

GC31J-07 Earth observations for studying human-made emissions in areas of conflict and war: A case for Ukraine



Wednesday, 11 December 2024



09:30 - 09:40



201 (Convention Center)

Abstract

Quantifying human-made emissions, such as greenhouse gases (GHG) and air pollutant emissions, is a fundamental task for scientific assessment of the status of the climate and environment as well as monitoring of international compliance of emission management. The emission estimates are often obtained via an activity-data (or bottom-up) approach which is based on extensive collection of activity data, such as fuel statistics, and reported as a form of emission inventories. The regular emission calculation/reporting practices should be able to provide robust estimates to reasonably fulfill the objectives in a “peaceful” world; however, the regular approach fundamentally cannot be implemented to achieve reasonable emission estimates in the areas of conflict and war, such as Ukraine and Gaza. We attempt to develop spatially explicit GHG emission estimates for Ukraine’s territory using best available data and knowledge by experts including local experts. Given the data/information challenges, remotely sensed data, particularly Earth observations (EO), could offer insights to the ongoing damage from the war. We examine a wide variety of EO, such as nighttime lights, thermal signatures, and synthetic-aperture radar (SAR) data, to determine and/or estimate spatial and temporal extent of sectoral emissions where possible. We highlight the combined/synergic use of multiple EO to attempt to get the entire picture with granular information by adding layers of unique pieces of information from each satellite. We also discuss the importance of the use of atmospheric data for evaluating emission estimates that might not be as robust as we hope due to the emission estimation challenges. Providing guidance on the accuracy and uncertainty is an extremely important task for us/researchers as our results might/could be used for critical assessment and decision making.

First Author



Tomohiro Oda

Universities Space Research
Association

Authors



Rostyslav Run

Lviv polytechnic national university



Jamon Van Den Hoek

NASA Goddard Space Flight



[Corey Scher](#)

University of California Berkeley



Center
[Srija Chakraborty](#)
Arizona State University



[Zhuosen Wang](#)

University of Maryland College
Park/NASA Goddard Space Flight
Center



[Ranjay Man Shrestha](#)
George Mason University Fairfax



[Virginia L. Kalb](#)

NASA Goddard Space Flight
Center



[Viktor Karamushka](#)
National University of Kyiv-Mohyla
Academy



[Hiroshi Suto](#)

Japan Aerospace Exploration
Agency



[Akihiko Kuze](#)
Japan Aerospace Exploration
Agency



[Brad Weir](#)

NASA Goddard Space Flight
Center



[Lesley Ott](#)
NASA Goddard Space Flight
Center

View Related
