Evidence from interior observations

NASA

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Mechanisms affecting air-sea CO_2 fluxes



Evidence from ocean interior observations





Methods

Ocean Circulation Inverse Model (DeVries)



- 3-d circulation model "fit" to tracer observations to determine climatological transport (OCIM)
- OCIM used offline to simulate anthropogenic CO₂ uptake by the ocean (DeVries, 2014)
- OCIM can be fit to decadal-average data to get (maybe?) decadal average ocean transport and air-sea CO₂ fluxes (DeVries et al., 2017)

eMLR technique for C_{ant} (Gruber et al., 2019)

- DIC data are split into different time periods
- DIC data are corrected for biological effects (C*)
- C* data are mapped to reference year
- MLRs are used to fill in gaps in reference year datasets

see also Sabine et al. (2004)

Example Results



Method Comparison

Ocean CO₂ Uptake



- Mechanisms captured by each method (e.g. "Natural" vs. "anthropogenic" CO₂)
- (2) Reconcile the differences in the variability
 - Mechanisms of variability
 - How much of the variability is real vs. an artifact of the method?