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Biomass burning from central Africa dominates air pollution across southern West Africa during the summer monsoon season

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From June to September each year, vast quantities of agricultural land in central and southern Africa are burned. Biomass burning emissions from these fires are injected into the atmosphere and carried west over the Atlantic Ocean at altitudes between 2 and 4 km. To date, these emissions have been thought to remain in highly stratified layers at this height. However, measurements from the DACCIWA (Dynamics-Aerosol-Cloud-Chemistry Interactions in West Africa) campaign in southern West Africa during June and July 2016 provide evidence that these biomass burning emissions can become entrained into the boundary layer over the eastern tropical Atlantic Ocean, after which they are advected into West Africa.

At this time of year, air in the West African boundary layer is advected into the region from the Atlantic Ocean by southerly trade winds. This marine air has not been in contact with land for at least a week. Nevertheless, aircraft measurements carried out during DACCIWA demonstrated a significant aerosol loading in the upwind marine boundary layer, with an average number concentration of 860 cm-3. Both marine and inland aerosol displayed properties of aged biomass burning aerosol. An analysis of the properties of upwind marine and inland aerosol suggests that this remote source contributes up to 80% of the near-surface aerosol loading in the southern West African boundary layer.