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Investigating wildfire risk for a small island and the potential use of remotely sensed data: A Jamaica case study

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There are limitations in assessing past and future trends in the occurrence of bushfires in Small Developing States (SIDS) and their impact on the economies of these islands. This is due largely to the lack of organised and digitised data on wild/bushfire incidents. With future projections of higher temperatures, more intense droughts and increased variability in rainfall for the SIDs, the potential losses associated with wildfires are likely to intensify. Using Jamaica as a case study, this investigation examines wildfire incidence for the period of 2010-2015. Meteorological data from the Meteorological Service, Jamaica, and fire data from the Jamaica Fire Brigade as well as the FIRM MODIS C6 archive from the National Aeronautics and Space Administration (NASA) are used to characterize Jamaica's bushfire/wildfire season and to investigate associations with seasonal rainfall and dryness patterns. The relationships between rainfall and mean temperature and remotely sensed wildfire data are further analysed using generalized additive mixed models (GAMMs). For Jamaica, an active fire season is observed from January to April for 2010-2013 and from June to August for 2014-2015. This is evident from both the Jamaica Fire Brigade and NASA datasets. The rainfall variability observed over this period may be related to the strong La Nina events between 2010 and 2012, and a weak El Nino in late 2014 to 2015. The remotely sensed dataset is shown to provide a good representation of annual wildfire incidents over Jamaica, explaining up to 85% of the island's wildfire annual variations. Statistical and dynamic models will be investigated in future work to suggest future trends in fire outbreaks. These should provide useful inputs in long-term sector planning particularly for agriculture, infrastructure, and health.