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## Robust weakening of the Gulf Stream during the past four decades observed in the Florida Straits

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The Gulf Stream is a vital limb of the North Atlantic circulation that influences regional climate, sea level, and hurricane activity. Given the Gulf Stream's relevance to weather and climate, many studies have attempted to estimate trends in its volumetric transport from various datasets, but results have been inconclusive, and no consensus has emerged whether it is weakening with climate change. Here we use Bayesian analysis to jointly assimilate multiple observational datasets from the Florida Straits to quantify uncertainty and change in Gulf Stream volume transport since 1982. We find with virtual certainty (probability  $P > 99\%$ ) that Gulf Stream volume transport through the Florida Straits declined by  $1.2 \pm 1.0$  Sv in the past 40 years (95% credible interval). This significant trend has emerged from the dataset only over the past ten years, the first unequivocal evidence for a recent multidecadal decline in this climate-relevant component of ocean circulation.