

IAF EARTH OBSERVATION SYMPOSIUM (B1)  
Earth Observation Applications, Societal Challenges and Economic Benefits (5)

Author: Ms. Ufuoma Ovienmhada  
Massachusetts Institute of Technology (MIT), United States

Prof. Danielle Wood  
Massachusetts Institute of Technology (MIT), United States

EARTH OBSERVATION DATA APPLIED TO MEASURE ENVIRONMENTAL INJUSTICE IN  
UNITED STATES PRISON LANDSCAPES

**Abstract**

According to a 2016 spatial analysis by Paige Williams, at least 732 federal and state prisons are located within three miles of a Superfund site, which are among the most polluted locations in the U.S. These environments have health risks for incarcerated populations including cancers, respiratory diseases, gastrointestinal problems and skin diseases. This reality points to an intersection between mass incarceration, environmental issues, and the resulting environmental injustice produced by exposure to adverse environmental conditions. While there have been efforts to elevate the narratives of incarcerated people who have been affected by toxic exposures, there has been little work to document the health of these landscapes in ecological terms or at wide geographic scale. In addition to this literature gap motive, a grassroots organization, Fight Toxic Prisons (FTP), that is at the forefront of prison ecology issues, has named a need for more mapping of this issue. Maps explaining and measuring the ecology of prison landscapes are needed because both the public, community organizers, and government decision-makers may not have clear information on the empirical relationship between location of prison facilities and exposure to environmental hazards for incarcerated persons. Satellite Earth Observation (EO) tools could be useful in addressing these environmental justice (EJ) monitoring needs for prison ecology. However the application of this technology in measuring EJ, or supporting EJ advocacy efforts has not been widely explored, as evidenced by the recent NASA request for information and grant solicitations concerning equity and environmental justice.

This paper presents an ongoing effort done in collaboration with FTP to utilize EO data to document the ecology of prison geographies and understand sociodemographic patterns of harm across the United States. First, we present the results of stakeholder interviews to understand needs or leverage points where EO-enabled technology interventions could support decision making by EJ practitioners. Second, we present domestic case studies demonstrating application of optical and radar satellite imagery to measure several indicators of environmental harms in prison landscapes including air pollution, extreme temperature, and exposures to natural disasters. This research will be the first known study of prison ecology using measurements from satellites and will elevate an issue that has been relatively invisible in broader environmentalism movements. The findings can be used by community organizers, policy makers, and anyone seeking to advocate for environmental justice for a population of people that tend to sit at the margins of fights for human rights.