

The Orbiting Carbon Observatory (OCO-2) tracks 2-3 peta-gram increase in carbon release to the atmosphere during the 2014-2016 El Niño

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The powerful El Niño event of 2015-2016 –the third most intense since the 1950s –has exerted a large impact on the Earth's natural climate system. The column-averaged CO₂ dry-air mole fraction (XCO₂) observations from satellites and ground-based networks are analyzed together with in situ observations for the period of September 2014 to October 2016. From the differences between satellite (OCO-2) observations and simulations using an atmospheric chemistry-transport model, we estimate that, relative to the mean annual fluxes for 2013, over the period July 2015 to June 2016, the most recent El Niño has contributed to an excess CO₂ emission from the Earth's surface (land+ocean) to the atmosphere in the range of 2.4 ± 0.2 PgC (1 Pg = 10^{15} g). The excess CO₂ flux resulted primarily from reduction in vegetation uptake due to drought, and to a lesser degree from increased biomass burning. It is about the half of the CO₂ flux anomaly (range: 4.4-6.7 PgC) estimated for the 1997/1998 El Niño. The annual total sink is estimated to be 3.9 ± 0.2 PgC for the assumed fossil fuel emission of 10.1 PgC. The major uncertainty in attribution arise from error in anthropogenic emission trends, satellite data and atmospheric transport.

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