



## A pan-Alpine climatology of lightning and convective initiation

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A new lightning-flash and convective initiation climatology is developed over the Alpine area, one of the hotspots for lightning activity in Europe. The climatology uses cloud-to-ground (CG) data from the European Cooperation for LIghtning Detection (EUCLID) network, occurring from 2005 to 2019. The CG lightning data are gridded at a resolution of approximately 2km and 10min. A new and simple method of identifying convective initiation (CI) events applies a spatiotemporal mask to the CG data to determine CI timing and location.

Although the method depends on a few empirical thresholds, sensitivity tests show the results to be robust. The maximum activity for both CG flashes and CI events is observed from mid-May to mid-September, with a peak at the end of July; the peak in the diurnal cycle occurs in the afternoon. CI is mainly concentrated over and around the Alps, particularly in northern and northeastern Italy. Since many thunderstorms follow the prevailing mid-latitude westerly flow, a peak of CG flashes extends from the mountains into the plains and coastal areas of northeastern Italy and Slovenia. CG flashes and CI events over the sea/coast occur less frequently than in plains and mountains, have a weaker diurnal cycle, and have a seasonal maximum in autumn instead of summer.