Understanding and predicting trends in north Atlantic CO_2 uptake

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To determine the maximum carbon dioxide (CO_2) emissions society must commit to, to remain below a given atmospheric CO_2 threshold, the scientific community must robustly quantify what proportion of human emitted CO_2 will be taken up by the land and marine carbon reservoirs. The North Atlantic Ocean is the most intense marine sink of anthropogenic CO_2 on the planet, accounting for about a fifth of the global oceanic anthropogenic CO_2 uptake, despite covering just 15% of the global ocean area. Carefully assessing uncertainties, we quantify the real-world trend in North Atlantic CO_2 uptake over the past two decades. Comparing this to results from state-of-the-art climate models, we find that models are systematically underestimating the observed CO_2 uptake trend. By performing a set of targeted climate model simulations, we diagnose and account for this bias, and produce the first set of observation-informed future ocean CO_2 uptake predictions.