

# A LOCAL CLIMATOLOGICAL STUDY ON THE MECHANICS OF NOCTURNAL COOLING IN PLAINS AND BASINS\*

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## ABSTRACT

At clear and calm nights, the air near the ground surface is cooled mainly due to radiative processes, thus an inversion layer is formed near the surface. In a basin, a strong surface inversion layer is formed and extraordinary low air temperature occurs at the bottom of it.

Analysis of the difference of the structures and mechanics of the atmospheric cooling on a plain versus in a basin was done with field observations in the Sugadaira Basin, Nagano Prefecture, and with data obtained at the Environmental Research Center, University of Tsukuba, and Meteorological Research Institute and Aerological Observatory located in Tsukuba Science City, Ibaraki Prefecture.

Compared with the difference of time variations of the air temperature in the surface inversion layer formed at a night, between on a plain and in a basin, the observed cooling in the basin was estimated to be about 1.4 times higher than on the plain. In detail, radiative cooling in the basin was about 1.3 times higher, and turbulent and advective cooling in it were about twice higher than on the plain. It is because the basin was located in the place with high altitude that radiative cooling was higher in the basin. On the other hand, it is because the basin had the slopes surrounding it, where cold air was formed, and because this cold air was transferred along the slope to the air layer above the bottom of the basin, that turbulent and advective coolings were about twice higher in the basin.

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