Comments on "The Kuroshio Structure and Transport Estimated by the Inverse Method"

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A recent paper by Nakano et al. (1994, henceforth NKT) described a calculation of Kuroshio transport through the Tokara Strait south of Japan using an inverse method. This calculation combines CTD and ADCP data using a technique pioneered by Wunsch (1978). A paper that has already been published by Bingham and Talley (1991, henceforth BT91) used substantially the same methodology and a very similar dataset and obtained similar results. BT91 found transports of 22 ± 5.1 Sv and 27 ± 3.3 Sv for the Tokara Strait and Okinawa Trough respectively, whereas NKT found a transport of 28 Sv through the Tokara Strait. Both BT91 and NKT showed that the topographic constraint was a strong one and that the ADCP data did not contribute greatly to constraining the transport estimate. Both found evidence of countercurrents on either side of the Kuroshio and a multifilament structure to the main current in the Tokara Strait. Not only is the basic inverse method the same, but many of the details of the calculation are similar, including the smoothing algorithm for the CTD data, a no-transport constraint through the Tokara Strait, and the method of incorporating the ADCP data into the inverse calculation. One difference in the NKT calculation was the use of conservation of salinity as a constraint on the inverse. The use of this constraint was surprising, as in our work we found conservation of salinity through two sections so close to one another not to be substantially independent of conservation of mass. Perhaps this is the reason why NKT's solution shows a large increase in transport of an eddy off of Cape Toimisaki above rank 20.

Given that the two analyses and datasets were so similar, we were disappointed that NKT did not compare the results. It would be interesting to see a discussion of the effects of the parts of the calculations that were different: eight versus four layers, the topographic constraint applied at $27.0\sigma_\theta$ versus $27.2\sigma_\theta$, and the use of a triangle survey around Tokara Strait versus two sections across Tokara Strait and the Okinawa Trough (NKT versus BT91 respectively for each point).

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REFERENCES

Bingham, F. M., and L. D. Talley, 1991: Estimates of Kuroshio transport using an inverse technique. *Deep-Sea Res.*, **38**(Suppl.), S21–S43.

Nakano, T., I. Kaneko, and Y. Takatsuki, 1994: The Kuroshio structure and transport estimated by the inverse method. *J. Phys. Oceanogr.*, **24**, 609–618.

Wunsch, C., 1978: General circulation of the North Atlantic west of 50W determined from inverse methods. *Rev. Geophys.*, **16**, 583–620.