

---

# Board 0690: Parameterization of long-continuing-current lightning for chemistry-climate models



Wednesday, 14 December 2022



16:00 - 19:30



McCormick Place - Poster Hall, Hall A (South, Level 3)

---

## Abstract

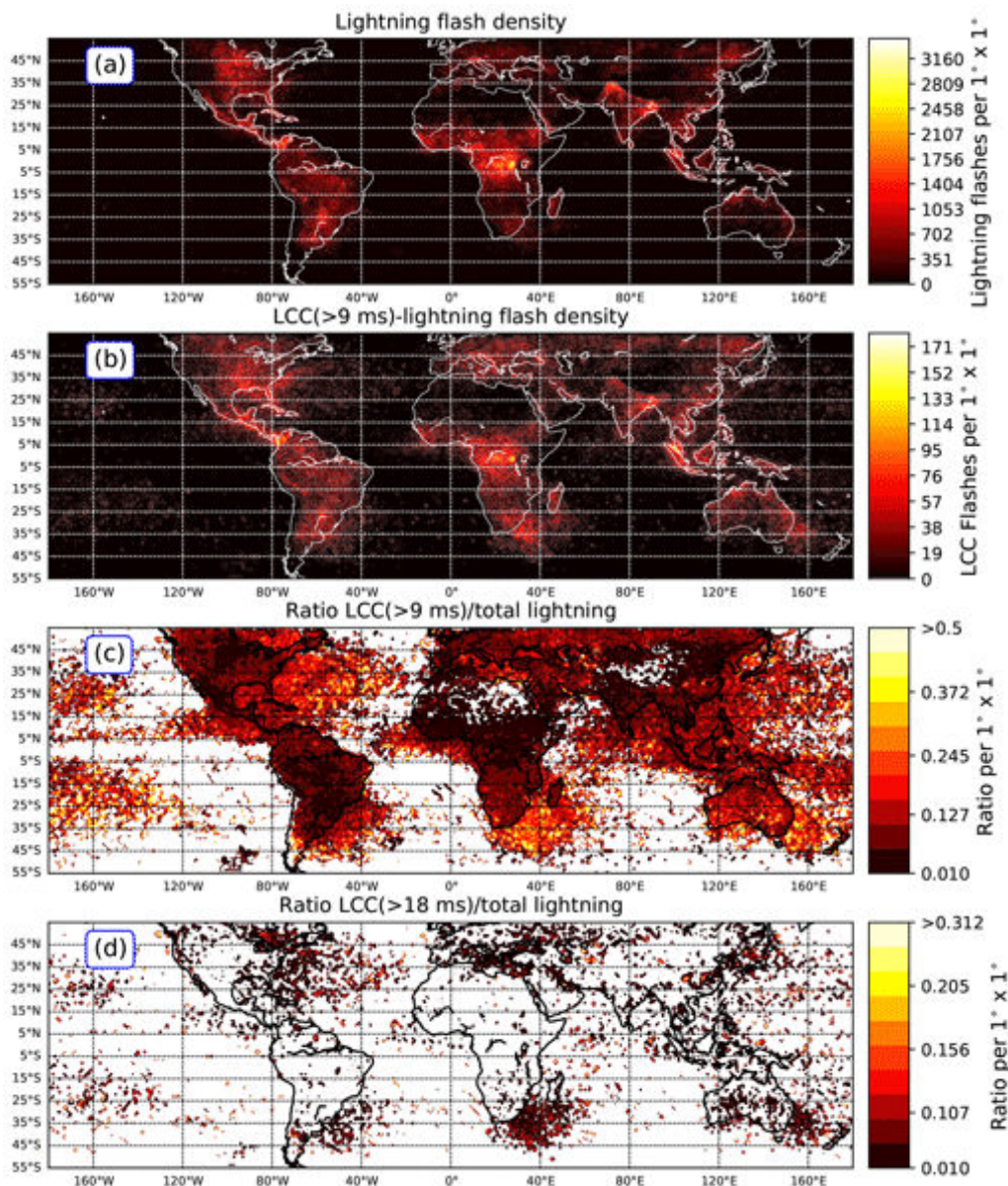
---

Lightning flashes can produce a discharge in which a continuing electrical current flows for more than 40 ms. Such flashes are proposed to be the main precursors of lightning-ignited wildfires and also to trigger sprite discharges in the mesosphere. Therefore, parameterizing their occurrence in chemistry-climate models can serve us to improve the parameterization of wildfires or to develop a parameterization of sprites.

In this work, we use global lightning measurements reported by the Lightning Imaging Sensor (LIS) on board the International Space Station (ISS) between March 2017 and March 2020 to develop the first parameterization of long-continuing-current lightning based on the vertical velocity at the 450 hPa pressure level [1]. We implement the developed parameterization into the Modular Earth Submodel System (MESSy) for usage within the European Center HAMburg general circulation model (ECHAM)/MESSy Atmospheric Chemistry (EMAC) model. Finally, we compare the simulated spatial distribution of long-continuing-current lightning with recent measurements provided by the Geostationary Lightning Mapper (GLM) over the Americas [2]. We obtain a good agreement between the simulated and the observed spatial distribution of long-continuing-current lightning.

[1] Pérez-Invernón, F. J., Huntrieser, H., Jöckel, P., and Gordillo-Vázquez, F. J.: A parameterization of long-continuing-current (LCC) lightning in the lightning submodel LNOX (version 3.0) of the Modular Earth Submodel System (MESSy, version 2.54), *Geosci. Model Dev.*, 15, 1545–1565, <https://doi.org/10.5194/gmd-15-1545-2022>, 2022.

[2] Fairman, S. I., & Bitzer, P. M. (2022). The detection of continuing current in lightning using the Geostationary Lightning Mapper. *J. Geophys. Res. Atmos.*, 127, e2020JD033451. <https://doi.org/10.1029/2020JD033451>



## Plain-language Summary

Long-continuing current lightning are proposed to be the main precursor of lightning-ignited wildfires. We have developed a novel parameterization of long-continuing current lightning for atmospheric models based on satellite measurements.

## First Author



**Francisco J. Perez-Invernon**

Instituto de Astrofísica de Andalucía (IAA - CSIC)

## Authors



[Heidi Huntrieser](#)

German Aerospace Center Oberpfaffenhofen



[Patrick Joeckel](#)

German Aerospace Center DLR Oberpfaffenhofen



[Francisco J. Gordillo-Vazquez](#)

Instituto de Astrofísica de Andalucía (IAA)-CSIC

---

**View Related**

---

---