

Reply

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As pointed out in the text (see White, 1973), there are real difficulties in the interpretation of the circulation pattern within 2° latitude of the equator, due to the failure of the geostrophic approximation to be valid there. As such, I doubt if anything quantitative can be said about the relative strength of the vortices contained in the inner and outer rows of the proposed

compound vortex street hypothesized to exist there. However, Weihs' point is well taken; if the vortices of the inner and outer rows were equal, then the von Kármán vortex theory (which assumes periodicity) could not be used to arrive at the length scales and propagation speeds of the vortices, in which case the excellent correspondence between the observed length

scale (400–600 km) and the theoretical length scale (500 km) would be strictly fortuitous. Actually, if such were the case, then this would be added evidence for thinking that the oceanic wake observed downstream from the Galapagos archipelago was a modified Rossby wake.

Weihls does not expect that the Galapagos archipelago would shed two vortex trails, rather, that it would shed only one. Similarly, I did not expect the Galapagos archipelago to bifurcate the undercurrent into two separate branches east of the archipelago, rather, that the undercurrent would re-form on the lee side of the archipelago. As such, one's intuition about how a planetary-scale eastward jet in the vicinity of the equator acts as it flows around a planetary-scale island seems less than reliable. To gain some insight into this

problem, it would be of interest to construct a laboratory experiment in a rotating tank (with sloping bottom to simulate the β -effect), whereby an eastward jet would be allowed to extend past a cylinder at Reynolds numbers in the range of 50 to 2500 and at Island numbers (square root of the inverted Rossby number) in the range of 1 to 1.5. This experiment would do much toward rigorously establishing whether a compound vortex street is possible in the situation I discussed.

REFERENCE

- White, W. B., 1973: An oceanic wake in the equatorial undercurrent downstream from the Galapagos archipelago. *J. Phys. Oceanogr.*, **3**, 156–161.