors), Springer, Berlin, 2004, pp. 170-176.

Shapiro, L., K. Arrigo, D. Bowen, R. Hannesson, S. Hare, D. Karl, B. Konar, R. Macdonald, W. Maslowski, J. McCreary, C. Pungowiyi, and V. Radchenko, Elements of a science plan for the North Pacific Research Board, pp. 125, National Research Council of the National Academies, National Academies Press, Washington DC, 2004.

2004

Chen, C.-T.A., Liu, K.K. and Macdonald, R.W., 2003. Continental margin exchanges. In: M. Fasham (Editor), *Ocean Biogeochemistry: The role of the ocean carbon cycle in global change*, Springer, pp 55-97.

Macdonald, R.W., D. Mackay and Y.-F. Li, 2002. Why do contaminants concentrate in the environment? Lessons from the Arctic. In *Ecological and Earth Sciences in Mountain Areas* (L. Taylor, K. Martin, D. Hik and A. Ryall Eds), pp 164-171.

Li, Y.-F., R.W. Macdonald, L. Jantunen, T. Harner, T. Bidleman, and W. Strachan, 2003. Transport and fate of hexachlorocyclohexanes in the North American Arctic Ocean. In *The Canadian Arctic Contaminants Assessment Report II*, edited by T.F. Bidleman, R.W. Macdonald, and J. Stow, pp. 202-213, DIAND, Ottawa.

Macdonald, R.W., T. Harner, and J. Fyfe, 2003. The interaction of climate change with contaminant pathways to and within the Canadian Arctic, In *The Canadian Arctic Contaminants Assessment Report II*, edited by T.F. Bidleman, R.W. Macdonald, and J. Stow, pp. 225-279, DIAND, Ottawa.

Steffen, A., W. Schroeder, L. Poissant, and R.W. Macdonald, 2003. Mercury in the Arctic atmosphere. In *The Canadian Arctic Contaminants Assessment Report II*, edited by T.F. Bidleman, R.W. Macdonald, and J. Stow, pp. 124-142, DIAND, Ottawa.

2003

Macdonald RW, Morton B, Addison RF, Johannessen SC, 2002. Marine environmental contaminant issues in the North Pacific: what are the dangers and how do we identify them? In: Perry IR, Livingston P, Bychkov A. (eds) PICES Scientific Report No. 22, PICES Science: The first ten years and a look to the future. North Pacific Marine Science Organization (PICES), Sidney, BC, pp. 61-86.

Kruzynski, G., R.F. Addison and R.W. Macdonald, 2002. Proceedings of a workshop on possible pathways of cadmium into the Pacific Oyster *Crassostrea gigas* as cultured on the coast of British Columbia, Institute of Ocean Sciences, March 6-7, 2001. *Canadian Technical Report of Fisheries and Aquatic Sciences*, 2405, 65pp.

2002

Macdonald, R.W., F. McLaughlin and G. Stern, 2001. The seasonal cycle of organochlorine concentrations in the Canadian Basin, In: *Synopsis of Research Conducted under the 2000/2001 Northern Contaminants Program* (Ed. S. Kalhok), R71-19/76-2001E, pp 118-124.

Codispoti, L., Caulfield, R., Darby, D., Delworth, T., Eicken, H., Falkner, K., Grebmeier, J., Hawkey, J., Lubin, D., Matrai, P., Macdonald, R., Ogilvie, A., Perovitch, D., Ramsay, M., Semtner, A., Shepson, P., Steele, M., Tynan, C., Weaver, A., Weingartner, T., 2001. Advancing the Scientific Basis for Predicting the Rapidly Changing Marine Component of the Arctic System: A Prospectus for the Arctic System Science's (ARCSS) Ocean Atmosphere-Ice Interactions (OAI) Component. ARCSS/OAI Report Number 9, University of Maryland Center for Environmental Science, Cambridge, MD, 60pp.

Macdonald, R.W., 2001. The Arctic Ocean and Contaminants: Pathways that lead to us. In: *Waters in Peril*, L. Bendell Young and P. Gallagher (Eds), Kluwer Publishers, pp 135-149.

2001

Macdonald R. W., Eisenreich S. J., Bidleman T. F., Dachs J., Pacyna J., Jones K., Bailey B., Swackhamer D., and Muir D. C. G. 2000. Chapter 7, Case studies on persistence and long range transport of persistent organic pollutants. In *Evaluation of persistence and long-range transport of organic chemicals in the environment* (eds. G. Klecka and D. Mackay), pp. 245-314, SETAC Press.

Macdonald, R.W., 2000. Arctic estuaries and ice: a positive-negative estuarine couple, In: *The Freshwater Budget of the Arctic Ocean* (E.L. Lewis et al., Eds), 383-407.

Macdonald, R.W., D.P. Shaw, and C.B.J. Gray, 2000. Contaminants in lake sediments and fish, In: *Health of the Fraser River Aquatic Ecosystem: A synthesis of research conducted under the Fraser River Action Plan*, Vancouver, BC, edited by C.B.J. Gray, and T. Tuominen, Volume 1, pp. 23-45, Environment Canada, Vancouver, BC.

Yunker, M.B., R.W. Macdonald, R. Brewer, S. Sylvestre, T. Tuominen, M. Sekela, R.H. Mitchell, D.W. Paton, B.R. Fowler, C. Gray, D. Goyette, and D. Sullivan, 2000. Assessment of natural and anthropogenic hydrocarbon inputs using PAHs as tracers. The Fraser River Basin and Strait of Georgia 1987-1997. Fraser River Action Plan /Burrard Inlet Environmental Action Program, Environment Canada, Vancouver, BC, 128pp.

2000

Klecka, G.M., D.Mackay, Boethling, R.S., D. Calamari, C. Cowan-Ellsberry, S. Eisenreich, J. Franklin, C.P.L. Grady, Jr., D.G. Graham, B. Hansen, P.H. Howard, K.C. Jones, K. Kannan, R.J. Larson, R.W. Macdonald, D. Mackay, T. McKone, D. Muir, T. Parkerton, L. Thibodeaux, D. Van de Meent, T. Wallington, C. Zetzsch, 1999. Evaluation of persistence and long-range transport of organic chemicals in the environment: summary of a SETAC.Pellston workshop. Summary of a SETAC Pellston Workshop on Persistence and Long-Range Transport of Organic Chemicals in the Environment; 13-19 July 1998; Fairmont Hot Springs, British Columbia, Canada. Pensacola FL: Society of Environmental Toxicology and Chemistry, 19pp.

Macdonald, R.W., F.A. McLaughlin, E.Carmack, H. Welch, G. Stern, D. Paton, M. O'Brien, D. Tuele and D. Sieberg, 1999. The seasonal cycle of organochlorine concentrations in the Canadian Basin, In: *Environmental Studies No. 75, Synopsis of Research Conducted under the 1997/98 Northern Contaminants Program* (J. Jensen Ed), pp 63-68.

Macdonald, R.W., F. McLaughlin and G. Stern, 1999. The seasonal cycle of organochlorine concentrations in the Canadian basin, In: *Synopsis of Research Conducted under the 1998/99 Northern Contaminants Program* (Ed. S. Kalthok), R71-19/76-1999E, pp 43-47.

Macdonald, R.W., W.L. Lockhart, M.B. Yunker, F.A. McLaughlin, B. Billeck, L.R. Snowdon, J.N. Smith and G. Ilyin, 1999. PAH concentrations and distributions in the Arctic Ocean, In: *Environmental Studies No. 75, Synopsis of Research Conducted under the 1997/98 Northern Contaminants Program* (Ed. J. Jensen), pp 55-59.

Macdonald, R.W., F.A. McLaughlin, E.Carmack, G. Stern, M. O'Brien, D. Tuele, D. Sieberg, and D. Paton, 1999. Long-range transport of contaminants to the Canada Basin and selective withdrawal through the Canadian Archipelago, In: *Environmental Studies No. 75, Synopsis of Research Conducted under the 1997/98 Northern Contaminants Program* (Ed. J. Jensen), pp 61-62.

Macdonald, R.W., F.A. McLaughlin, E.Carmack, H. Welch, G. Stern, D. Paton, M. O'Brien, D. Tuele and D. Sieberg, 1999. The seasonal cycle of organochlorine concentrations in the Canadian Basin, In: *Environmental Studies No. 75, Synopsis of Research Conducted under the 1997/98 Northern Contaminants Program* (Ed. J. Jensen), pp 63-68.

1999

Bewers, J.M. and R.W. Macdonald, 1998. Regional blueprint and pilot project for the Arctic marine environment, *Intergovernmental Oceanographic Commission, Reports of Meetings of Experts and Equivalent Bodies, Fourth Session*, GOOS Report **No. 40**, Annex XV, IOC-WMO-UNEP-ICSU/HOTO - IV/3, 7pp.

Carmack, E.C., K. Aagaard, J.H. Swift, R.G. Perkin, F.A. McLaughlin, R.W. Macdonald and E.P. Jones,

1998. Thermohaline transitions, In: *Physical Processes in Lakes and Oceans, Coastal and Estuarine Studies*, **Volume 54**, pp 179-186.

Barrie, L., E. Falck, D. Gregor, T. Iversen, V. Kimstach, H. Loeng, R. Macdonald, S. Pfirman, T. Skotvold and E. Wartena, 1998. Physical and chemical processes influencing pollutant transport into and within the Arctic, In: *The AMAP Assessment Report: Arctic Pollution Issues*, Chapter 3, pp. 25-116.

Bakke, T., J. Hameedi, V. Kimstach, R.W. Macdonald, S. Melnikov, A. Robertson, R. Shearer and D. Thomas, 1998. Petroleum hydrocarbons, In: *The AMAP Assessment Report: Arctic Pollution Issues*, Chapter 10, pp. 661-716.

Macdonald, R.W., Ruttenberg, K.C. and Gobeil, C., 1998. The Mackenzie Shelf - budgets and problems, International Workshop, In: *Exchange Processes Between the Arctic Shelves and Basins*. Japan Marine Science and Technology Center, Yokohama, pp. 63-65.

1998

Barrie L., R.W. Macdonald, T. Bidleman, M. Diamond, D. Gregor, R. Semkin, W. Strachan, S. Backus, M. Bewers, C. Halsall, C. Gobeil, J. Hoff, A. Li, L. Lockhart, D. Mackay, J. Pudykiewicz, K. Reimer, J. Smith, G. Stern, W. Schroeder, R. Wagemann, F. Wania, M. Yunker, 1997. Sources, occurrence and pathways. In: *Canadian Arctic Contaminants Assessment Report* (Eds. K. A. J. Jensen, R. Shearer), pp. 25-182. Department of Indian and Northern Affairs.

Macdonald, R.W., F.A. McLaughlin, and E.C. Carmack, 1997. Long-Range transport of contaminants to the Canadian Basin, In: *Environmental Studies No. 74, Synopsis of Research Conducted under the 1997/98 Northern Contaminants Program* (Ed. J. Jensen), pp 89-95

1997

Aagaard, K., Carmack, E.C., Jones, E.P., Macdonald, R.W., McLaughlin, F.A., Perkin, R.G. and Swift, J.H., 1996. Hydrographic observations during the "Arctic '94" expedition. In: *Proceedings of the ACSYS Conference on the Dynamics of the Arctic Climate System* (Eds. P. Lemke, L. Anderson, R. Barry and V. Vulginsky),. The World Climate Research Program, **WMO/TD No. 760**, Goteborg, Sweden, pp. 359-363.

Carmack, E.C., Macdonald, R.W., Perkin, R.G., McLaughlin, F.A. and Pearson, R.J., 1996. Anomalous warm water in the Canadian basin of the Arctic Ocean. In: *Proceedings of the ACSYS Conference on the Dynamics of the Arctic Climate System* (Eds. P. Lemke, L. Anderson, R. Barry and V. Vulginsky),. The World Climate Research Program, **WMO/TD No. 760**, Goteborg, Sweden, pp. 374-377.

Macdonald, R.W., Paton, D.W., Carmack, E.C. and Omstedt, A., 1996. The Mackenzie Shelf brine factory: A river runs through it. In: *Proceedings of the ACSYS Conference on the Dynamics of the Arctic Climate System* (Eds. P. Lemke, L. Anderson, R. Barry and V. Vulginsky),. The World Climate Research Program, **WMO/TD No. 760**, Goteborg, Sweden, pp. 425-429.

McLaughlin, F.A., Carmack, E.C. and Macdonald, R.W., 1996. Physical and geochemical properties across the Atlantic/Pacific water mass boundary in the southern Canadian basin. In: *Proceedings of the ACSYS Conference on the Dynamics of the Arctic Climate System* (Eds. P. Lemke, L. Anderson, R. Barry and V. Vulginsky),. The World Climate Research Program, **WMO/TD No. 760**, Goteborg, Sweden, pp. 430-435.

Aagaard, K., Carmack, E.C., Jones, E.P., Macdonald, R.W., McLaughlin, F.A., Perkin, R.G. and Swift, J.H., 1996. Hydrographic observations during the "Arctic '94" expedition. In: *Proceedings of the ACSYS Conference on the Dynamics of the Arctic Climate System* (Eds. P. Lemke, L. Anderson, R. Barry and V. Vulginsky),. The World Climate Research Program, **WMO/TD No. 760**, Goteborg, Sweden, pp. 359-363.

Jones, E.P., K. Aagaard, E.C. Carmack, R.W. Macdonald, F.A. McLaughlin, R.G. Perkin, J.H. Swift, 1996. Recent changes in Arctic Ocean thermohaline structure: results from the Canada/U.S. 1994 Arctic Ocean Section, In: *Memoirs of National Institute of Polar Research*, **51**: 307-315.

Gushue, W., E.C. Carmack and R.W. Macdonald, 1996. Freshwater inputs to Husky Lakes and Liverpool Bay. *Canadian Technical Report of Hydrography and Ocean Sciences*, **175**, 23 pp.

Macdonald, R.W., F.A. McLaughlin and E.C. Carmack, 1996. In: *Environmental Studies No. 73, Synopsis of Research Conducted under the 1994/95 Northern Contaminants Program* (Eds. J.L. Murray, R.G.

- Shearer and S.L. Han), pp 45-50.
- 1996
- Ellis, K.M., J.N. Smith, R.P. Nelson, L. Kilius, R. Macdonald, E. Carmack and S.B. Moran, 1995. Distribution of artificial radionuclides in the Arctic Oceans from the 1994 Arctic Ocean Section. In: *Proceedings of International Conference on Environmental Radioactivity in the Arctic* (Eds. P. Strand and A. Cooke), Oslo, Norway, Aug. 21-25, 1995, pp. 204-207.
- 1995
- Cretney, W.J. and R.W. Macdonald, 1994. Anthropogenic Organic Compounds in Sediments, pp 57-64, In: *Proceedings, First Annual Pacific Ecozone Workshop* (Eds. Harding, L., J. Landucci and R.C.H. Wilson), Sidney, B.C., *Technical Report Series No. 222*, Canadian Wildlife Service, Pacific and Yukon Region, B.C.
- Macdonald, R.W. and E.A. Crecelius, 1994. Marine sediments in the Strait of Georgia, Strait of Juan de Fuca and Puget Sound; what can they tell us about contamination?, In: *The Proceedings of the British Columbia/Washington Symposium on the Marine Environment, Canadian Technical Report of Fisheries and Aquatic Sciences, No. 1948*, (Eds. R.C.H. Wilson, R.J. Beamish, F. Aitkens and J. Bell), pp101-137.
- Harrison, P.J., B. Frost, D.L., Mackas, R.W. Macdonald and E.A. Crecelius, 1994. An assessment of nutrients, plankton and some pollutants in the water column and their transboundary transport, In: *The Proceedings of the British Columbia/Washington Symposium on the Marine Environment, Canadian Technical Report of Fisheries and Aquatic Sciences, No. 1948*, (Eds. R.C.H. Wilson, R.J. Beamish, F. Aitkens and J. Bell), pp138-172.
- West, P., R.W. Macdonald, B. King, and T.M. Fyles, 1994. Canada loadings and discharges to the Strait of Georgia and Juan de Fuca: Current loadings and sediment record, In: *Proceedings of the the Pacific North West International Section, Air and Waste Management Association, Annual Conference & Exhibition, Victoria B.C.*
- Macdonald, R.W. and E. Carmack, 1994. Long-Range Transport of Contaminants to the Canadian Basin, In: . In: *Environmental Studies No. 72, Synopsis of Research Conducted under the 1993/94 Northern Contaminants Program* (Eds. J.L. Murray and R.G. Shearer), pp 104-108.
- 1994
- Macdonald, R.W. and F.A. McLaughlin, 1993. Long-Range Transport of Contaminants to the Canadian Basin, In: . In: *Environmental Studies No. 70, Synopsis of Research Conducted under the 1992/93 Northern Contaminants Program* (Eds. J.L. Murray and R.G. Shearer), pp 15-20.
- 1993
- Cretney, W.J., N.F. Crewe, R.W. Macdonald and D.W. Paton, 1992. Spatial and temporal distributions in subtidal sediments from Howe Sound, B.C., In: *Proceedings of Howe Sound Environmental Science Workshop* (Eds. C.D. Levings, R.B. Turner, and B. Ricketts), *Canadian Technical Report of Fisheries and Aquatic Sciences, No. 1879*, pp 143-151.
- Li Jinxia, Zhang Gongxun, Du Ronggui, C.S. Wong, R.W. Macdonald, and W.K. Johnson, 1992. Pathways and fates of heavy metal mixture in the Xiamen MEEE, In: *Marine Ecosystem Enclosed Experiments* (Eds. C.S. Wong, and P.J. Harrison), Proceedings of a symposium held in Beijing, People's Republic of China, 9-14 May 1987, pp. 275-292.
- Xu Qinghui, Li Jinxia, Xu Kuncan, Zou Hanyang, Fu Tianbao, Zhang Gongxun, C.S. Wong, R.W. Macdonald, W.K. Johnson, and F.A. Whitney, 1992. Biogeochemical behaviours of heavy metals in marine enclosed ecosystems, In: *Marine Ecosystem Enclosed Experiments* (Eds. C.S. Wong, and P.J. Harrison), Proceedings of a symposium held in Beijing, People's Republic of China, 9-14 May 1987, pp 293-307.
- Zhang Gongxun, Du Ronggui, Li Jinxia, C.S. Wong, R.W. Macdonald and W.K. Johnson, 1992. Release of heavy metals from polluted sediment in MEEE enclosures, In: *Marine Ecosystem Enclosed Experiments* (Eds. C.S. Wong, and P.J. Harrison), Proceedings of a symposium held in Beijing, People's Republic of China, 9-14 May 1987, pp 308-313.
- Thomas, D.J., R.W. Macdonald, and A.B. Cornford, 1983. A comparison of natural and petroleum resource

- development fluxes of metals, hydrocarbons and nitrogen, phosphorus and silicon to the Beaufort Sea. *Canadian Technical Report of Hydrography and Ocean Sciences*, **30**, 54pp.
- Macdonald, R.W., and F.A. McLaughlin, 1992. Long range transport of contaminants to the Canadian Arctic basin, In: Environmental Studies No: 68, Synopsis of Research Conducted Under the 1991/92 Northern Contaminants Program, (J.L. Murray and R.G. Shearer, Eds.), pp 17-22,
- 1992
- Iseki, K., R.W. Macdonald, and E.C. Carmack, 1987. Distribution of Particulate Matter in the Southeastern Beaufort Sea in Late Summer. In: *Proceedings of the 9th Symposium on Polar Biology, National Institute of Polar Research*, **1**, 35-46.
- 1987
- Macdonald, R.W., and H. Nelson, 1984. A laboratory performance check for the determination of metals (Hg, Zn, Cd, Cu, Pb) in reference marine sediments. *Canadian Technical Report of Hydrography and Ocean Sciences*, **33**, 57pp
- 1984
- Macdonald, R.W., B.D. Bornhold, and I. Webster, 1983. The Kitimat Fjord System: An Introduction In: *Proceedings of a Workshop on the Kitimat Marine Environment* (Ed. R.W. Macdonald), *Canadian Technical Report of Hydrography and Ocean Science*, **18**, 2-14.
- Macdonald, R.W., W.J. Cretney, C.S. Wong, and P. Erickson, 1983. Chemical characteristics of water in the Kitimat Fjord system, In: *Proceedings of a Workshop on the Kitimat Marine Environment* (Ed. R.W. Macdonald), *Canadian Technical Report of Hydrography and Ocean Science*, **18**, 66-88.
- Macdonald, R.W., 1983. The distribution and dynamics of suspended particles in the Kitimat Fjord system, In: *Proceedings of a Workshop on the Kitimat Marine Environment* (Ed. R.W. Macdonald), *Canadian Technical Report of Hydrography and Ocean Science*, **18**, 116-138.
- Cretney, W.J., C.S. Wong, R.W. Macdonald, P.E. Erickson and B.R. Fowler, 1983. Polycyclic aromatic hydrocarbons in surface sediments and age-dated cores from Kitimat Arm, Douglas Channel, and adjoining waterways, In: *Proceedings of a Workshop on the Kitimat Marine Environment* (Ed. R.W. Macdonald), *Canadian Technical Report of Hydrography and Ocean Science*, **18**, 162-196.
- 1983
- Macdonald, R.W., 1982. An examination of metal inputs to the arctic marine environment via drilling fluid disposal, Chapter 3.8, In: *Report on Offshore Oil and Gas Drilling Fluid Disposal in the Canadian North*.
- Macdonald, R.W., 1982. Environmentally acceptable trace metal contents of barite for Arctic disposal, Ch. 3.10 In: *Report on Offshore Oil and Gas Drilling Fluid Disposal in the Canadian North*.
- 1982
- Cretney, W., R.W. Macdonald, C.S. Wong, et al, 1981. Biodegradation of a Chemically Dispersed Crude Oil. In: *1981 Oil Spill Conference Proceedings*, 37-43
- 1981
- Macdonald, R.W., and C.S. Wong, 1975. Factors Influencing the Saturation of Gases in Sea Water, In: *Chemistry and Physics of Aqueous Solutions*, 214-232.
- 1975

POPULAR ARTICLES

Macdonald, 2008. Are contaminants a dead issue in the Arctic Ocean, *Meridian*, April, 2008.

Macdonald RW, 2005. Beaufort Sea. In: Nutall M, editor. *Encyclopedia of the Arctic*. New York: Taylor & Francis, in press.

Macdonald, R.W., D. Mackay and Y.-F. Li, 2003. Why do contaminants concentrate in the environment, Science Highlights for the state of Mountain Ecological and Earth Sciences.

Macdonald, R.W., F.A. McLaughlin and L. Adamson, 1997. The Arctic Ocean -- the last refuge of volatile organochlorines, *Canadian Chemical News*, **49(8)**, 28-29.

Macdonald, R.W., 1991. Arctic Shelves and Basins; Coast Guard icebreakers provide a platform for Arctic research, *Fleet News*, **22**, 32-34.

DATA REPORTS

- Wright CA, Johannessen SJ, Macdonald RW, Burd BJ, Hill P, Van Roodselaar A, Bertold S (2008) The Strait of Georgia Ambient Monitoring Program Phase I, 2002-2007: Sediment and Benthos. *Canadian Data Report of Hydrography and Ocean Sciences* **1208**:112pp
- 2008
- O'Brien, M.C., Soon, M., Nielsen, B., Elliot, C., Juhasz, T., Macdonald, R.W., Denman, K.L., Thomson, R.E., and Calvert, S.E., 2000, Sediment trap data from the Strait of Georgia, *Canadian Data Report of Hydrography and Ocean Sciences*, **155**, 89pp.
- 1999
- Boyd, J., R.W. Macdonald, D. Paton, K. Hutton, J. Baumann, S. Berthold, and B. Moore, 1997. Burrard Inlet sediment core contaminant profiles, Burrard Inlet Action Program (BIEAP), Burnaby BC, 15pp +App.
- Paton, D.W., V. Knight and R.W. Macdonald, 1997. NOGAP B.6 oxygen isotope data from water and ice cores from the Beaufort Sea, May, 1992. *Canadian Data Report of Hydrography and Ocean Sciences*, **149**, 23 pp.
- 1997
- Carmack, E. C., R. W. Macdonald, O'Brien, M.C., Pearson, R., Timmermans, L., Sieberg, D., Von Hardenberg, B., Sutherland, N., Tuele, D., Jackson, F., 1996. Physical and Chemical Data Collected in the Beaufort Sea and Canadian Archipelago August - September 1995. *Canadian Data Report of Hydrography and Ocean Sciences*, **147**, 281 pp.
- 1996
- Macdonald, R.W., M.C. O'Brien, E.C. Carmack, R. Pearson, F.A. McLaughlin, D. Sieberg, J. Barwell-Clarke, D.W. Paton and D. Tuele, 1995. Physical and chemical data collected in the Beaufort, Chukchi and East Siberian Seas, August - September, 1993, *Canadian Data Report of Hydrography and Ocean Sciences*, **139**, 288pp.
- O'Brien, M.C. and R.W. Macdonald, 1995. Ocean Chemistry data report: Pb-210 and metal data for sediment cores and sediment trap collections from Alice Arm and Observatory Inlet: Part 4, March 1982, June 1982, September/October 1982, July 1984, *Canadian Data Report of Hydrography and Ocean Sciences*, **17 (4)**, 81pp.
- 1995
- Paton, D.W., A. Abehennah, W. Grieve and R.W. Macdonald, 1994. NOGAP B.6, Oxygen isotope data from water and ice cores from the Beaufort Sea, September 1990, May 1991 and September 1991, *Canadian Data Report of Hydrography and Ocean Sciences*, **134**, 118 pp.
- Pearson, R., M. O'Brien, D. Sieberg, F.A. McLaughlin, D.W. Paton, D. Tuele, J. Barwell-Clarke, E.C. Carmack, R.W. Macdonald and M. Galbraith 1994. NOGAP B.6, Physical and chemical data collected in the Beaufort Sea and Mackenzie River Delta, April-May and September, 1992, and ice core data collected in 1991-1992. *Canadian Data Report of Hydrography and Ocean Sciences*, 129, 198 pp.
- 1994
- Yunker, M.B., F.A. McLaughlin, B.R. Fowler, G. Brooks, G. Chiddell, C. Hamilton and R.W. Macdonald, 1992, NOGAP B.6; Volume 9: Hydrocarbon Determinations; Mackenzie River And Beaufort Sea, *Canadian Data Report of Hydrography and Ocean Sciences*, **60**, 286 pp
- Macdonald, R.W., D. Sieberg, R. Pearson, D. Paton, M. C. O'Brien, F.A. McLaughlin, E.C. Carmack, 1992, Oceanographic Data Collected from the Henry Larsen in the Beaufort Sea, September 1991. *Canadian Data Report of Hydrography and Ocean Sciences*, **112**, 108 pp.
- Macdonald, R.W., R. Pearson, F.A. McLaughlin, M.C. O'Brien, D.W. Paton, E.C. Carmack, J.R. Forbes, J. Barwell-Clarke, 1992. Physical and Chemical Data Collected in the Beaufort Sea and Mackenzie River Delta, April - May, 1991, *Canadian Data Report of Hydrography and Ocean Sciences*, **104**, 154pp.

1992

Gobeil, C., D. Paton, F.A. McLaughlin, R.W. Macdonald, G. Paquette, Y. Clermont, et M. Lebeuf, 1991, Donnees geochemiques sur les eaux interstitielles et les sediments de la mer de Beaufort, *Rapport Statistique Canadien sur l'Hydrographie et les Sciences Oceanique*, **101**, 92pp.

O'Brien, M.C., K.Iseki, R.W. Macdonald, R. Forbes, Yang Liangfeng, D. McCullough, 1991, Sediment trap data collected in the Beaufort Sea, March 1987 - March 1988, *Can. Data Rep. Hydrogr. Ocean Sci.*: **60 (8)**, 237 pp

Macdonald, R.W., E.C. Carmack, F. A. McLaughlin, D. Sieberg, M. C. O'Brien, D. Paton, R. Pearson, Yang Liangfeng, C.Gobeil, 1991, Oceanographic Data Collected from the Henry Larsen in the Beaufort Sea, August-September 1990. *Canadian Data Report of Hydrography and Ocean Sciences*, **97**, 142 pp.

1991

Macdonald, R.W., E.C. Carmack, M.C. O'Brien, F.A. McLaughlin, B. Minkley and K. Berger-North, 1990. Oceanographic data collected from the Sir John Franklin in the Beaufort Sea, September 1989. *Canadian Data Report of Hydrography and Ocean Sciences*, **80**, 100pp.

Yunker, M.B., F.A. McLaughlin, B.R. Fowler, T.A. Smyth, W.J. Cretney, R.W. Macdonald and D. McCullough 1990. NOGAP B.6; Volume 7: Hydrocarbon determinations; Mackenzie River and Beaufort Sea shoreline peat samples. *Canadian Data Report of Hydrography and Ocean Sciences*, **60**, 81pp.

1990

Carmack, E.C., J.E. Papadakis, D.M. Macdonald, and R.W. Macdonald 1989. Nogap B.6; Volume 6: Physical data collected in the Beaufort Sea, Summer 1987. *Canadian Data Report of Hydrography and Ocean Sciences*, **60**, 219pp.

1989

Macdonald, R.W., K. Iseki, M.C. O'Brien, F.A. McLaughlin, D. McCullough, D.M. Macdonald, E.C. Carmack, M. Yunker, S. Buckingham, and G. Miskulin, 1988. NOGAP B.6; Volume 5, Chemical data collected in the Beaufort Sea and Mackenzie River Delta, March - July 1987, *Canadian Data Report of Hydrography and Ocean Sciences*, **60(5)**, 56pp.

Macdonald, R.W., K. Iseki, M.C. O'Brien, F.A. McLaughlin, D. McCullough, D.M. Macdonald, E.C. Carmack, H. Adams, M. Yunker, G. Miskulin and S. Buckingham, 1988. NOGAP B.6; Volume 4, Chemical data collected in the Beaufort Sea, Summer, 1987. *Canadian Data Report of Hydrography and Ocean Sciences*, **60(4)**, 103pp.

McCullough, D., R.W. Macdonald, K. Iseki, and E.C. Carmack, 1988. NOGAP B.6; Volume 3: Beaufort Sea current measurements, September, 1987 - March, 1988. *Canadian Data Report of Hydrography and Ocean Sciences*, **60(3)**, 37pp.

Macdonald, D.M., L.E. Cuypers, D. McCullough, E. Carmack, and R.W. Macdonald, 1988. NOGAP B.6; Volume 2: Physical data collected in the Beaufort Sea, March-June, 1987. *Canadian Data Report of Hydrography and Ocean Sciences*, **60(2)**, 157pp.

McCullough, D., R.W. Macdonald, K. Iseki, and E.C. Carmack, 1988. NOGAP B.6; Volume 1: Beaufort Sea current measurements, March-August, 1987. *Canadian Data Report of Hydrography and Ocean Sciences*, **60(1)**, 42pp.

Cuypers, L.E., A.W. Blaskovich, E.C. Carmack, and R.W. Macdonald, 1988. NOGAP B.6; Physical data collected in the Beaufort Sea, September, 1986. *Canadian Data Report of Hydrography and Ocean Sciences*, **59**, 149pp.

Macdonald, R.W., K. Iseki, E.C. Carmack, D. Macdonald, M. O'Brien, and F. McLaughlin, 1988. Data report: NOGAP B.6; Beaufort Sea oceanography, September 1986. *Canadian Data Report of Hydrography and Ocean Sciences*, **58**, 68pp.

1988

- Thomas, D.J., R.W. Macdonald, and M. Robinson, 1986. Arctic data inventory and appraisal Volume 18, Canada Basin: Chemical Oceanography 1926 through 1983, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(18)**;
- Thomas, D.J., M. Yunker, P. Wainwright and R.W. Macdonald, 1986. Arctic data compilation and appraisal Volume 16, Queen Elizabeth Islands: Chemical Oceanography 1952 through 1985, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(16)**, 125pp
- Thomas, D.J., R.W. Macdonald and A.G. Francis, 1986. West Coast data inventory and appraisal, Volume 5, Offshore B.C. waters: Chemical oceanography 1932 through 1984. *Canadian Data Report of Hydrography and Ocean Sciences*, **37(5)**, 250pp
- Thomas, D.J. and R.W. Macdonald, 1986. West Coast data inventory and appraisal Volume 4, The Strait of Georgia and Adjoining B.C. Inlets and waters: Chemical Oceanography 1926 through 1983, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(4)**, 300pp.
- Thomas, D.J., R.W. Macdonald and A.G. Francis, 1986. West Coast data inventory and appraisal Volume 3 (parts 1 and 2), Dixon Entrance, Hecate Strait, Queen Charlotte Sound and Adjoining B.C. coastal waters: Chemical Oceanography- 1937 through 1984, *Canadian Data Report of Hydrography and Ocean Sciences*, **37(3)**, Part 1 (278pp), Part 2 (248pp)
- 1986
- Macdonald, R.W., 1985. Guidelines for obtaining, calculating and reporting quality statements for chemical analysis of marine sediments, Unpublished Manuscript (lab manual) 92pp
- 1985
- Macdonald, R.W., M.C. O'Brien, and D.M. Macdonald, 1984. Ocean Chemistry data report: Alice Arm, Observatory Inlet; Part 1, December 1981, January 1982, June 1982, January 1983. *Canadian Data Report of Hydrography and Ocean Sciences*, **17(1)**, 75pp.
- Macdonald, R.W., M.C. O'Brien, and D.M. Macdonald, 1984. Ocean Chemistry data report: Alice Arm, Observatory Inlet; Part 2, March 1982 *Canadian Data Report of Hydrography and Ocean Sciences*, **17(2)**, 52pp.
- Macdonald, R.W., M.C. O'Brien, and D.M. Macdonald, 1984. Ocean Chemistry data report: Alice Arm, Observatory Inlet; Part 3, September - October 1982, *Canadian Data Report of Hydrography and Ocean Sciences*, **17(3)**, 110pp.
- 1984
- Fissel, D.B., L. Cuypers, D.D. Lemon, J.R. Birch, A.B. Cornford, R.A. Lake, B.D. Smiley, R.W. Macdonald, and R.H. Herlinveaux, 1983. Volume 6. Queen Elizabeth Islands: Physical Oceanography - temperature, salinity, currents and water levels. *Canadian Data Report of Hydrography and Ocean Sciences*, **5(6)**, 214pp
- Thomas, D.J., R.W. Macdonald, A.G. Francis, V. Wood, and A.B. Cornford, 1983. Arctic data compilation and appraisal Volume 4 Northwest Passage: Chemical Oceanography. *Canadian Data Report of Hydrography and Ocean Sciences*, **5(4)**, 200 pp.
- Birch, J.R., D.B. Fissel, D.D. Lemon, A.B. Cornford, R.A. Lake, B.D. Smiley, R.W. Macdonald, and R.H. Herlinveaux. 1983. Volume 3. Northwest Passage: Physical Oceanography - temperature, salinity, currents and water levels, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(3)**, 262pp
- 1983
- Thomas, D.J., R.W. Macdonald and A.B. Cornford, 1982. Arctic data and appraisal volume 2, Beaufort Sea: Chemical Oceanography, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(2)**, 243pp.
- Cornford, A.B., D.D. Lemon, D.B. Fissel, H. Melling, B.D. Smiley, R.H. Herlinveaux, and R.W. Macdonald, 1982. Arctic data compilation and appraisal volume 1 Beaufort Sea: Physical Oceanography - temperature, salinity, currents and water levels, *Canadian Data Report of Hydrography and Ocean Sciences*, **5(1)**, 279pp.

1982

Macdonald, R.W., F.A. McLaughlin and J. Page, 1980. Nutrient storage by freezing: data report and statistical analysis, *Pacific Marine Sciences Report* **80-2**, 69pp.

1980

Macdonald, R.W., D.M. Macdonald, and P.S. Munro, 1978. Oceanographic data report Kitimat Arm, Porpoise Harbour, February, 1977, *Pacific Marine Science Report* **78-24**, 61pp

de Mora, S.J., C.S. Wong, and R.W. Macdonald, 1978. A preliminary investigation of copper release from copper-based marine antifouling paints, *I.O.S. Note* **5**, 22pp.

Macdonald, R.W., M.E. Mcfarland, S.J. deMora, D.M. Macdonald and W.K. Johnson, 1978. Oceanographic data report: Amundsen Gulf August-September, 1977, *Pacific Marine Science Report* **78-10**, 92pp

1978

Macdonald, R.W., and C.S. Wong, 1977. The distribution of mercury in Howe Sound sediments, *Pacific Marine Science Report*, **77-6**, 51pp

Wong, C.S., J.A.J. Thompson and R.W. Macdonald, 1977. Chemical studies on mercury in Howe Sound and heavy metals at Point Grey dump site, 1976-77, *IOS Note* **1**, 22 pp.

Macdonald, R.W., and C.S. Wong, 1977. The interaction of chlorine and seawater, *Pacific Marine Science Report* **77-6**, 49 pp

1977

Wong, C.S., W.J. Cretney, R.W. Macdonald, and P. Christensen, 1976. Hydrocarbon levels in the marine environment of the southern Beaufort Sea, *Beaufort Sea Technical Report*, **38**, 113 pp.

1976

CRUISES AND FIELD-WORK EXPERIENCE

2009 Strait of Georgia on the Vector to service moorings and collect water and sediments. Chief Scientist (Oct 31- Nov 3).

2008 Amundsen Gulf, Beaufort Sea. Chief Scientist for Leg 6a (Jan 31-Feb 21, 2008) for the CFL project aboard the CCGS Amundsen.

2007 Strait of Georgia on the Vector to collect water samples and sediment cores (November 27 – December 1).

2007 Cape Vera, Devon Island – sampling for biovector transport in the Arctic (Ottawa U collaboration), July 4-29, 2007.

2005 Cruise to the Canadian Arctic Archipelago and Hudson Bay (CCGS Amundsen) as part of ArcticNet, September 15-October 1, 2005.

2003 Cruise to Nares Strait, USCGS Healy, July 19-August 19.

2003 BC lakes sediment coring and contaminant cycling measurements in Meziadin Lake, BC.

2002 BC lakes sediment coring for records of contaminants in Shuswap, Moose, Bowron and Quesnel Lakes.

2001 BC lakes sediment coring for records of contaminants in North and East Barriere Lakes, and Frazer Lake (anadromous fish transport study in collaboration with Jules Blais, Ottawa U).

1998 SHEBA recovery section, CCGS *Louis S. St Laurent*, September 1998, CTD, water sampling for changes in the Canada Basin, mooring recovery and deployment (Chief Scientist).

1995 Garrow Lake, May 5-May11, CTD, water and ice sampling for thermohaline work and tailings transport (with P. Erikson and A. Etier).

1995 Fraser Estuary, Feb 7-8, Collecting sediment cores out of McDonald Slough and Gunnerson Slough (with D. Paton and J. Luternauer).

1994 Kitimat Cruise, Vector, Oct 17-22, collecting sediment cores out of Jesse Lake.

1994 Arctic Ocean Section, July 24-Sept 10; Louis S. St. Laurent, Contaminants program.

1994 Fraser Drainage lake coring, Moose Lake, Stuart Lake, Kamloops Lake, June 7-13.

1993 Fraser Drainage lake coring, Vector cruise to the Strait of Georgia Dump Site (3 days); Vector cruise to Kitimat (1 week) to collect cores.

1993 CCGS Henry Larsen Joint Canadian Russian Oceanographic Expedition to the Beaufort Sea, the Chukchi Sea, and the Eastern Siberian Sea; 4 week cruise to make geochemical and contaminant measurements on water, sediments and biota. Included participants from BIO, Scripps and the Russian Ministry of Nature Conservancy.

1992 CCGS Henry Larsen; 3 week cruise in the Beaufort Sea (chief scientist). The cruise involved recovery of 9 moorings and redeployment of 5 of them. We completed another year at the time series deep station in the Canada Basin sampling for chemistry, including the organochlorines

1992 Ice-based field work (April - May), out of PCSP Tuktoyaktuk, using fixed and rotary wing support aircraft and snowmobiles. Objectives included oceanographic sampling, ice sampling, sampling for contaminants and deployment and recovery of moorings (Chief Scientist).

1991 CCGS Henry Larsen; 4-week cruise to the Southern Beaufort Sea, on a ship-of-opportunity, ice-breaker (Chief Scientist). (Deep Arctic mooring, chemical and physical sampling over the Mackenzie shelf and at a deep Arctic basin climate station, sediment pore water studies, organochlorine measurements).

1991 Field work (April - May) on the ice, based out of Tuktoyaktuk and using fixed and rotary wing

support aircraft. Objectives included oceanographic sampling, ice sampling, sampling for contaminants and deployment of moorings (Chief Scientist).

1990 CCGS Henry Larsen; 4-week cruise to the Southern Beaufort Sea, on a ship-of-opportunity, ice-breaker (Chief Scientist). (Deep Arctic mooring, chemical and physical sampling over the Mackenzie and Banks Island shelves and at a deep Arctic basin climate station, sediment pore water studies).

1989 CCGS Sir John Franklin; 2-week cruise to the Southern Beaufort Sea on a ship-of-opportunity, ice-breaker (Chief Scientist). (Chemical and physical sampling over the Mackenzie shelf and at a deep Arctic basin climate station).

1987 CSS John P. Tully; 6 week cruise to the Southern Beaufort Sea to do physical, chemical and biological sampling (total scientific party of 31), (Chief Scientist).

1987 Field work (3 excursions) on the ice, based out of Tuktoyaktuk and using fixed and rotary wing support aircraft. Objectives included oceanographic sampling and deployment of moorings (Chief Scientist).

1987 CSS Vector; 1-week cruise to run instrument intercomparisons and shakedown (Chief Scientist).

1986 Ivik; 1-week cruise to the southern Beaufort Sea to deploy and recover moorings, and carry out oceanographic sampling on shelf-wide transects (Chief Scientist).

1986 Minuk; 1-week, ice-based Arctic field work around Minuk (Esso artificial island) to recover moorings and sample (Scientist).

1985 MEEE; 4 week experiment run at Xiamen in China to develop enclosure technology for the Chinese (Scientist).

1984 CSS John P. Tully; 2-week coastal cruise to Alice Arm to collect cores, sediments and seismic data (Scientist).

1983 CSS Vector; 2-week coastal cruise to Alice Arm to moor traps and collect oceanographic data (Chief Scientist).

1982 CSS Vector; two 2-week coastal cruises to Alice Arm to moor traps and collect oceanographic data (Chief Scientist).

1981 CSS Vector; 2-week, interdisciplinary cruise to Kitimat Fjord Systto collect cores, seismic data, moor equipment and collect oceanographic data (Chief Scientist).

1981 Bell Jar Experiment; 7-week field trip working in Kiel fjord (Federal Republic of Germany) as part of the Canada-Germany cooperative program.

1981 CSS Richardson; collecting cores and sidescan data from Strait of Georgia and Ballenas Basin (Chief Scientist).

1979 RV Poseidon; 3-week cruise to the Baltic as part of a Canada-Germany cooperative program.

1979 RV T. Thompson collecting samples in Saanich Inlet to develop methods for Chromium analysis.

1979 MV Sea Lion; 2-week cruise to Kitimat Fjord System to collect oceanographic data (work contracted to Seakand I acted as departmental representative).

1978 CSS Parizeau; 1-week cruise to Alberni Inlet to collect sediments and oceanographic data (Chief Scientist).

1978 CSS Parizeau; 1-week cruise to Strait of Georgia to collect nutrient data and cores (Chief Scientist)

1977 MV Pandora II; 4-week ship-of-opportunity cruise to Amundsen Gulf (Beaufort Sea) to collect oceanographic data and samples (scientist).

1977 CSS Parizeau; 1-week cruise to Alberni Inlet to make ocean dumping related measurements for dissolved oxygen, and to collect box cores.

1977 CSS Parizeau; 2-week cruise to Kitimat Fjord systto collect oceanographic data in support of

proposed pipe-line terminal studies (Chief Scientist)

1977 CSS Vector; 1-week cruise to Howe Sound to collect samples in support of the ocean dumping program (Chief Scientist).

1976 Submersible Pisces from MV Pandora II; 3-day work in Saanich Inlet to perform liquid chlorine release experiments at various depths (Chief Scientist).

1976 CSS Vector; 1-week cruise to Saanich Inlet to collect box cores and oceanographic data (Chief Scientist).

1976 CSS Vector; 1-week cruise to Howe Sound to collect samples related to Hg pollution (Chief Scientist)

1975 MV Sea Lion; 2-week cruise to Strait of Georgia to perform an ocean dumping experiment at the Point Grey Ocean Dumping Site (Chief Scientist).

1975 MV Pandora II; 4-week cruise to the Beaufort Sea to collect and analyze water samples for low-molecular-weight hydrocarbons (scientist)

1974 MV Theta; 4-week cruise to the Beaufort Sea to collect and analyze water samples for low-molecular-weight hydrocarbons (scientist)