Abstract Submitted
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Observations Determination of Surface Radiative Forcing by CO2 and CH4[1] WILLIAM COLLINS, Lawrence Berkeley Natl Lab and UC Berkeley, DANIEL FELDMAN, Lawrence Berkeley Natl Lab, JONATHAN GERO, University of Wisconsin-Madison, Space Science and Engineering Center, MARGARET TORN, Lawrence Berkeley Natl Lab and UC Berkeley, ELI MLAWER, Atmospheric and Environmental Research, Inc., TIMOTHY SHIPPERT, Pacific Northwest National Laboratory, Fundamental and Computational Sciences — Earth's background atmospheric CO2 and CH4 concentrations have been steadily rising due to anthropogenic emissions, and these increases since 1750 have implications for the radiative balance of the Earth's atmosphere. The physics governing how atmospheric CO2 and CH4, both well-mixed greenhouse gases (WMGHGs), influence atmospheric infrared energy balance, and thus climate, are well established, but the impact of recent atmospheric WMGHG trends on the surface energy balance has not been experimentally confirmed in the field. Using infrared WMGHG absorption bands and controlling for atmospheric temperature and water vapor, spectra from the DOE ARM Program's Atmospheric Emitted Radiance Interferometers (AERI) yield the first direct observational evidence of the time-series of WMGHG surface radiative forcing directly attributable to recent increases in WMGHGs, in this case between 2000-2010. The time-series shows a secular trend of in the radiative forcing from both CO2 and CH4. This data record provides the first comprehensive observational evidence of surface radiative forcing by WMGHGs, confirming theoretical predictions of the atmospheric greenhouse effect.

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