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Reconstructing 20th century burned area by combining global fire model input, satellite observations and machine learning

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The temporal coverage (2000 to present) of global burned area satellite observations limits many aspects of fire research e.g., long-term trend analysis, disentangling the effect of various drivers on fire behaviour and detection and attribution of changes to climate change. As a result, global fire models are more frequently being called upon to answer questions about past and future fire behaviour. Unfortunately, the limited temporal coverage of the observations also hinders the development and evaluation of these fire models. The current generation of global fire models from ISIMIP are able to simulate well some characteristics of regional fire behaviour such as mean state and seasonality. However, the performance of these models differs greatly from region to region, and aspects such as extreme fire behaviour are not well represented yet. Here, we explore the possibility of using machine learning algorithms to model burned area from the same input parameters that are passed to global climate models. Once trained, this data-driven model can be evaluated against regional proxies for past fire behaviour e.g., tree rings and charcoal records. Hopefully, this data-driven reconstruction can provide valuable insights on the 20th century burned area, and can help improve and evaluate fire models.