

Surface Observation-based Estimates of the Ocean Carbon Sink

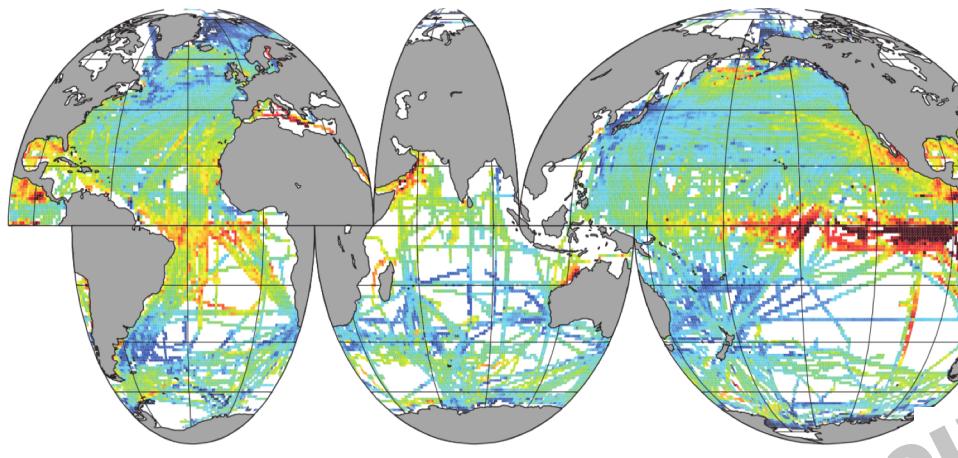
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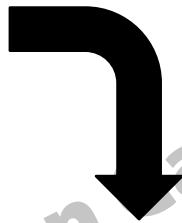


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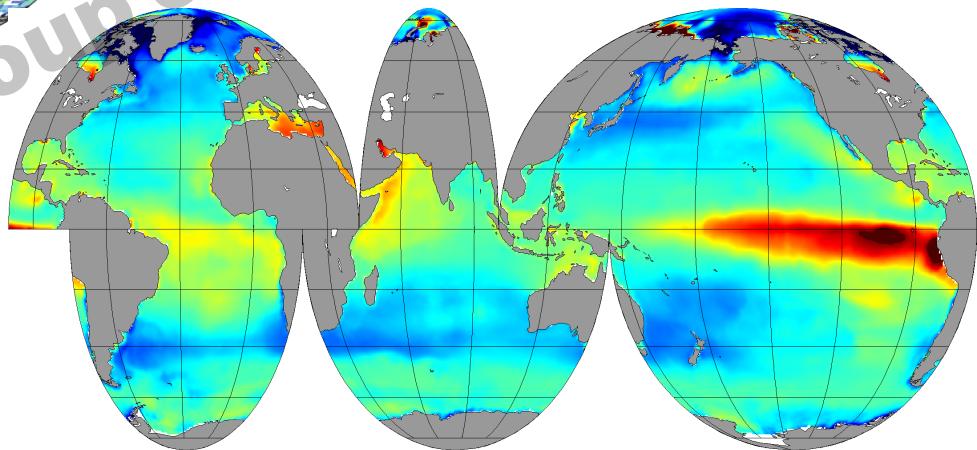
The Engines: LDEO & SOCAT



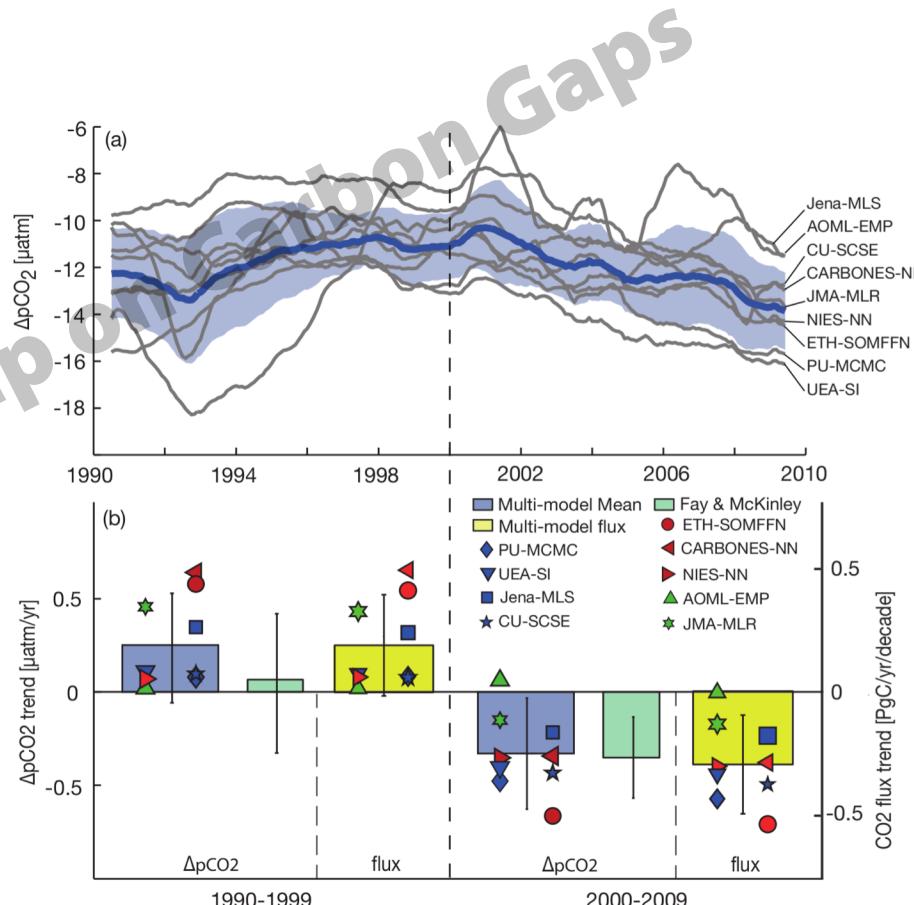
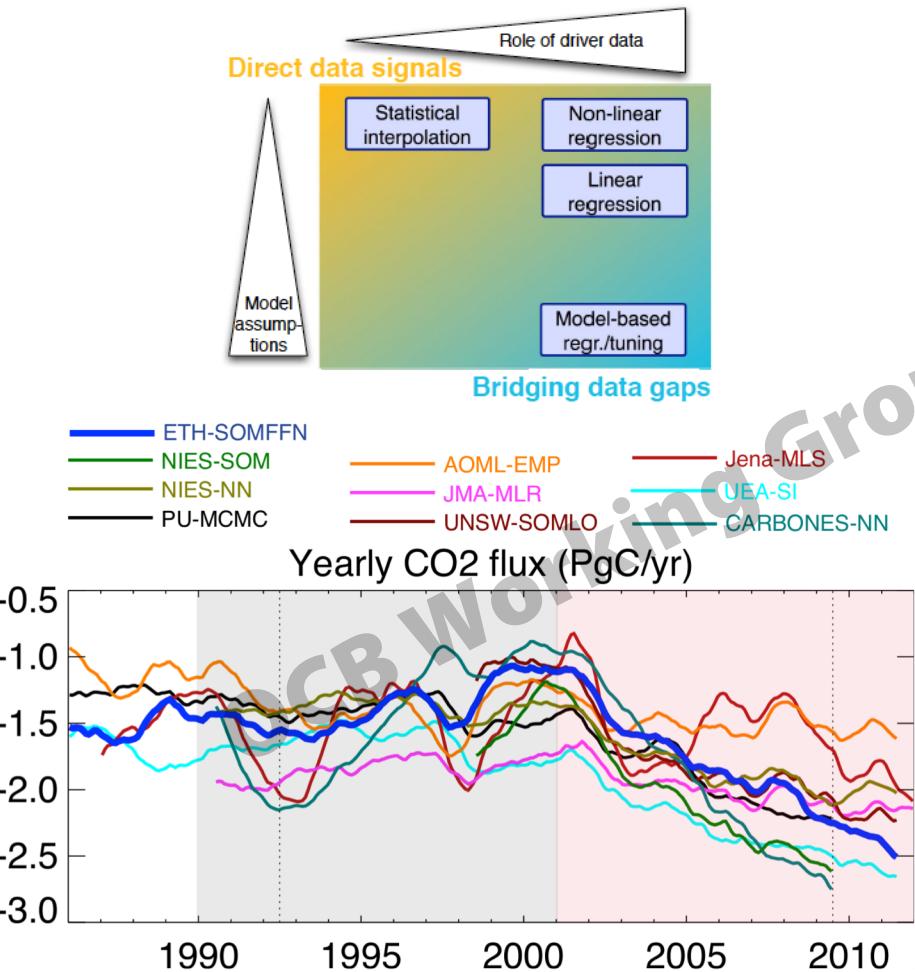
(II) $\text{CO}_2 \text{ flux} = k_x \times \text{solubility} \times (p\text{CO}_2_{\text{air}} - p\text{CO}_2_{\text{oc}})$



(I) machine learning,
statistical interpolation
based on autocorrelation
structure,
mixed layer scheme, ...



First results from the intercomparisons of 10+ estimates

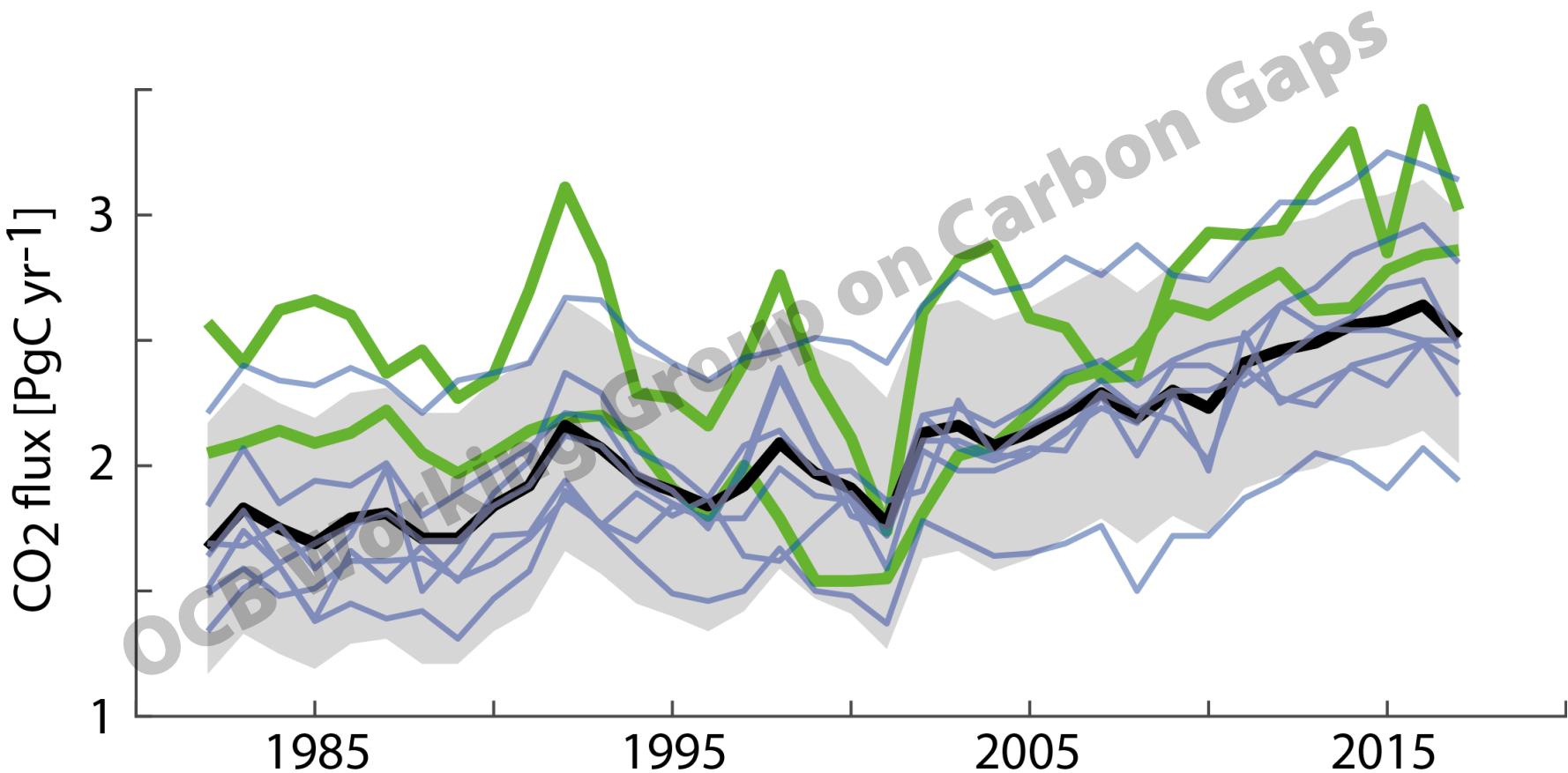




New developments:

- Sommer-Denvil et al. GMD: 2-step machine learning approach
- Gregor et al. GMD: ensemble of machine learning techniques
- Arctic Ocean mapping by Yasunaka et al. 2017
- Coastal mapping by Laruelle et al 2017
- Inclusion of float observations by Bushinsky et al 2019

Observation-based estimates included in GCB (now 3 in 2019)





Known issues:

- Area covered
- Coastal zones and marginal sea treatment
- Contemporary vs anthropogenic carbon fluxes
- Data sparsity
- Uncertainty not fully quantified

Therefore we need this WG as the next step forward