Problems related to analysis of mesoclimatic features in regions along state borders

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SUMMARY

The needs for analysis of climatic features in mesoscale are stressed. They must be known through studies of various practical problems in open areas in the regions along state borders, as well. Analysis of climatic features is based on meteorological observations obtained in different countries. In connection with this the following problems are discussed, that is, to obtain the needed data from foreign countries, how to get a good comparison of different observation techniques used in different countries. Some illustrations of these problems are shown and proposals for their practical solution are given.

INTRODUCTION

The analysis of climatic features in macroscale has been successful since the regional climatology developed. Borders among states did not influence them in spite of the fact that the original data on which they are built up came from different climatic net works, different time spans, and are obtained with different observation methods respectively and that they are often observed with different instruments.

This is not the case with the analysis in mesoscale, with linear dimensions up to 16 kilometers, particulary in a complex terrain. And just such analyses are nowadays needed at studies in landscape ecology (Gams, 1986), ecosystem (Hočevar, 1986), air pollution (Petkovšek, 1978) and others, respectively. Distribution of winds, air temperature, soil temperature, radiation and other meteorological elements have to be known as functions of the terrain as precise as possible (Hočevar, 1981). At this point various troubles caused by the presence of the state border show up. These troubles will be discussed, some examples will be given and some proposals for their practical solution will be suggested.

PROBLEMS

Nowadays the studies of climatic features in mesoscale are still based mostly on surface observations of meteorological elements in spite of the fact that remote sensing could be helpful as well (Tretjak et al., 1985). Only the troubles connected with the first group of observations will be discussed here.

For the climatic study of particular geographical regions, parts of which belong to different states, the first problem is the access to the data.

In spite of being very banal it is a rather big one. The climatological network is led by different state authorities in different states. For instance it is led in Italy by the Department of defence. So, the access to the climatic data in Italy, beside the ones which can be obtained from the World Meteorological Organisation, is not straight forward.

The meteorological observations are standardised by the World Meteorological Organisation. But in spite of this the grid of meteorological stations is different in different states and regions and the observation methods and instruments are not quite the same. Classical examples of this are the various weather shelters, the psychrometers and the radiation instruments, respectively used in different states. Problems are even more stressed when considering nonstandarised observations obtained with various methods, which are used in mesoscale studies in particular.

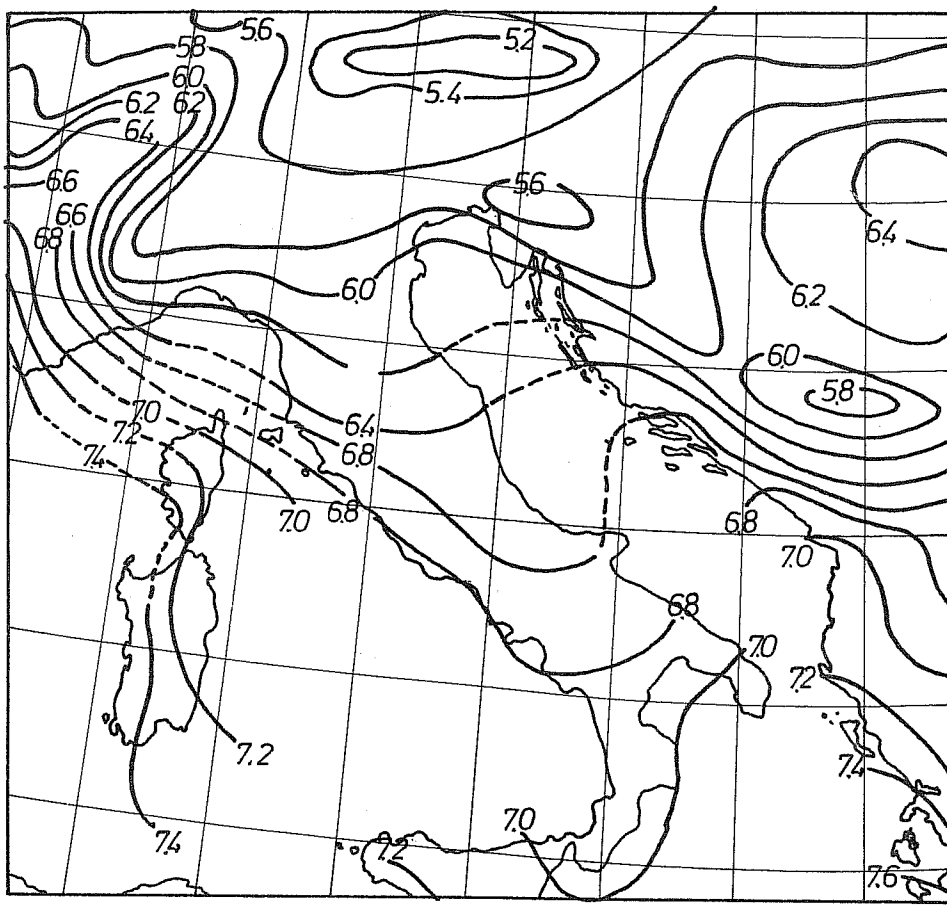

FIG. 1 - Daily global irradiation for July in part of Europe in kWh/m² (mean for the period 1966-1975 after Palz 1984).

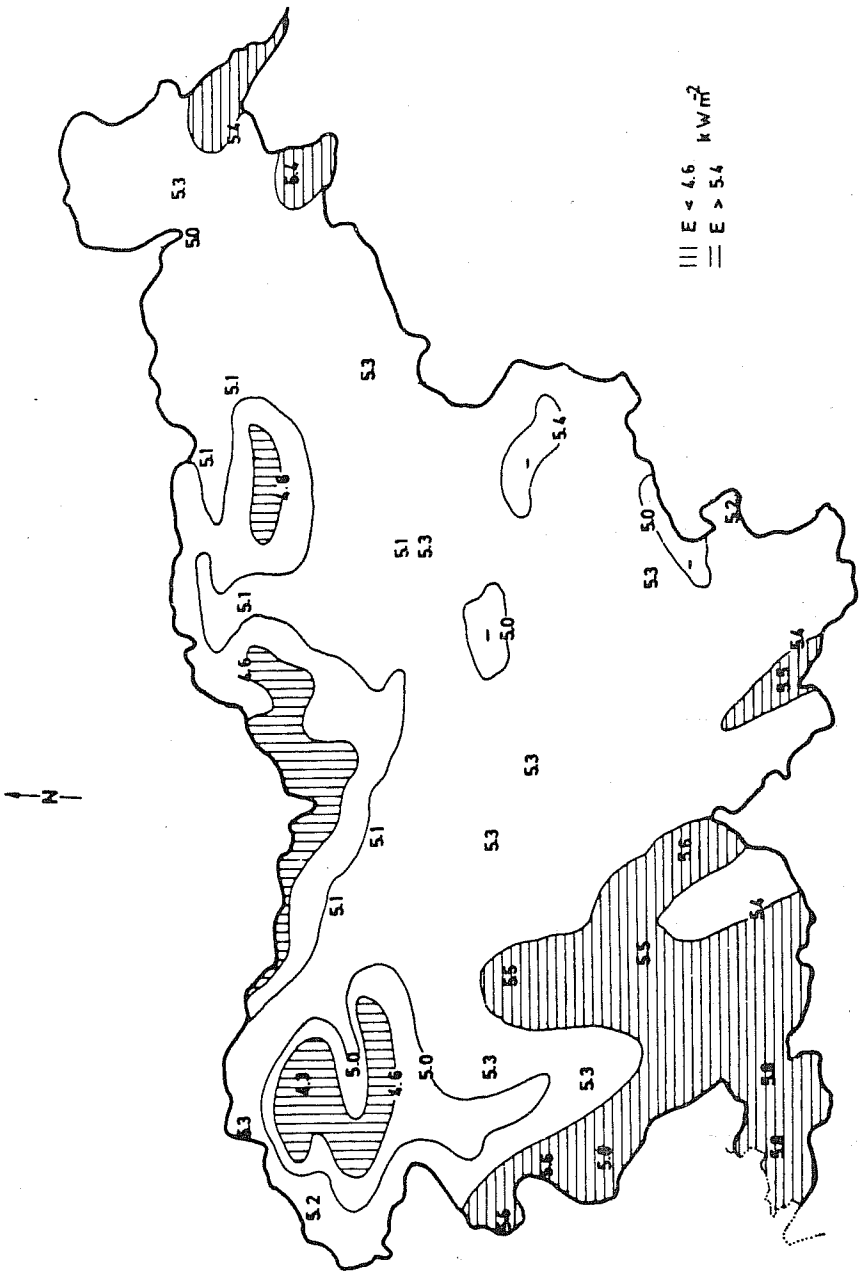

FIG. 2a - Daily global irradiation for July in Slovenia in KWh/m² (mean for the period 1960-1979, after Hočevar and al. 1982).

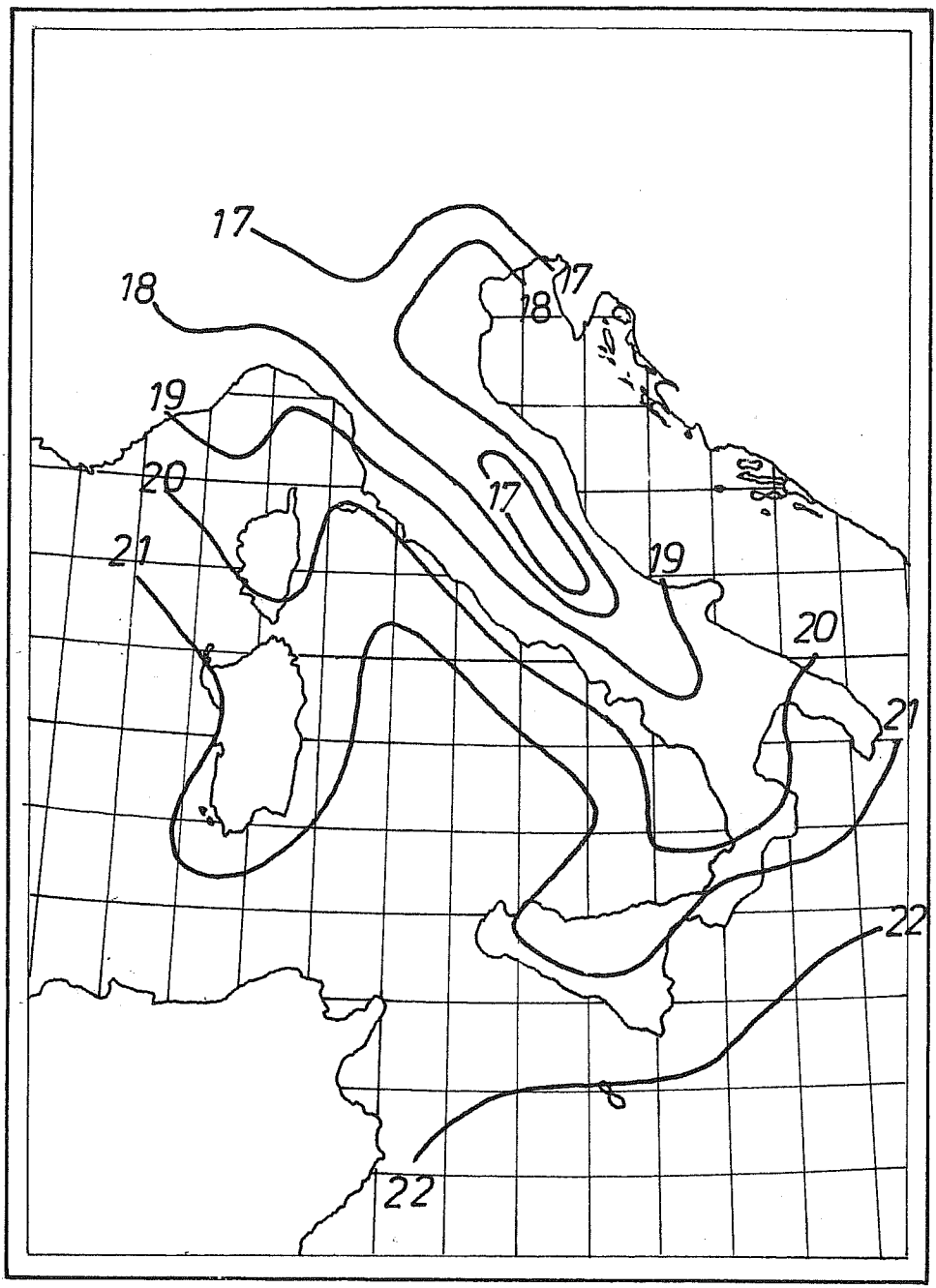

FIG. 2b - Daily global irradiation for July in Italy in 10^3 Langleys (mean for the period 1959-1973, after Cicala, 1977).

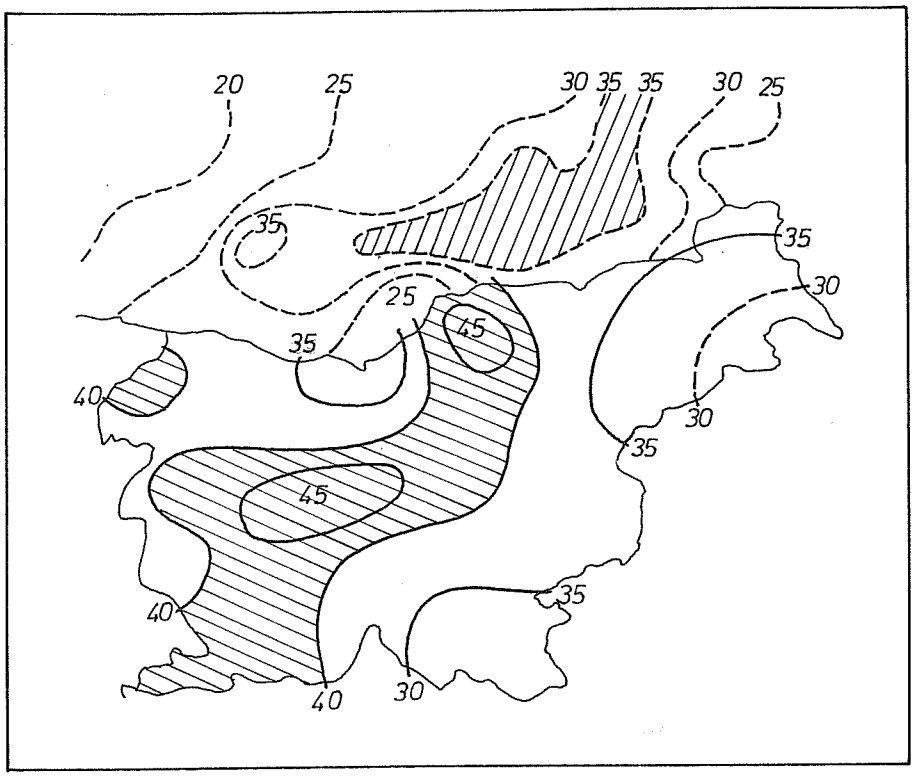

FIG. 3 - Mean frequency of thunderstorm in Slovenia and Austria in days per year (mean for the period 1951-1960, after Petkovšek 1966).

As examples of macro- and mesoscale analysis we can present the maps of global irradiation in Europe (Palz 1984), where Slovenia is presented with data from one location only. The isolines are smooth and state borders do not present any disturbance (Fig. 1). Much more sophisticated is its distribution in Slovenia, which has a rather complex terrain, using data on 31 locations (Fig. 2a, Hočevar et al., 1982). Somewhat less complicated is the distribution in Italy (Fig. 2b, Cicala, 1977).

A very illustrative example showing how the state border parts different observation methods on both sides is the thunderstorm map of Slovenia (Petkovšek, 1966). The discontinuity of isolines giving the yearly number of days with thunderstorms at the state border with Austria is highly significant (Fig. 3).

PROPOSALS TO OVERCOME THESE TROUBLES AS CONCLUSION

From the scientific point of view, the studies of mesoclimatic features, of a geographical region belonging to different states, should use all the existing standardized and nonstandardized observations regarding the region. There-

fore the access to them in different countries should be enabled. Recommendation of this and similar meetings should help to attain this very important goal.

To eliminate as much as possible the nonhomogeneity of the observations, a close personal collaboration among scientists from bordering countries should be stimulated by governmental authorities. This would contribute to the scientific results and to a better understanding of both sides of the border, as well. The results supported in this way will be namely more objective and therefore the solution of practical problems based on them more accurate.

LITERATURE

CICALA, A. 1977: *La rete piranometrica del servizio metereologico dell'aeronautica. Considerazioni e rilievi sui risultati di quindici anni di osservazioni.* Rivista di Met. Aeron. **33**, 3: 189-212.

GAMS, I. 1986: *Osnove pokrajinske ekologije.* Univerza Edvarda Kardelja, Filozofska fakulteta, oddelek za geografijo, 175 pp.

HOČEVAR et al. 1982: *Sončno obsevanje v Sloveniji, trajanje in energija.* Zb. Biotehniške fak, UEKL - Kmetijstvo s. 1, Supl. 6, 96 pp.

HOČEVAR, A. and L. KAJFEŽ-BOGATAJ 1986: *Assessment of Ecosystem Productivity in a Watershed from Meteorological point of View.* III. Conference o Biosfere, Optimalizace Ekosystemu v Povodi, Čsvts, Praha, Zbornik Referatov: 9-24.

PALZ, W. 1984: *Atlas über die Sonnens-Strahlung Europas, Band 1: Horizontale Flächen.* Verlag TUV Rheinland. Köln, 297 pp.

PETKOVŠEK, Z. 1966: *Nevihtna karta in nevihtna pogostnost v Sloveniji za dobo 1951-1960.* Razprave-Papers, Drustvo meteorologov Slovenije, **7**: 3-20.

PETKOVŠEK, Z. 1985: *Die Beendigung von Luftverunreinigungsperioden in Talbecken.* Z. Meteor. **35**, 6: 370-372.

TRETJAK, A., BANOVEC, T. HLAVATY, M., D. MAVER 1985: *Analysis of various index transformation techniques of original Landsat MMS Data for an improved discrimination among various vegetation canopies.* Zb. Biotehniške fak. UEKL - Agronomija, Supl. 10: 81-92.