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The Importance of Vegetation Build Up for Burnt Area Seasonality

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Vegetation build up is a major controlling factor for wildfires globally. The exact nature of the dependency of wildfire activity on past vegetation productivity is still under debate, however. Given the potential future rise in conditions conducive to extremely damaging fires in many regions of the world, controlling factors like this need to be investigated urgently to better understand and manage especially extreme wildfire events.
To improve our understanding of wildfires and the advice given to policy makers, a comprehensive understanding of all contributing factors is required. Changes to land management can be controversial and thus concrete evidence is required to assess and modify longstanding management practices and regulations if needed.
We therefore used global satellite datasets extending from 2005 to 2011 to assess the relationship between burnt area and various biophysical variables. Vegetation proxy data included vegetation optical depth and the fraction of absorbed photosynthetically activate radiation. Different regions and time periods were analysed separately to isolate regional and temporal effects respectively. The relationship between pre-season vegetation productivity and burnt area was modelled as a regionally and temporally varying weighted sum of past monthly productivity proxies.
As expected, significant differences in fire regimes were found across biomes, signified for example by significant shifts in the seasonality of burnt area. Understanding these shifts in the seasonality of both burnt area and the accompanying temporal dependence on past vegetation growth is key to reproducing observed wildfire regimes in fire models. As these relationships were found to vary both temporally and regionally, judicious inclusion of biophysical variables in fire models coupled with algorithms able to capture these relationships is necessary.
However, remotely sensed observations were of different quality in different areas due to inhomogeneous cloud cover patterns, making assessments for much-affected regions like South America and South East Asia especially difficult. Likewise, the found correlation between decreasing cloud cover and increasing burnt area biased our results. Due also to the short time span of the data available in this investigation, these factors warrant further investigation to more fully quantify the temporal and regional relationships at work.