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

Author: Mr. Swarnajyoti Mukherjee
GP Advanced Projects, Srl, Italy

Mr. Krittanon Sirorattanakul
California Institute of Technology, United States
Ms. Daniela Vargas-Sanabria
Universidad Estatal a Distancia (UNED), Costa Rica
Mr. Samridh Patial
University of Petroleum and Energy Studies, India
Mr. Abinash Silwal
Kathmandu University, Nepal
Ms. Kristine Jane Atienza
Space Generation Advisory Council (SGAC), Austria

SUPPLEMENTING EARTH OBSERVATION WITH TWITTER DATA TO IMPROVE DISASTER ASSESSMENTS: A CASE STUDY OF 2020 BOBCAT FIRE IN SOUTHERN CALIFORNIA

Abstract

Space-based Earth Observation allows us to simultaneously detect changes on the Earth's surface over large areas. As a result, it is often used to assist with disaster assessments to understand associated property damages in the affected areas. Geographic Information Systems and Remote Sensing are very popular for their applications in handling disasters and are being utilized as a key tool to support decision making throughout the disaster management process. Moreover, the use of social media, especially Twitter, has become a popular communication platform that is identified in providing vital information in emergency situations. Twitter users can use the services to work synergistically regardless of physical distance.

To demonstrate the benefits of supplementing Earth observations with Twitter data in disaster assessments, we use a recent fire in Southern California, the Bobcat fire, that started on September 6, 2020 and burned for over 3 months until it was finally contained on December 18, 2020 as a case study. The plume from the fire spanned more than 1,000 miles with smoke travelling across the entire North American continent. 115,000 acres of land got affected along with unprecedented wildlife loss. Additionally, this fire has turned the San Gabriel mountains into bare and ashen sloped.

In this study, we integrated Earth observations with data from Twitter, to assess a more comprehensive view of the overall damages including physical and emotional state as an aftermath of a disaster. Remote sensing data let us understand pre- & post-fire conditions of the land as well as temperature variation and soil condition of the ground. Geographical locations are analysed from tweets which are compared with levels of various pollutants measured from ground instrumentations and the amount of smoke coverage from satellite imagery. With the additions of Twitter data, using machine learning and natural language processing, we are able to derive a more holistic impact of the Bobcat fire on California citizens. Thus, augmenting remote sensing data with socially sensed Twitter data will strengthen the capabilities of experts and staff working to analyse and manage disaster risk by providing them with both spatial and socio–economic information. Moreover, we can also determine how various factors contribute to the superspreading of messages. A better understanding of social media utilization would allow us to

determine a better risk reduction tool, whether it would be for the purposes of early warning of disaster events or reducing mental stresses after a disastrous event.