

4B.3 - California Dominates U.S. Emissions of Sulfuryl Fluoride, a Synthetic Pesticide and Potent Greenhouse Gas



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321/322 (*The Baltimore Convention Center*)

Abstract

Sulfuryl fluoride (SO_2F_2) is a synthetic pesticide and a potent greenhouse gas (GHG) that is accumulating in the global atmosphere. SO_2F_2 has been increasingly used for agricultural and structural fumigation worldwide to replace methyl bromide (CH_3Br), which was largely phased out under the Montreal Protocol to protect the ozone layer. Rising emissions of SO_2F_2 are concerning due to its relatively long atmospheric lifetime and high global warming potential (GWP). However, there is a paucity of information on how emissions of SO_2F_2 are distributed across the U.S., and there is currently no inventory of SO_2F_2 emissions for the U.S. or individual states. We provide an atmospheric measurement-based constraint on U.S. SO_2F_2 emissions using high-precision SO_2F_2 measurements from the NOAA Global Greenhouse Gas Reference Network (GGGRN) and a geostatistical inverse model. We find that California has the largest SO_2F_2 emissions among all U.S. states, with the highest emissions from southern coastal California (Los Angeles, Orange, and San Diego counties). Outside of California, only very small and infrequent SO_2F_2 emissions are detected by our analysis of GGGRN data. We find that California emits 60-85% of U.S. SO_2F_2 emissions, at a rate of $0.26 (+/-0.10) \text{ Gg yr}^{-1}$. Furthermore, we estimate that emissions of SO_2F_2 from California are equal to 5.5-12% of global SO_2F_2 emissions -- a large contribution from a single state.

Co-Authors



Dylan C. Gaeta

Johns Hopkins University
Baltimore, MD
USA**Scot Michael Miller (Presenter)**Johns Hopkins University
BALTIMORE, MD

USA

**Jens Mühle**

SIO

La Jolla, CA

USA

**Isaac J. Vimont**

NOAA

Boulder, CO

USA

**Molly Crotwell**

CIRES, Univ. of Colorado Boulder

Boulder, CO

USA

**Lei Hu**

NOAA

Boulder, CO

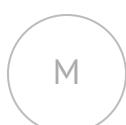
USA

**John Miller**

NOAA

Boulder, CO

USA

**Kathryn McKain**

Univ. of Colorado Boulder

Boulder, CO

USA

**Bianca C. Baier**

ESRL

Boulder, CO

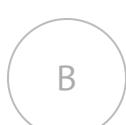
USA

**Mingyang Zhang**

Johns Hopkins University

Baltimore, MD

USA

**Jianing Bao**

Clemson University

Anderson, SC

USA



Benjamin Miller
CIRES, Univ. of Colorado Boulder
Boulder, CO
USA
