Graig Sutherland

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Environment and Climate Change Canada
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Professional Experience

2018-	Research Scientist, Environment and Climate Change Canada, Dorval, Canada
2017-2018	Scientist, Norwegian Meteorological Institute, Oslo, Norway
2014-2017	Postdoctoral Fellow, Department of Mathematics, University of Oslo, Norway
2009-2010	Physical Oceanographer, Oceans Ltd. St. John's, Canada.
2005-2006	Research Assistant, Korean Ocean Resarch and Development Institute, South Korea.
2003-2005	Research Assistant, Ocean Sciences and Productivity, Institute of Ocean Sciences, Department of Fisheries and Oceans Canada, Patricia Bay, Canada.

Education

2011-2014	PhD in Ocean Physics, National University of Ireland, Galway.
2007-2009	MSc in Physical Oceanography, Memorial University of Newfoundland and Labrador.
1998-2003	BSc in Physics and Ocean Sciences (Physical Oceanography) with a minor in Mathematics, University of Victoria.

Awards and Grants

2018	Norwegian Research Council (PETROMAKS), Co-Pi Dynamics of Floating Ice (DOFI): Project is 13 million NOK over 4 years.
2011	National Science and Engineering Research Council, Canada, Postgraduate Scholarship (PGS-D): $63000 CAD ($21000 per annum for 3 years).
2009	Memorial University of Newfoundland and Labrador, Recognition of Excellence.
2008	National Science and Engineering Research Council, Canada, Alexander Graham Bell Award (CGS-M): $17500 CAD.
2008	Memorial University of Newfoundland and Labrador, SGS Merit Award: $5000 CAD.

Professional Activities

- Scientific committee, Surface Ocean Lower Atmosphere Study (SOLAS), "Frontiers in ocean-atmosphere exchange: Air sea interface and fluxes of mass and energy", 2017, Cargèse, Corsica, France.
- Organizing committee, "5th Norway-Scotland waves symposium." 2017, Oslo, Norway.
- Session chair "The Dynamics of the Air-Sea Interface: Application to Oceanic Mixing and Transports" at the 2016 Ocean Sciences Meeting, New Orleans, USA.
- Reviewer for *National Science Foundation, Nature Communications, Journal of Physical Oceanography, Geophysical Research Letters, Journal of Geophysical Research: Oceans, Journal of Atmospheric and Oceanic Technology, Ocean Modelling, Ocean Dynamics, Continental Shelf Research, Physical Review Fluids, Wave Motion, Applied Ocean Research, Cold Regions and Science Technology.*

Publications

Journal Articles

2021 Röhrs, J., **G. Sutherland**, G. Jeans, M. Bedington, A. K. Sperrevik, K.-F. Dagestad, Y. Gusdal, C. Mauritzen, A. Dale, J. H. LaCasce. Surface currents in operational oceanography: Key applications, mechanisms, and methods. *Journal of Operational Oceanography*, accepted.

- Løken, T. K., J. Rabault, A. Jensen, **G. Sutherland**, K. H. Christensen and M. Müller. Wave measurements from ship mounted sensors in the Arctic marginal ice zone. *Cold Regions and Science Technology*, 182, 103207.

2020 Voermans, J. J., J. Rabault, K. Filchuk, P. Heil, A. Marchenko, C. Collins, M. Dabboor, **G. Sutherland** and A. V. Babanin. Experimental evidence for a universal threshold characterizing wave-induced sea ice break up. *The Cryosphere.* 14(11), 4265-4278.

- **Sutherland, G** and others. Evaluating the leeway coefficient of ocean drifters using operational marine environmental prediction systems. *Journal of Atmospheric and Oceanic Technology*, 37(11), 1943-1954
- Rabault, J., **G. Sutherland**, O. Gundersen and A. Jensen. An open source, versatile, affordable waves in ice instrument for remote sensing in the polar regions. *Cold Regions and Science Technology*, 170, 102955.

2019 ten Doeschate, A., **G. Sutherland**, H. Bellenger, S. Landwehr, L. Esters and B. Ward. Upper ocean response to rain observed from a vertical profiler. *Journal of Geophysical Research: Oceans.* 124(6), 3664-3881

- **Sutherland, G.**, K. H. Christensen, J. Rabault and A. Jensen. A two layer model for wave dissipation in sea ice. *Applied Ocean Research.* 62, 1519-1533.
- Rabault, J., **G. Sutherland**, A. Jensen, K. H. Christensen, A. Marchenko. Experiments on wave propagation in grease ice: Combined wave gauges and particle image velocimetry measurements. *Journal of Fluid Mechanics*, 864, 876-898.

2018 Esters, L., Ø. Breivik, S. Landwehr, A. ten Doeschate, **G. Sutherland**, K. Christensen, J. Bidlot and B. Ward. Turbulence scaling comparisons in the ocean surface boundary layer. *Journal of Geophysical Research: Oceans.* 123(3), 2172-2191.

2017 ten Doeschate, A., **G. Sutherland**, L. Esters, D. Wain, K. Walesby and B. Ward. ASIP: Profiling the Upper Ocean. *Oceanography.* 30(2), 22-24.

- **Sutherland, G.**, J. Rabault and A. Jensen. A method to estimate reflection and directional spread using rotary spectra from accelerometers on large ice floes. *Journal of Atmospheric and Oceanic Technology.* 34(5), 1125-1137.
- Esters L., S. Landwehr, **G. Sutherland**, T. G. Bell, K. H. Christensen, E. S. Saltzman, S. D. Miller and B. Ward. Parameterizing air-sea gas transfer with dissipation. *Journal of Geophysical Research: Oceans.* 122(4), 3041-3056.
- Rabault J., **G. Sutherland**, O. Gundersen and A. Jensen. Measurements of wave damping by grease ice using Open Source loggers. *Journal of Glaciology.* 63(238), 372-381.
- **Sutherland G.**, T. Halsne, J. Rabault and A. Jensen. The attenuation of monochromatic surface waves due to the presence of an inextensible cover. *Wave Motion.* 68, 88-96.

2016 **Sutherland G.**, L. Marié, G. Reverdin, K. H. Christensen, G. Broström and B. Ward. Enhanced turbulence associated with the diurnal jet in the ocean surface boundary layer. *Journal of Physical Oceanography.* 46(10), 3051-3067.

- Rabault J., **G. Sutherland**, B. Ward, K. H. Christensen, T. Halsne and A. Jensen. Measurements of waves in landfast ice using inertial motion units. *IEEE Transactions on Geoscience and Remote Sensing.* 54(11), 6399-6408.
- **Sutherland G.** and J. Rabault. Observations of wave dispersion and attenuation in landfast ice. *Journal of Geophysical Research: Oceans.* doi:10.1002/2015JC011446.

2015 Reverdin, G., S. Morisset, L. Marié, D. Bourras, **G. Sutherland**, B. Ward, J. Salvador, J. Font, Y. Cuypers, L. Centurioni, V. Hormann, N. Koldziejczyk, J. Boutin, F. D'Ovidio, F. Nencioli, N. Martin, D. Diverres, G. Alory and R. Lumpkin. Surface salinity in the North Atlantic subtropical gyre during the Strasse/SPURS summer 2012 cruise. *Oceanography.* 28(1), 114-123.

2014 **Sutherland G.**, G. Reverdin, L. Marié and B. Ward. Mixed and mixing layer depths in the ocean surface boundary layer under conditions of diurnal stratification. *Geophysical Research Letters.* 41(23), 8469-8476.

- Ward B., T. Fristedt, A.H. Callaghan, **G. Sutherland**, X. Sanchez, J. Vialard and A. ten Doeschate. The Air-Sea Interaction Profiler (ASIP): An autonomous upwardly-rising profiler for microstructure measurements in the upper ocean. *Journal of Atmospheric and Oceanic Technology.* 31(10), 2246-2267
- **Sutherland G.**, K. H. Christensen and B. Ward. Evaluating Langmuir turbulence parameterizations in the ocean surface boundary layer. *Journal of Geophysical Research: Oceans.* 119(3), 1899-1910.

2013 **Sutherland G.**, K. H. Christensen and B. Ward. Wave-turbulence scaling in the ocean mixed layer. *Ocean Science.* 9(4), 597-608.

2008 Cherniawsky J.Y. and **G. Sutherland**. Large-scale errors in ERS altimeter data. *Marine Geodesy.* 31(1), 2-16.

2007 Arbic B.K., P. St-Laurent, **G. Sutherland** and C. Garrett. On the resonance and influence of the tides in Ungava Bay and Hudson Strait. *Geophysical Research Letters.* 34, L17606, doi:10.1029/2007GL030845.

- **Sutherland G.**, M.G.G. Foreman and C. Garrett. Tidal current energy assessment for Johnstone Strait, Vancouver Island. *Proceedings of the Institution of Mechanical Engineers Part A: Journal of Power and Energy.* 221(2), 147-157.

2005 **Sutherland G.**, C. Garrett and M.G.G. Foreman. Tidal resonance in Juan de Fuca Strait and the Strait of Georgia. *Journal of Physical Oceanography*, 35(7), 1279-1286.

2004 Foreman M.G.G., **G. Sutherland**, P.F. Cummins. M2 tidal dissipation around Vancouver Island: an inverse approach. *Continential Shelf Research*, 24(18), 2167-2185.

Conference Proceedings

2020 Rabault, J., J Voermans, **G. Sutherland**, A. Jensen, A. Babanin and K. Filchuk. Development of open source instruments for in-situ measurements of waves in ice. In *IAHR*, Trondheim, Norway.

- Løken, T. K., J. Rabault, A. Jensen, **G. Sutherland**, K. H. Christensen and M. Müller. Wave measurements in the Arctic marginal ice zone from ship mounted sensors. In *IAHR*, Trondheim, Norway.

2017 Marchenko A., J. Rabault, **G. Sutherland**, C. O. Collins III, P. Wadhams and M. Chumakov. Field observations and preliminary investigations of a wave event in solid drift ice in the Barents Sea. In *POAC-17*, Busan, South Korea.

2016 Rabault J., T. Halsne, **G. Sutherland** and A. Jensen. PTV investigation of the mean drift currents under water waves. *18th International Symp. on the App. of Laser and Imaging Tech. to Fluid Mech.*, Lisbon, Portugal.

- Esters L., S. Landwehr, **G. Sutherland**, T. G. Bell, E. S. Saltzman, K. H. Christensen, S. D. Miller and B. Ward. The relationship between ocean surface turbulence and air-sea gas transfer velocity: An in-situ evaluation. In *IOP Conference Series: Earth and Environmental Science*, 35(1), p. 012005. Seattle, USA.

Technical Reports

2005 Foreman, M.G.G., L. Beauchemin, J.Y. Cherniawsky, M. A. Peña, P. F. Cummins, and **G. Sutherland**. A review of models in support of oil and gas exploration off the north coast of British Columbia. Can. Tech. Rep. Fish. Aquat. Sci. 2712: v + 58p.

2002 Rohr K.M.M. and **G. Sutherland**. A Reconnaissance AVO Study of the Queen Charlotte Basin. *CEOR Report 2002-3*.

Field Work

2019 F/F *Helmer Hanssen*, Thomas Kramer (University of Tromso), Western Norway. Oil on water exercise (NOFO). Drifter deployment. 4 days.
- Tempelfjorden, Svalbard. Measured wave motion in sea ice from custom built sensors. 5 days.

2018 Tempelfjorden, Svalbard. Measured wave motion in sea ice from custom built sensors. 5 days.

2016 Adventdalen, Svalbard. Responsible for sampling strategy and development of instrumentation to measure wave motion in ice. 6 days.

2015 Galway Bay, Ireland. Investigating the impact of surfactants on wave propagation and air-sea fluxes. 5 days.
- Svea and Tempelfjorden, Svalbard. Responsible for sampling strategy and development of instrumentation to measure wave motion in ice. 14 days.

2013 B/O *Sarmiento de Gamboa*, Jordi Font (CSIC), subtropical Atlantic, SPURS project, operated the Air-Sea Interaction Profiler (ASIP), which is a prototype microstructure profiler which is semi-autonomous and vertically rising, 28 days.

2012 N/O *Thalassa*, Gilles Reverdin (LOCEAN), subtropical Atlantic, SPURS project, operated ASIP, 37 days.

2011 R/V *Knorr*, Scott Miller (SUNY Albany), north Atlantic, gas exchange study, operated ASIP, 30 days.
- R/V *Johan Hjort*, Göran Broström (Met. No.), Vestfjorden, Norway, operated ASIP, 10 days.

2008 CCGS *Amundsen*, Tim Paparyiakou (U. of Manitoba), western Canadian Arctic, Canadian Flaw lead IPY project, operated the Vertical Microstructure Profiler, 42 days.

2003 R/V *Seiyo Maru*, Hidekatsu Yamazaki (Tok. U. of Fish.), Sea of Japan, collected microstructure TurboMap profiles, 7 days.

2002 CCGS *JP Tully*, Michael Riedel (UVIC), seismic reflection survey in Queen Charlotte Basin, acquisition of seismic reflection data, 28 days.

Select Conference Presentations and Invited Seminars (last 5 years)

2019 An overview of ECCC sea ice forecasting activities. *Oil Spill Modeling for Improved Response to Arctic Maritime Spills: The Path Forward*, Anchorage, USA. (Invited).
- Wind driven response of different surface drifters. *Ocean Predict 19*, Halifax, Canada.
- So you want to swim across the Atlantic? *Ocean Predict 19*, Halifax, Canada.
- Wave dissipation due to sea ice. *Atmospheric and Oceanic Sciences Seminar Series*, McGill University, Montréal, Canada (Invited).

2018 Wave dissipation due to sea ice. *8th International Workshop on Sea Ice Modelling, Data Assimilation and Verification*, Montréal, Canada. (Invited).
- Wave dissipation due to sea ice. *Civil and Environmental Engineering Seminar Series*, Clarkson University, Potsdam, NY, USA. (Invited).
- Wave dissipation in sea ice. *METNO Seminar Series*, Norwegian Meteorological Institute, Oslo, Norway. (Invited)

2017 A look at directional spread in sea ice: Observations from the Barents Sea. 5^{th} *Norway-Scotland Waves Symposium*, Oslo, Norway. (Invited).

2016 Waves in Oil and Ice Experiment (WOICE). *TAO Seminar Series*, University of Victoria. (Invited).
- Measurements of waves in landfast ice in Svalbard: Effect of flexural stress on wave properties. *Ocean Sciences Meeting*, New Orleans, USA. (Invited).
- Enhanced dissipation associated with the diurnal jet in the ocean surface boundary layer. *Ocean Sciences Meeting*, New Orleans, USA.

2015 Detection and transport of oil in ice. University of Manitoba. Winnipeg, MB, Canada. (Invited).
- Dispersion, attenuation, and the directional spectra of waves in landfast ice: Observations from Tempelfjorden, Svalbard. 4^{th} *Norway-Scotland Waves Symposium*, Edinburgh, UK. (Invited).