

## FACTORS CONTROLLING LOCAL CLIMATE

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### Summary

The local climate is determined by the climate forming factors of finer scale, than the factors forming macrorelief. There are mesorelief, urban building, large tracts of forest etc. The features of local climate develop under the influence of differences between the components of heat and water balances of active surface in various climatic zones. All components of heat and water balances (solar radiation, which comes to the inclined and vertical surfaces, atmosphere transparency, evaporation amount, turbulence intensity etc) change in cross-country with specific properties of underlying surface (asphalt coverings, roofs of buildings, crowns of trees) and in the presence of pollutants. As a result the special types of local climate are created: urban climate, forest climates, and island climates.

### 1. Introduction

To reveal the regularities of local climate it is necessary to isolate them, to observe according to their scales and to find the factors determining them. Meteorological stations should be located not regularly, as it is accepted when studying macroclimate and weather, but depending on physical-geographic conditions. Thus we can study the surface air layer which is under the influence of underlying surface and processes occurring in troposphere. The main factors determining the climatic features of surface air layer are heat and water cycles.

The heat balance of active surface can be written down as:

$$R - P - LE - B = 0 \quad (1)$$

where  $R$  - radiation balance,  $B$  - heat flow into the ground,  $P$  - turbulent heat flow in the surface air layer,  $E$  - evaporation or condensation of water vapor,  $L$  - latent heat of vapor formation.

The heat balance of active surface includes not only the processes of heating and cooling of air and soil, but also two important components of water cycle: evaporation and condensation.

So the physical analysis of local climate features is the analysis of heat and water balances of active surface and its components. The role of global meteorological conditions is also taken into account to find out the reasons of similarity or, on the contrary, the differences of local climates in different climate zones.

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#### **Bibliography**

Abakumova, G., E. Feigelson, V. Russak, and V. Stadnik, 1996: Evaluation of Long-Term Changes in Radiation, Cloudiness, and Surface Temperature on the Territory of the Former Soviet Union. *J. Climate*, **9**, 1319-1327 pp. [Long-Term Changes in Radiation on the Russian Territory are discussed].

European Solar Radiation Atlas, 1979. Commission of the European Communities. W. Grossehen-Verlag, Dortmund, Germany, 58 p. [The features of the solar radiation income in Europe are presented].

Kondratiev K. Ya., Pivovarova Z.I., Fedorova M.P., 1978. The radiation regime of inclined surfaces. L., Gidrometeoizdat, 214 p. [The features of solar radiation income on the inclined surface are discussed].

#### **Biographical Sketch**

**Kobysheva Nina Vladimirovna**, Dr. of geogr. Sci., Professor, Honoured Scientist, Head of the technical climatology laboratory of MGO, Professor of Sankt-Petersburg University. Fields of scientific interests are statistical methods in climatology, applied climatology. Author of 7 monographs, 3 text-books, Building Standards and Rules "Building Climatology", more than 200 papers. Supervisor and editor of Scientific-Applied reference book. About 25 Candidate's dissertation were defended under her guidance. A member of working group of WMO, working group № 13 CIB, working group № 75 of International Electrotechnical Commission. Was conferred a medal of National Exhibition of economy achievements, medal "Honoured expert of gidro-meteo service", Voeikov's prize, International WMO and CCL certificate.

Was born in 1925 in Omsk city. Was graduated from the Odessa Hydrometeorological Institute in 1948. In 1955 has defended the candidate dissertation after finishing the post-graduate course of Main Geophysical Observatory.