

## Poster #70

### Large Historical Growth in Global Terrestrial Gross Primary Production

J. E. Campbell<sup>1</sup>, J. A. Berry<sup>2</sup>, U. Seibt<sup>3</sup>, S. J. Smith<sup>4</sup>, S. A. Montzka<sup>5</sup>, T. Launois<sup>6,7</sup>, S. Belviso<sup>6</sup>, and L. Bopp<sup>6</sup>, M. Laine<sup>8</sup>

<sup>1</sup> Sierra Nevada Research Institute, University of California, Merced, USA.

<sup>2</sup> Department of Global Ecology, Carnegie Institution for Science, Stanford, USA.

<sup>3</sup> Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, USA.

<sup>4</sup> Joint Global Change Research Institute, Pacific Northwest National Laboratory, College Park, USA.

<sup>5</sup> Earth System Research Laboratory, National Oceanic and Atmospheric Administration, Boulder, USA.

<sup>6</sup> Laboratoire des Sciences du Climat et de l'Environnement, Gif-sur-Yvette, France

<sup>7</sup> Now at: INRA, UMR 1391 ISPA, 33140 Villenave d'Ornon, France

<sup>8</sup> Finnish Meteorological Institute, Helsinki, Finland

Contact: Elliott Campbell [ecampbell3@ucmerced.edu]

Growth in terrestrial gross primary production (GPP) may provide a negative feedback for climate change. It remains uncertain, however, to what extent biogeochemical processes can suppress global GPP growth<sup>3</sup>. In consequence, model estimates of terrestrial carbon storage and carbon cycle –climate feedbacks remain poorly constrained<sup>4</sup>. Here we present a global, measurement-based estimate of GPP growth during the twentieth century based on long-term atmospheric carbonyl sulphide (COS) records derived from ice core, firm, and ambient air samples<sup>5</sup>. We interpret these records using a model that simulates changes in COS concentration due to changes in its sources and sinks, including a large sink that is related to GPP. We find that the COS record is most consistent with climate-carbon cycle model simulations that assume large GPP growth during the twentieth century ( $31\% \pm 5\%$ ; mean  $\pm$  95% confidence interval). While this COS analysis does not directly constrain future GPP growth it provides a global-scale benchmark for historical carbon cycle simulations.