

Statistical relationship between the air moisture source and stable isotope composition of precipitation in Hungary

 **EGU** General
Assembly 2020


Új Nemzeti
Kiválóság Program


NATIONAL RESEARCH, DEVELOPMENT
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HUNGARY

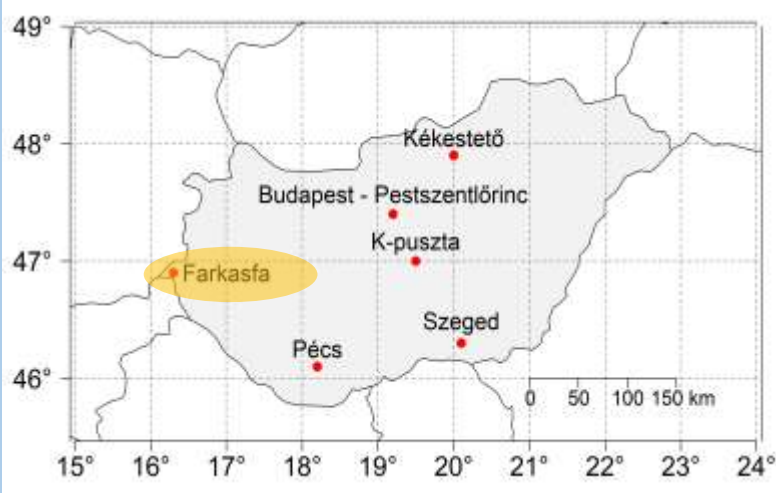
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 **HUNGARIAN
METEOROLOGICAL
SERVICE**
1870-2020

Data and Methods

Sampling Sites - Farkasfa



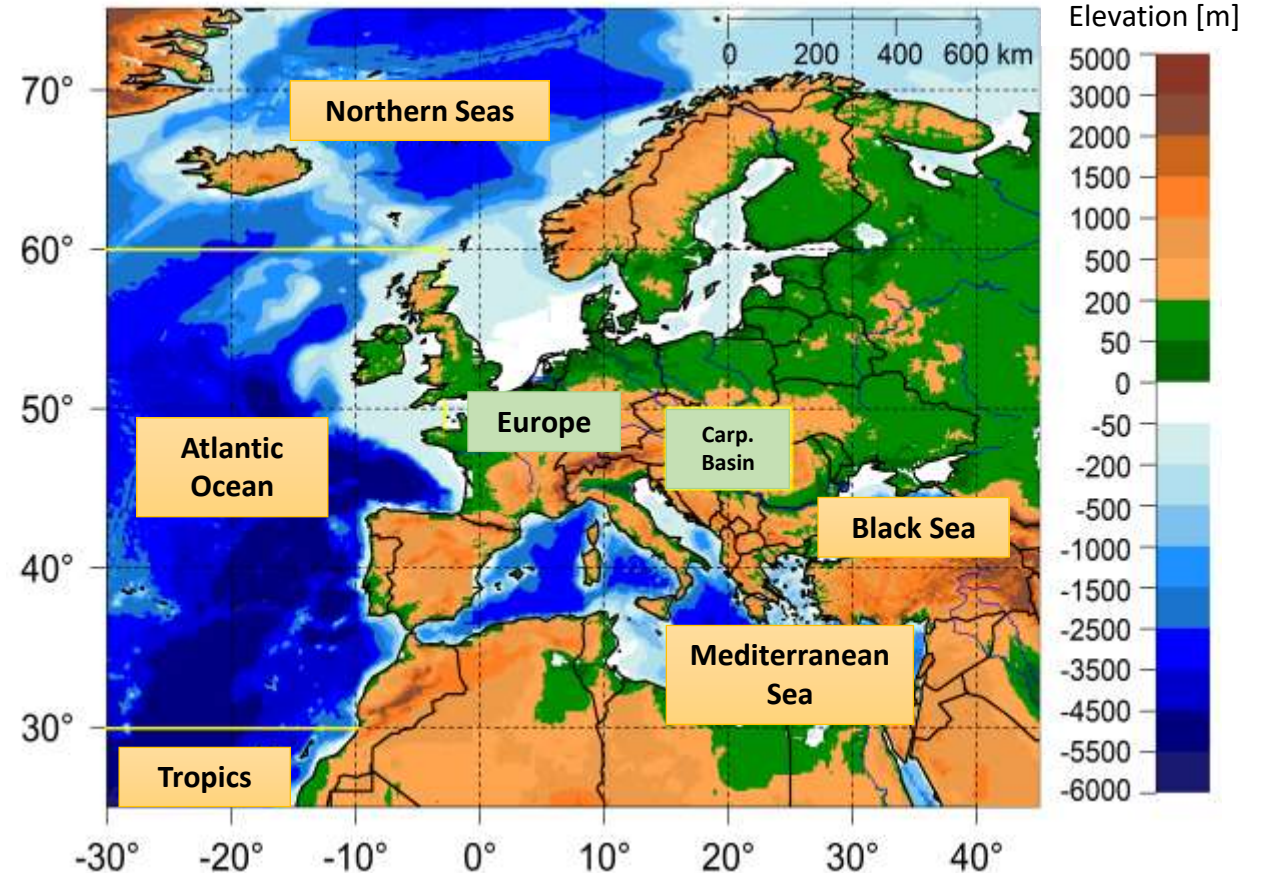
Precipitation sample collection & stable isotope composition [δD and $\delta^{18}O$] measurements on daily basis

Detected Source Regions:
Marine & Terrestrial

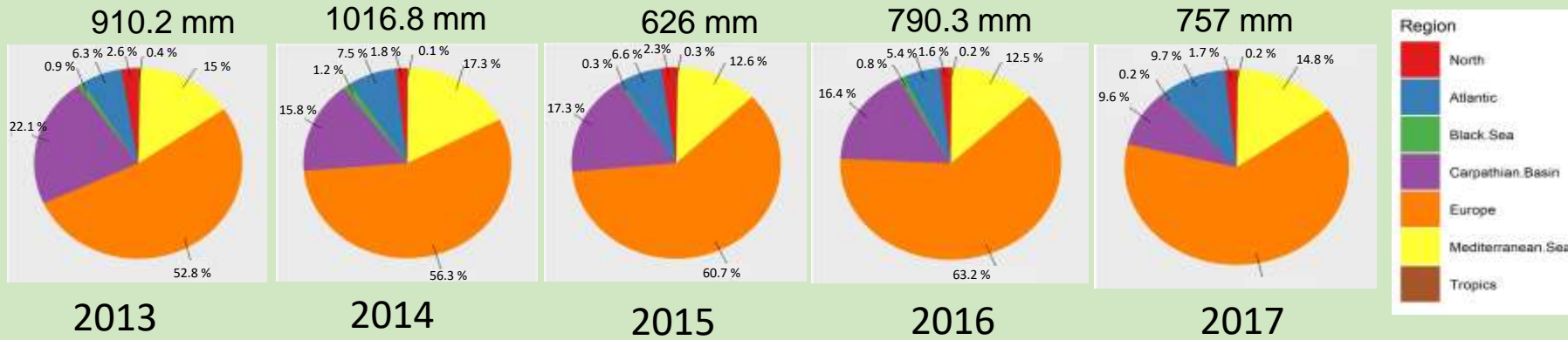
QUESTION:
Are **d-excess values** significantly **different** from each other with respect to the **source region** of the precipitation?

Moisture Source Diagnostic

- **96 hours** long **precipitation-event based** backward trajectories
- **NOAA HYSPLIT** model
- Three elevation (500 m, 1500 m and 3000 m)
- Moisture uptake regions: calculating **specific humidity** along the trajectories.



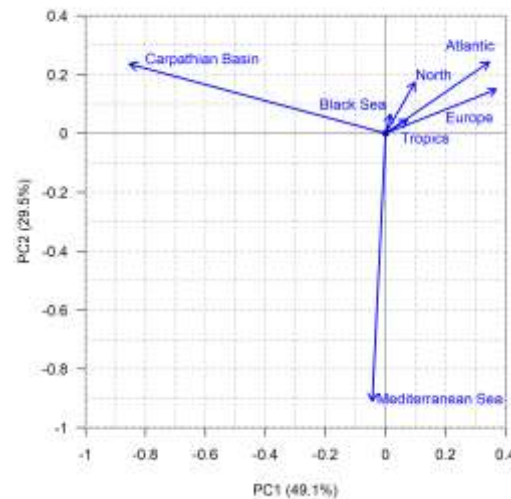
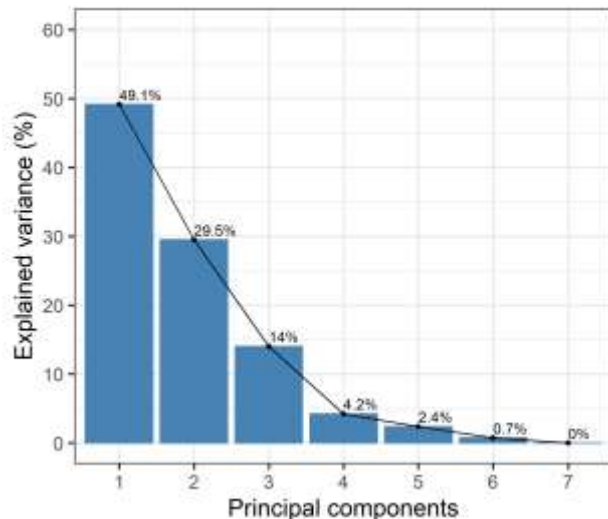
Contribution of different source regions to the annual precipitation



- **Correlation** between PCs and the time series of original variables (i.e. source regions)
- **Representation** of given source region in the given PC

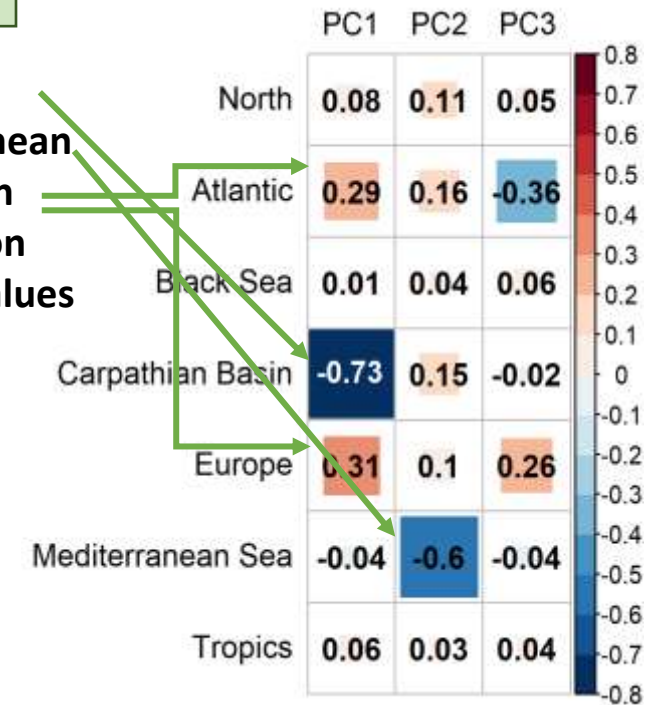
Statistical relationship between d-excess values and source regions

- Source regions are NOT independent
- **Principal Component Analysis (PCA)** on the **d-excess values** (observations) with respect to the **source regions's contribution to the precipitation**.



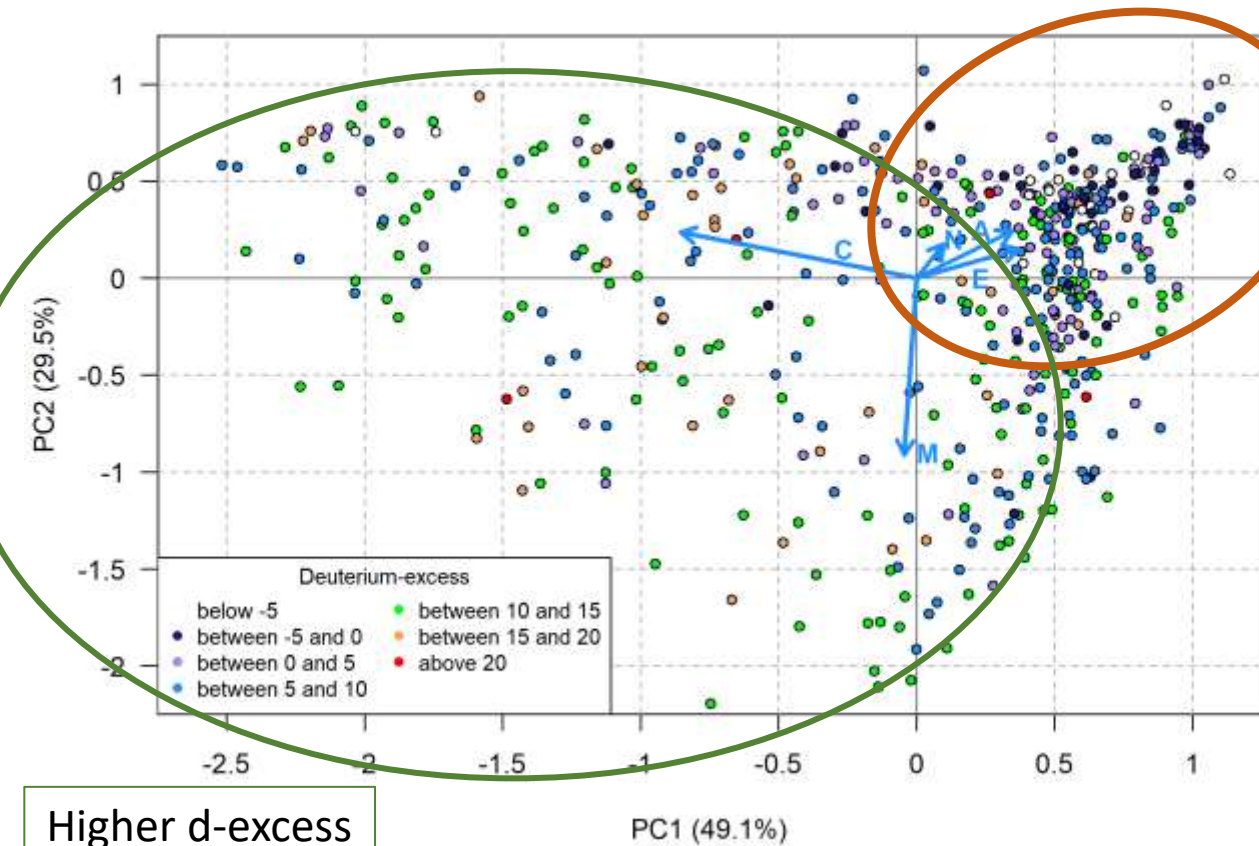
- A linear vector space is spanned by the PCs
- Examination of **d-excess values in two-dimensional space** spanned by PC1 and PC2.

Local Mediterranean Western effects on d-excess values



Question:

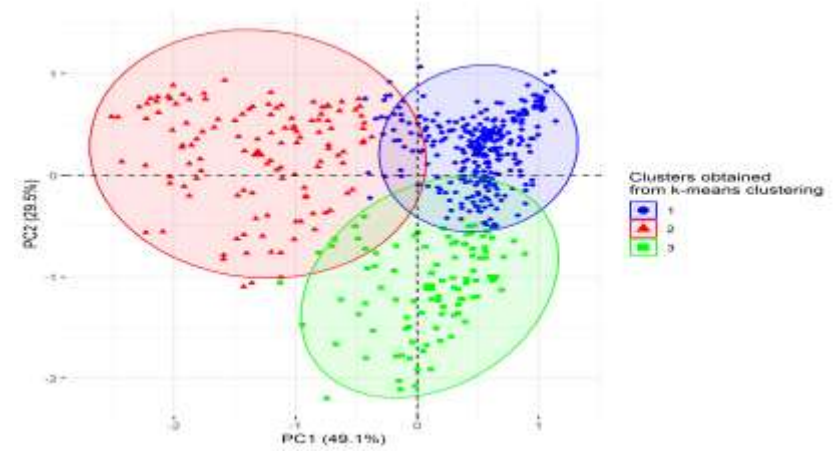
Are the d-excess values separated from each other with respect to the source regions?



Higher d-excess values

Lower d-excess values

- A: Atlantic
- N: North
- E: Europe
- C: Carpathian Basin
- M: Mediterranean Sea



Future plan:
cluster analysis on d-excess values with respect to Peczely and Hess-Brezowsky classification

Idea:
d-excess values that differ from each other with respect to the source region may also be connected to different weather conditions. → macrosynoptic types: Peczely classification

