

## Curriculum Vitae

Eli Tziperman

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Born: September 21, 1957, Israel. Married + 3.

### Areas of Interest:

Large scale climate and ocean dynamics, including El Nino, thermohaline circulation, abrupt climate change, glacial cycles and equable climates; advanced methods of ocean data assimilation

### Education:

Hebrew Univ., Jerusalem	B.A., with distinction	1982	Physics and Math
MIT – Woods Hole	Ph.D.	1987	Physical Oceanography
Oceanographic Institution			
<i>Adviser:</i> Carl Wunsch			
Weizmann Inst. of Science	Postdoctoral Fellow	1987-89	Physical Oceanography

### Appointments:

Aug 2003 –	Prof of Oceanography & Applied Physics, Harvard University, Dept of Earth and Planetary Sciences and Division of Engineering and Applied Sciences		
1998–2003	Prof., Dept. of Environmental Sciences, Weizmann Institute of Science		
1994–1998	Associate Prof., Dept. of Environmental Sciences, Weizmann Inst. of Science		
1990–1993	Senior Scientist, Dept. of Environmental Sciences, Weizmann Inst. of Science		
1989 – 1990	Scientist, The Weizmann Institute of Science		

### Misc:

Professor E.D. Bergman Memorial Award, 1990. Israeli-US Binational Science foundation.

Alon Scholarship, 1989. Israeli Academic Planning and Grant Committee (VATAT).

Carl-Gustav Rossby Award for the most outstanding thesis submitted to the Center for Meteorology and Physical Oceanography, MIT, in the academic year 1986-1987.

Meirbaum Oceanographic Scholarships, Hebrew University, 1984, 1985, 1987.

## **Publications:** Eli Tziperman.

- Tziperman, E., 1986: On the role of interior mixing and air-sea fluxes in determining the stratification and circulation of the oceans. *J. of Physical Oceanography*. 16, 680–693.
- Tziperman, E., 1987: The Mediterranean outflow as an example of a deep buoyancy - driven flow. *J. of Geophysical Research*. 92, 14510-14520.
- Tziperman, E. and A. Hecht, 1988: Circulation in the eastern Levantine basin determined by inverse methods. *J. of Physical Oceanography*. 18, 506–518.
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- Tziperman, E. and W. C. Thacker, 1989: An Optimal Control/ Adjoint equations approach to studying the oceanic general circulation. *J. of Physical Oceanography*, 19, 1471–1485.
- Speer, K. and E. Tziperman, 1990: Convection from a source in an ocean basin. *Deep Sea Research*, 37:431–446.
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- Speer, K. and E. Tziperman, 1992: Rates of water mass formation in the North Atlantic Ocean. *J. of Physical Oceanography*, 22, 94-104.
- Tziperman, E., W. C. Thacker, R. B. Long and Show-Ming Hwang, 1992. Oceanic data analysis using a general circulation model. Part I: simulations. *J. of Physical Oceanography*, Vol 22, No 11, 1434-1457.
- Tziperman, E., W. C. Thacker, R. B. Long, Show-Ming Hwang, and S. Rintoul, 1992. Oceanic data analysis using a general circulation model. Part II: A North Atlantic model. *J. of Physical Oceanography*, Vol 22, No 11, 1458 - 1485.
- Speer, K., E. Tziperman, and Y. Feliks 1993: Topography and grounding in a simple bottom layer model. *J. Geophysical Research*, 98, C5, 8547-8558.
- Tziperman, E. and K. Bryan, 1993: Estimating global air-sea fluxes from surface properties and from climatological flux data using an oceanic GCM. *J. of Geophysical Research*. vol 98, C12, 22,629-22,644.
- Tziperman, E., I. Yavneh and S. Ta'asan, 1993: Multilevel Turbulence Simulations. *Europhysics Letters*, 24 (4), 239-244.
- Tziperman, E., J. R. Toggweiler, Y. Feliks and K. Bryan, 1994: Instability of the thermohaline circulation with respect to mixed boundary conditions: Is it really a problem for realistic models? *J. of Physical Oceanography*. 24, 217-232.
- Tziperman, E. and K. Speer, 1994. A study of water mass transformation in the Mediterranean Sea: analysis of climatological data and a simple 3-box model. *Dynamics of Atmospheres and Oceans*, 21, 53-82.

- Tziperman, E., L. Stone, M. A. Cane and H. Jarosh 1994: El Niño Chaos: Overlapping of resonances between the seasonal cycle and the Pacific Ocean-Atmosphere oscillator. *Science*, 264, 72-74.
- Tziperman, E., M. A. Cane and S. Zebiak, 1995: Irregularity and locking to the seasonal cycle in an ENSO prediction model as explained by the quasi-periodicity route to chaos. *Journal of the Atmospheric Sciences*, **52**, 293-306.
- Griffies, S., and E. Tziperman, 1995. A linear thermohaline oscillator driven by stochastic atmospheric forcing. *Journal of Climate*, **8**, 2440-2453.
- Gat, J. R., A. Shemesh, E. Tziperman, A. Hecht, D. Georgopoulos and O. Basturk. 1996. The stable isotope composition of waters of the eastern Mediterranean Sea. *J. Geophys. Res.*, 101, C3, 6441-6451.
- Toggweiler, J. R., E. Tziperman, Y. Feliks, K. Bryan, Stephen M. Griffies, B. Samuels, 1996: Reply. *Journal of Physical Oceanography*, **26**, 1106-1110.
- Tziperman, E., S. Zebiak and M. A. Cane, 1997: Mechanisms of Seasonal - ENSO interaction. *Journal of the Atmospheric Sciences*, **54**, 61-71.
- Tziperman, E., 1997: Inherently unstable climate behaviour due to weak thermohaline ocean circulation, *Nature* **386**, 592-595.
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- Sirkes, Z., E. Tziperman, 1997. Finite Difference of Adjoint or Adjoint of Finite Difference? *Monthly Weather Review*, **125**, 3373-3378.
- Tziperman, E., H. Scher, S. Zebiak and M. A. Cane, 1997: Controlling spatiotemporal chaos in a realistic El Niño prediction model. *Physical Review Letters*, **79**, 6, 1034-1037.
- Tziperman, E., M. A. Cane, S. Zebiak, Y. Xue, B. Blumenthal, 1998: On the Locking of El Niño's peak time to the end of the calendar year in the delayed oscillator picture of ENSO. *J. Climate*, **11**, 2191-2199.
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- Gildor, H. and E. Tziperman, 2000. Sea ice as the glacial cycles' climate switch: role of seasonal and orbital forcing. *Paleoceanography*, **15**, 605-615.
- Tziperman, E., 2000. Uncertainties in thermohaline circulation response to greenhouse warming. *Geophysical Research Letters*, **27** 3077-3080.
- Gildor, H. and E. Tziperman, 2001. Physical mechanisms behind biogeochemical glacial-interglacial CO<sub>2</sub> variations. **27**, 3077-3080 *Geophysical Research Letters*. (also: *Science*, Editor's choice, **293** #6 July 2001 ).

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- Sirkes, Z. and E. Tziperman, 2001. Identifying a damped oscillatory thermohaline mode in a general circulation model using an adjoint model. *J. Physical Oceanography*, **31**, 2297-2306.
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- D. S. Abbot and E. Tziperman, 2008. A High Latitude Convective Cloud Feedback and Equable Climates. **134**, 165-185; DOI: 10.1002/qj.211. *Quarterly Journal of the Royal Meteorological Society*.
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- Gebbie, G. and E. Tziperman, 2008. Predictability of SST-modulated westerly wind bursts. **submitted**.
- Gebbie, G. and E. Tziperman, 2008. The impact of ocean-modulated westerly wind bursts on forecasts of El Niño events. **submitted**.
- Sayag, R. and E. Tziperman, 2008. The role of ice longitudinal stresses and sub-glacial till dynamics in shear flow instability of an ice flow. **In press**. *Journal of Geophysical Research*,
- Eisenman, E., C. Bitz, and E. Tziperman, 2008. Rain driven by receding ice sheets as a cause of past climate change. **submitted**.
- Abbot, D. S. and E. Tziperman, 2008. Winter Arctic sea ice uncertainty under global warming due to a cloud radiative feedback. **submitted**.
- Abbot, D. S. and E. Tziperman, 2008. Controls on the activation and strength of a high latitude convective-cloud feedback. **submitted**
- Y. Ashkenazy, Y. Feliks, E. Tziperman, H. Gildor, 2008. Asymmetry of daily temperature records. *Journal of the Atmospheric Sciences*, **in press**

## Chapters in Books

- Malanotte-Rizzoli, P. and E. Tziperman, 1996. The Oceanographic Data Assimilation Problem: Overview, Motivation and Purposes. In: *Modern approaches to data assimilation in ocean modeling*, Malanotte-Rizzoli, P. Ed., Elsevier.
- Sirkes, Z., E. Tziperman and C. W. Thacker, 1996. Combining Data and a Global Primitive Equation Ocean General Circulation Model Using the Adjoint Method. In: *Modern approaches to data assimilation in ocean modeling*, Malanotte-Rizzoli, P. Ed., Elsevier.
- Tziperman, E., 1998. Controlling chaos in a high-dimensional continuous spatiotemporal model. In: *Handbook of Chaos Control*, H. Schuster, Ed. Wiley-VCH.

## Refereed proceedings

- Tziperman, E., 1992: Methods of testing parameterizations: vertical ocean mixing. Proceedings, 1990 Global Change Institute on Earth System Modeling, Snowmass, Colorado, pages 335-358. University Corporation for atmospheric research, Office for Interdisciplinary Studies, POB 3000, Boulder CO 80307-3000.

- Tziperman, E., and Z. Sirkes. 1997: Using the adjoint method with the ocean component of coupled ocean-atmosphere models. *J. Meteorological Society of Japan* **75**, 1B, 463-470.
- Gildor, H. and E. Tziperman, 2001. Sea-ice, the glacial cycles' climate switch, and inter-hemispheric thermohaline teleconnections. *Annals of Glaciology*; **23**, 501-506. [Proceedings of International Glaciological Society meeting. Fairbanks, Alaska, U.S.A., 19-23 June 2000.]
- Gildor, H. and E. Tziperman, 2003. Sea-ice switches and abrupt climate change. *Phil. Trans. R. Soc. Lond. A*; **361**, 1935-1944.
- MacMynowski, D. G. and E. Tziperman, 2008. Applying engineering feedback analysis tools to climate dynamics. *American Control Conference*, 2008.

### **Misc.**

- Cessi, P., R. T. Pierrehumbert, E. Tziperman 2001: Lecture notes for Woods Hole Geophysical Fluid Dynamics summer school on conceptual models in climate dynamics.