Geophysical Research Abstracts
Vol. 16, EGU2014-9480, 2014
EGU General Assembly 2014

Optimal Estimates of Global Terrestrial GPP from Fluorescence and DGVMs

Nicholas Parazoo (1,2), Kevin Bowman (1,2), Joshua Fisher (1), Christian Frankenberg (1), Dylan Jones (2,3), Alessandro Cescatti (4), Oscar Perez-Priego (5), Georg Wohlfahrt (6), Leonardo Montagnani (7,8)

(1) Jet Propulsion Laboratory, CalTech, Pasadena, CA, USA, (2) Joint Institute for Regional Earth System Science and Engineering, UCLA, Los Angeles, CA, USA, (3) Department of Physics, University of Toronto, Toronto, Ontario, Canada, (4) European Commission, Joint Research Center, Institute for Environment and Sustainability, Ispra, Italy, (5) Departamento de Fisica Aplicada, Universidad de Granada, Granada, Spain, (6) Institut fur Okologie, Universitat Innsbruck, Sternwartestr, Innsbruck, Austria, (7) Forest Services, Autonomous Province of Bolzano, Via Brennero, Bolzano, Italy, (8) Faculty of Science and Technology, Free University of Bolzano, Piazza Universita, Bolzano, Italy

Changes in the processes that control terrestrial carbon uptake are highly uncertain but likely to have a significant influence on future atmospheric CO_2 levels. RECCAP aims to improve process understanding by reconciling fluxes from top-down CO_2 inversions and bottom-up estimates from an ensemble of DGVMs. As these models are typically used in projections of climate change a key part of this effort is benchmarking models and evaluating drivers of net carbon exchange within the current climate. Of particular importance are the spatial distribution and time rate of change of GPP. Recent advances in the remote sensing of solar-induced chlorophyll fluorescence opens up a new possibility to directly measure planetary photosynthesis on spatially resolved scales. Here, we discuss a new methodology for estimating GPP and uncertainty from an optimal combination of an ensemble of DGVMs from the TRENDY project with satellite-based fluorescence observations from GOSAT. Prior uncertainty is estimated from the spread of DGVMs and updated through assimilation of fluorescence. We evaluate optimized fluxes against flux tower data in N. America, Europe, and S. America, benchmark TRENDY models using updated uncertainty estimates, and examine changes in the structure of the seasonal cycle. We find this methodology provides a novel way to evaluate models used in climate projections.