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The North Brazil Current and the deep western boundary current of the tropical Atlantic are significant cross-equatorial pathways of the larger, climatically important, Atlantic Meridional Overturning Circulation. The North Brazil Current draws waters with negative potential vorticity from the southern hemisphere into the northern hemisphere; the deep western boundary current brings waters with positive potential vorticity from the northern hemisphere into the southern. It is known that fluid parcels within these flows must modify their potential vorticity upon crossing the equator, in order to become stable to symmetric instability and to penetrate further than a few Rossby deformation radii into the opposing hemisphere.

Negative potential vorticity in the northern hemisphere and positive potential vorticity in the southern hemisphere is described as being anomalous. Idealised models forced with flows dynamically similar to those seen in the tropical Atlantic suggest that the excitement of symmetric instability is capable of, and efficient at neutralising anomalous potential vorticity originating from the opposing hemisphere. The instability sets the potential vorticity to zero in waters where it was initially anomalous. This is done via the generation of stacked overturning cells. Three dimensional idealised models suggest the cores of North Brazil Current rings are likely to experience symmetric instability, with timescales of several weeks. Models suggest symmetric instability in the deep western boundary current may occur but over much longer timescales of between several months to a year. It is unclear whether dissipative effects could be more efficient at removing anomalous potential vorticity in the deep Ocean. Similarly, it is not clear how much diapycnal mixing the excitement of the instability will cause, with the idealised models used in this study too coarse to fully resolve the mixing process.
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