



# PATTERNS OF PBL HIGHT DURING 1989-2019 OVER ROMANIA, MOLDAVIA REGION USING ERA5 DATA AND CORRELATION WITH NAO INDEX.



## ATMOSPHERIC SCIENCES - SESSION AS2.1

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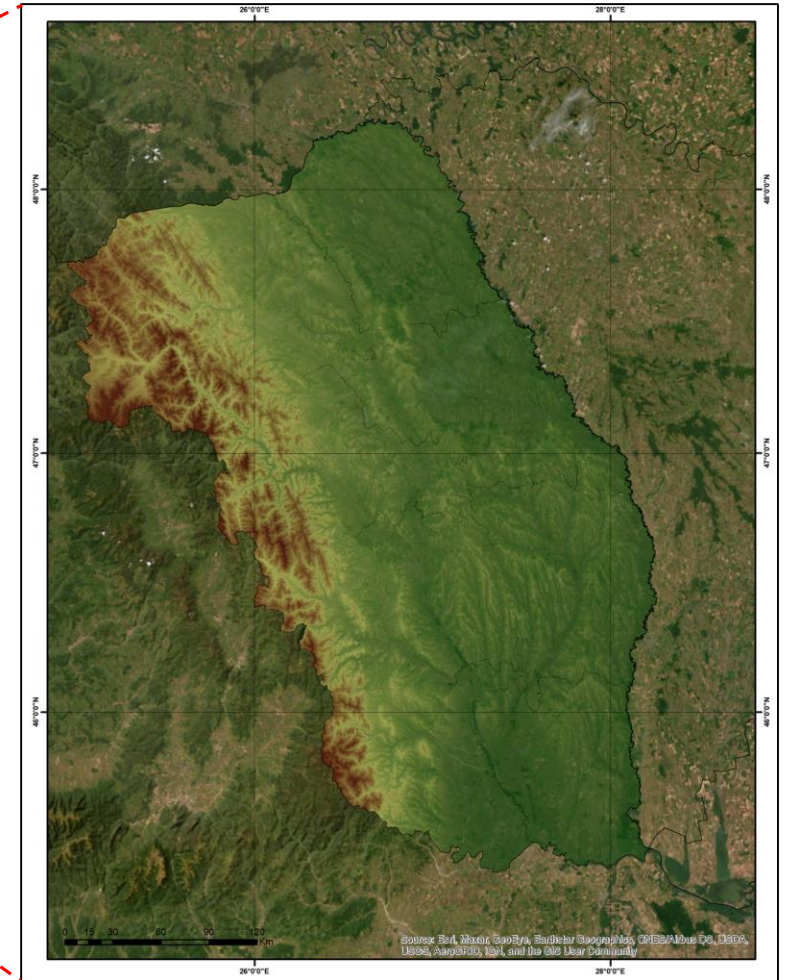
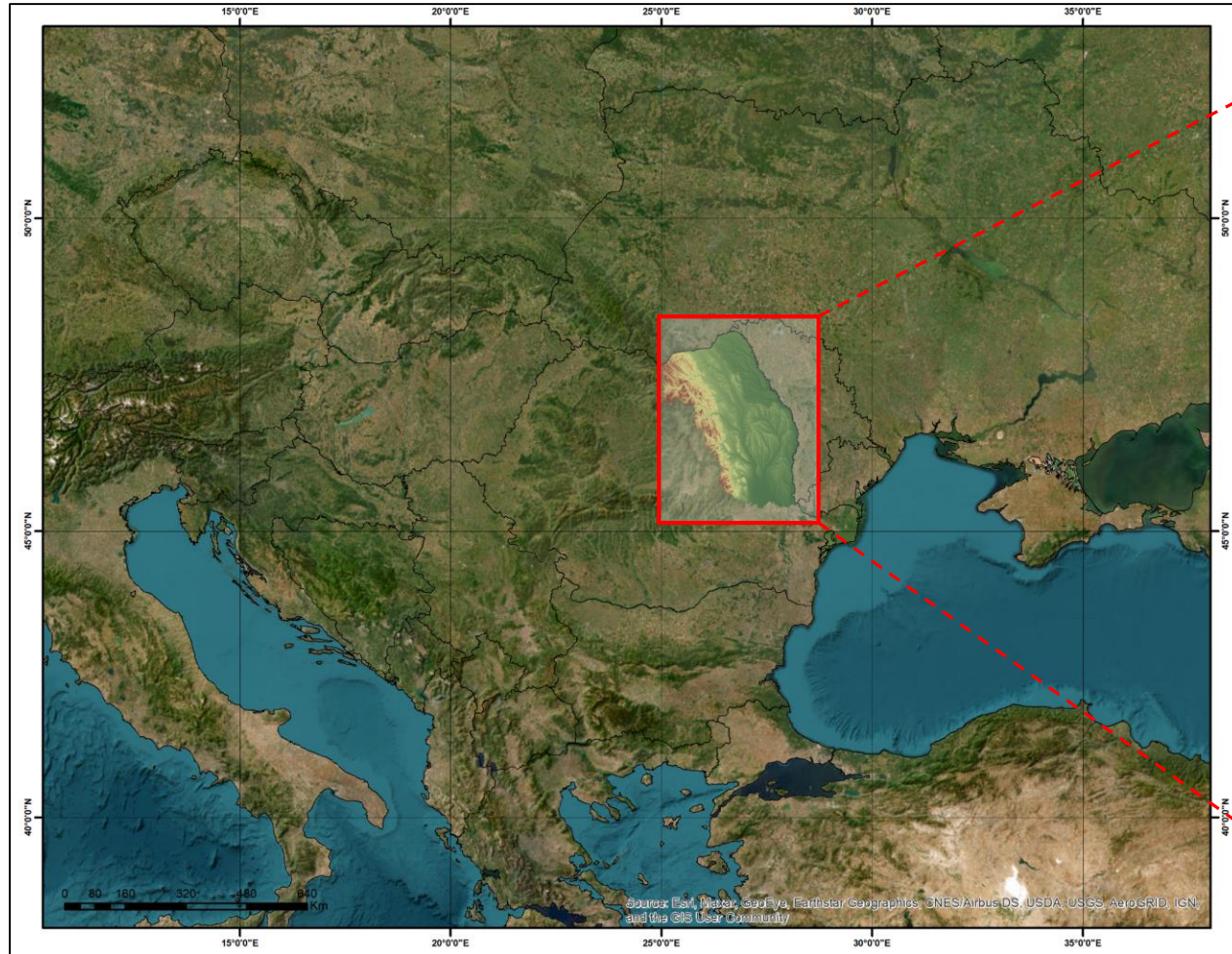
## ABSTRACT

The evolution of the Planetary Boundary Layer Height (PBLH) is a very important meteorological parameter because most of the population carries out their socio-economic activities inside this layer and because it has a significant impact on weather events and air quality. This parameter is influenced by energy and mass exchanges between the land surface and the atmosphere. In our study, hourly PBLH data were used over a period of 30 years (1989-2018), for the warm season (May, June, July, August and September). The data we used comes from the ECMWF (European Centre for Medium-Range Weather Forecasts) database, ERA5. By means of Open GrADS (The Grid Analysis and Display System), the PBLH deviations were graphically represented and interpreted. On the other hand, the NAO (The North Atlantic Oscillation) has influences over the climate variability and weather worldwide. It is well known that NAO exhibits considerable variability throughout a season and during a year, as well, and prolonged periods (for a few months) of both positive and negative phases of the pattern are ordinary. Both the PBLH variations and the NAO index can have an impact on the weather and climate conditions. In this study we will present the patterns of PBLH during 1989-2019 and correlations between the NAO index and the variability of the monthly summer PBLH in Moldavia Region, Romania.

# MOLDAVIA REGION:

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eastern Romania;  
extra-Carpathian region.



## DATA AND METHODS

**ERA5** Boundary Layer Height dataset (1989-2019);

**NCEP/NCAR** Reanalyses - daily mean composites:  
precipitable water, temperature 2m, specific humidity,  
meridional wind;

Warm season (MJJAS) over a 30 - year period;

**EOF** (Empirical Orthogonal Function) method:

Spatial (**eigenvectors**) + temporal (**principal components** or PCs) decomposition of a dataset;

reduce the **dimensionality** of complex datasets



# RESULTS AND DISCUSSION

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## EOF 1 + PC1

NAO represents the main causal mechanism of the EOF1

Over half of the total = over 50%

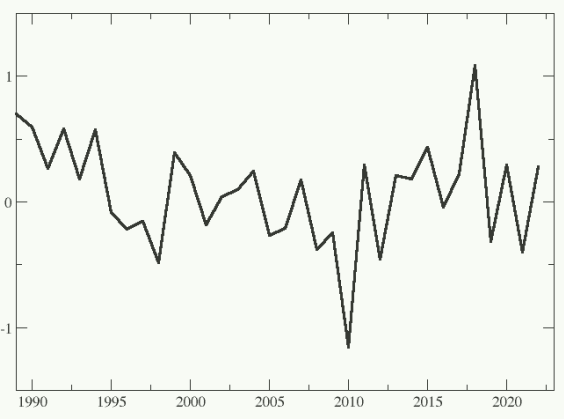
PC1 = particular pattern in 10-year intervals

First 10 years (1989 - 1999) negative

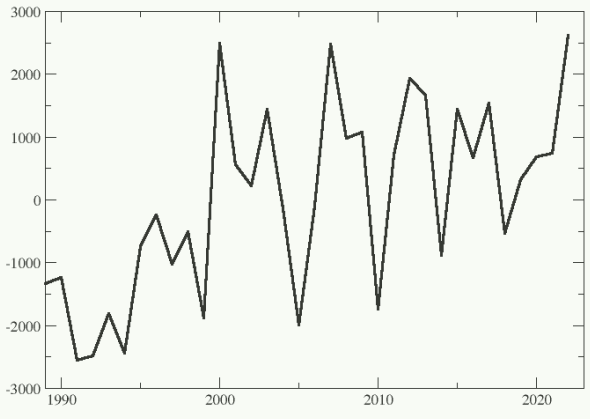
Next 10 years (2000 - 2010) negative and positive

Last 10 years (2011 - 2021) predominantly positive

NAO\_Anuual



PC 1



## EOF 2 + PC2

**Precipitable water** from the warm season represents the main causal mechanism of the EOF2 = **about 10% of total**;

## EOF 3 + PC3

Advection events of **warm tropical air** from Africa, resulting in successive heatwaves represents the main causal mechanism of the EOF3 = **about 7% of total**;

## EOF 4 + PC4

**Specific humidity** represents the main causal mechanism of the EOF4 = **about 5% of total**;

## EOF 5 + PC5

**Meridional circulations** appear to be responsible for PBLH variation in EOF5 = **about 4% of total**.

## CONCLUSIONS

**Planetary Boundary Layer Height (PBLH)** = important meteorological parameter and has a significant impact on weather events and air quality.

**North Atlantic Oscillation (NAO)** = has influences over the climate variability and weather worldwide.

NAO = considerable variability throughout a season and during a year and prolonged periods (for a few months) of both positive and negative phases of the pattern are ordinary.

The PBLH is strongly influenced by the NAO.

There are several meteorological parameters that influence the height of the planetary boundary layer, but in a smaller percentage: temperature, specific humidity, precipitable water, winds.