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塔塔加地區表層土壤熱通量特性之研究

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摘　　要　本研究蒐集塔塔加地區雲杉林(Spruce forest, *Picea morrisonicola* Hay., 北向坡)、草原區(Meadow plot, 玉山箭竹 *Yushania niitakamensis* (Hay.) Keng)等二個永久樣區氣象站，以及麟趾山(玉山箭竹、北向坡)與鹿林山(玉山箭竹、南向坡)和觀山(地表裸露、北向坡)等共五處氣象站，深度各爲 0.05m 及 0.1m 之土壤溫度以及埋設深度爲 0.05m 之土壤熱流量板觀測資料，應用梯度法推算各處氣象站之表層土壤熱通量，以比較不同海拔、不同坡向、不同植被之差異，研究結果顯示：土壤熱通量平均年收支淨值爲中海拔地區小於中高海拔地區，數值分別爲 -68.85 $MJm^{-2}Yr^{-1}$、-49.28 $MJm^{-2}Yr^{-1}$，平均年振幅亦爲中海拔地區小於中高海拔地區，其數值分別爲 14.38 $MJm^{-2}Yr^{-1}$、37.12 $MJm^{-2}Yr^{-1}$。不同坡向間之差異，平均年收支淨值之分佈情形爲北向坡大於南向坡大於東向坡，數值分別爲-23.30 MJ $m^{-2}Yr^{-1}$、-74.09 MJ $m^{-2}Yr^{-1}$ 及-74.66 $MJm^{-2}Yr^{-1}$；平均年振幅分別爲 37.12 $MJm^{-2}Yr^{-1}$、44.34 $MJm^{-2}Yr^{-1}$ 和 41.68 $MJm^{-2}Yr^{-1}$。不同地表植被的差異年平均振幅在被覆草原的麟趾山站爲 37.12 $MJm^{-2}Yr^{-1}$，在雲杉林站爲 10.97 $MJm^{-2}Yr^{-1}$，林內的年振幅之比率僅爲林外的 29.55%，充分表現了森林的緩暖與緩冷的保溫功能。

關鍵詞：土壤溫度、土壤熱通量、塔塔加高山生態系、長期生態研究。

The Characteristics of Apparent Soil Heat Budget in Tatachia Area

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ABSTRACT　In two permanent plots of the Tatachia area, a spruce forest plot (*Picea morrisonicola* Hay., northern aspect), a meadow plot (*Yushania niitakamensis* (Hay.) Keng, eastern aspect) and Lintze Mt.(northern aspect), Lulin Mt.(southern aspect) and Kuanshan (uncovered surface, northern aspect) observatories, we measured soil temperatures at soil depths of 0.05 and 0.10 m, and collected data of thermal flow at soil depth of 0.05 m. This study used the gradient method to estimate the heat flux of soil surface in 5 observatories in order to examine the differences resulting from elevation, orientation and canopy. The results revealed that average annual net value of soil heat flux was smaller at middle altitude (-68.85 $MJm^{-2}Yr^{-1}$) than at higher altitude (-49.28 $MJm^{-2}Yr^{-1}$), and the same pattern for average annual amplitude, 14.38 and 37.12 $MJm^{-2}Yr^{-1}$respectively. The average annual net value was the greatest on the north

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aspect (-23.30 $MJm^{-2}Yr^{-1}$), the intermediate on the south aspect (-74.09 $MJm^{-2}Yr^{-1}$) and the least on the east aspect (-74.66 $MJm^{-2}Yr^{-1}$), and the average annual amplitude was 37.12, 44.34 and 41.68 $MJm^{-2}Yr^{-1}$ respectively. The average annual amplitude was 37.12 $MJm^{-2}Yr^{-1}$ in grassland of Lintze Mt. and 10.97 $MJm^{-2}Yr^{-1}$ in the spruce forest. The average annual amplitude was reduced 70 % by the forest canopy, clearly showing the efficiency of forest canopy to buffer the temperature.

Key Words: soil temperature, soil heat flux, Tatachia alpine ecosystem, Long Term Ecosystem Research.