Agostino Manzato<sup>1</sup>, Stefano Serafin<sup>2</sup>, Mario Marcello Miglietta<sup>3</sup>, Daniel Kirshbaum<sup>4</sup>, Wolfgang Schulz<sup>5</sup>

<sup>1</sup>OSMER – ARPA Friuli Venezia Giulia, Palmanova, Italy
 <sup>2</sup>Department of Meteorology and Geophysics, University of Vienna, Vienna, Austria
 <sup>3</sup>ISAC–CNR, Padua, Italy
 <sup>4</sup>Department of Atmospheric and Oceanic Sciences, McGill University, Montreal, Canada
 <sup>5</sup>OVE Service GmbH – Dept. ALDIS, Vienna, Austria

Convection Working Group workshop – Budapest 17 May 2022 (onsite)



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CG data kindly provided by EUCLID on a  $0.025^{\rm o}\times0.020^{\rm o}$  (about  $2.01\times2.13$  km) grid every 10–min. NE–Italy rules.



# Spatial distr changes with months $[10^4 \# flashes km^{-2} h^{-1}]$





# Domain stratified in sea/coast, plain and mountain

Following Feudale and Manzato JAMC 2014: "sea/coast" < 5m;  $5m \le$  "plain"  $\ge$  400m and "mountain" > 400m.





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Only mountain and plain have a strong diurnal cycle



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- To define a CI event we used an area of a typical storm in its *initial stage*, i.e. ~ 10 × 10 km (Fig. 5a in Senf and Deneke JAMC 2017): CI grid box (0.125° × 0.1°) is 5 × 5 CG grid boxes.

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- Starting from typical storm-duration and path-lenght (Wapler AR 2017, Nisi et al. QJ 2018) and doing sensitivity tests (only absolute values of CI events changes, but not the distributions) the final parameters are: D = 90min and R = 50km.

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  To avoid "ghost" flashes we imposed that a CI grid box must have more than 1 flash in 10-min (N > 1).



# How it works? Cls of 12 June 2018 from 05 to 23 UTC



# 2005-2019 spatial distr: CI density $[10^6 \text{ } \text{#events km}^{-2} \text{ h}^{-1}]$

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# Spatial distr of Z(CG) - Z(CI)[]: max CG per CI in NEI

Difference between standarized CG and CI distros.



# Spatial distr of Z(CG) - Z(CI)[]: max CG per CI in NEI

Difference between standarized CG and CI distros. Much more CG flashes on NE-Italy plain (downstream the Veneto Prealps with respect the zonal





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Same for the diurnal cycle.



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Cl occurring at 11–12 UTC produce less CG flashes, while Cl events at evening (18–19 UTC) are associated to more CG flashes, because there is also the contribute of CG produced by large systems (e.g. MCS) initiated few hour before, when potential instability is at maximum.



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#### Framework and References

This work has been developed in the framework of the "Multi–scale Transport and Exchange processes in the Atmosphere over Mountains program and eXperiment" (TEAMx; http://www.teamx-programme.org).

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### Appendix: 2017–2019 spatial distr for CG-alone vs. IC+CG





A comparison with CG-alone or IC+CG during 2017-2019 (when IC are  $\sim$  2 times more frequent than CG) using the same parameters ( $2 \le N \le 30$ , R = 50 km and D = 90 min) shows how only the absolute number of CI events increases. but not the spatial distr. Increasing the N filter will produce less CI events...