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The large-scale tilt of the eddy divergence in the tropics

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This work is concerned with the large-scale structure of the upper-level divergence/precipitation field in the deep tropics. Once the fine ITCZ structure is filtered out, the coarse-grained eddy divergence field is found to tilt eastward moving away from its maximum near the equator in the summer hemisphere. This robust tilt (observed for both hemispheres and seasons) is also present in the classical Gill solution.

In this presentation we show that the sign of the tilt is intimately linked to the direction of the eddy momentum flux. The observed eastward tilt is such that the momentum flux is directed towards the wave source, suggesting that the observed tilt is determined by wave propagation.

We also discuss the determination of the tilt in the simple Gill model and its sensitivity to the meridional Hadley flow. We show that the increase in the cross-equatorial momentum flux when the Hadley cell strengthens is associated with an increased tilt of the divergence field in the downstream direction of the flow, supporting the conjecture that the tilt is associated with propagation.