

## IPCC's Earth Energy Imbalance Assessment is Based on Physically Invalid Argo Float-Based Estimates of Global Ocean Heat Content

A groundbreaking paper by physicist Jonathan Cohler, David Legates (University of Delaware, retired), Kesten Green (Adelaide University), Ole Humlum (University of Oslo), Franklin Soon (Marblehead High School), and Willie Soon (Institute of Earth Physics and Space Science) dismantles the core of IPCC climate assessments. The paper proves that the United Nations Intergovernmental Panel on Climate Change (IPCC) bases its claims of Earth trapping extra heat from human activity on fundamentally flawed and thermodynamically meaningless calculations based on data from ocean floats. Published in *Science of Climate Change* (Vol. 6.1, 2026), the study demonstrates these metrics violate basic physics and the scientific method, rendering them unreliable for any policy decisions.

### The Core Issue: Invalid Ocean Heat Measurement Methodology

The IPCC asserts oceans absorb about 90% of the energy that is purportedly “trapped” by human generated greenhouse gases. This conclusion relies mainly on data collected by Argo floats. These devices dive to 2,000 meters (1.24 mi), measure temperature, salinity, and pressure, then surface once every 10 days to transmit the collected data to satellites.

However, our analysis exposes several fatal flaws:

- **Over Half the Ocean is Excluded:** Argo floats sample only the upper half of the ocean's depth and volume, and exclude several other areas as well. The deep ocean below 2,000 m holds half the thermal energy but is virtually unmeasured, with sparse “Deep Argo” floats totally inadequate.
- **Guesswork Dominates:** The floats are spaced usually 200–500 kilometers (about 124–310 miles) from one another. That means huge stretches of the ocean have no floats taking any readings; they are unsampled (i.e. no direct measurements). To create complete worldwide maps or grids of things like temperature and salinity, scientists must guess / fill in the gaps between the floats (this is called interpolation). But those guesses do not properly account for smaller-scale ocean features, such as:
  - swirling eddies (like whirlpools 10–100 km across),
  - turbulent mixing, and
  - narrow currents.

These smaller, energetic movements are very important in the real ocean, because they transport heat, salt, nutrients, etc., but the wide spacing and filling-in process misses or smooths them over. As a result, the final global maps often show fake patterns or errors (called “artifacts”) that are not actually happening in the ocean; they are just side effects of the guessing method. In short, the data points are too sparse to capture the ocean's real small-to-medium-scale chaos, so the computer-filled maps look smoother and cleaner than reality, and sometimes invent features that simply do not exist.

- **Anomalies Are Physically Meaningless:** IPCC uses “anomalies,” which are current measurements minus arbitrary baseline / reference period measurements. Temperature, an intensive property, is not additive over non-equilibrium systems like the ocean. Averaging temperatures from different places and times produces computational fiction, not actual

temperature or energy changes, in direct violation of the 150-year unchanged laws of thermodynamics (Essex et al., 2007; Cohler, 2025).

- **Inaccurate Tracking:** While underwater, floats drift with currents completely untracked, yet all data collected during each ascent is assigned to that single 10-day surfacing location, introducing significant space and time errors in the data.

### **Circularity and Massive Hidden Uncertainties**

The IPCC AR6 reported value of  $0.7 \pm 0.2 \text{ W/m}^2$  for “Earth’s Energy Imbalance” (EEI) is derived by changing measured satellite data ranges to match these invalid ocean energy estimates, a circular process. The paper quantifies all of these overlooked uncertainties: mesoscale variability ( $\pm 0.9 \text{ W/m}^2$ ), deep ocean ignorance ( $\pm 0.35 \text{ W/m}^2$ ), sea-level discrepancies ( $\pm 0.33 \text{ W/m}^2$ ), polar undersampling ( $\pm 0.1 \text{ W/m}^2$ ), aliasing, and more. The total uncertainty is well over  $\pm 1 \text{ W/m}^2$  at 95% confidence, an order of magnitude larger than the  $\pm 0.2 \text{ W/m}^2$  claimed by the IPCC AR6 report, making their EEI value statistically indistinguishable from  $0 \text{ W/m}^2$ .

### **The Truth is Even Worse**

These OHC and EEI estimates are not just uncertain, they are physically invalid, based on the 150-year-old most fundamental principles of thermodynamics (the science of energy flow). Using a standardized test based on the principles of the scientific method, these estimates fail, and therefore must be discarded. True ocean heat trends remain unquantifiable with current Argo technology. This paper ultimately exposes how IPCC assessments promote unsubstantiated alarm, driving multi-trillion-dollar policies rooted in pseudoscience.

**Click here to read the full paper**

<https://doi.org/10.5281/zenodo.18936064>