

## **CURRICULUM VITAE**

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**Date of Birth:** 19 June 1965

**Nationality:** British

**Present Employer:** Natural Environment Research Council

**Date Appointed:** January 1991

**Present Position:** Research Scientist, Band 4 (since September 2005)

### **Highest educational qualifications/memberships and dates obtained:**

1983-86 B.Sc. (Hons, Upper Second) in Physics & Meteorology,  
University of Reading (UK), awarded July 1986.

1986-87 M.Sc. in Physical Oceanography, University College of North  
Wales (UCNW), awarded September 1988.

1992-99 Ph.D. in Physical Oceanography, School of Earth Sciences,  
University of Southampton, awarded February 2000.

### **Previous Employment:**

1987-88 Research Assistant in the College of Oceanography,  
Oregon State University (OSU), USA.

1989-90 Research Associate in the Climatic Research Unit (CRU), School  
of Environmental Sciences, University of East Anglia, UK.

## **Refereed Publications (to September 2006)**

### **Submitted**

(41) Marsh, R., Hazeleger, W., Yool, A., and E. J. Rohling. Long-term fate of the thermohaline circulation under two alternative controls on salinity. Submitted to Geophysical Research Letters [8/08/06].

(40) Lenton, T. M., Aksenov, Y., Annan, J. D., Cooper-Chadwick, T., Cox, S. J., Edwards, N. R., Goswami, S., Hargreaves, J. C., Harris, P. P., Jiao, Z., Livina, V., Lunt, D. J., Marsh, R., Payne, A. J., Price, A. R., Ridgwell, A. J., Rutt, I., Shepherd, J. G., Valdes, P. J., Williams, D. A. G., Williamson, M. S., and A. Yool. A modular, scalable, Grid ENabled Integrated Earth system modeling (GENIE) framework: Effect of dynamical atmosphere and ocean resolution on bi-stability of the thermohaline circulation. Submitted to Climate Dynamics [26/07/08].

(39) Lunt, D. J., Williamson, M. S., Valdes, P. J., Lenton, T. M., and R. Marsh (2006) Comparing transient, accelerated, and equilibrium simulations of the last 30 000 years with the GENIE-1 model. Submitted to Climate of the Past [14/06/06].

(38) Marsh, R., Josey, S. A., de Cuevas, B. A., Redbourn, L. J., and G. D. Quartly. Recent warming of the North Atlantic and the role of ocean heat transport. Submitted to Journal of Geophysical Research (Oceans) [9/03/06].

(37) Challenor, P. G., and R. Marsh. First steps towards the estimation of the probability of thermohaline collapse. Submitted to Ocean Modelling [31/05/05].

### **In Press**

(36) Price, A. R., Jiao, Z., Voutchkov, I. I., Lenton, T. M., Williams, G., Lunt, D. J., Marsh, R., Valdes, P. J. and S. J. Cox (2006). Collaborative study of GENIEfy Earth System Models using scripted database workflows in a Grid-enabled PSE. In, Proceedings of the UK e-Science All Hands Meeting. Nottingham, UK, AHM. (In Press).

### **2006**

(35) Marsh, R., Smith, M. P. L. M., Rohling, E. J., Lunt, D. J., Lenton, T. M., Williamson, M. S., and A. Yool (2006). Modelling ocean circulation, climate and oxygen isotopes in the ocean over the last 120,000 years. Climate of the Past Discussions, 2, 657-709.

(34) Ridgwell, A. J., Hargreaves, J. C., Edwards, N. R., Annan, J. D., Lenton, T. M., Marsh, R., Yool, A., and A. J. Watson (2006). Marine geochemical data assimilation in an efficient Earth System Model of global biogeochemical cycling. Biogeosciences Discussions, 1313-1354. SRef-ID: 1810-6285/bgd/2006-3-1313.

(33) Lenton, T. M., Williamson, M. S., Edwards, N. R., Marsh, R., Price, A. R.,

Ridgwell, A. J., Shepherd, J. G., and the GENIE team (2006). Millennial timescale carbon cycle and climate change in an efficient Earth system model. *Clim. Dyn.*, DOI: 10.1007/s00382-006-0109-9.

(32) Challenor, P. G., Hankin, R. K. S., and R. Marsh (2006). Towards the Probability of Rapid Climate Change. In "Avoiding Dangerous Climate Change", Schellnhuber, H J., Cramer, W., Nakicenovic, N., Wigley, T. and Yohe, G (Eds). Cambridge University Press.

## 2005

(31) Cameron, D. R., Lenton, T. M., Ridgwell, A. J., Shepherd, J. G., Marsh, R., and A. Yool (2005). A factorial analysis of the marine carbon cycle controls on atmospheric CO<sub>2</sub>. *Global Biogeochemical Cycles*, **19**, GB4027, doi:10.1029/2005GB002489.

(30) Rahmstorf, S., Crucifix, M., Ganopolski, A., Goosse, H., Kamenkovich, I., Knutti, R., Lohmann, G., Marsh, R., Mysak, L. A., Wang, Z. , and A. Weaver (2005). Thermohaline circulation hysteresis: a model intercomparison. *Geophys. Res. Lett.*, **32**, L23605 10.1029/2005GL023655.

(29) Marsh, R., de Cuevas, B. A., Coward, A. C., Nurser, A. J. G., and S. A. Josey (2005). Water mass transformation in the North Atlantic over 1985-2002 simulated in an eddy-permitting model. *Ocean Science*, **1**, 127-144.

(28) McDonagh, E. L., Bryden, H. L., King, B. A., Sanders, R. J., Cunningham, S. A., and R. Marsh (2005). Decadal changes in the South Indian Ocean thermocline. *J. Climate*, **18**, 1575-1590.

(27) Josey, S. A., and R. Marsh (2005). Surface freshwater flux variability and recent freshening of the North Atlantic in the eastern subpolar gyre. *J. Geophys. Res.*, **110**, C05008, doi:10.1029/2004JC002521.

(26) Marsh, R., de Cuevas, B. A., Coward, A. C., Bryden, H. L., and M. Alvarez (2005). Thermohaline circulation at three key sections in the North Atlantic over 1985-2002. *Geophys. Res. Lett.*, **32**, L10604, doi:10.1029/2004GL022281.

(25) Annan, J. D., Hargreaves, J. C., Edwards, N. R., and R. Marsh (2005). Parameter estimation in an intermediate complexity earth system model using an ensemble Kalman filter. *Ocean Modelling*, **8**, 135-154.

(24) Edwards, N. R. and R. Marsh (2005). Uncertainties due to transport-parameter sensitivity in an efficient 3-D ocean-climate model. *Clim. Dyn.*, **24**, 415-433.

## 2004

(23) Hargreaves, J. C., Annan, J. D., Edwards, N. R. and R. Marsh (2004). An efficient climate forecasting method using an intermediate complexity Earth

system model and the ensemble Kalman Filter. *Clim. Dyn.*, **23**, 745-760.

(22) Marsh, R., Yool, A., Lenton, T. M., Gulamali, M. Y., Edwards, N. R., Shepherd, J. G., Krznic, M., Newhouse, S. and S. J. Cox (2004). Bistability of the thermohaline circulation identified through comprehensive 2-parameter sweeps of an efficient climate model. *Clim. Dyn.*, **23**, 761-777.

(21) Rohling, E. J., Marsh, R., Wells, N. C., Siddall, M., and N. R. Edwards (2004). Similar meltwater contributions to glacial sea level changes from Antarctic and northern ice sheets. *Nature*, **430**, 1016-1021.

### **2003**

(20) Gulamali, M. Y., Lenton, T. M., Yool, A., Price, A. R., Marsh, R., Edwards, N. R., Valdes, P. J., Wason, J. L., Cox, S. J., Krznic, M., Newhouse, S. and J. Darlington (2003). GENIE: Delivering e-Science to the environmental scientist. In, Cox, Simon J. (ed.) Proceedings of UK e-Science All Hands Meeting 2003. Swindon, EPSRC, 145-152.

(19) Marotzke, J., Lawton J.H., Marsh, R. and McCave, I. H. (2003). Introduction to: Abrupt climate change: evidence, mechanisms and implications - papers of a discussion meeting held at the Royal Society on 4 and 5 February 2003, *Phil. Trans. Roy. Soc. Lond. A*, **361**, 1829-1830 .

### **2002**

(18) Speich, S., Blanke, B., de Vries, P., Doos, K., Drijfhout, S., Ganachaud, A., and R. Marsh (2002). Cold, warm and temperate routes of the upper branch of the thermohaline conveyor belt. *Geophys. Res. Lett.*, **29(10)**, 1416-1419.

(17) Marsh, R., and A. P. Megann (2002). Tracing water masses with particle trajectories in an isopycnic-coordinate model of the global ocean. *Ocean Modelling*, **4**, 27-53.

### **2000**

(16) Marsh, R. (2000). Recent variability of the North Atlantic thermohaline circulation inferred from surface heat and freshwater fluxes. *J. Climate*, **13**, 3239-3260.

(15) Marsh, R. (2000). Cabbeling due to isopycnal mixing in isopycnic coordinate models. *J. Phys. Oceanogr.*, **30**, 1757-1775.

(14) Marsh, R. (2000). Modeling the North Atlantic circulation under the NAO-minimum wind forcing of 1877-81. *Atmos.-Ocean*, **38**, 367-393.

(13) Marsh, R., Nurser, A. J. G., Megann, A. P., and A. L. New (2000). Water mass transformation in the Southern Ocean of a global isopycnic coordinate GCM. *J. Phys. Oceanogr.*, **30**, 1013-1045.

## 1999

(12) Hays, G. C., Luschi, P., Papi, F., Del Seppia, C., and R. Marsh (1999). Changes in behaviour during the inter-nesting period and post-nesting migration for Ascension Island green turtles. *Mar. Ecol. Prog. Ser.*, **189**, 263-273.

(11) Nurser, A. J. G., Marsh, R. and R. G. Williams (1999). Diagnosing water mass formation from air-sea fluxes and surface mixing. *J. Phys. Oceanogr.*, **29**, 1468-1487.

(10) Marsh, R., Petrie, B., Weidman, C. R., Dickson, R. R., Loder, J. W., Hannah, C. G., Frank, K., and K. Drinkwater (1999). The 1882 tilefish kill - a cold event in shelf waters off the north-eastern United States. *Fish. Oceanogr.*, **8**, 39-49.

## 1998

(9) Luschi, P., Hays, G. C., Del Seppia, C., Marsh, R., and F. Papi (1998). The navigational feats of green sea turtles migrating from Ascension Island investigated by satellite telemetry. *Proc. R. Soc. Lond.B*, **265**, 2279-2284.

## 1997

(8) Hays, G. C., and R. Marsh (1997). Estimating the age of juvenile loggerhead sea turtles in the North Atlantic. *Can. J. Zool.*, **75**, 40-46.

## 1996

(7) Marsh, R., Roberts, M. J., New, A. L., and R. A. Wood (1996). An intercomparison of a Bryan-Cox-type ocean model and an isopycnic ocean model. Part II: The subtropical gyre and meridional heat transport. *J. Phys. Oceanogr.*, **26**, 1528-1551.

(6) Roberts, M. J., Marsh, R., New, A. L., and R. A. Wood (1996). An intercomparison of a Bryan-Cox-type ocean model and an isopycnic ocean model. Part I: The subpolar gyre and high-latitude processes. *J. Phys. Oceanogr.*, **26**, 1495-1527.

(5) Marsh, R., and A. L. New (1996). Modeling 18 Degree Water variability. *J. Phys. Oceanogr.*, **26**, 1059-1080.

## 1995

(4) New, A. L., Bleck, R., Jia, Y., Marsh, R., Huddleston, M., and S. Barnard (1995). An isopycnic model study of the North Atlantic. Part I: Model experiment. *J. Phys. Oceanogr.*, **25**, 2667-2699.

(3) Marsh, R. (1995). Observations of the upper ocean response to storm forcing in the South Atlantic Roaring Forties. *Ann. Geophysicae*, **13**, 1027-1038.

**1993**

(2) Jones, P. D., Marsh, R., Wigley, T. M. L., and D. A. Peel (1993). Decadal timescale links between Antarctic Peninsula ice-core oxygen-18, deuterium and temperature. *The Holocene*, **3**, 14-26.

**1992**

(1) Hulme, M., Marsh, R., and P. D. Jones (1992). Global changes in a humidity index between 1931-60 and 1961-90. *Climate Research*, **2**, 1-22.

## Summary of experience

### *Areas of expertise:*

- Observed Climate Change (papers 1, 2)
- Isopycnal Ocean Modelling (4, 6, 7)
- The Global Conveyor Belt (17, 18)
- Tracking Sea Turtles (8, 9, 12)
- Air-Sea Interaction (3, 28)
- Water Mass Transformation (11, 13, 15, 29)
- Rapid Climate Change (19, 32, 37)
- Recent Ocean Variability (5, 10, 14, 16, 26, 28, 38)
- Past Changes in ocean circulation and climate (21, 35, 39)
- Earth System Modelling – General (20, 23, 24, 25, 36, 40)
- Earth System Modelling – Future Projections (33, 41)
- Earth System Modelling – Biogeochemical Cycles (31, 34)
- Earth System Modelling – THC Stability (22, 30)

### *Recent and Present National and International Collaborations and Activities:*

- Theme Leader on NOC Core Strategic Project “Large Scale Long Term Ocean Circulation (LSLTOC)” (2000-07)
- Collaborator on a RAPID project, “The role of the Cryosphere in Rapid Climate Change”(2002-06)
- Collaborator on a RAPID project, “The Probability of Rapid Climate Change” (2002-06)
- Collaborator on an e-Science project “Grid ENabled Integrated Earth system modelling (GENIE)” (2002-05)
- Co-Investigator (with Prof. John Shepherd) on an e-Science project “GENIEfy: creating a Grid ENabled Integrated Earth system modelling framework for the community” (2005-08)
- Co-Investigator (with Prof. Eelco Rohling and Prof. Harry Elderfield) on the Consortium Project “Deglaciation QUEST: Climate and Biogeochemical Cycles during the last deglaciation” (2006-09)
- Collaborator with the Tyndall Centre for Climate Change Research (since 2000)
- Contributing Author on Chapter 5, The Scientific Basis, Fourth Assessment Report of the Intergovernmental Panel Climate Change (for publication May 2007)
- Principal Investigator, Theme 1 “Climate, Ocean Circulation and Sea Level” of “Oceans 2025” (NERC Marine Centres’ Proposed Strategic Research Programme 2007-2012)

### *Practical Expertise*

- Programming in FORTRAN to develop, run and diagnose a range of ocean models: written in primitive equations (in both level and isopycnic vertical coordinates) and in frictional-geostrophic equations
- Developing a new framework (GENIE) to couple, run and diagnose models of ocean, atmosphere, sea ice, land physics, vegetation and biogeochemical cycles

- Combining model and observational datasets, specifically analysis of hydrographic data, surface flux data and satellite data
- Seagoing (CTD, XBT, ADCP, Navigation) – participated in two WOCE sections: A11 (South Atlantic), Dec 1992 - Feb 1993; A25 (North Atlantic), Aug/Sept 1997

#### *Teaching and Project Supervision*

- Guest Lecturer in “Ocean Modelling” (2 lectures, Spring 2001), “Introduction to Physical Oceanography” (2 lectures, November 2002), SOES 1008 (2 lectures scheduled, 2006/07)
- Topic Expert in SOES 6001 (2004/05, 2005/06)
- Preparing new tutorial for SOES 6006 (Climate Dynamics, for 2007)
- Lead Supervisor (with Prof. John Shepherd) of GENIEfy tied PhD Student in SOES (Richard Myerscough, since October 2005)
- Supervisor of SOES M.Ocean student project, (Mike Smith, 2005/06)

#### *Organisation of seminar series and meetings*

- Organiser of Physical Oceanography & Climate seminar series at Southampton Oceanography Centre, 2000-02
- Co-Organiser of “Abrupt Climate Change: Evidence, Mechanisms and Implications”, a Discussion Meeting held at the Royal Society, 4-5 February 2003 (with Prof. J. Marotzke, Prof. J. H. Lawton, Prof. I. H. McCave)
- Co-Organiser of GENIE Earth System Modelling Workshop held at National Institute for Environmental e-Science, University of Cambridge, 26-28 June 2006 (with Dr. T. Lenton)
- Co-Organiser of “Horizons in Earth Systems” seminar series of World University Network, 2006/07: “Climate Change Science at the IPCC Fourth Assessment” (with Prof. M. Schlesinger)

#### **Recent Professional Development**

- 1) Supervising Research Students (June 2003, Univ. of Southampton)
- 2) Promotion Panel Workshop (May 2004, NERC)
- 3) The Leadership Programme (February 2005, NERC)
- 4) Essential Project Management (October 2005, NERC)