

What I learned: through the rigorous application of classical ocean physics, NASA satellite observations can track tiny variations of the Earth's energy imbalance.

We all know that the ocean stores ~90% of Earth's global energy imbalance. But knowing that fact is different from showing two independent estimates tell the same story.

Earth's top-of-atmosphere (TOA) **net radiative fluxes** are available from EBAF products derived from radiometric measurements on **CERES** sensors on various satellites.

ECCO combines 30+ years of altimetry, gravimetry and in-situ observations with an ocean physics model that strictly obeys dynamics and conservation laws. From ECCO, we derive **net global ocean heat fluxes**.

In the newest ECCO solution, changes in full-depth global ocean heat content track EBAF TOA net radiative imbalance remarkably closely, even at *monthly timescales*.

Amplitudes of Global-Mean Net Ocean Heat Fluxes

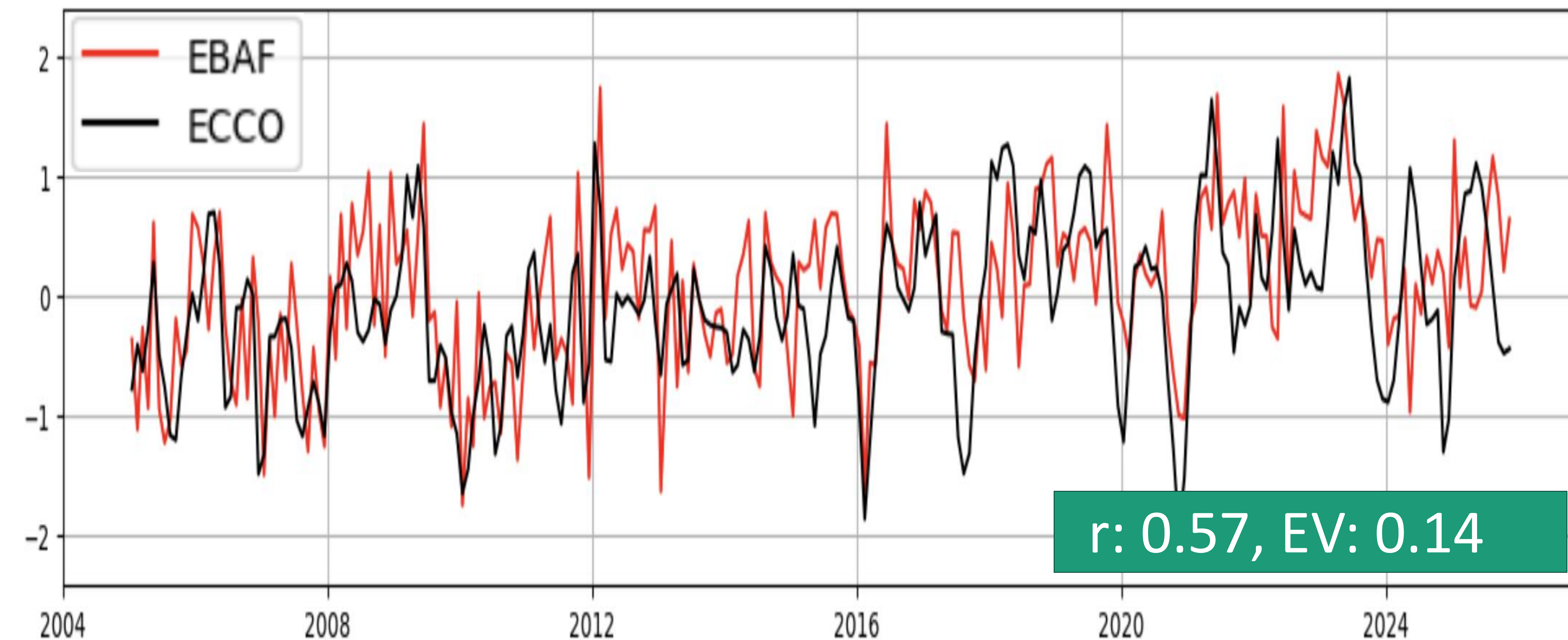
Seasonal cycle $\sim 30 \text{ Wm}^{-2}$

Anomalies $\sim 2 \text{ Wm}^{-2}$

Time-mean net $\sim 0.80 \text{ Wm}^{-2}$

Monthly-mean global net heat fluxes

CERES EBAF vs. ECCO [Wm^{-2}]



1-year rolling mean global net heat fluxes

CERES EBAF vs. ECCO [Wm^{-2}]

