



Full Text View

[Volume 29, Issue 8 \(August 1999\)](#)

Journal of Physical Oceanography

Article: pp. 2119–2119 | [PDF \(14K\)](#)

Reply

Mark A. Cane

Lamont-Doherty Earth Observatory of Columbia University, Palisades, New York

Vladimir Kamenkovich

Institute of Marine Sciences, Department of Marine Sciences, University of Southern Mississippi, Stennis Space Center, Mississippi

(Manuscript received January 15, 1999, in final form February 24, 1999)

DOI: 10.1175/1520-0485(1999)029<2119:R>2.0.CO;2

ABSTRACT

We do not agree with [Mellor's \(1999\)](#) interpretation of our results. We tried to make two points about JEBAR: (i) it can be a misleading conceptual tool and (ii) calculations with the formulation (1) in Mellor's comment on our note are likely to be error prone.

On the first point, a two-layer wind-driven ocean was offered as the simplest illustrative example that we could think of. While not a comprehensive model for the ocean circulation, it is hardly "strange." Our point was precisely that while the bottom torque term (BT) is nil because bottom topography has no influence on the solution, JEBAR is not small. Indeed, in the simple example we gave of a seamount 0.5 km high and $O(500)$ km wide JEBAR was many times larger than the wind stress term. Thus JEBAR gives a wrong impression of the importance of bottom relief. This example is relevant to the study of [Greatbatch et al. \(1991\)](#) and [Krupitsky and Cane \(1997\)](#), among others.

On the second point, we illustrated how inevitable errors in data make calculation with (1) hazardous. We recognize that the Sverdrup balance is an incomplete description of the ocean circulation, especially, as in Mellor's example, in the vicinity of western boundary currents. We don't say that calculation with (1) is prima facie wrong because it disagrees with Sverdrup balance. In our note we wrote: "The Eq. (1) with JEBAR is correct and can be used for the calculation. However, the results here suggest that doing so amounts to finding the influence of topography on the vertically integrated transport from the difference of two large terms." This is a poor computational strategy since, if the two terms are not used consistently throughout the model calculation, it is likely to lead to imperfect cancellation and spurious transport values. Sampling problems and other data errors make such mismatches inevitable, as our paper illustrates. The earliest recognition of this problem that we are aware of is in [Mellor et al \(1982\)](#).

Table of Contents:

- [REFERENCES](#)

Options:

- [Create Reference](#)
- [Email this Article](#)
- [Add to MyArchive](#)
- [Search AMS Glossary](#)

Search CrossRef for:

- [Articles Citing This Article](#)

Search Google Scholar for:

- [Mark A. Cane](#)
- [Vladimir Kamenkovich](#)

At the end of our paper we suggest a better computational strategy might be to use the form (2) and minimize BT “consistent with reasonable estimates of data errors.” We didn’t actually carry through this strategy for a real world example, but referred the reader to [Godfrey \(1989\)](#) and [Bogden et al \(1993\)](#) for closely related approaches.

REFERENCES

- Bogden, P. S., R. E. Davis, and R. Salmon, 1993: The North Atlantic Circulation: Combining simplified dynamics with hydrographic data. *J. Mar. Res.*, **51**, 1–52..
- Godfrey, J. S., 1989: A Sverdrup model of the depth-integrated flow for the world ocean allowing for island circulations. *Geophys. Astrophys. Fluid Dyn.*, **45**, 89–112..
- Greatbatch, R. J., A. F. Fanning, A. D. Goulding, and S. Levitus, 1991: A diagnosis of interpentadal circulation changes in the North Atlantic. *J. Geophys. Res.*, **96**, 22 009–22 023..
- Krupitsky, A., and M. A. Cane, 1997: A two-layer wind-driven ocean model in a multiply connected domain with bottom topography. *J. Phys. Oceanogr.*, **27**, 2395–2404.. [Find this article online](#)
- Mellor, G., 1999: Comments on “On the utility and disutility of JEBAR”. *J. Phys. Oceanogr.*, **29**, 2117–2118.. [Find this article online](#)
- , C. R. Mechoso, and E. Keto, 1982: A diagnostic calculation of the general circulation of the Atlantic Ocean. *Deep-Sea Res.*, **29**, 1171–1192..

Corresponding author address: Dr. Mark A. Cane, Lamont-Doherty Earth Observatory, Columbia University, 61 Route 9W, P.O. Box 1000, Palisades, NY 10964.

E-mail: mcane@ldeo.columbia.edu

top ▲



© 2008 American Meteorological Society [Privacy Policy and Disclaimer](#)
Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
[Allen Press, Inc.](#) assists in the online publication of AMS journals.