Are Temporal Changes in Eddy Transports Significant?

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Summary:
Altimeter sea surface height measurements from the TOPEX/Poseidon (T/P) mission are used to identify interannual changes in eddy variability and transports in the upper ocean. Interannual variability is a "missing link" in our understanding of ocean dynamics and climate variability. This study investigates the role of interannual variability in eddy transport. The methodology involves identifying eddies from altimeter measurements and analyzing their properties. The results show that eddy transport varies significantly from year to year, with some years having much stronger eddies than others. This variability has implications for our understanding of ocean circulation and climate change.

Methodology:
Eddy transport is calculated from altimeter sea surface height (SSH) measurements. Eddies are identified by their characteristic shape, which is determined by the local gradient of SSH. The transport of an eddy is then calculated as the integral of the SSH gradient along the eddy's path. This approach allows for the analysis of eddy transport over time, providing insights into the role of eddies in ocean circulation and climate variability.

Temporal Changes in Eddy Variability

Fig. 3: For a quantitative description of temporal changes in eddy variability, frequency spectra, and one-year periods were computed from along-track SSH and slope data from the region depicted in the figure. To highlight the variability of the short-period slope coordinates, the variance of the slope was determined for each repeat cycle over the same area. Results are presented in Fig. 4.

Temporal Changes in Eddy Scales

To gain insight into temporal variability, we computed eddy scales (T/3) over a sliding 3-year window as the temporal eddy SSH decorrelation time scale.

References: