

Docente non Universitario

Esperienze:

Current position

Professor of Ocean Physics, Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge, Wilberforce Road, Cambridge CB3 0WA.

Concurrently: Professeur Associé Recherche, Université Pierre et Marie Curie, Paris, based at Laboratoire d'Océanographie de Villefranche (adjunct position).

Born 14 May 1948. Married to Maria Pia Casarini of Milan, Italy.

Education

1966-69 - Churchill College, Cambridge. College Scholar. 1969 BA in Natural Sciences (Physics). 1972 MA (Cantab).

1970-74 - Scott Polar Research Institute, University of Cambridge. PhD awarded April 1974. Thesis "The effect of a sea ice cover on ocean surface waves".

1994 ScD (Cantab) awarded for published work.

Appointments

1969 Sept - 1970 Oct. Research scientist, Bedford Institute of Oceanography, Dartmouth, Canada. Assistant to Senior Scientist on "Hudson 70" Expedition, an 11-month oceanographic cruise which accomplished the first circumnavigation of the Americas, by way of Antarctica, Chilean fjords, south and north Pacific, Northwest Passage.

1974 Apr - 1975 Dec. Postdoctoral fellow of National Research Council of Canada at Institute of Ocean Sciences, Victoria, B.C., Canada, working on sea ice structure and dynamics in the Beaufort Sea and oil spill impacts.

1976 Jan - 2002 Dec. Scott Polar Research Institute, University of Cambridge. Initially Senior Research Associate (Principal Investigator for Office of Naval Research); 1981-7 Assistant Director of Research; 1987-1992 Director; 1992-2001 Reader in Polar Studies; 2001-2 Professor of Ocean Physics. 2003 Jan. Transferred Chair to DAMTP.

1980-1990 Senior Research Fellow, Churchill College, Cambridge

2013- Fellow, Clare Hall, Cambridge.

Visiting professorships:-

1980-81. Office of Naval Research Chair of Arctic Marine Science, Naval Postgraduate School, Monterey, California.

1987-88. Cecil and Ida Green Scholar at Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography, La Jolla (further visits 1989-92 working with acoustic tomography group of Walter Munk); and Walker Ames Professor, University of Washington, Seattle.

1995. Invited Visiting Professor, Arctic Environmental Research Centre, National Institute of Polar Research, Tokyo, Japan.

1996. British Council - Monbusho Visiting Professor at Graduate University of Advanced Studies, Tokyo, Japan, based at National Institute of Polar Research. Revisited 2000 and 2001 under Royal Society grant to develop Anglo-Japanese joint programme in Arctic research.

2002. Visiting scholar, Laboratoire d'Océanographie de Villefranche (LOV), France. From 2007 Professeur Associé Recherche, Université Pierre et Marie Curie, Paris, based at LOV.

2003-4 Professorial Fellow, Scottish Association for Marine Science, Dunstaffnage Marine

Laboratory, Oban, Scotland.

Honours

- 1977 W.S. Bruce Prize, Royal Society of Edinburgh, "for oceanographic investigations and for studies of pack ice behaviour near Spitsbergen, the North Pole and off East Greenland".
- 1983 Elected Fellow of the Arctic Institute of North America "in recognition of significant contributions to the knowledge of the polar and sub polar regions".
- 1987 The Polar Medal (H.M. The Queen) with Arctic and Antarctic clasps.
- 1990 Italgas Prize for Research and Innovation in Environmental Sciences, Turin.
- 2006 Elected Foreign Member of Finnish Academy of Science and Letters (Academia Scientiarum Fennica).
- 2008 Listed as no. 5 among "Britain's top 100 environmentalists" by "Independent on Sunday" (Oct 12 2008).
- 2008 Recognised by IPCC "for contributing to the work of the Nobel Peace Prize".

Committees

- Member of US National Academy of Sciences Panel on Responding to Oil Spills in Arctic Marine Environments, 2012-13, report being completed for Dec 2013.
- Member of Scientific Committee, European Environment Agency, Copenhagen, 2004-12.
- Review Editor for Chapter 1, 5th Assessment Report (AR5), Intergovernmental Panel on Climate Change, 2012-3.
- Member of Committee for electing annual ENI Prizes, Rome.
- Member of Scientific Commission for the Holy Shroud, Diocese of Turin, for determining new experimental programme.
- Co-ordinator of several EU projects, including ECOPS (European Co-operation on Ocean and Polar Science) 1991-3; ESOP (European Subpolar Ocean Programme) 1993-6; INTERICE 1998-2008 (consortium of European laboratories using ice tank at Hamburg for sea ice physics experiments); CONVECTION (Greenland Sea convection) 2000-4; GreenICE (Greenland Arctic Shelf Ice and Climate Experiment) 2003-7; on steering committee of DAMOCLES (EU FP6, 2006-2010) and ACCESS (Arctic climate, economy and society) 2011-4. Co-coordinator of new EU project ICE-ARC, on impacts of Arctic summer sea ice retreat, 2014-8. Principal Investigator for ONR Arctic Program 1976-1997, 2011-6 (new programme on wave interaction with ice).
- Formerly: President, IAPSO (International Association for the Physical Sciences of the Ocean) Commission on Sea Ice; Co-ordinator, International Programme for Antarctic Buoys (IPAB), World Climate Res. Prog.; member of Scientific Steering Comm., ASPECT (Antarctic Sea-ice properties and climate); UK delegate, Arctic Ocean Sciences Board; member of NERC Peer Review College.

Societies

Fellow of the Royal Geographical Society (FRGS); American Geophysical Union; European Geosciences Union; International Glaciological Society; Society for Underwater Technology; Intl. Assoc. Hydrological Sciences; Remote Sensing Soc.; Challenger Society for Marine Science; The Oceanography Society; Society for Scientific Exploration; Arctic Club; Antarctic Club; The Explorers' Club (New York); BIO-Oceans Association (Dartmouth NS); Cambridge Rotary Club.

PhD theses supervised: 21 (Squire, Langhorne, Kristensen, Bratchie, Crocker, O'Farrell, Rottier, Gray,

Sheard, Brandon, Low, Tadross, Huddleston, Cottier, Brigham, Jonsdottir, Aksenov, Flocco, Von Eye, Fletcher, Wagner).

Editorships Editorial Board, "Cold Regions Science and Technology" (Elsevier); "Journal of Oceanography Research and Data" (LOV); "Underwater Technology" (Society for Underwater Technology). Associate Editor, "Oceanography" (The Oceanography Soc., Washington D.C.). Formerly Associate Editor, "Journal of Physical Oceanography."

Research experience

Organiser and leader of internationally respected research group since 1976, working on the physical oceanography of the polar seas and the physics of sea ice and icebergs. 45 field projects carried out in Arctic and Antarctic seas, involving work from ships, submarines, AUVs, aircraft and ice camps, including large-scale collaboration among ships, aircraft and ice-based groups. Projects have included major studies of waves in ice and marginal ice zone processes (MIZEX Science plan leader, 1983-7, new ONR-MIZ programme 2011-); 6 RN submarine voyages under Arctic Ocean 1971-2007 (most recently aboard HMS "Tireless" 2007 which included the first use of a multibeam sonar from a submarine to obtain 3D ice imagery); sidescan and multibeam sonar profiling from under-ice AUVs including Autosub off NE Greenland and Gavia and WHOI AUVs (4 campaigns 2004-12); studies of strain and deformation fields in sea ice (FRAM1-3, SIMI projects for ONR; Weddell Sea work for NERC); measurement of mass balance on melting floes in Fram Strait (Sept 2009); modelling work on under-ice tomography (Scripps); convective chimney mapping in Greenland Sea (first multiyear winter and summer tracking; polar eddies (first section); iceberg dynamics and flexure (1980 with "Endurance", then 2012 with BBC shown as "Operation Iceberg", BBC2 Nov 2012).

In recent years I have co-ordinated a sequence of EU research projects (as well as being a partner in many others). Those that I have led are: ECOPS (European Co-operation on Ocean and Polar Science) 1991-3, involving deployment of upward sonar moorings in East Greenland Current; ESOP (European Subarctic Ocean Programme 1993-6 (22 partners), a comprehensive study of the physics, chemistry and biology of the central Greenland Sea gyre and its convective systems; INTERICE, 1998-2003 (consortium of laboratories using ice tank at Hamburg for sea ice physics experiment); CONVECTION, 2000-3 (12 partners), a study of the physics of chimney convection in the Greenland Sea and its relation to ice formation; and GreenICE (Greenland Arctic Shelf Ice and Climate Programme) 2003-6 (6 partners) which involved setting up an ice camp north of Ellesmere Island in 2004 for ice physics and seabed sediment coring studies. At present I am workpackage leader and steering committee member of the ACCESS project (Arctic climate, economy and society, 28 partners), a successor of DAMOCLES (45 partners), and am co-coordinator of a newly funded EU project in Horizon 2020 called ICE-ARC (Arctic ice changes and their economic impact).

Conference organization (a few examples):-

Co-organizer, "The Arctic and Environmental Change", Royal Society Discussion Meeting, Oct 12-13 1994.

Member of Organizing Committee and Convenor of Polar Session, Oceanology International '94, Brighton, April 1994, and Oceanology International '96, March 1996.

Member of Scientific Committee, IAPSO Advanced Study Institute on the Physics of Ice-Covered Seas, Savonlinna, Finland, June 6-17 1994.

Conference Director, ITC'94 (Fourth International Conference on Ice Technology), Southampton,

Sept 1994; Member of Scientific Committee, POAC-99, Helsinki (Int. Conf. on Port & Ocean Engng. under Arctic Conds).

Convenor, Sea Ice Dynamics Session, Nordic Seas Symposium, Hamburg, 7-9 Mar 1995.

Member of Organizing Committee, ISOPE '95 (International Society of Offshore and Polar Engineers), The Hague, May 1995, and ISOPE'96, Los Angeles, May 1996.

Convenor of session P13 on ice-ocean dynamics, IUGG-99 (International Union of Geodesy and Geophysics), Birmingham, July 1999. Convenor: Climate of the Polar Regions session EGS Assembly 2001-4, Nice, 2005-111 Vienna. Typically 120-150 attendees.

Co-organiser of Hudson-70 40th anniversary event, Bedford Institute of Oceanography Dartmouth, Oct 2010; received prize for Hudson-70 at BIO 50th Anniversary 2012.

Co-organiser, International Advanced Workshop on Oil Spills in Sea Ice – Past, Present and Future, Zavatti Polar Institute, Fermo, Italy, September 2011. Guest editor of special volume of “Cold Regions Sci. Technol.” based on workshop papers.

Teaching

- Cambridge University Part III Mathematics (MMaths): taught 4th year course on polar oceans and climate change, annually 2008-date. Part II (3rd year) Geography: lecture course on sea ice, icebergs and polar oceanography, 1982-2003. Textbook based on course, “Ice in the Ocean”, published 2000. Seminars to MPhil in Polar Studies, SPRI, 1976-date.
- Université Pierre et Marie Curie, Paris. Cours de thèse (examined course for graduate students) on polar oceanography, 2005-9.
- Frequent invited lectures at summer schools, conferences etc. Examples: Orkney International Science Festival, 1995, 1997, 1999, 2008, 2011, 2012, 2013; Wadati Conferences on Climate Change in the Polar Regions, Fairbanks 1994, Tsukuba 1995 and 2001; Okhotsk Sea and Sea Ice Symposium, Mombetsu, 1997, 1998 (keynote address), 2001; International Conferences on the Oceanography of the Ross Sea, Antarctica, Lerici, 1997 and Ischia, 2001; ACSYS Sea Ice Thickness Workshops, 1997, 2003; Gordon Research Conference on Sea Ice Biology, 1999; World Economic Forum, New York, 2002; AGU Fall Meeting 2007; MIT Global Change Fora, Rome 2009, Brussels 2011; NERC Spring Schools; Ice Technology (Ice Tech), Banff 2008, Anchorage, 2010; ISAR-1 (Tokyo, International Symposium on Arctic Research) 2008; ISAR-2 (Tokyo) 2010 – invited lecture in presence of HIH Princess Takamado, managing editor for conference proceedings in journal “Polar Science”; ISAR-3 Tokyo 2013.
- Contributor to Open University Foundation Course in Oceanography.
- Examiner for 11 PhD theses in UK, France, Finland, Norway, Sweden, most recently Finland June 2013.

Named lectures (some examples)

W.S. Bruce Lecture, Royal Society of Edinburgh, 1980

Walker-Ames Lecture, University of Washington, 1988

Italgas Prize Lecture, University of Turin, 1990

Finnish Academy Acceptance Lecture, 2007

Royal Institution Friday Night Discourse, March 7 2008, on “The Polar Oceans and Climate Change”.

Publications. 4 books authored, 7 books edited or coedited, 280 other publications.

Public interactions

Frequent contributions on Arctic climate change to TV, radio, press in several countries, including BBC2 “Newsnight” special edition Sept 2012. Most recent public interactions followed

Nature piece on cost of Arctic methane emissions July 2013 [ref. 20], which resulted in 600 media reports worldwide.

Briefings to All Party Parliamentary Committee on Climate Change 2007-13, following earlier briefings to Prime Minister (Rt. Hon. Margaret Thatcher) 1990,

Briefings to Environmental Audit Committee, House of Commons, Feb 2012.

Trustee, Meridian Project, London (modelling of climate change impacts).

Publicazioni

BOOKS AUTHORED OR COAUTHORED

- 01)** *2000 Wadhams, P. Ice in the Ocean. Taylor and Francis, 351pp. ISBN 90-5699-296- (First textbook on sea ice physics)
- 02)** 2007 Cox, P., D. Rughani, P. Wadhams and D. Wasdell . Planet Earth We Have a Problem: Feedback Dynamics and the Acceleration of Climate Change. All Party Parliamentary Committee on Climate Change, UK Parliament, 128pp.
- 03)** 2009 Wadhams, P. The Great Ocean of Truth. Melrose Books, St Thomas Place, Ely UK. 378pp. ISBN 978 1 907040 30 6. (Account of Hudson-70 oceanographic expedition 1969-70)
- 04)** 2013 Wadhams, P. and C. Woodworth-Lynas (2011). The Physics of Icebergs. Elsevier, for Dec 2013.

BOOKS EDITED

- 05)** 1990 Murthy, T.K.S., J.G. Paren, W.M. Sackinger and P. Wadhams (eds). Ice Technology for Polar Operations. Proceedings of Second Int'l Conference on Ice Technology, Cambridge, 18-20 Sept 1990. Computational Mechanics Publications (CMP), Southampton, 426pp.
- 06)** 1992 Murthy, T.K.S., W.M. Sackinger and P. Wadhams (eds). Advances in Ice Technology. Proceedings of Third Int'l Conf. on Ice Technology, MIT, 11-13 Aug 1992. CMP, 365pp.
- 07)** 1994 Murthy, T.K.S., P.A. Wilson and P. Wadhams (eds.). Marine, Offshore and Ice Technology. Computational Mechanics Publications, Southampton, 402pp.
- 08)** 1995 Wadhams, P., J.A. Dowdeswell and A.N. Schofield (eds.). The Arctic and Environmental Change. Proceedings of a Discussion Meeting. Phil. Trans. R. Soc. Lond., A352(1699), 197-385.
- 09)** 1996 Republished in book form, Gordon and Breach Publishers, 193pp.
- 10)** 1999 Wadhams, P., J.-C. Gascard and L. Miller (eds.). The European Subpolar Ocean Programme: ESOP. Sea ice - ocean interactions, deep convection and carbon cycling in the Greenland Sea. Deep-Sea Res. Part II: Topical Studies in Oceanography., 46 no. 6- 7, 1011-1530.
- 11)** 2000 Lewis, E.L., E.P. Jones, P. Lemke, T.D. Prowse and P. Wadhams (eds.). The Freshwater Budget of the Arctic Ocean. Kluwer, Dordrecht. 623pp.
- 12)** 2007 Wadhams, P. and G. Amanatidis, eds. Arctic Sea Ice Thickness: Past, Present and Future. European Commission, Brussels, Climate Change & Natural Hazards Srs., EUR22416, 409pp.

PAPER ON GLOBAL SEA LEVEL

- 13)** *2004 Wadhams, P. and W. Munk. Ocean freshening, sea level rising, sea ice melting. Geophys. Res. Lett., 31, L11311, doi:10.1029/2004GLO20039. (Major anomaly in estimation of global sea level rise from census hydrography, in that sea ice melt explains freshening

rate of ocean but does not in itself cause sea level rise, while eustatic sources would give too much freshening. Anomaly is still unexplained)

PAPERS ON ICE THICKNESS MEASUREMENTS FROM SUBMARINES

- 14) 1977 Wadhams, P. and R.T. Lowry. A joint topside-bottomside remote sensing experiment on Arctic sea ice. Proc. 4th Canadian Symp. on Remote Sensing, Quebec, 16-18 May 1977. Canadian Remote Sensing Soc., 407-423.
- 15) 1978 Wadhams, P. Sidescan sonar imagery of sea ice in the Arctic Ocean. Can. J. Remote Sensing, 4(2), 161-173. (First paper on sidescan sonar imaging of the underside of sea ice)
- 16) 1978 Wadhams, P. Characteristics of deep pressure ridges in the Arctic Ocean. Proc. 4th Intl. Conf. on Port & Ocean Engng Under Arctic Conds., St. John's, 26-30 Sept.
- 17) 1977 (ed. D. B. Muggeridge). Memorial Univ. of Nfld., St. John's, 1, 544-555.33. 1979 E. R. Walker and P. Wadhams Thick sea-ice floes. Arctic, 32(2), 140-147. (Occurrence of exceptionally thick undeformed ice)
- 18) 1979 Lowry, R. T. and P. Wadhams On the statistical distribution of pressure ridges in sea ice. J. Geophys. Res., 84(C5), 2487-2494. (Theoretical model of depth and spacing distributions)
- 19) 1980 GEBCO CHART – ARCTIC OCEAN (Submarine track appeared, including several transects of Arctic mid-Ocean ridge)
- 20) 1980 Wadhams, P. and R. J. Horne. An analysis of ice profiles obtained by submarine sonar in the Beaufort Sea. J. Glaciol., 25(93), 401-424.
- 21) 1980 Wadhams, P. A comparison of sonar and laser profiles along corresponding tracks in the Arctic Ocean. In Sea Ice Processes and Models, Proc. AIDJEX/ICSI Symp., Seattle, 6-9 Sept. 1977 (ed. R. S. Pritchard), Univ. Washington Press, Seattle, 283-299. (First direct comparison of laser and submarine profiles; validation of negative exponential form for pressure ridge depths)
- 22) 1980 Wadhams, P. Ice characteristics in the seasonal sea ice zone. Cold Reg Sci. Technol., 2, 37-87. (Major review paper)
- 23) 1980 Wadhams, P.. The estimation of sea ice thickness from the distribution of pressure ridge heights and depths. Proc. Intl. Workshop on the Remote Estimation of Sea Ice Thickness, St. John's, Sept 1979 (eds. J. R. Rossiter, D. P. Bazeley). Memorial Univ. of Nfld., St. John's, 53-76.
- 24) 1981 Wadhams, P. Sea-ice topography of the Arctic Ocean in the region 70oW to 25oE. Phil. Trans. Roy. Soc., London, A302(1464), 45-85. (Draft and ridges, 1976 voyage)
- 25) 1981 Wadhams, P. The ice cover in the Greenland and Norwegian Seas. Rev. Geophys. Space Phys., 19(3), 345-393. (Uses Sovereign results from Greenland Sea and Fram Strait)
- 26) 1983 Wadhams, P. The prediction of extreme keel depths from submarine sonar data. Cold Regions Sci. & Technol., 6, 257-266. (Techniques for deriving scour return periods)
- 27) 1983 Wadhams, P. Sea ice thickness distribution in Fram Strait. Nature, Lond., 305(5930), 108-111. (Produced first evidence-based ice mass flux estimate for Fram Strait)
- 28) 1984 McLaren, A. S., P. Wadhams and R. Weintraub. The sea ice topography of McClure Strait in winter and summer of 1960 from submarine profiles. Arctic, 37(2), 110-120. (US cruises)
- 29) 1985 Wadhams, P., A.S. McLaren and R. Weintraub. Ice thickness distribution in Davis Strait in February from submarine sonar profiles. J. Geophys. Res., 90(C1), 1069- 1077. (US cruise)
- 30) 1986 Wadhams, P., and T. Davy. On the spacing and draft distributions for pressure ridge keels. J. Geophys. Res., 91(C9), 10,697-10,708. (Demonstrates 3-parameter lognormal for spacings, neg exponential for drafts)

- 31) 1986 Wadhams, P. The seasonal ice zone. In *The Geophysics of Sea Ice* (ed. N. Untersteiner), Proc. NATO Advanced Study Inc. on Air-Sea Interaction in the Presence of Ice, Maratea, 26 Sept - 10 Oct 1981. Plenum Press, New York. 825-991. (Major review paper).
- 32) 1986 Wadhams, P. The ice cover. In *The Nordic Seas* (ed. B. G. Hurdle), Springer-Verlag, New York, Chapter 2, 21-87. (Major review paper) Monograph 85, American Geophys. U., Washington DC, 337-361. (Demonstrates 3-parameter lognormal for spacings, neg exponential for drafts)
- 33) 1988 Wadhams, P. The underside of Arctic sea ice imaged by sidescan sonar. *Nature, Lond.*, 333, 161-164. (First paper on high quality sidescan sonar of ice underside)
- 34) 1989 Wadhams, P. Sea-ice thickness distribution in the Trans Polar Drift Stream. *Rapp. P-v Reun. Cons. Int. Explor. Mer*, 188, 59-65.
- 35) 1990 Wadhams, P. Evidence for thinning of the Arctic ice cover north of Greenland. *Nature, Lond.*, 345, 795-797. (First-ever paper on sea ice thinning in the Arctic Ocean)
- 36) 1991 Comiso, J.C., P. Wadhams, W.B. Krabill, R.N. Swift, J.P. Crawford and W.B. Tucker. Top/bottom multisensor remote sensing of Arctic sea ice. *J. Geophys. Res.*, 96 (C2), 2693-2709. (First paper on direct comparisons between sonar, SAR and passive microwave data)
- 37) 1991 Wadhams, P., N.R. Davis, J.C. Comiso, R. Kutz, J. Crawford, G. Jackson, W. Krabill, C.B. Sear, R. Swift and W.B. Tucker III. Concurrent remote sensing of Arctic sea ice from submarine and aircraft. *Int. J. Remote Sensing*, 12(9), 1829-1840. (Analysis of SAR and passive microwave versus sonar)
- 38) 1992 Wadhams, P. Sea ice thickness distribution in the Greenland Sea and Eurasian Basin, May 1987. *J. Geophys. Res.*, 97, 5331-5348. (Basic analysis of ice thickness distribution)
- 39) 1992 Wadhams, P. and J.C. Comiso. The ice thickness distribution inferred using remote sensing techniques. In *Microwave Remote Sensing of Sea Ice* (ed. F. Carsey), Geophysical Monograph 68, Am. Geophys. U., Washington. ch. 21., 375-383. (Extent of correlations between SAR, microwave and thickness)
- 40) 1992 Sear, C.B. and P. Wadhams Statistical properties of Arctic sea ice morphology derived from sidescan sonar images. *Prog. Oceanogr.*, 29, 133-160. (Quantitative analysis of sidescan sonar data to yield ice parameters)
- 41) 1992 Wadhams, P., W.B. Tucker III, W.B. Krabill, R.N. Swift, J.C. Comiso and N.R. Davis. Relationship between sea ice freeboard and draft in the Arctic Basin, and implications for ice thickness monitoring. *J. Geophys. Res.*, 97(C12), 20325-20334. (Direct laser-sonar comparisons, a key dataset for future altimeter interpretations)
- 42) 1992 Wadhams, P. Ice thickness observations from British submarines, In *Report of the Sea Ice Thickness Workshop 19-21 November 1991*, New Carrollton, Maryland (ed. A.S. Thorndike, C. Parkinson, D.A. Rothrock) Applied Physics Laboratory, University of Washington, Seattle, B19-B21. Also P. Wadhams and J.C. Comiso. Inferring ice thickness distribution from airborne laser profiling, *Sea Ice Thickness Workshop*, loc.cit., B43-B51. Comiso, J.C. and P. Wadhams. Active and passive microwave signatures and relationship to ice thickness, *Sea Ice Thickness Workshop*, loc.cit., B66-B75.
- 43) 1994 Wadhams, P. and N.R. Davis. The fractal properties of the underside of Arctic sea ice. In *Marine, Offshore and Ice Technology* (ed. T.K.S. Murthy, P.A. Wilson, P. Wadhams), Computational Mechanics Publns, Southampton, 353-363. (Second paper on fractals, after Rothrock et al)
- 44) 1995 Davis, N.R. and P. Wadhams. A statistical analysis of Arctic pressure ridge morphology. *J. Geophys Res.*, 100(C6), 10915-10925. (First statistical analysis of ridge slopes and shape factors)

- 45) 1995 Wadhams, P. Arctic sea ice extent and thickness. *Phil. Trans. R. Soc., Lond.*, A352(1699), 301-319.
- 46) 1996 Fitzharris, B.B., I. Allison, R.J. Braithwaite, J. Brown, P.M.B. Foehn, W. Haeberli, K. Higuchi, V.M. Kotlyakov, T.D. Prowse, C.A. Rinaldi, P. Wadhams, M.-K. Woo and Xie Youyu. The cryosphere: changes and their impacts. In *Climate Change*
- 47) 1995 - Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses (ed. R.T. Watson, M.C. Zinyowera, R.H. Moss). Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge Univ. Press, 241-265. Chapter for 2nd Assessment Rept. of IPCC).
- 48) 1997 Wadhams, P. Ice thickness in the Arctic Ocean: the statistical reliability of experimental data. *J. Geophys. Res.*, 102(C13), 27951-27959. (Derives standard errors in statistical parameters derived from finite ice thickness data sets)
- 49) 1997 Wadhams, P. Variability of Arctic sea ice thickness - statistical significance and its relationship to heat flux. In *Operational Oceanography. The Challenge for European Co-operation* (ed. J.H. Stel, H.W.A. Behrens, J.C. Borst, L.J. Droppert, J.P. Van der Meulen). Elsevier, Amsterdam, Oceanography Series vol. 62, 368-384.
- 50) 1998 Wadhams, P. Sea ice morphology. In *Physics of Ice-Covered Seas* (ed. M. Leppäranta) Univ. Helsinki Press, 1, 231-288. (Major review)
- 51) 1999 Kerman, B., P. Wadhams and J. Comiso. Informational equivalence between synthetic aperture radar imagery and the thickness of Arctic pack ice. *J. Geophys. Res.*, 104(C12), 29721-29731. (Further demonstration that SAR brightness is related to ice thickness)
- 52) 1999. Martin, T. and P. Wadhams. Sea-ice flux in the East Greenland Current. *Deep- Sea Res.*, 46, 1063-1082.
- 53) 2000 Wadhams, P. and N.R. Davis. Further evidence of ice thinning in the Arctic Ocean. *Geophys. Res. Letters*, 27(24), 3973-3976. (Paper confirming for Eurasian Basin the 40+% thickness loss reported by Rothrock et al, 1999, for Canada Basin)
- 54) 2001 Wadhams, P. and N.R. Davis. Arctic sea-ice morphological characteristics in summer 1996. *Ann. Glaciol.*, 33, 165-170. (First evidence of systematic loss of pressure ridge numbers in Arctic)
- 55) 2006 Hughes, N.E. and P. Wadhams. Beyond SCICEX: measurement of Arctic sea ice thickness by submarine in the 21st Century. *Ann. Glaciol.*, 44,
- 56) 2007 Wilkinson, J.P., P. Wadhams and N.E. Hughes. A review of the use of sonar on underwater vehicles to obtain information on sea ice draft. In *Arctic Sea Ice Thickness: Past, Present and Future*. European Commission, Brussels, Climate Change & Natural Hazards Srs., EUR22416, 30-45. 65. Wadhams, P. Arctic sea ice changes under global warming. Proc. ICETECH 2008 Intl. Conf. and Exhibition on Performance of Ships and Structures in Ice, Banff, July 20-23
- 57) 2008. Soc. Naval Architects Marine Engrs., ISBN 978-0-9780896-1-0, paper 140.
- 58) 2011 Wadhams, P., N E Hughes and J Rodrigues. Arctic sea ice characteristics in winter 2004 and 2007 from submarine sonar transects. *J. Geophys. Res.*, 116, C00E02, doi:10.1029/2011JC006982.
- 59) 2012 Wadhams, P. New predictions of extreme keel depths and scour frequencies for the Beaufort Sea using ice thickness statistics. *Cold Regions Sci. Technol.*, 76, 77-82.
- 60) 2012 Wadhams, P. and N. Toberg . Changing characteristics of Arctic pressure ridges. *Polar Science* 6(1), 71-77.
- 61) 2012 Wadhams, P. Arctic ice cover, ice thickness and tipping points. *AMBIO (Royal Swedish Acad. Sci)*, 41, 23-33.

PAPERS ON ICE THICKNESS MEASUREMENTS FROM AUVs

- 62) 2004 Wadhams, P., J.P. Wilkinson and A. Kaletsky. Sidescan sonar imagery of the winter marginal ice zone obtained from an AUV. *J. Atmos. Oceanic Technol.*, 21, 1462- 1470. (First sidescan sonar imagery of ice underside obtained from an AUV)
- 63) 2006 Wadhams, P., J.P. Wilkinson and S.D. McPhail. A new view of the underside of Arctic sea ice. *Geophys. Res. Lett.*, 33, L04501, doi:10.1029/2005GL025131. (First use of an AUV to obtain 3D imagery of ice underside from multibeam sonar)
- 64) 2006 Nicholls, K. W., et al. inc. P. Wadhams. Measurements beneath an Antarctic ice shelf using an autonomous underwater vehicle, *Geophys. Res. Lett.*, 33, L08612, doi:10.1029/2006GL025998.71.
- 65) 2007 Wilkinson, J.P., P. Wadhams and N.E. Hughes. Modelling the spread of oil under fast sea ice using three-dimensional multibeam sonar data. *Geophys. Res. Lett.*, 34, L22506, doi:10.1029/2007GL031754. (First valid data on the oil containment capacity of an under-ice surface)
- 66) 2008 Wadhams, P., J.P. Wilkinson and M.J. Doble. Three-dimensional mapping of the sea ice underside from AUVs and applications to the offshore industry. *Proc. ICETECH*
- 67) 2008, Intl. Conf. on Performance of Ships and Structures in Ice, Banff, July 20-23 2008. *Soc. Naval Archit. Marine Engrs*, ISBN 978-0-9780896-1.
- 68) 2008 Wadhams, P. and M.J. Doble . Digital terrain mapping of the underside of sea ice from a small AUV. *Geophys. Res. Lett.*, 35, L01501, doi:10.1029/2007GL031921. (First use of a through-ice AUV to obtain under-ice 3D imagery)
- 69) 2008 Wadhams, P. and J.P. Wilkinson . Measuring the thickness of sea ice. In Collins, K J and G. Griffiths (eds.), *Proceedings of the International Workshop on Autonomous Underwater Vehicle Science in Extreme Environments* held at the Scott Polar Research Institute, Cambridge, 11-13 April 2007, 199-200.
- 70) 2008 Dowdeswell, J.A. + XXII inc. P. Wadhams. AUVs and investigations of the ice- ocean interface in Antarctic and Arctic waters. *J. Glaciol.*, 54(187), 661-672.
- 71) 2009 Doble, M.J., A.L. Forrest, P. Wadhams and B.E. Laval. Through-ice AUV deployment: operational and technical experience from two seasons of Arctic fieldwork. *Cold Regions Sci. Technol.*, 56, 90-97. (Second season with an under-ice AUV; imagery of multi-year ridges obtained)
- 72) 2011 Doble, M J, H Skourup, P. Wadhams and C.A. Geiger. The relation between Arctic sea ice surface elevation and draft: a case study using co-incident AUV sonar and airborne scanning laser. *J. Geophys. Res.*, 116, C00E03, doi:10.1029/2011JC007076.
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