Weekly Report – June 3, 2022

Satellite Climate Studies Branch (SCSB)/CISESS

NOAA/NESDIS/STAR

Acting Branch Chief: John Knaff

Submitted by: John Knaff
Email: John.Knaff@noaa.gov
Phone: 970-491-8881

Date of Submission: 3 June 2022

HIGHLIGHTS FOR NESDIS LEADERSHIP

Data and Information

A Raspberry Pi camera set up at the AOSC Department

A Raspberry Pi camera was set up at the AOSC Department (on the roof of the Atlantic Building) on the UMD campus on May 23rd by Daile Zhang, Guangyang Fang and an AOSC undergrad student Domenic Brooks. This camera is part of the Mid-Atlantic Raspberry Pi camera network. The camera network will take high-speed videos of lightning and the videos will be used for evaluation and validation studies of the Geostationary Lightning Mapper (GLM) on NOAA's GOES-16 Satellite and other ground-based lightning networks, as well as long-term thunderstorm climatology study in the Mid-Atlantic area. This research project is supported by Zhang's 2021 Seeds Grant project of lightning observations, with Brooks and another undergrad student's summer internship at CISESS.

Figure The Raspberry Pi camera setting at AOSC

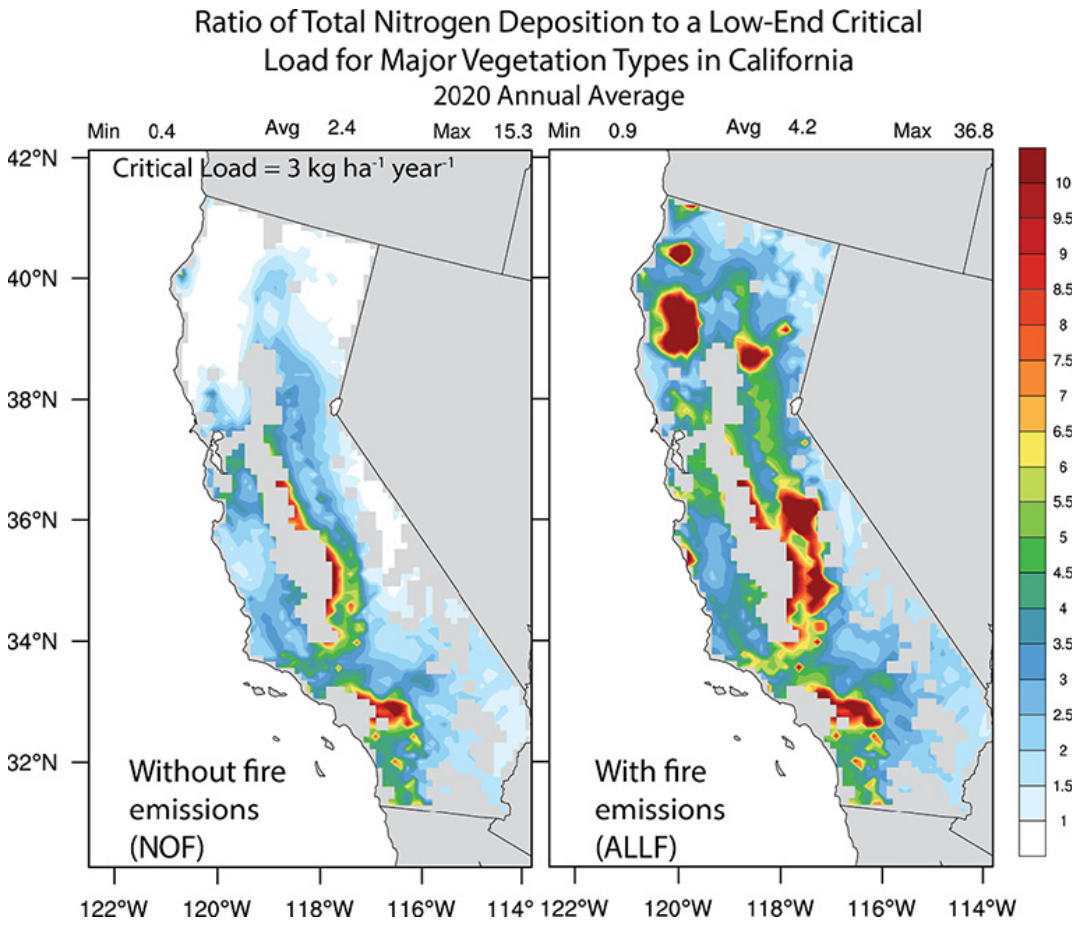
(Daile Zhang, CISESS, dlzhang@umd.edu, GOES-R AWG, GOES-R PGRR, NOAA-NASA ROSES)

PUBLICATIONS

Historic 2020 Wildfires and their Effects on Nitrogen Deposition in California
Citation**: Campbell, Patrick, Tong, Daniel,** Rick Saylor, Yunyao Li, Siqi Ma, **Xiaoyang Zhang**, Shobha Kondragunta and Fangjun Li, 2022: Pronounced increases in nitrogen emissions and deposition due to the historic 2020 wildfires in the western U.S., *Sci. Total Environ.*, **839**, 156130, https://doi.org/10.1016/j.scitotenv.2022.156130. The 2020 "gigafires" contributed up to 83% of the total nitrogen emissions in the western U.S. These resulted in a 78% increase in annual average nitrogen deposition in California. The average nitrogen deposition increases to California's forests are 6-12 times the critical load, defined as the point at which forest ecosystems undergo undesired impacts such as expansion of invasive species, vegetation change, and biodiversity loss.

Summary: Two groups of CISESS Scientists, experts on air quality and experts on biomass burning emissions collaborated on a study of the huge wildfires in the western United States in August to October 2020. Patrick Campbell and Daniel Tong, GMU scientists who work with the Air Resources Laboratory and Xiaoyang Zhang, an SDSU scientist who works with STAR on their VIIRS biomass burning product used satellite observations and modeling to analyze the effects the wildfire had on both oxidized nitrogen (NOx) and reduced nitrogen (NH_3). They found that the extreme biomass burning had a huge impact on both types of nitrogen in the atmosphere, contributing 83% to local emissions (see the figure below) and 55 % of CONUS emissions.

Once this nitrogen was deposited by dry and wet deposition, it enhanced nitrogen on land by around 78%. To evaluate the impact on the California forest ecosystem, the researchers used *critical loads* (CLs) based on oligotrophic species (defined as plants that can live where there aren't many available nutrients) are highly sensitive to atmospheric N, with initial declines in number observed at N deposition levels (i.e. CLs) as low as 3 kg ha^{-1} $year^{-1}$. The wildfire-related N deposition increases on vegetation ranged from 23% to 170%.



(Patrick Campbell, CISESS, patrick.c.campbell@noaa.gov, Funding: ARL)