Detection of continuing currents in lightning and lightning-ignited wildfires from geostationary orbit

05. Assessing climate variability and change using satellite observations

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Lightning strikes are a significant cause of wildfires globally, releasing trace gases into the atmosphere. It has long been suggested, through experiments and field observations, that continuing currents in lightning play a critical role in starting wildfires. However, it is rare to find simultaneous evidence of both optical and radio signals from lightning strikes that confirm this role. This study analyzes the optical signals of lightning-ignited wildfires reported by the Geostationary Lightning Mapper (GLM) in the Contiguous United States (CONUS) during the summer of 2018. It also examines the optical and Extremely Low Frequency (ELF) radio signals of a confirmed fire-igniting lightning flash in the Swiss Alps. Despite the limits of the approach due to the data uncertainties, we found that lightning strikes with continuing currents lasting more than 10 ms have a higher probability of igniting wildfires than cloud-to-ground lightning in CONUS. In addition, the study confirms the existence of long continuing currents associated with a prolonged optical signal from a video-recorded fire-igniting lightning flash. The occurrence of lightning with continuing currents could increase under climate change [1]. Therefore, monitoring the occurrence of lightning with continuing currents from space is essential to investigate the sensitivity of lightning-induced wildfires under climate change. We explore the potential of using the novel data from the Lightning Imager (LI) and Flexible Combined Imager (FCI) on the new Meteosat Third Generation (MTG) satellite to examine the correlation between wildfires and lightning strikes with continuing currents in Europe and Africa. This study is the first attempt to use such data for this purpose. References Pérez-Invernón, F. J., Gordillo-Vázquez, F. J., Huntrieser, H., & Jöckel, P. (2023). Variation of lightning-ignited wildfire patterns under climate change. Nature communications, 14(1), 739.