# Rebuttal

We would like to thank the reviewers for their thoughtful comments and efforts towards improving our manuscript. We address comments specific to reviewer 2 below (blue letters).

**Reviewer 2**

The paper elucidates the role of Long-Continuing-Current (LCC) lightning flashes. (20ms) in Lightning Induced Fires (LIW) by an exhaustive analysis of satellite and meteorological reanalysis products. The goal is to identify parameterizations for LIW that are informed by LCC, and some current treatments are shown to be incorrect. Furthermore, the LIE/LCC connection has not been probed in the Mediterranean region that makes this study valuable. The results are described and aggregated well and will be valuable to the community.

We thank the referee for these encouraging comments.

My major concern is that the paper focuses entirely on the LCC and meteorology (P, T, CAPE, H2O) and does not evaluate the state of the vegetation (e.g. how dry?, vapor pressure deficit, soil moisture). Is this important for ignition and/or propagation, will this promote more dry-lightning events regionally? I would lie to see a short discussion explaining the role of these lower frequency drought periods. Specifically, are there any changes in the records of LIW/LCC relations during drought years in the long records analyzed here. Can this explain some of the difference reported between the Iberian peninsula and Greece.

As the reviewer points out, the state of vegetation is important for ignition, arrival and survival phases of LIW. A deep analysis of the state of vegetation is out of the scope of this work. However, we have now included an analysis of the runoff index for LIW in the Iberian Peninsula and Greece. The product “ERA5 hourly data on single levels from 1979 to present” includes the runoff index, defined as:

“Some water from rainfall, melting snow, or deep in the soil, stays stored in the soil. Otherwise, the water drains away, either over the surface (surface runoff), or under the ground (sub-surface runoff) and the sum of these two is called runoff…. The units of runoff are depth in meters of water. ...” (see more in https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview).

We think the runoff index can be a good proxy for the state of vegetation, as it represents the amount of water contained in the soil.

For the Iberian Peninsula, the median runoff index for typical CG flashes over coniferous/mixed forests is $9x10^{-5}$ m, while it is $2x10^{-5}$ m for LIW. For Greece, the median runoff index for typical CG flashes over coniferous/mixed forests is $2x10^{-4}$ m, while for LIW it is $8x10^{-5}$ m. Therefore, as the reviewer points out, the state of vegetation is also an important factor for the occurrence of LIW. In addition, this analysis shows that both typical CG lightning and LIW in the Iberian Peninsula took place over drier conditions than in Greece. **This analysis has now been included in the manuscript.**

We have collected the annual median value of the runoff index for typical CG flashes over coniferous/mixed forests and the ratio of total number of LIW to total number of CG flashes over coniferous/mixed forests :

Iberian Peninsula

| Year | Runoff typical CG (m) | Total number of LIW / Total number of CG |
|---|---|---|
| 2009 | $7x10^{-5}$ | $14x10^{-3}$ |
| 2010 | $12x10^{-5}$ | $7x10^{-3}$ |
| 2011 | $13x10^{-5}$ | $9x10^{-3}$ |
| 2012 | $9x10^{-5}$ | $9x10^{-3}$ |
| 2013 | $17x10^{-5}$ | $8x10^{-3}$ |
| 2014 | $10x10^{-5}$ | $2x10^{-3}$ |
| 2015 | $6x10^{-5}$ | $3x10^{-3}$ |

Greece

| Year | Runoff typical CG (m) | Total number of LIW / Total number of CG |
|---|---|---|
| 2017 | $11x10^{-5}$ | $4.1x10^{-4}$ |
| 2018 | $19x10^{-5}$ | $2.8x10^{-4}$ |
| 2019 | $17x10^{-5}$ | $3.8x10^{-4}$ |

Let us now analyze these data. The total number of LIW per lightning can be influenced by the detection efficiency of each lightning location system. Therefore, we plot these data after splitting them into 3 subgroups: WWLLN data over the Iberian Peninsula (2009-2013), ENTLN data over the Iberian Peninsula (2014-2015) and ENTLN data over Greece:

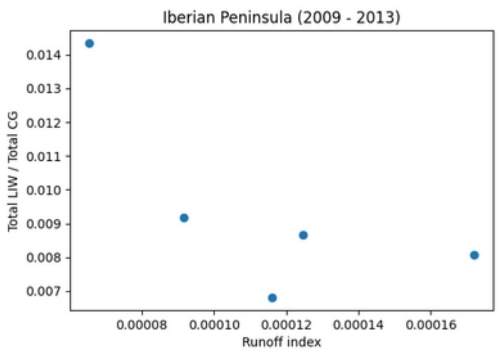


*Figure 1: Annual ratio of total number of LIW to typical CG over coniferous and mixed forests in the Iberian Peninsula versus the median runoff index (m) for typical CG. These data correspond to the period between 2009 and 2013.*

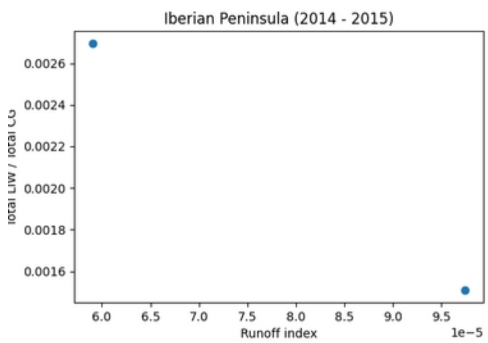


*Figure 2: Annual ratio of total number of LIW to typical CG over coniferous and mixed forests in the Iberian Peninsula versus the median runoff index (m) for typical CG. These data correspond to the period between 2014 and 2015.*

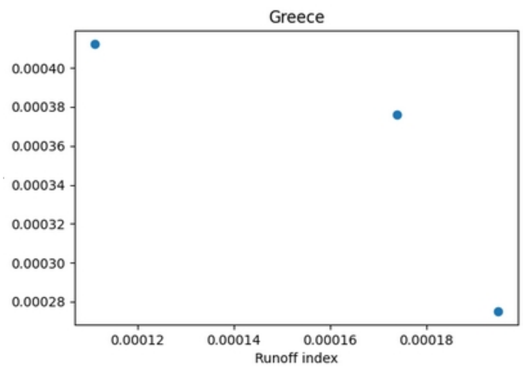


*Figure 3: Annual ratio of total number of LIW to typical CG over coniferous and mixed forests in Greece versus the median runoff index (m) for typical CG. These data*

Figures 1-3 suggest a negative correlation between the annual total number of LIW per CG lightning and the annual median value of the runoff index in the Iberian Peninsula and Greece.

The ratio of the total number of LCC-lightning flashes to typical flashes reported by ISS-LIS in Europe for 2017, 2018 and 2019 (May-September) is, respectively, 0.01510884, 0.01211159 and 0.01143837. However, as we stayed in the manuscript, the total number of LCC-lightning flashes within the Iberian Peninsula and Greece is too low to analyze them at a regional scale.

Minor edits

58 LIW tend to occur in Clouds with High Base (CBH, prefer to high-base clouds, at multiple places in paper)

Done.

60 have been made

Done

70 RS are composed of a we identify shared meteorological conditions

Done