

John Charles Marshall

Cecil and Ida Green Professor of Oceanography
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Born, Nottingham, England, October 12th 1954

B.Sc. in Physics (1st Class Hons), Imperial College, 1976
Ph.D. in Physics, Imperial College, 1980: advisor J.S.A. Green
Postdoctoral Researcher, Oxford University, 1981-83
Lecturer, 1984-89; Reader, 1989, Physics, Imperial College
Associate Professor, 1991-92; Professor, 1993-present, M.I.T.

Research Interests

I am an oceanographer with broad interests in climate and the general circulation of the atmosphere and oceans, which I study through the development of mathematical and numerical models of key physical and biogeochemical processes: see <http://oceans.mit.edu/JohnMarshall/research/>

My research focuses on important, and usually difficult, problems of the ocean circulation involving interactions between motions on different scales. I approach these problems using observations, theory, laboratory experiments, and new innovative approaches to global ocean and climate modeling pioneered by my group (the MITgcm). I have made contributions in rotating fluid dynamics, the fluid dynamics of ocean convection, subduction, thermohaline circulation, ocean gyres, circumpolar currents, eddies and flow instability. Over recent years, my research has increasingly focused on the role of the ocean in climate and climate change, the dynamics of aqua-planets, and the coupled atmosphere-ocean-ice problem.

Key research themes are:

- Ocean Dynamics and particularly understanding interactions across scales from those of convection, through the mesoscale up to the global scale circulation.
- Climate Dynamics and the role of the ocean in setting the climate of the planet.
- Climate modeling.

I helped organize and/or led a number of large oceanographic field experiments including:

- The Labrador Sea Experiment (1996-1997) focusing on open ocean deep convection
- CLIMODE (2005-2008) observing the cycle of convection and restratification over the Gulf Stream
- DIMES (2009-2012), the Diapycnal and Isopycnal Mixing Experiment in the Southern Ocean

Related activities

I am lead architect of the MITgcm, a widely used ocean circulation model.

I published an undergraduate text book with Prof Alan Plumb: Atmosphere, Ocean and Climate Dynamics (2008): <http://marshallplumb.mit.edu> along with accompanying rotating fluid dynamics experiments as part of the ‘Weather in a Tank’ project: <http://weathertank.mit.edu>

I have supervised 22 graduate students and over 30 postdocs during my research career: see <http://oceans.mit.edu/JohnMarshall/group>

Author or coauthor of about 190 refereed publications
see <http://oceans.mit.edu/JohnMarshall/papers/>

Awards

1986: L.F. Richardson Prize of the Royal Meteorological Society

2004: Adrian Gill Prize of the Royal Meteorological Society

2008: Elected a Fellow of the Royal Society

2014: Elected a Fellow of the American Meteorological Society

2014: Sverdrup Gold Medal of the American Meteorological Society

2016: Bernhard Haurwitz Prize of the American Meteorological Society