

Weather in a Tank

A Laboratory Guide to Rotating Tank Fluid Experiments and Atmospheric Phenomena

Exploiting laboratory experiments in the teaching of meteorology, oceanography and climate

January 2008



This is an NSF-funded project in which curricula materials that combine atmospheric data and rotating laboratory fluid experiments are being developed in the teaching of meteorology, oceanography and climate at undergraduate level.

In phase I of the project, methodologies were explored in support of laboratory-based teaching of rotating fluid dynamics to sophomores, juniors and seniors at MIT.

In Phase 2 we are:

- implementing material developed in Phase 1 at the following 5 universities:
UMass.Dartmouth, The Johns Hopkins University, Millersville University, Pennsylvania State University, and the University of Wisconsin, Madison;
- exchanging and exploring ideas and methodologies in laboratory-based teaching with professors and students at those universities
- determine whether the approach we are advocating is successful pedagogy and, if so, whether it could be broadly sustained and so benefit a wide community.

Lodovica Illari
John Marshall, MIT



Low-cost rotating turntable on a portable cart used in classroom demonstration

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Project website: <http://paoc.mit.edu/labguide>

The 'Weather in a Tank' project explores how basic principles of rotating fluid dynamics, that play a central role in determining the climate of the planet, are best conveyed to students, teaching them how to move between phenomena in the real world, laboratory abstractions, theory and models.

The laboratory materials and associated curricula being developed could have a wide impact in the teaching of science at many levels in our universities and schools, not just in meteorology, oceanography and climate.

Partner Universities

MIT, L. Illari, J. Marshall

Penn State, S. Lee, P. Bannon, R. Najjar

UMass Dartmouth, A. Tandon

University of Wisconsin – Madison, G. McKinley, M. Morgan

Johns Hopkins University, T. Haine, D. Waugh

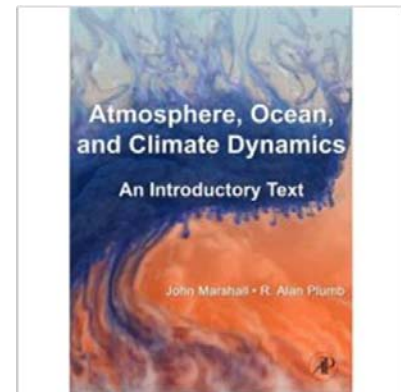
Millersville University, R. Clark, T. Sikora

Our Education consultant is Dr Kathie Mackin.

To date, the project, currently in its second year, has engaged some 300 students at the universities above.

Undergraduate text book

Many rotating fluid experiments targeted in the 'Weather in a Tank' project are described in a new undergraduate textbook by Marshall and Plumb: *Atmosphere, Ocean and Climate Dynamics* (Academic Press)



Workshop on teaching weather and climate using laboratory experiments

June 18-29, 2008

U. of Chicago

Organized By Noboru Nakamaru (Chicago)
and John Marshall (MIT)

We welcome you to participate and contribute to this workshop: more details can be found here:

<http://geosci.uchicago.edu/~nnn/workshop/>

