A 30 years observation-based global monthly gridded sea surface pCO_2 product from 1982 through 2011.

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Citation:

This product is free to be used. Please cite the data as:

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Please cite the method as:

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Method:

The observation-based pCO_2 fields were created using a 2-step neural network technique. In a first step, the global ocean is divided into 16 biogeochemical provinces using a self organizing map. In a second step, the non-linear relationship between variables known to drive the surface ocean carbon system and gridded observations from the SOCATv2 dataset (Bakker et al. 2014) is reconstructed using a feed-forward neural network within each province separately. The final product is then produced by projecting these driving variables, i.e., surface temperature, chlorophyll, mixed layer depth, and atmospheric CO_2 onto oceanic pCO_2 using these non-linear relationships. This results in monthly pCO_2 fields at 1°x1° resolution covering the entire globe with the exception of the Arctic Ocean and few marginal seas. The air-sea CO_2 flux is then computed using a standard bulk formula. More details can be found in Landschützer et al. 2013 and Landschützer et al. 2014. Compared to Landschützer et al. 2014 we now have extended the time series back in the past from 1982 through 2011. More details can be obtained from Landschützer et al. 2015 and the manuscript supplement.

Content:

File 1: spco2_ETH_SOM-FFN_CDIAC_ETH30yr.nc

The netcdf file contains:

- lat: latitude in degrees north (89.5°S – 89.5°N with 1° resolution)
- lon: longitude in degrees east (179.5°W-179.5°E with 1° resolution)
- time: time in seconds since 2000-01-01-00:00 (monthly resolution)
- spco2_raw: The raw 2-step neural network sea surface pCO_2 output in µatm
- fgco2_raw: The air-sea flux density, calculated from the raw sea surface pCO_2 in mol m^{-2} yr^{-1}.
- spco2_smoothed: A smoothed product of the raw pCO_2, created by the spatial and temporal mean of each points neighboring pixels (the 3x3x3 pixel neighborhood domain) in µatm.
- fgco2_smoothed: A smoothed product of the raw air-sea CO_2 flux, created by the spatial and temporal mean of each points neighboring pixels (the 3x3x3 pixel neighborhood domain) in mol m^{-2} yr^{-1}.
- aco2: Atmospheric pCO_2 in µatm for the air-sea flux calculation, derived from the Globalview Marine Boundary Layer (MBL) xCO_2 product and SST (Reynolds et al. 2002) as well as sea level pressure (Kalnay et al. 1996) following Dickson et al. 2007.
- dco2: Delta pCO_2 calculated from the CO_2 partial pressure difference between atmosphere and the raw surface ocean partial pressure.
- dco2_smoothed: Delta pCO_2 calculated from the CO_2 partial pressure difference between atmosphere and the smoothed surface ocean partial pressure.
- kw: The gas transfer velocity calculated from the ERA-interim wind product (Dee et al. 2011) as described in Landschützer et al. 2014 in m yr^{-1}.
- sol: The CO_2 solubility in mol m^{-3} $µatm^{-1}$ calculated from sea surface temperature (Reynolds et al. 1996) and Hadley centre EN4 sea surface salinity (Good et al. 2013) following Weiss 1974.
- ice: The percentage of sea ice from the Rayner et al. 2003 sea ice product.
- lsmask: The land-sea mask.

Inquiries:

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