

# Hail Climatology based on recovered data in Romania

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# Overview

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- ☐ Hail climatology
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    - mean number of hail days
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    - maximum
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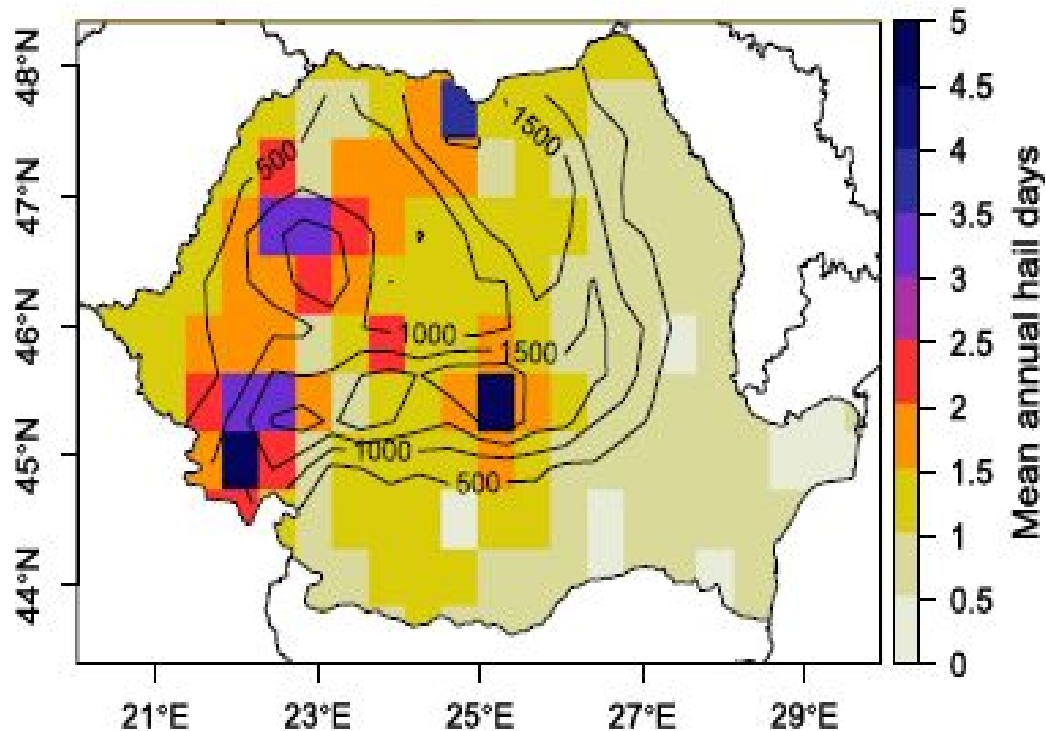
# Data

- \* data from 105 weather stations (with less than 10% missing data over 54 yr (1961–2014);
- \* the daily hail records: time of occurrence, duration, hailstone minimum and maximum diameter (measured using a ruler);
- \* reanalysis data (Twentieth Century Reanalysis V2) for instability indices such as CAPE, near surface specific humidity ( $q$ ), freezing level height (FLH), and cloud precipitable water (CLDWTR);



# Hail climatology

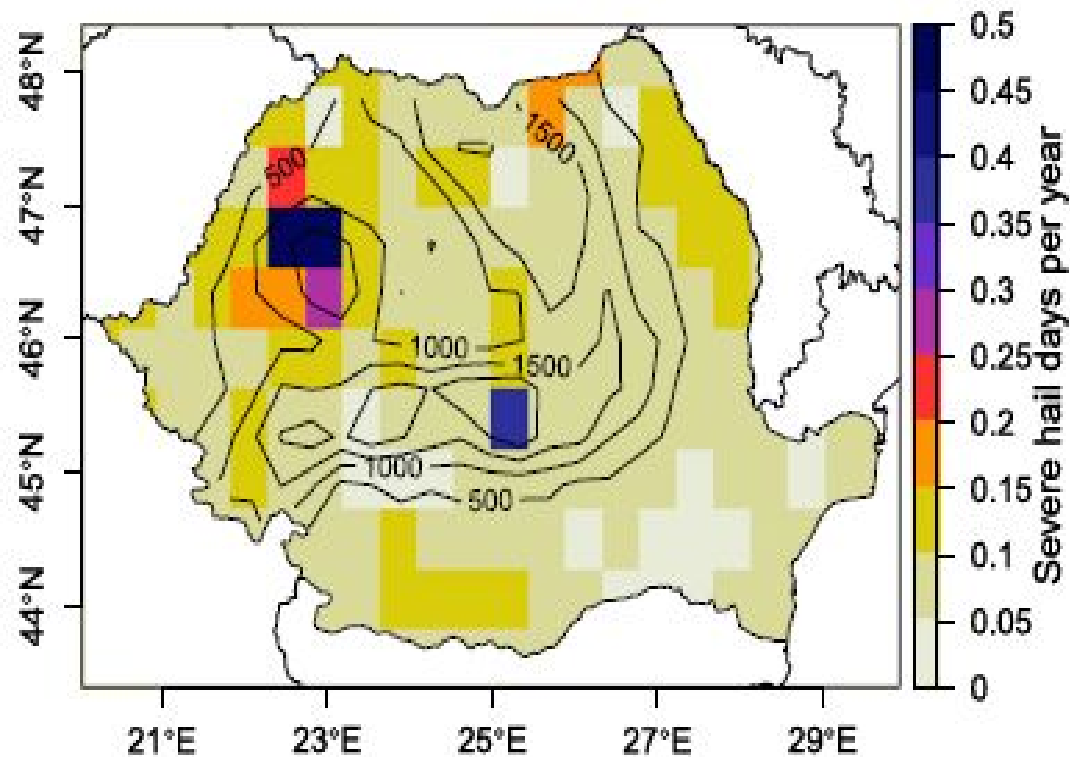
## Frequency (mean number of hail days)



- ★ Spatial distribution of the mean hail days per year for the period 1961–2014. The black contour lines show the areas where the terrain is higher than 500 m.

# Hail climatology

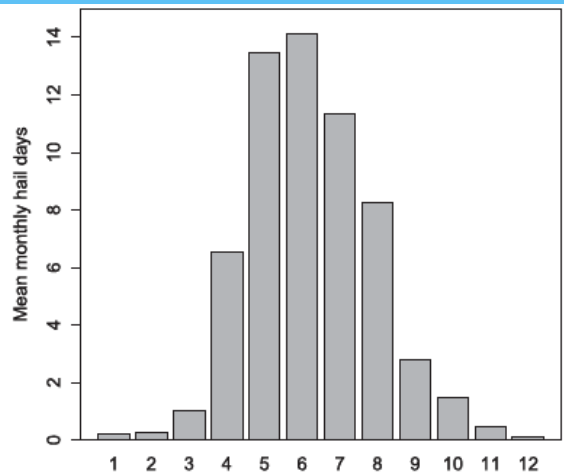
## Frequency (mean number of severe hail days)



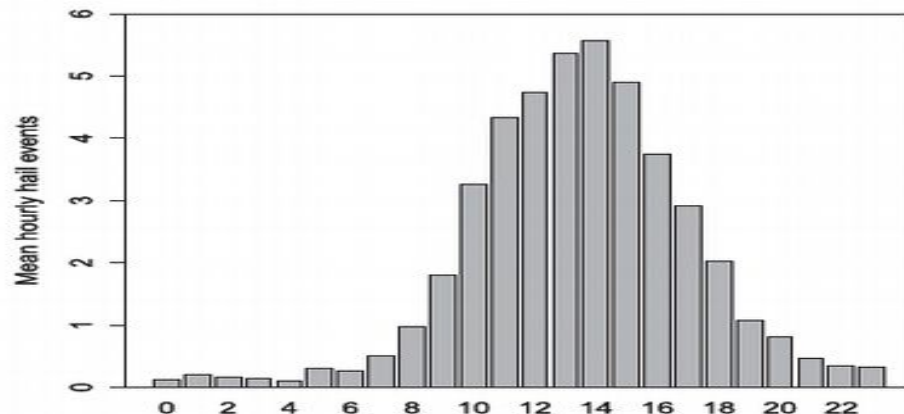
- ★ Spatial distribution of the mean number of days with severe hail per year for the period 1961–2014. The black contour lines show the areas where the terrain is higher than 500 m.

# Hail climatology

## Monthly and hourly frequency



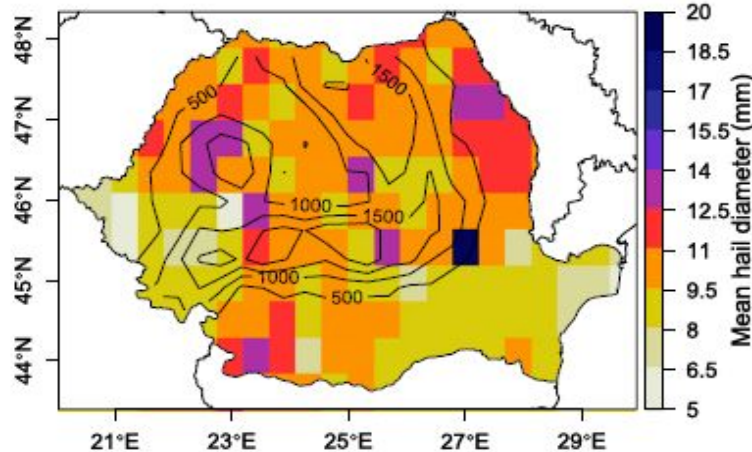
- \* Monthly distribution of the mean hail days per year for the period 1961–2014.



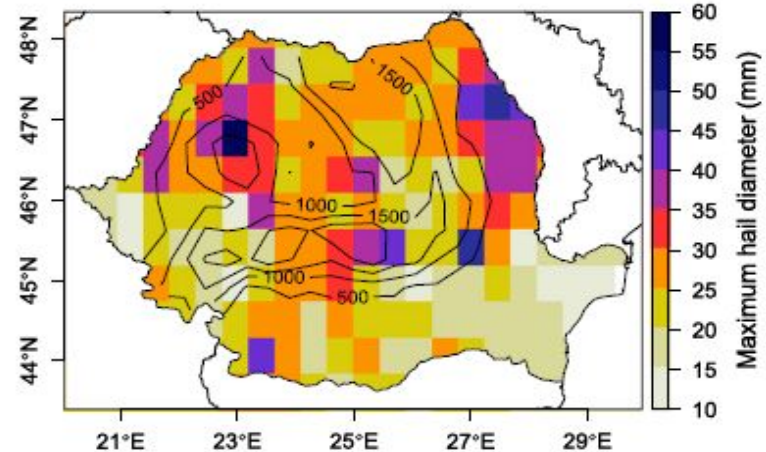
- \* Hourly distribution of the average hourly hail events for the period 1961–2014.

# Hail climatology

## Mean and maximum diameter



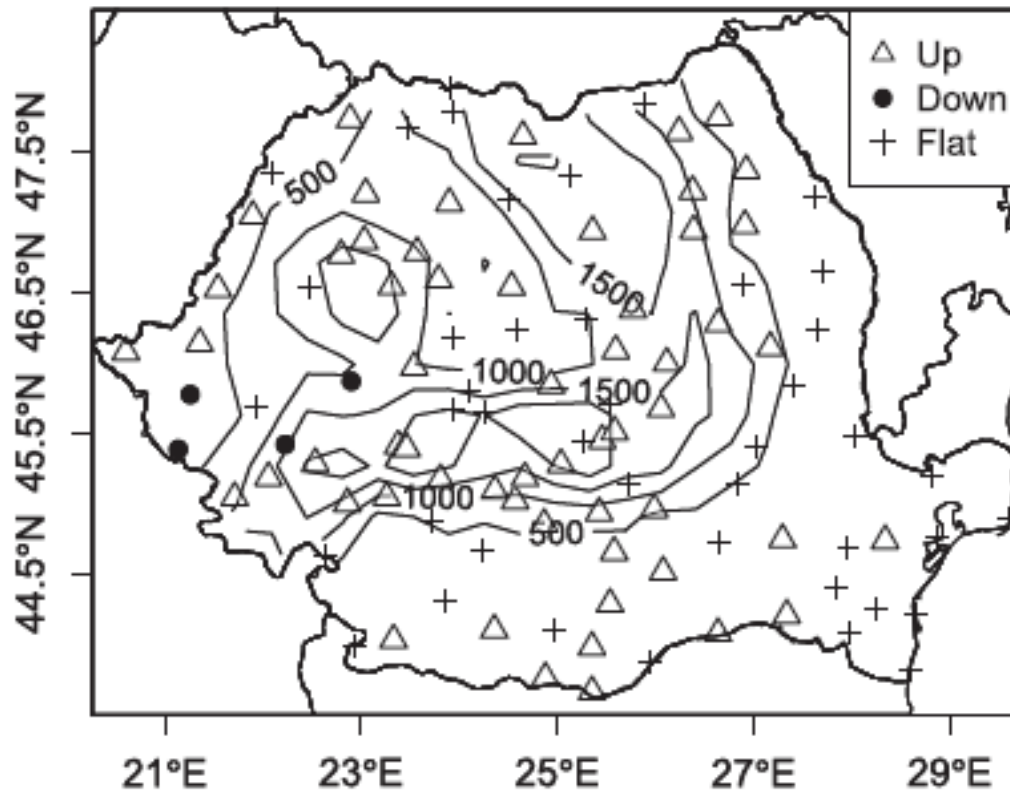
- ★ Spatial distribution of the mean hail diameter for the period 1961–2014. The black contour lines show the areas where the terrain is higher than 500 m.



- ★ Spatial distribution of the maximum hail diameter for the period 1961–2014. The black contour lines show the areas where the terrain is higher than 500 m.

# Hail trends

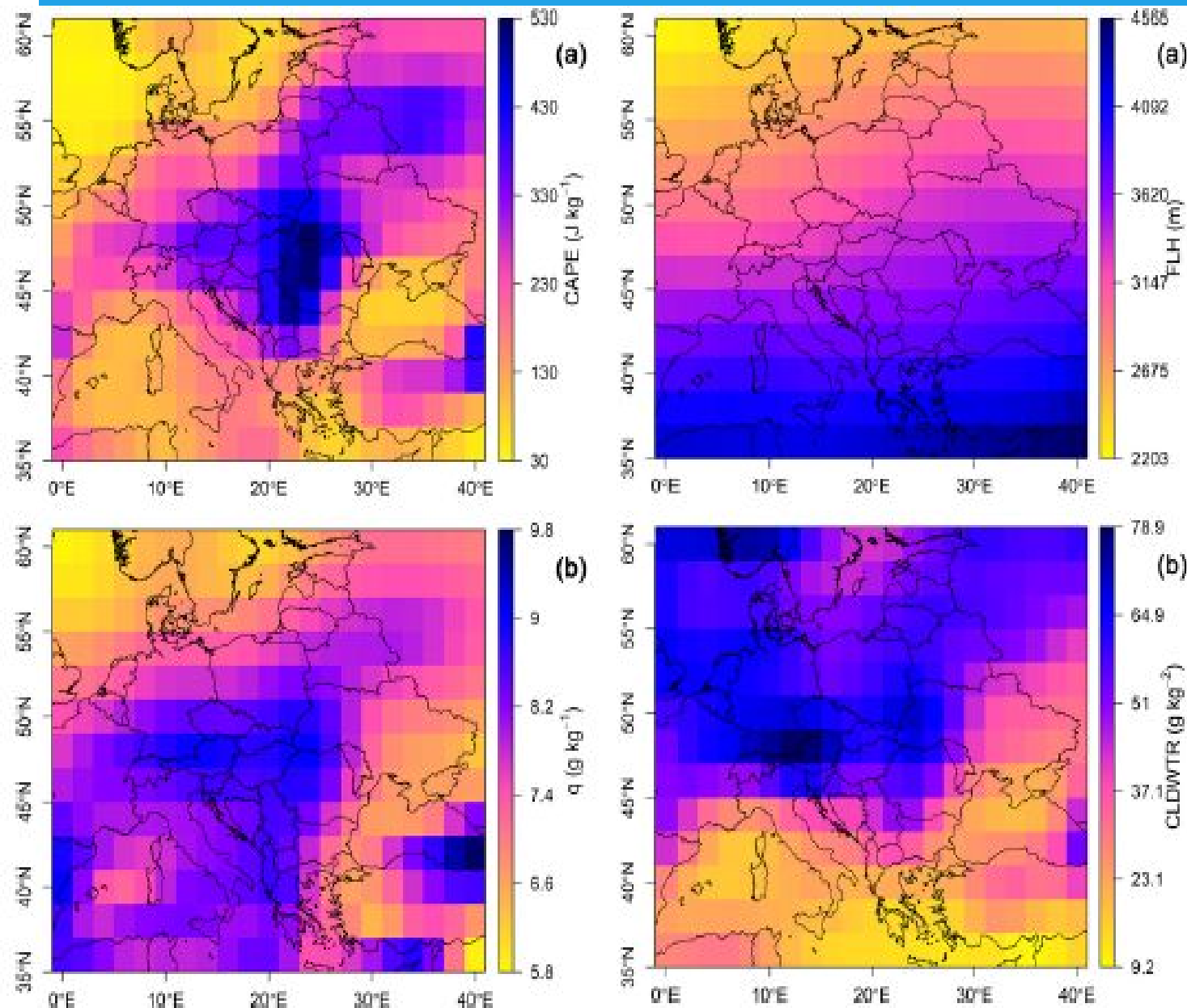
## Mean number of hail days



- ★ Trends in mean hail days per year at each of the 105 weather stations during 1961–2014. The black contour lines show the areas where the terrain is higher than 500 m.



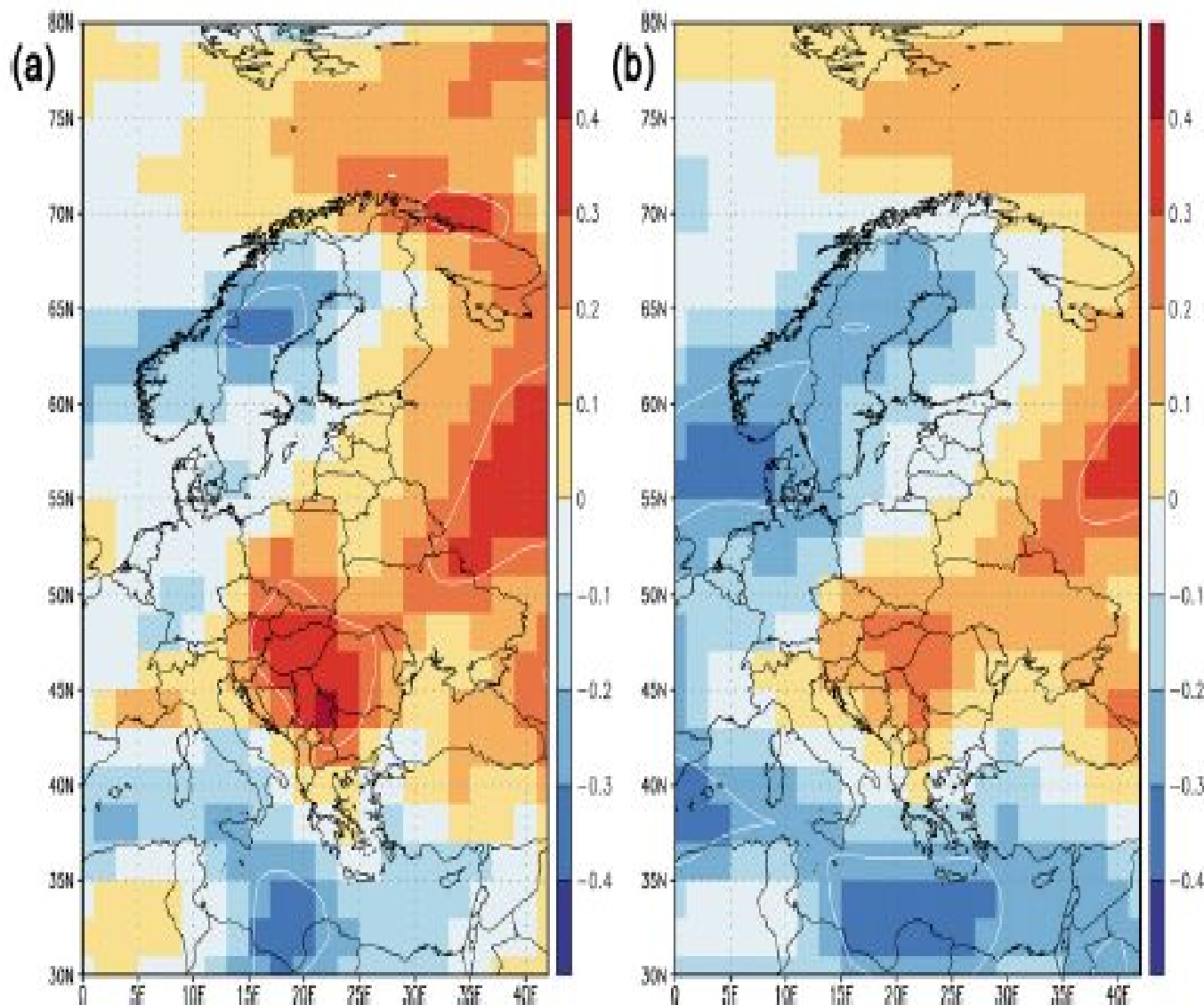
# Composite maps of instability indices



★ Composite maps of spatial distribution of average (a) CAPE and (b) q in the lowest 100 hPa for the events with hail diameter larger than 15mm within the period 1961–2012.

★ Composite maps of spatial distribution of average (a) FLH and (b) CLDWTR for the events with hail diameter larger than 15mm within the period 1961–2012.

# Correlation maps of instability indices



- ★ Correlation maps (shaded values) between (a) hail days per year and CAPE and (b) hail days per year and  $q$  in the lowest 100 hPa from values averaged over April–September (1961–2012). The areas surrounded by white contours show significant correlation coefficients at the confidence levels larger than 95%..

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## Hail Climatology and Trends in Romania: 1961–2014

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DOI: <http://dx.doi.org/10.1175/MWR-D-16-0126.1>

Received: 1 April 2016

Final Form: 8 August 2016

Published Online: 21 October 2016

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# Conclusion

- ★ Reanalysis datasets (integrated with in-situ data) could provide useful information on the areas where convective storms associated with hail develop, helping to build hail risk maps and other climate services associated with hail.