

## COMPARISON OF TRYS FOR BRATISLAVA



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### Summary

The paper presents a comparison of two test reference years for Bratislava – the Slovak one and the HadRM3 based one. The latter has been generated using Hadley regional climate model for Europe developed by the Hadley Centre for Climate Prediction, UK [1]. The results are discussed in terms of possible climate change scenarios and the desirable response in the area of building design.

**Keywords:** Test reference years, climate change, buildings, energy, carbon emissions

### 1 Introduction

The Hadley regional climate model (HadRM3) covers the whole of Europe in boxes of side 50 km and provides simulated daily weather data for the periods 1960-1990 and 2070-2100 inclusive. It consists of seven distinct runs that cover different time periods and different climate scenarios. The first three runs are using the historic forcing data (concentrations of carbon dioxide and other greenhouse emission gases) for the period 1960-1970 inclusive. It is referred to these as the historic ensemble. Next four runs are for the period 2070-2100 using forcing data based on the medium-high global warming (3 runs) and medium-low (1 run) scenarios for climate change. Several climate change scenarios can be modelled whereas no scenario is considered to be more likely than any other. In reality, a different emission scenario will happen which is different from all the model scenarios. As an example the figure 1 shows summer design days for various HadRM3 based scenarios and future years for London, Heathrow, UK [4].

The climate data for Bratislava used in this study were derived from one of the forced historic ensemble data set. The Slovak climate data for Bratislava [2] are based on the measurements performed in the period 1968 – 1985 and selected using the Danish methodology described in [3].

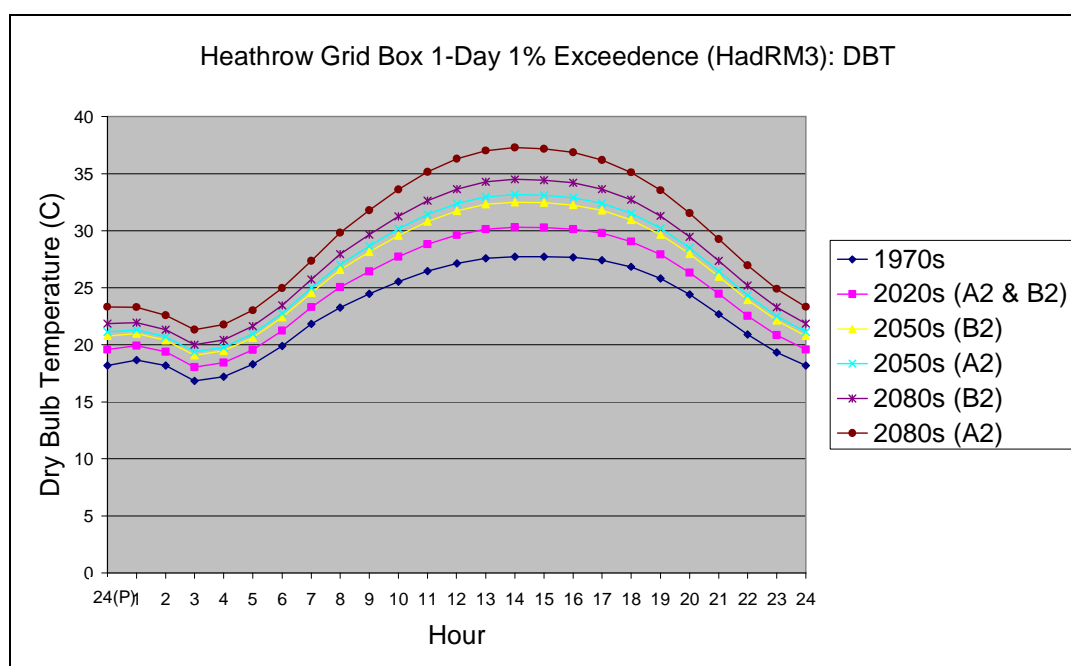


Fig. 1 Summer design days for various HadRM3 based scenarios and future years for London, Heathrow, UK

## 2 Comparison

The aim of the presented study is not a kind of precision comparison of the two test reference years as they are based on different algorithms and time periods. Far more is such comparison interesting because:

- Hadley based TRY can be under circumstances used for building simulation purposes as there is no official TRY for Bratislava,
- The difference between both of them might be used as a correction factor when evaluating various HadRM3 based climate change scenarios for Bratislava.

The Figs. 2, 3 and 4 show the comparison between the mean, maximum and minimum ambient air temperature values of both test reference years, whereas for the Hadley based TRY the daily values and for the Slovak one the monthly values were used.

The Fig. 5 shows the difference between both the mean and minimum ambient air temperatures in both TRYs (using simple comparison of the monthly mean values). The Hadley based mean temperatures seem to be little higher than the Slovak ones. This is caused mainly by the difference in the maximum values as the minimum values are almost identical except of three summer months and March. This fact is also quite good visible in the Figs. 2 and 6.

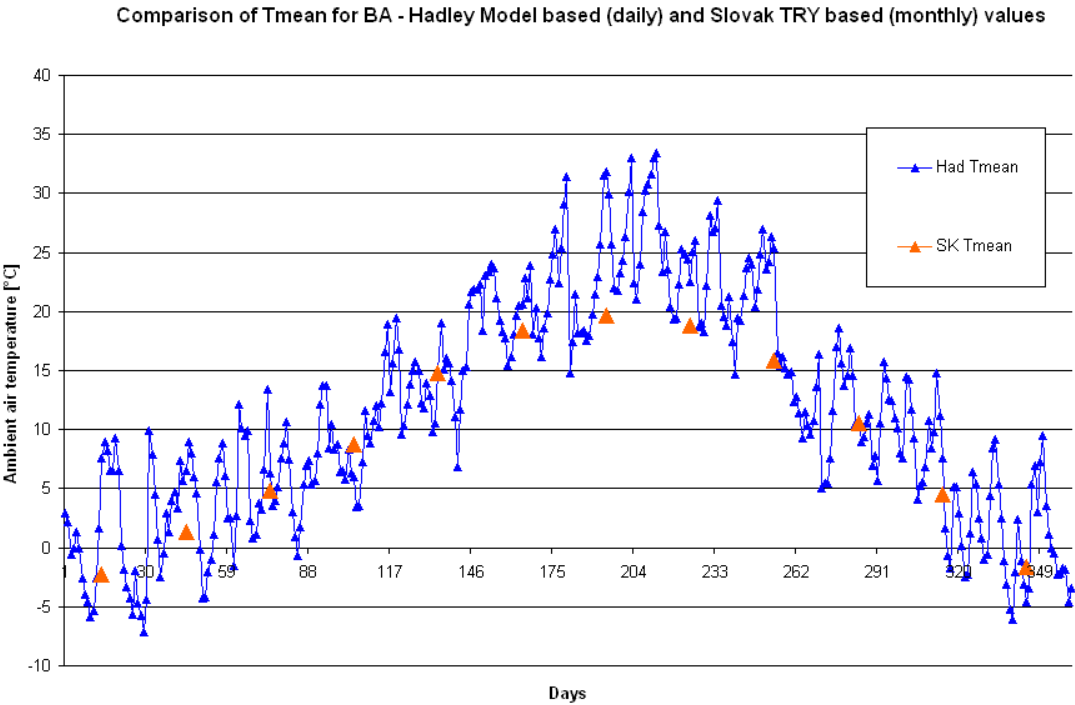


Fig. 2 Comparison of the mean ambient air temperature values of both test reference years.

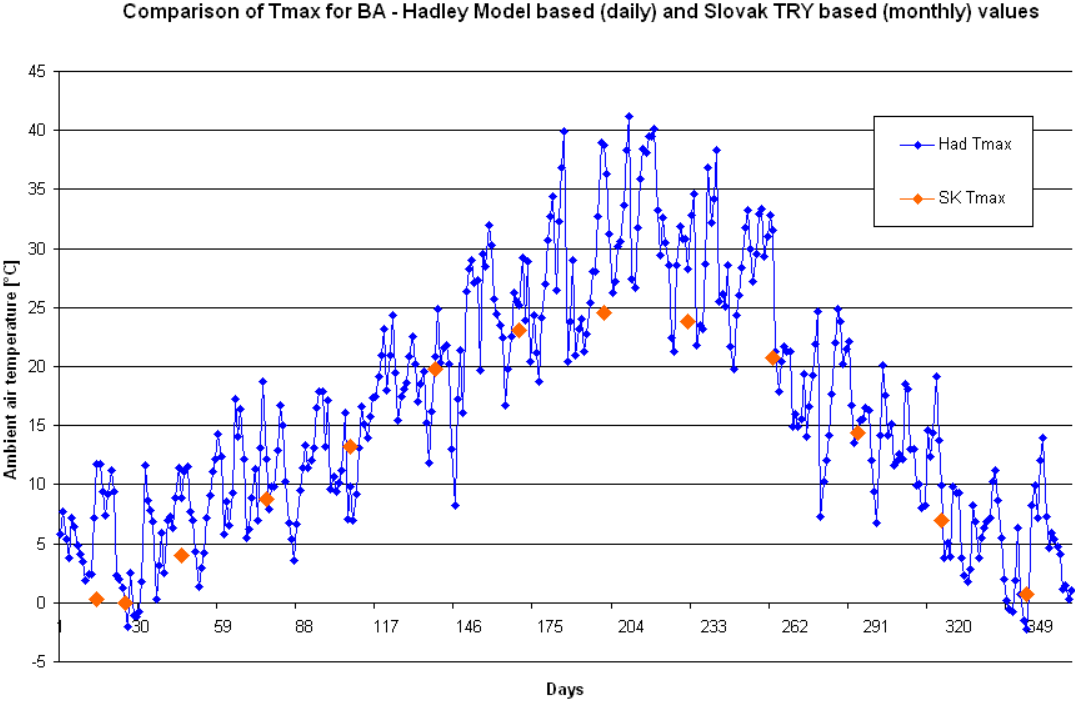
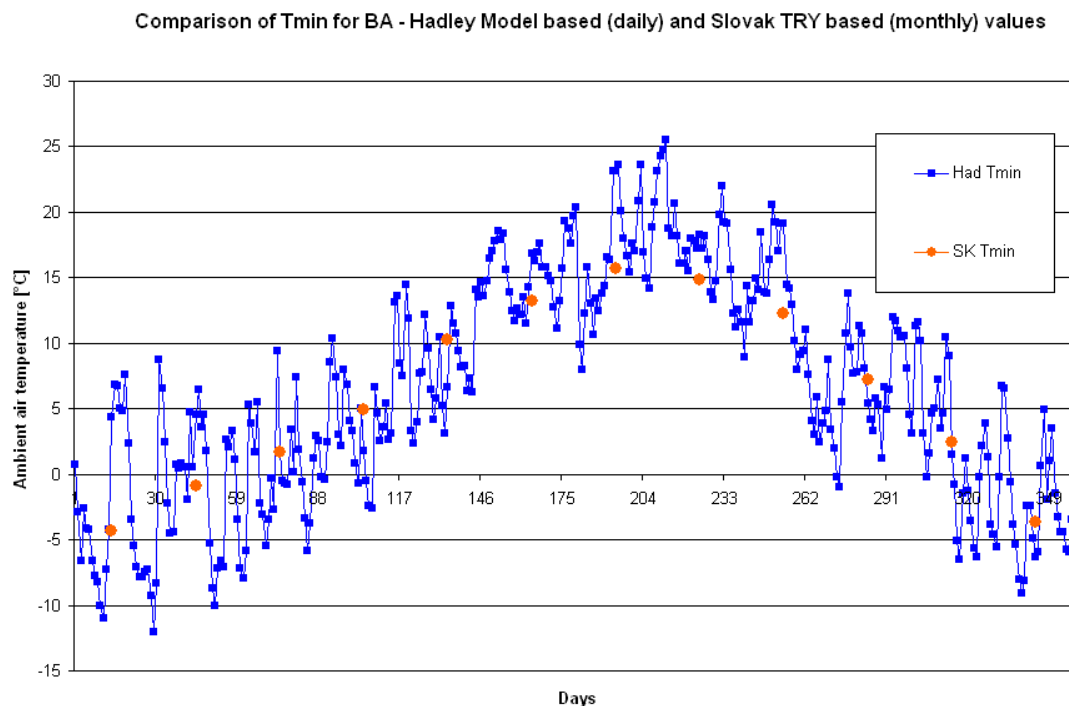
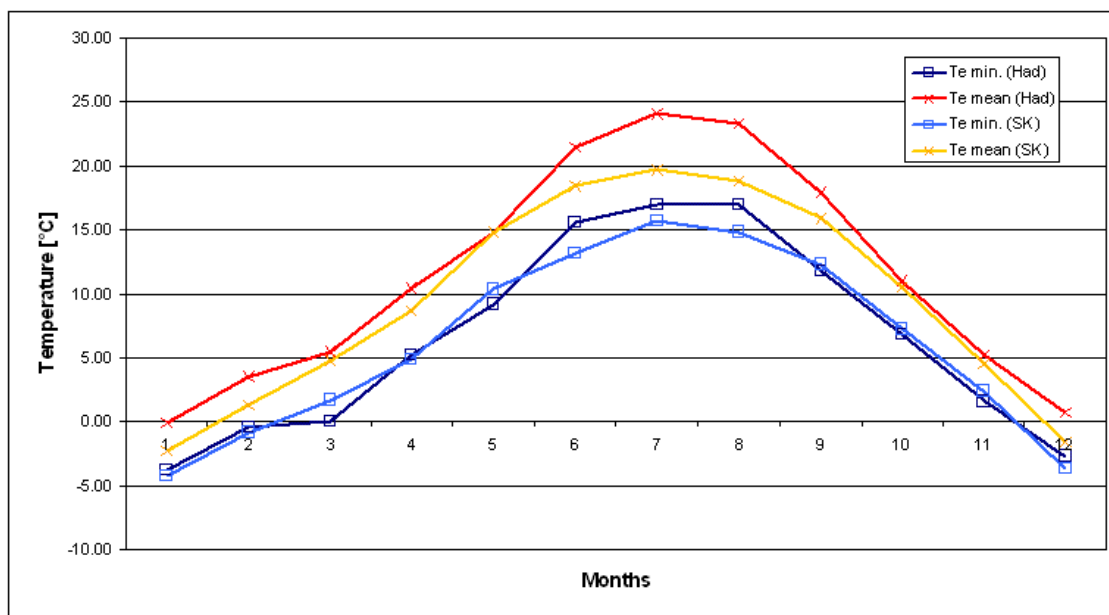


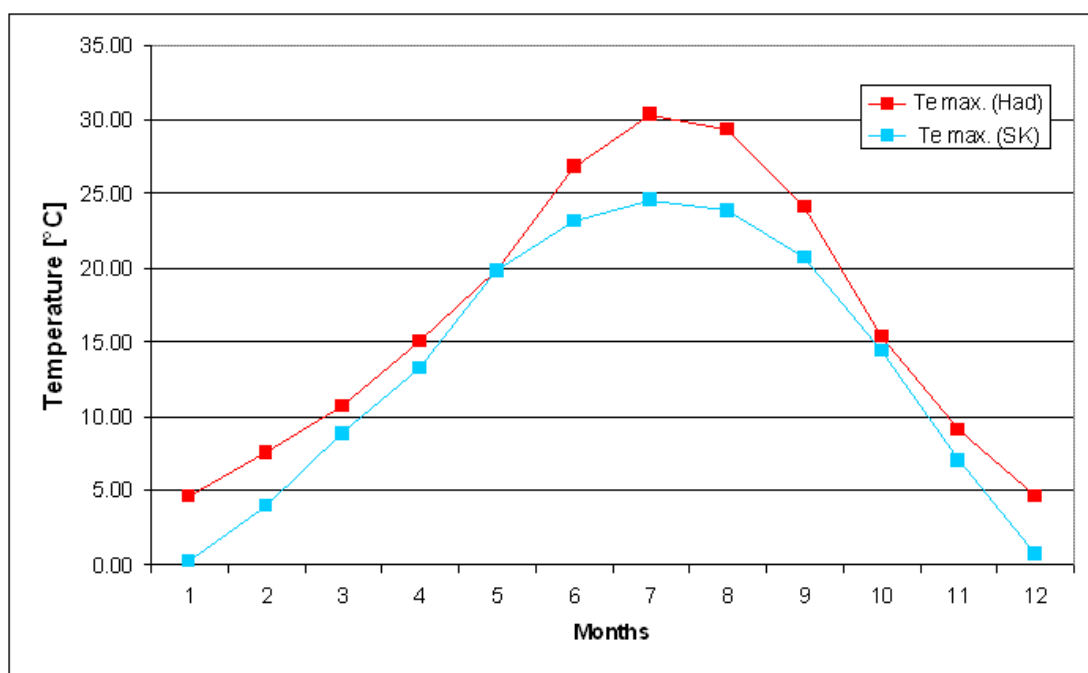
Fig. 3 Comparison of the maximum ambient air temperature values of both test reference years.



**Fig. 4** Comparison of the minimum ambient air temperature values of both test reference years.



**Fig. 5** Comparison of the mean and the minimum ambient air temperatures in both TRYs using simple comparison of the monthly mean values.



**Fig. 6** Comparison of the maximum ambient air temperatures in both TRYs using simple comparison of the monthly mean values.

### 3 Conclusions

As already mentioned the presented comparison does not want to evaluate the quality or the precision of the investigated test reference years as they are based on different data, time periods and algorithms. It just would like to show that there is a need for regular check of the designed climate data against the real climate development and expected trends. If the climate change tendency towards higher temperatures proves to be stable the update of the design climate data will be inevitable. Further it shows that Hadley based climate change scenarios can be used also for Bratislava bearing in mind that minimum values have approximately the same tendency as the Slovak measured ones. The difference is maximum values, which require further investigation and perhaps confrontation with newer measured data set (for example 1990-2006), if available. This would make a sense as e.g. the computer simulations of the building performance behavior experience a boom in the presence and realistic climate data are the basic precondition for meaningful and reliable simulation results.

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### References

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