

STUDIES ON SNOW-COVER MONITORING ON THE TIBETAN PLATEAU BY REMOTE SENSING

Z. QUNZHU, F. XUEZHI, W. GUANGYU, AND L. XING

Lanzhou Institute of Glaciology and Geocryology, Chinese Academy of Sciences, Lanzhou, Gansu 730000, P.R.China

From the analysis of recent NOAA/AVHRR data and MSS images of Landsat-1 and 2, it has been found that the seasonal snow deposit on the Tibetan Plateau is mainly distributed in the following regions.

1. In the eastern and southeastern parts of the Tibetan Plateau, namely the eastern section of the Himalayan Mountains and other regions including the Nyainqentanglha Mountains, Hengduan Mountains, Anyemaqen Mountains, Bayan Har Mountains, and Qinghai Lake area, where the snow cover is about 50% of the total area.
2. In the western and northwestern parts of the Tibetan Plateau, namely the Ali region, Karakunlun Mountain, Western Kunlun Mountain, Pamir Plateau, etc.
3. In the mountainous areas around the Tibetan Plateau, such as the middle and western sections of the Himalaya Mountains, Kunlun Mountain, Qilian Mountain, etc.

On the vast Jiangtang upland, from south of the Yarlung Zangbo River to north of the Kunlun Mountains and the interior of the Hoh Xil region, the terrain is flat, the climate is dry with strong wind and less snowfall, and the snow deposits are distributed in patches. According to NOAA data statistics, the multiyear average snow cover area (1967-1983) of the Tibetan Plateau was about $31.6 \times 10^4 \text{ km}^2$.

In contrast to North America and Eurasia, the snow cover area on the Tibetan Plateau has a larger annual variation and exhibits a bimodal distribution, i.e. the first peak occurs from October to November in late

Autumn and early winter and the second peak occurs from April to May in the late winter and early spring. The snow cover area reaches a maximum of 16.3% in February in the whole region, followed by April and December. From late July to early September, the snow cover (including glaciers and permanent snow deposit) is least, amounting to only 5.3%. However, in the areas such as the upper reaches of the Yangtze River and the Yellow River in the eastern and northeastern parts of the plateau and the Qinghai Lake area, the snow cover area reaches a maximum in April.

In contrast to the northern hemisphere and Eurasia (Figures 1 and 2), the snow cover area on the Tibetan Plateau has a larger interannual variation due to greater precipitation variability in winter and spring. The variation coefficient (C_v) of the snow cover area on the Tibetan Plateau is 0.536 ($n=17$), while those of the northern hemisphere and Eurasia are 0.054 ($n=20$) and 0.042 ($n=20$) respectively. The study also showed that the period from the late 1970s to the early 1980s was the largest snow cover period of the plateau in the last 20 years.

Fig.1 Annual Variation of Snow Area in the North Hemisphere and Euro-Asia
(From D.A.Robinson, 1993⁽¹⁾)

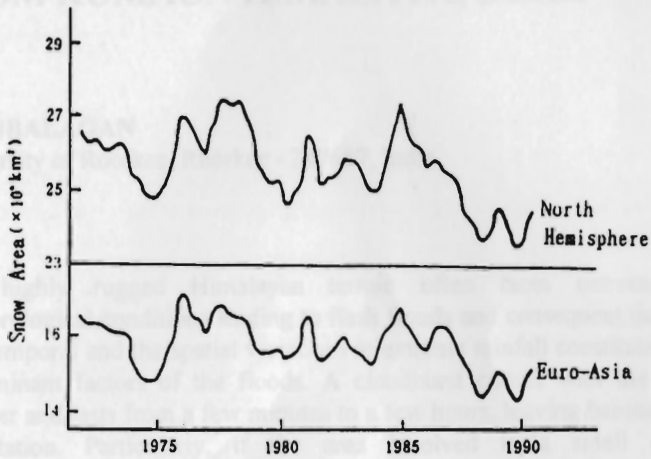


Fig.2 Annual Variation of Snow Area in the Tibete plature

