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The 2019/20 eastern Australian mega forest fires - a global forest perspective

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The 2019/20 forest fires in eastern Australia burned over 5.8 million hectares of mainly temperate broadleaf forest between September 2019 and January 2020. This burned area figure is expected to rise over the remainder of the austral summer, but is already an order of magnitude larger than the mean annual burned area for Australian forest fires over the last 20 years, which is ~0.59 Mha per year. Here we show that this forest fire event is of a record-breaking scale, both nationally and globally, and was pre-conditioned by wide-spread prolonged drought and extreme heat.

We analysed global remotely sensed burned area data for 2000-2019 to estimate annual burned area fractions of all continental forest biomes. The annual burned area fraction, which is related to the length of fire intervals and other aspects of fire regimes, allows us to compare levels of fire activity across different forest biomes and continents.

Though very large fires occur in some forest biomes, such as the boreal forests of North-America and Asia, over the 20 years covered by our data set, annual burned area fractions have been very small (<0.03) for nearly all continental forest biomes including Australia's temperate broadleaf forest biome. These findings provide a global historical reference for the interpretation of the scale of the 2019/20 eastern Australian mega forest fires.

With fire activity in all forest biomes strongly constrained by the moisture content of the fuels, explanations for the unconstrained burning of millions of hectares of temperate broadleaf forest in a single season must be sought in the extreme drought that has affected eastern Australia for the last two years. We use gridded daily soil moisture predictions for the continent to show how widespread and prolonged dryness set the stage for the unprecedented forest fire event of 2019/20.