OKLAHOMA
EPSCoR
UPDATE
Promoting Innovative Research

Forest Mapping Algorithms Developed by S³OK Researchers Used in Forest Conservation Study in the Brazilian Amazon

The Brazilian Amazon has the largest area of tropical rainforest and is habitat of the highest biodiversity in the world. In the past two decades, the indigenous territory (ITs) and protected areas (PAs) have increased and covers 43% of the Brazilian Legal Amazon (BLA). The establishment of ITs and PAs have significantly reduced deforestation and increase forest conservation in the BLA. However, the effects of the ITs and PAs in reducing deforestation remains unclear due to differences in the available data and due to continuing conflicts between forest conservation and socio-economic development in the BLA. There has been increasing threats on forest conservation in ITs and PAs due to weakened environmental laws and regulations, changes in government policies, and vast economic development in the past decade in Brazil.
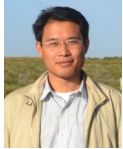
Qin

Xiao

Hence, Dr. Yuanwei Qin from the University of Oklahoma's Department of Microbiology and Plant Biology led an international team (Xiangming Xiao, Fang Liu, Fabio de Sa e Silva, Yosio Shimabukuro, Egidio Arai, and Philip Martin Fearnside) to investigate the interannual changes in forest areas and deforestation in the BLA, ITs, PAs, and non-PAs, and the effects of national PAs and state PAs in
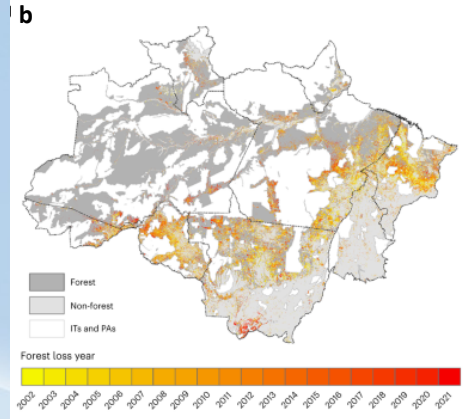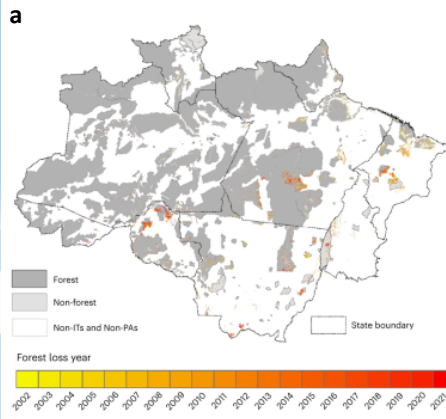
Annual gross forest area losses in the BLA from 2002-2021 in the (a) ITs/PAs and (b) outside ITs/PAs.

deforestation from 2000-2021 under the changing environmental laws, governance, natural disturbance, & covid-19 pandemic.

"We generated annual evergreen forest map using daily images acquired by moderate resolution imaging spectroradiometer (MODIS) onboard the Terra satellite during 2000-2021 and used the forest mapping algorithms we developed and evaluated in Oklahoma and other regions," Qin said.

"We found that ITs and PAs increased to cover 52% of forest area and observed only 5% net forest loss and 12% gross forest loss in the Brazilian amazon during 2000-2021," Qin added.

The research team also investigated the effect of ITs and PAs on the annual gross forest area loss rates before and after the ITs and PAs were established in the BLA.

"During 2003-2021, we found that gross forest area loss fell 48% in PAs with strict protection objective and 11% in PAs with sustainable use objective after the PAs were established in the BLA," Qin said.

"However, the percentage rate in annual gross forest area loss in ITs and PAs in 2018-2021 was twice than the forest loss in the non-PAs. This could be attributed to the recent changes of Brazil's forest policies, which may have affected forest conservation in the ITs, PAs, and non-PAs," Qin added.

"Our results indicate that ITs and PAs play an important role in forest conservation in the BLA. We suggest that more consideration is strongly needed to strengthen the environmental policies and laws aimed at conserving and protecting forest areas in ITs and PAs of the Brazilian Amazon," Xiao said.

Click on the link to read full journal article.