

Changes in the climate suitability for tourism in Romania in the near future (2021-2040) in the context of climate changes

Liliana VELEA^{(1),(2)} and Alessandro GALLO⁽¹⁾

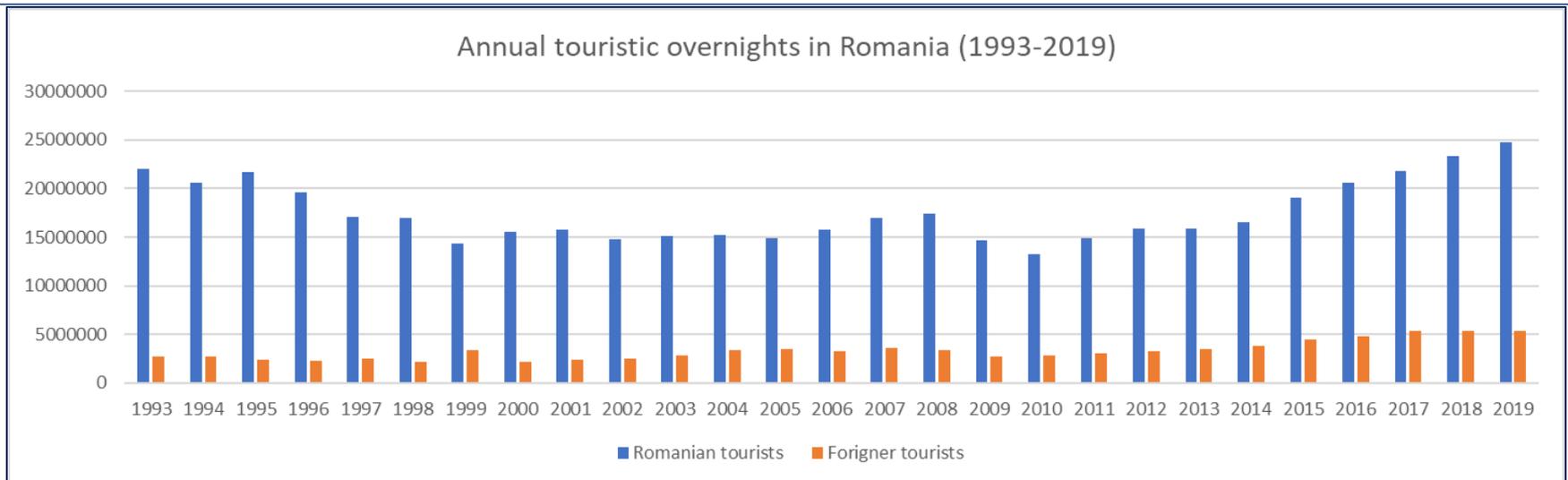
⁽¹⁾Università Ca' Foscari, Dipartimento di Studi Umanistici, Venice, Italy

⁽²⁾National Meteorological Administration, Bucharest, Romania

Liliana.velea@unive.it

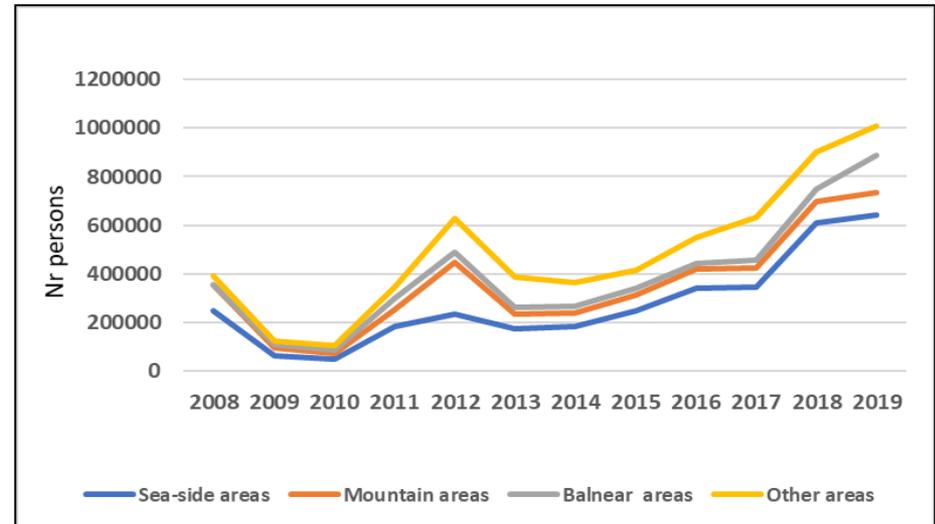
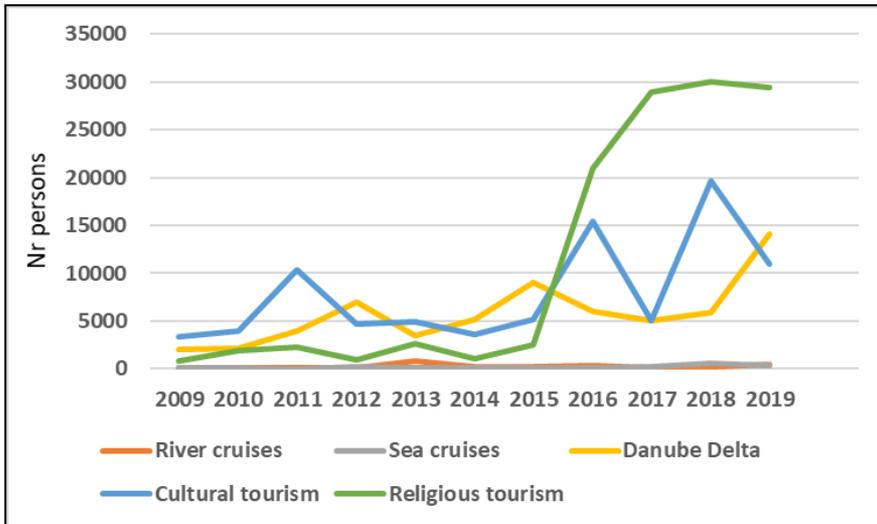
Motivation

- Tourism is an important economic sector, which in Romania brought about 2.6% from GDP in 2017.
- The number of tourists –both residents and non-residents- is increasing in the last years.
- The pandemic situation strongly affected tourism worldwide especially in 2020, but the improvement of this situation opened the opportunities for tourism.
- Nevertheless, **on longer term the climate changes** present a real challenge for this sector too, due to the **strong relationship between tourism and weather, climate and environmental features** of the touristic destination.



Motivation

The tourist motivation for choosing a particular destination has multiple facets, but the overall weather aspect may be seen as a common feature.



Number of persons using services provided by tour-operators agencies for holidays in Romania between 2008-2019 (data source: www.insse.ro)

A suitable index to describe quantitatively the weather conditions agreeable for outdoor activities is **Holiday Climate Index (HCI)** (Scott and al, 2016)

Data and methods

HCI incorporates the three facets of climate important to leisure tourism activities: **thermal comfort (TC)** - a combination of daily maximum temperature ($^{\circ}\text{C}$) and mean relative humidity (%); **aesthetic (A)** (cloud cover %) and **physical (P)** - a combination of precipitation (mm) and wind speed (km/h).

$$\text{HCI: Urban} = 4(\text{TC}) + 2(\text{A}) + (3(\text{precipitation}) + \text{wind})$$

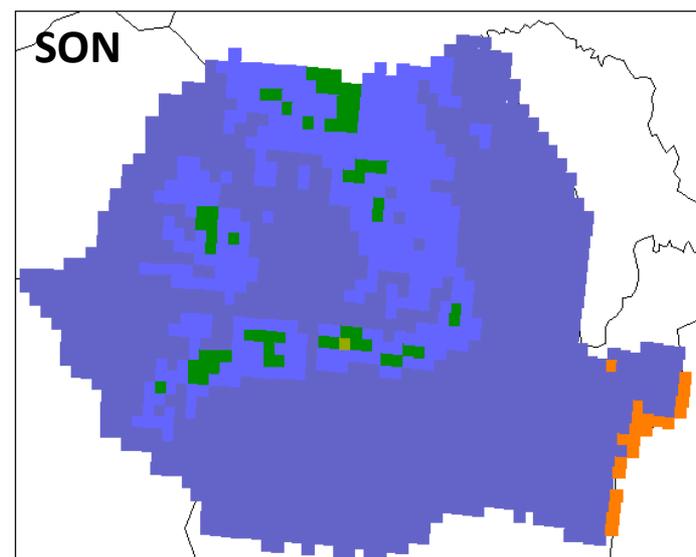
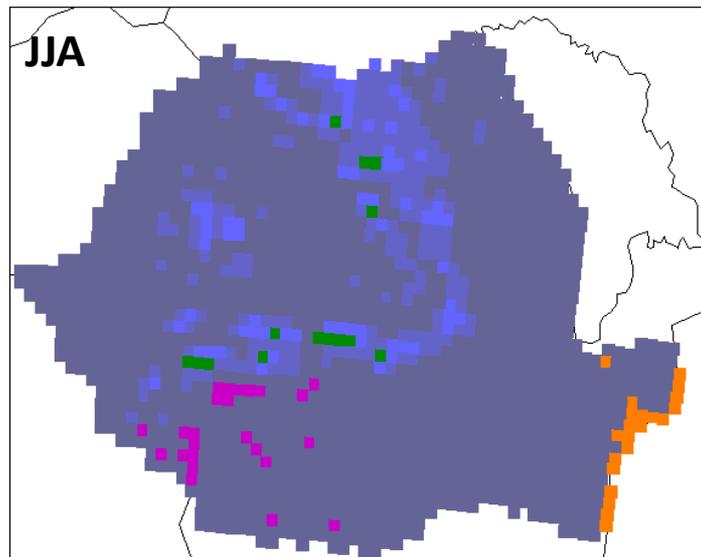
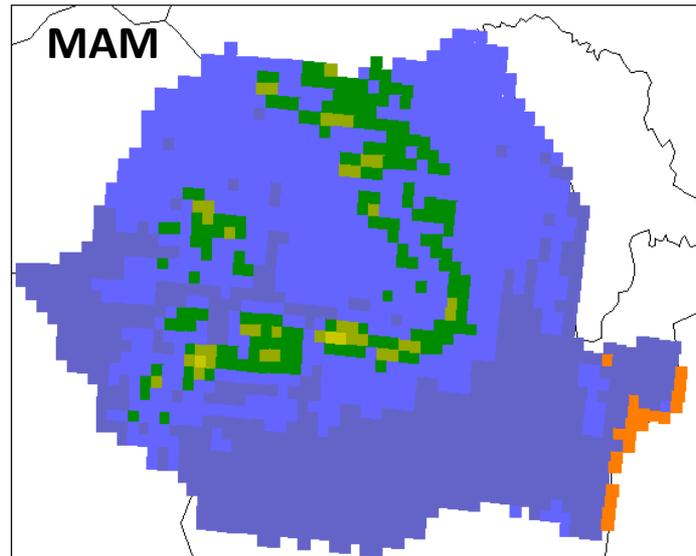
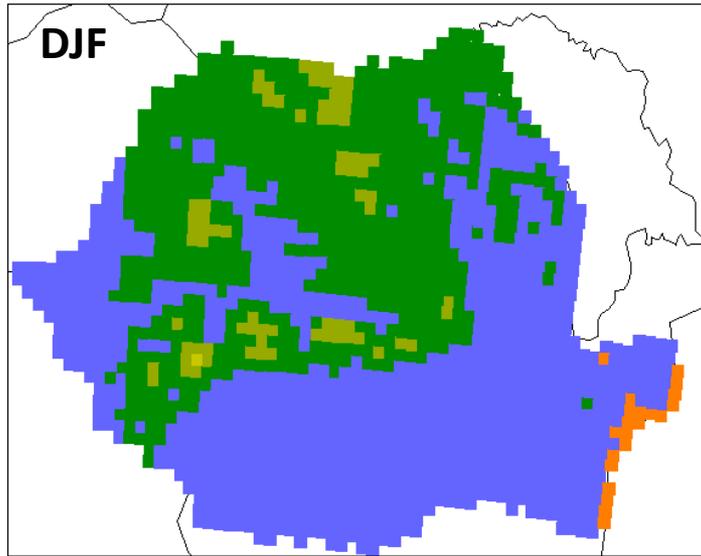
HCI values	Climate suitability classes (HCI rating)	Acronym used in the graphics
90 ÷ 100	Ideal	I
80 ÷ 89	Excellent	E
70 ÷ 79	Very good	VG
60 ÷ 69	Good	G
50 ÷ 59	Acceptable	A
40 ÷ 49	Marginal	M
30 ÷ 39 20 ÷ 29	Unacceptable	UA
10 ÷ 19 9 ÷ 0	Dangerous	D

HCI rating system (after Scott et al, 2016)

Data and methods

- ‘Climate Suitability for Tourism Indicators’ dataset (<https://cds.climate.copernicus.eu/>)
- HCI data at daily and monthly scale, based on 5 climate models
- Period: reference 1986-2005
near future 2021-2040
- Climate change scenarios RCP45, RCP85
- Analysis at seasonal scale at country level and at monthly scale for the 3 most populated cities in Romania

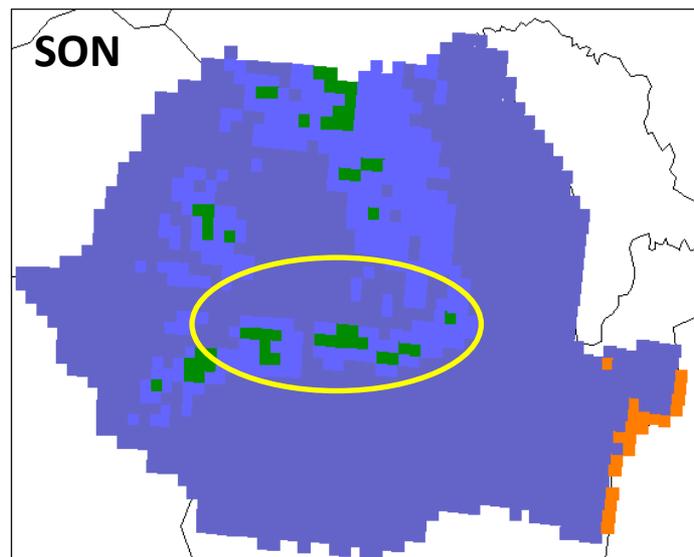
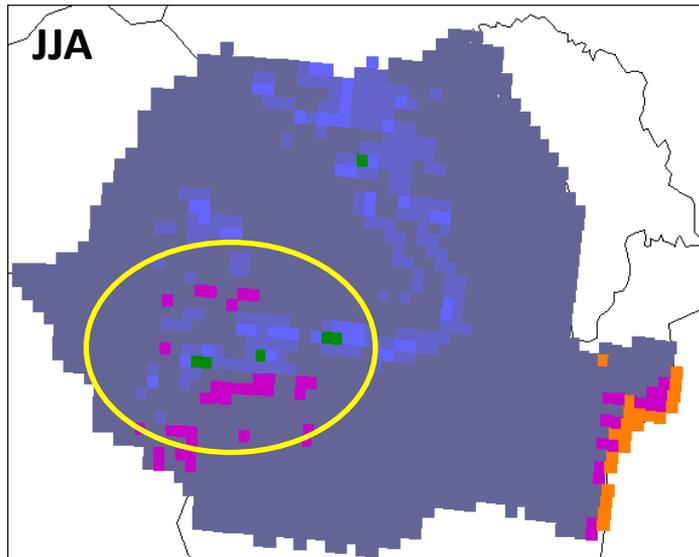
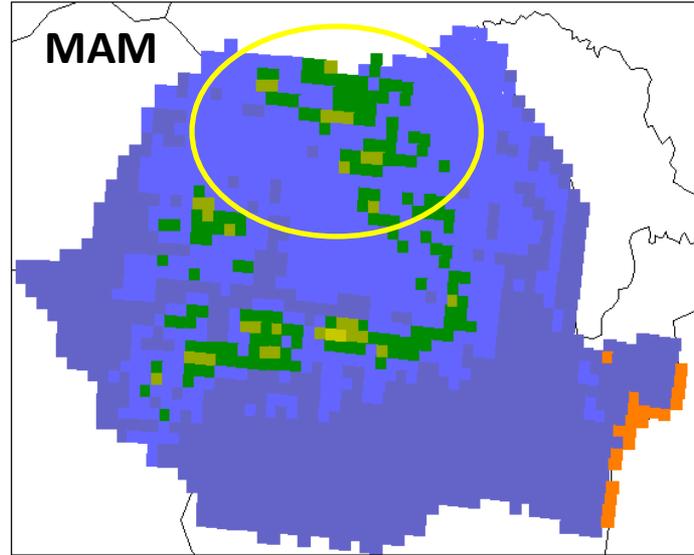
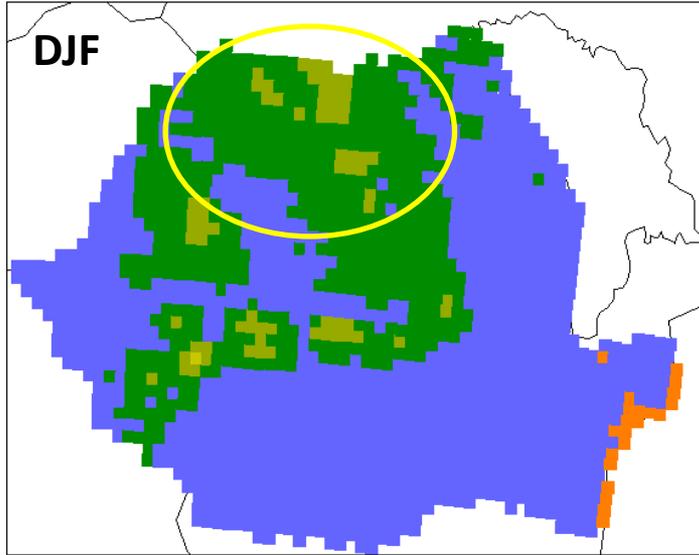
RESULTS: Reference period 1986-2005



The modelled current climate is generally favourable for leisure outdoor activities.

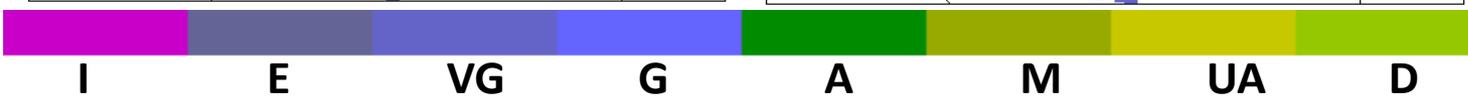
The best climate conditions are during summer, while the least 'pleasant' are found during winter, especially in the mountainous area.

RESULTS: Near future (2021-2040) – RCP45 scenario

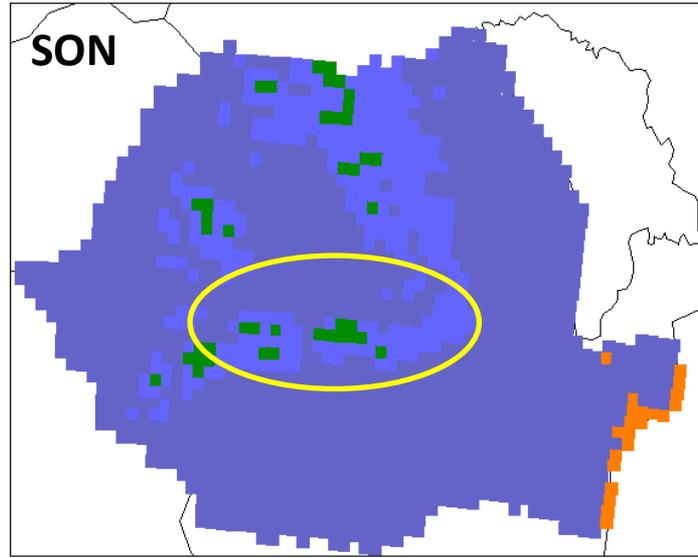
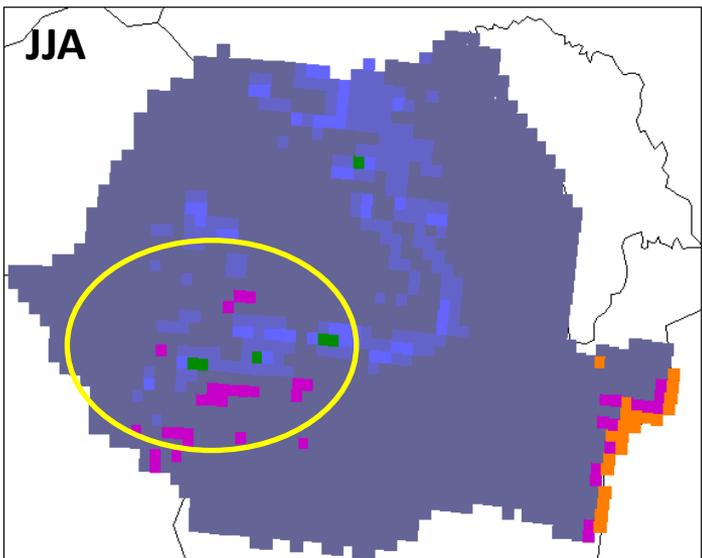
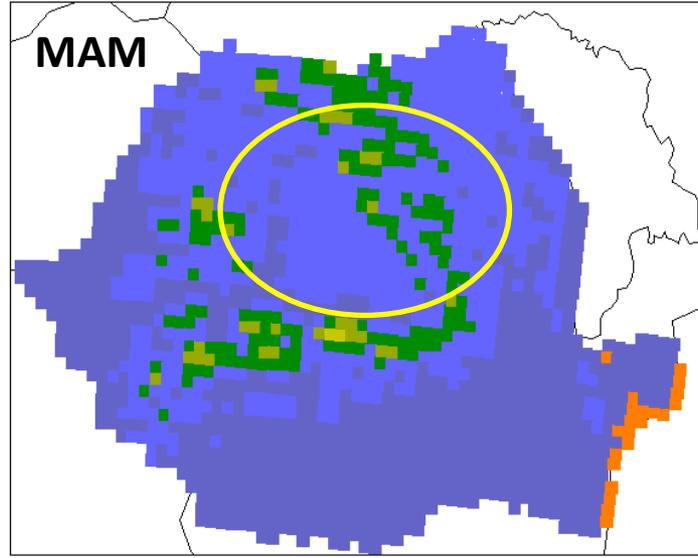
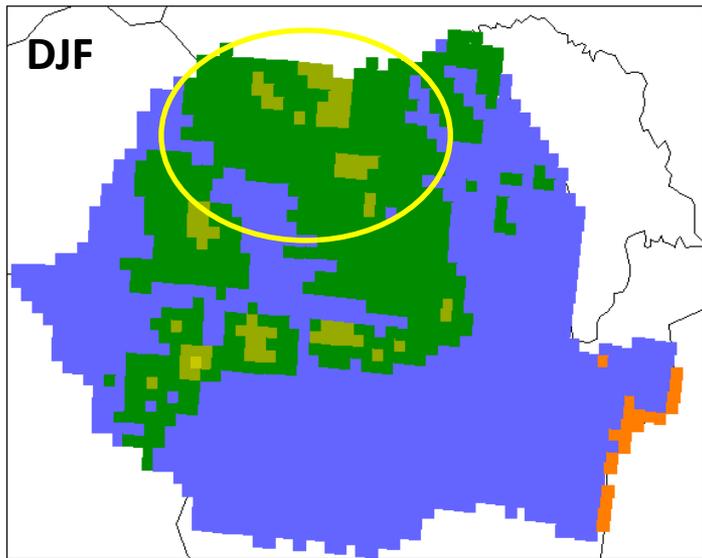


Small changes, on limited/isolated areas in all seasons.

These changes are found mostly in mountainous areas and are 'positive' changes (i.e. improvement of conditions).



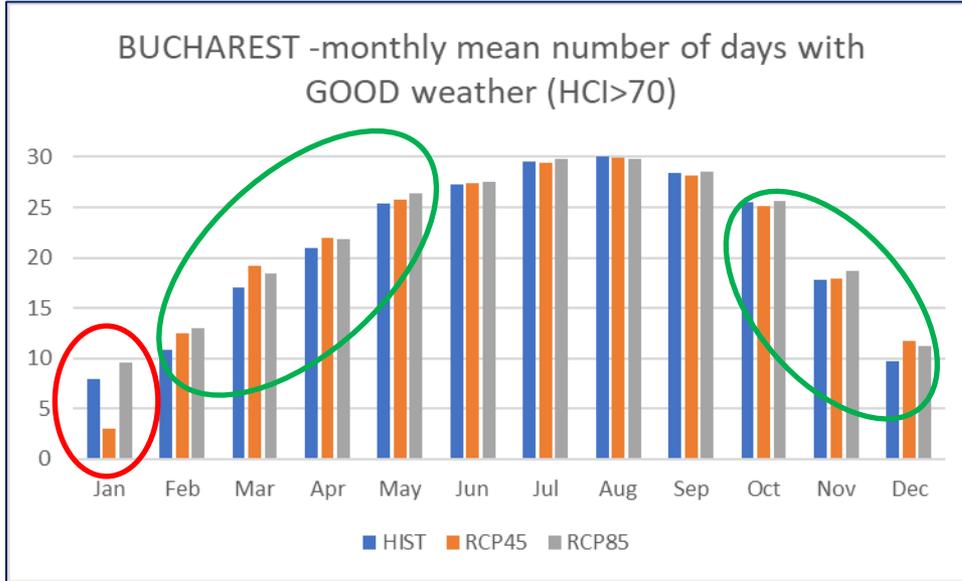
RESULTS: Near future (2021-2040) – RCP85 scenario



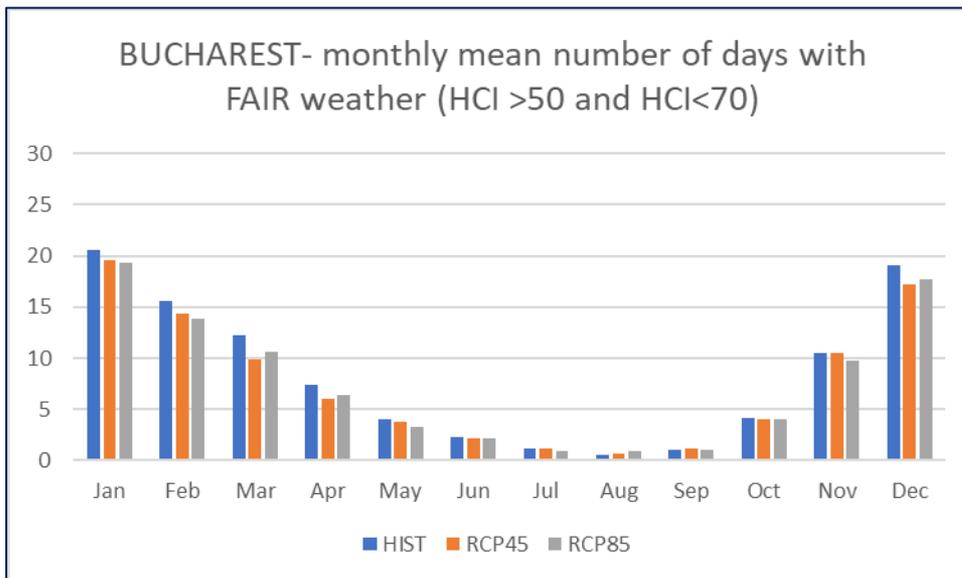
Small changes, on limited/isolated areas in all seasons, similar to RCP45 scenario.



RESULTS: Examples of changes in BUCHAREST (South Romania)

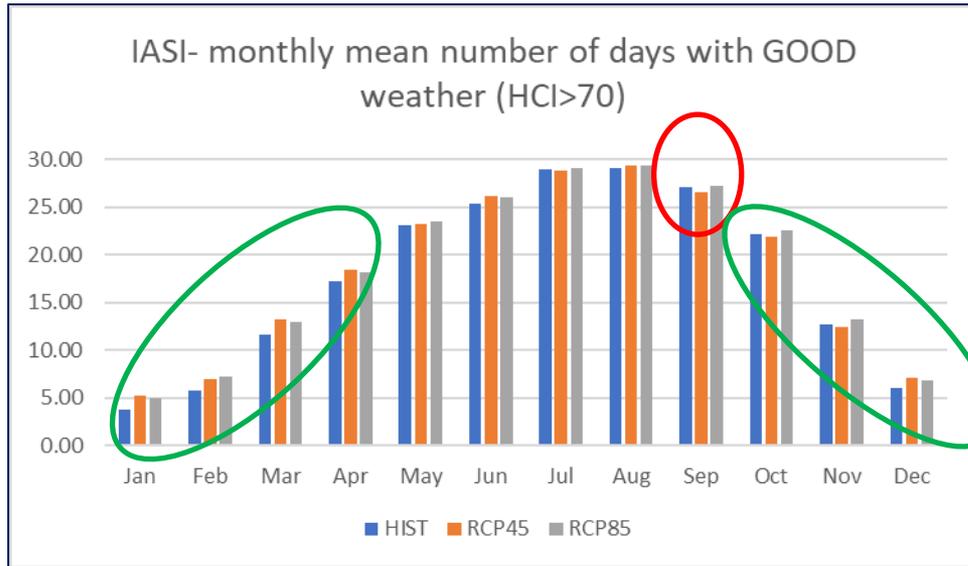


Source: <https://www.viator.com>

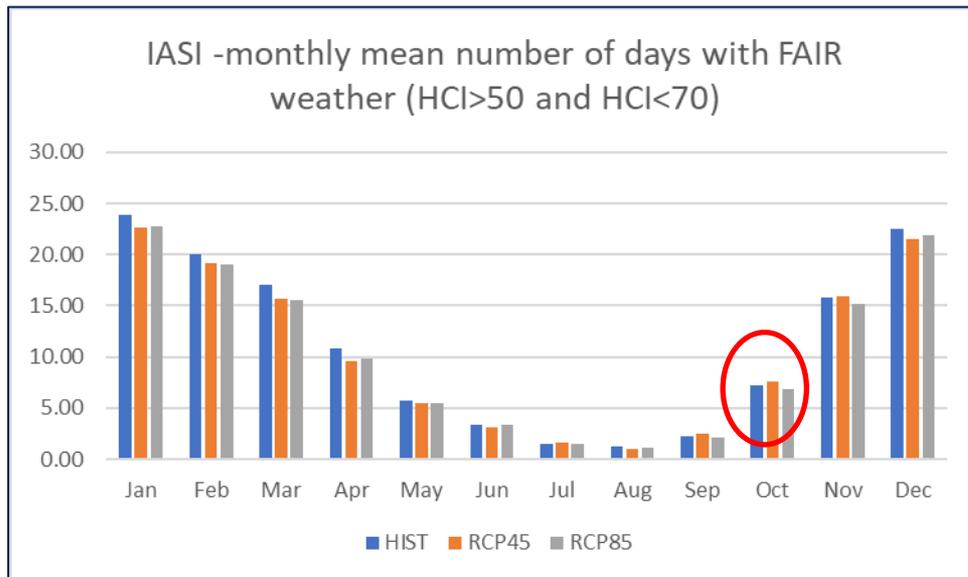


- During spring and late autumn months, the number of days with good weather is slightly increasing.
- In summer months no significant changes are found.
- The uncertainty related to climate changes scenarios is visible for January.

RESULTS: Examples of changes in IASI (NE Romania)

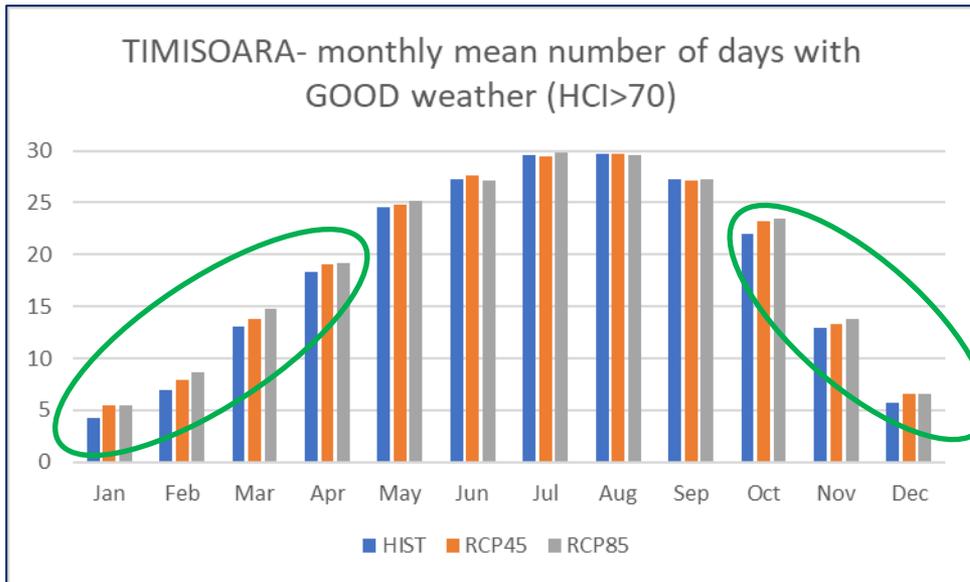


Source: <https://palatulculturii.ro>

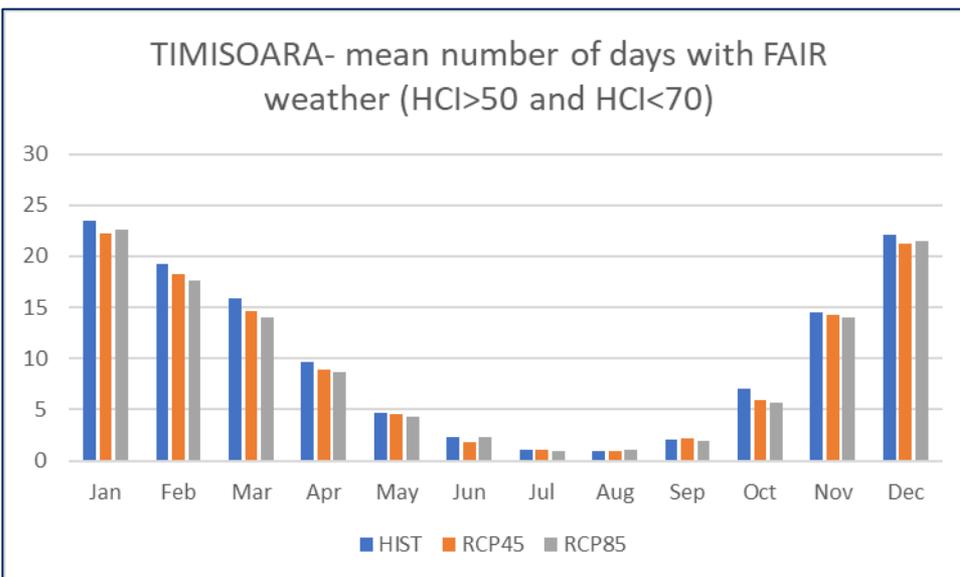


- The number of days with good weather is slightly increasing during cold season.
- In summer months no significant changes are found.
- The uncertainty related to climate changes scenarios is more visible for September/October.

RESULTS: Examples of changes in TIMISOARA (W Romania)



Source: <https://eunivercitiesnetwork.com/>



- The number of days with good weather is slightly increasing during cold season.
- In summer months no significant changes are found.

Conclusions

- Overall, the number of **GOOD weather days is increasing**, especially during bounding seasons, in the entire country.
- The **uncertainty** associated with climate change scenarios is generally **low**, in particular during summer months.
- For the cities analysed, the number of GOOD weather days is expected to increase with 1-2 days in each season except for summer (when no significant changes are expected).
- This may **positively impact the tourism**, however the magnitude of this impact is expected to vary depending on **dominant tourism type** (e.g. business/cultural for cities), **existing degree of seasonality** (e.g. for beach tourism), **other socio-economic factors** (e.g. infrastructure development, population/target tourist categories income etc).
- **Climate and environmental information** customized for tourism may bring a significant added-value for defining efficient measures for **adaptation to climate changes** and may contribute to a **sustainable development** including in the **tourism sector**.

References

- <http://www.bursa.ro/ministerul-turismului-ponderea-turismului-in-produsul-intern-brut-a-crescut-de-la-1-5-procente-in-2016-la-aproximativ-2-6-procente-in-2017-01869330> (in Romanian)
- Scott, D., Rutt, M., Amelung, B. and Tang, M. (2016): An Inter-Comparison of the Holiday Climate Index (HCI) and the Tourism Climate Index (TCI) in Europe, *Atmosphere*, 7, 80; doi:10.3390/atmos7060080

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