Deconstruction of science paper's data evidence basis

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MPO/ATM 624

- Title of science paper:
  - The potential vorticity flux through the Yucatan Channel and the Loop Current in the Gulf of Mexico

    Julio Candela, Julio Sheinbaum, José Ochoa, and Antoine Badan

    Robert Leben

- Size of evidence set:
  - 5 figures

- Figures 1, 2

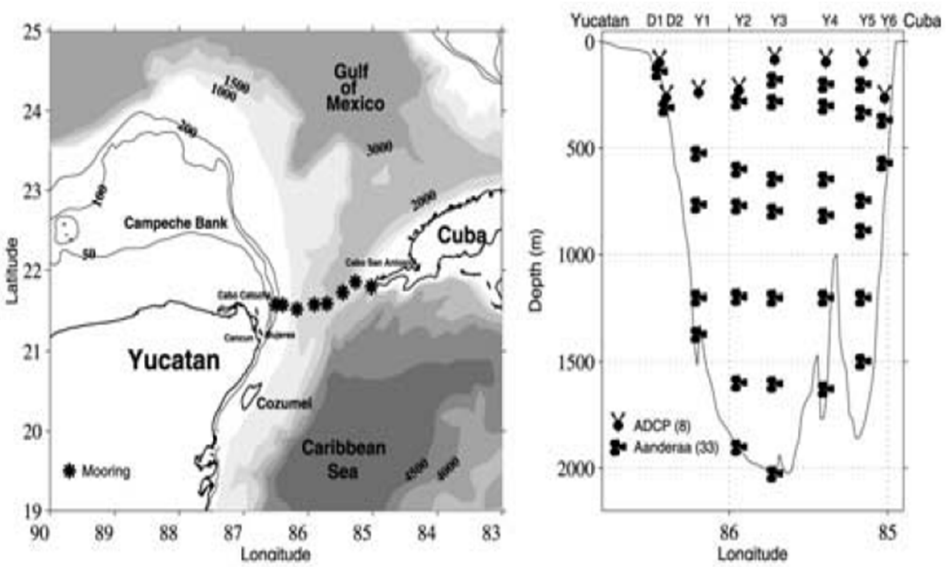


Figure 1 (left): Map and display of the mooring array location -- method used to obtain the data
Figure 1 (right): Mooring array location at depth -- method used to obtain the data

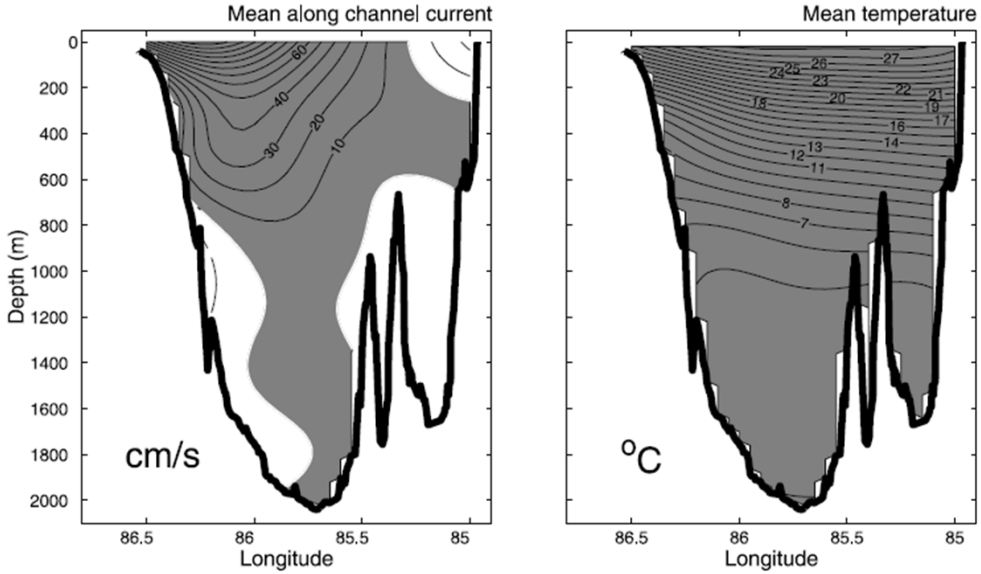
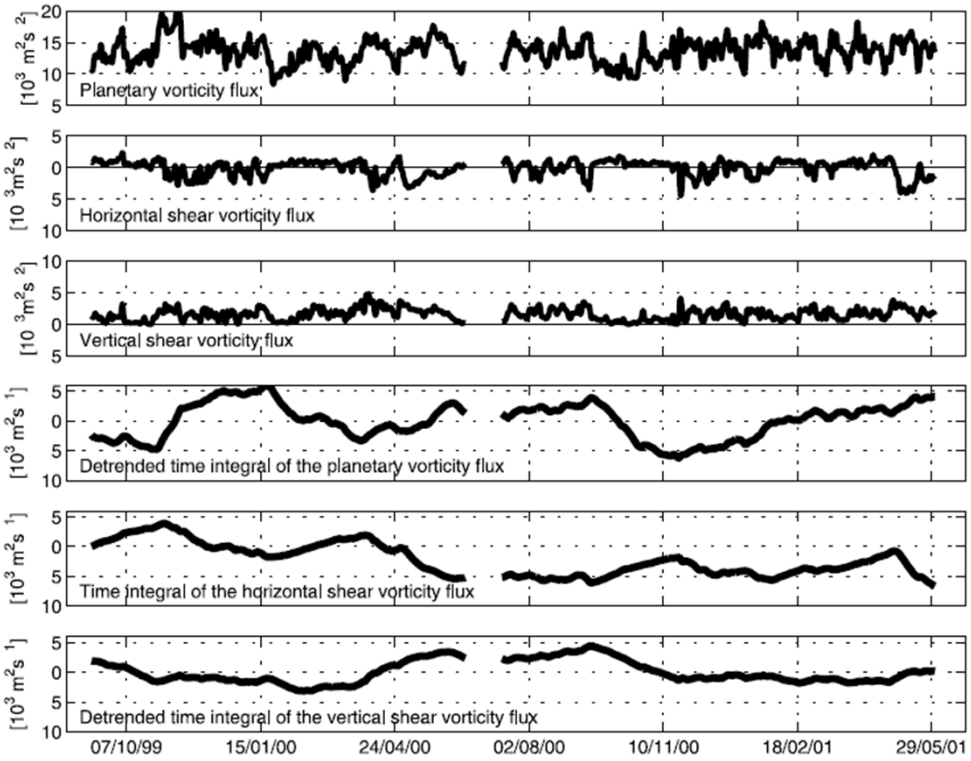


Figure 2 (left): Velocity data (raw -- obtained from Acoustic Doppler Current Profilers (ADCPs))
Figure 2 (right): Temperature data (raw -- obtained from CTDs)

- Results
  - Figure 3



Comparison/Decomposition figure:
Results obtained from the raw data are compared to decide which ones are important to the quantity being measured.

More specifically:
Terms of the potential vorticity equation are compared to show which ones are dominant and mostly affect the claim of the paper.

- Results
  - Figure 4

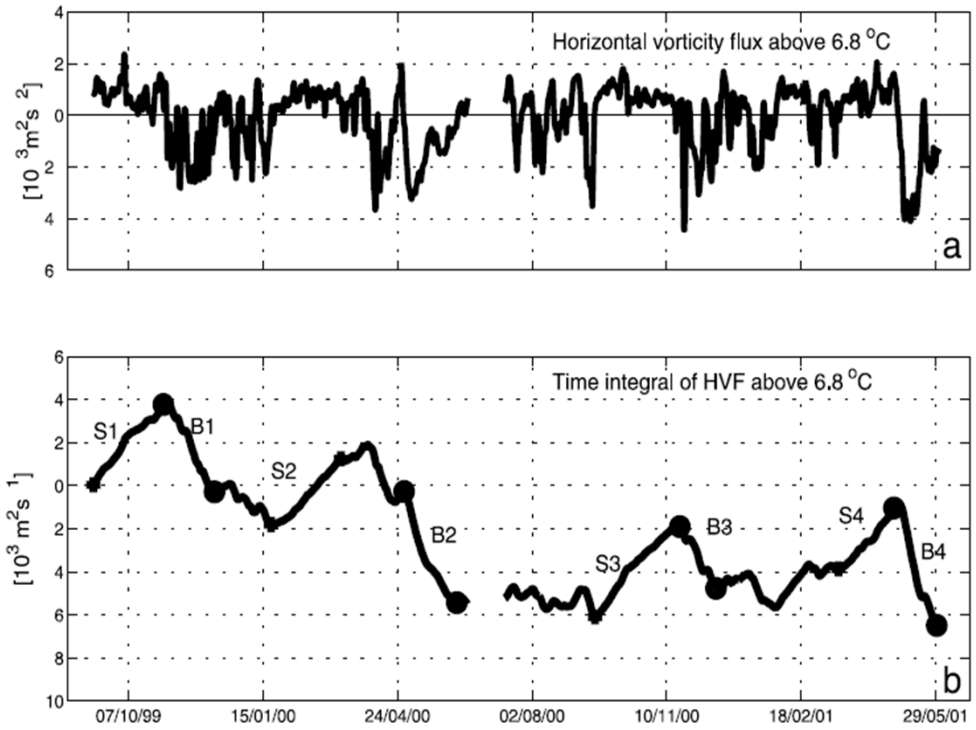
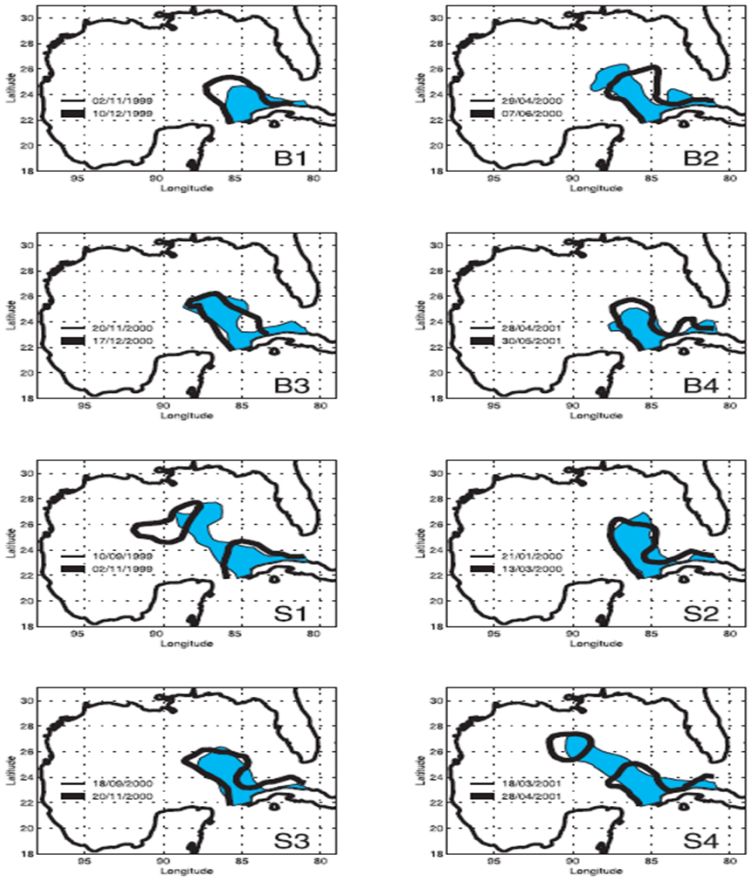


Figure which claims that certain features exist at a specific time.

→ Negative and positive potential vorticity events

- Results
  - Figure 5



Relationship figure:

→ It claims causality, connecting the events of figure 4 to the features in figure 5.

→ Positive and negative vorticity events lead to different Loop Current positions; retracted and extended, respectively.

- Abstract

Two-year-long time series of current and density structure measurements across the Yucatan Channel's main section allow the calculation of the time-dependent potential vorticity flux between the Gulf of Mexico and the Caribbean Sea, which is characterized by alternating periods of positive (cyclonic) and negative (anti-cyclonic) vorticity influx. Periods of negative cumulative vorticity influx are related to the Loop Current extending into the Gulf of Mexico, whereas periods of positive cumulative vorticity influx relate to a Loop Current retraction, sometimes coincident with the shedding of an anti-cyclonic eddy.

Shown in Figure 4 of results.

Shown in Figure 5 of results.