

INFLUENCE OF CLOUDINESS ON THE INCIDENT SHORTWAVE RADIATION OF NEVADO COROPUNA

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ABSTRACT

The Nevado Coropuna (NC) is located in the volcanic Cordillera Ampato, and it has glaciers that represent the most important freshwater for the Arequipa region. The aim of this work is to analyze the influence of cloud cover on shortwave radiation incident of NC, which is altered in the presence of clouds mainly in the rainy period, from 2015 to 2016. For this study, it was used hourly radiation data from Automatic Weather Station, conventional weather stations and meteorological satellite GOES 13 data, which has a high temporal resolution. To estimate the cloudiness, it was applied Spectral Composite Threshold (Jedlovec, 2009).

During the austral summer, Peru has the rainy period from December to March, caused by the most humidity advection, an income of the East flux from the basin Amazon and the formation and intensification of High Bolivia. Besides in specific years, such as “El Niño” or “Coastal Niño”, anomalies positives of the sea surface temperature favors with an income of humidity and increase of rainfall in the occidental side of NC. Arequipa region has a diurnal cycle, during the day, has more clouds between December and March above 80%. At night the cloudiness diminishes significantly, hourly there are more clouds in the afternoon. The NC has a similar pattern, and there is a difference between the oriental and occidental side. The cloudiness has a high impact in the incident shortwave radiation, in clear days the average hourly radiation could reach up to 1200 W/m²; meanwhile, in cloudy days this does not pass the 600 W/m². Meantime, in the dry period, generally there are not clouds; in the conventional meteorological stations are found predominantly high clouds, cirrus. In summary, the cloudiness in the occidental Tropical Andes plays an important role in the rainy period, blocking the incident radiation above the NC, protecting the West glaciers and diminished the available energy to ablation process.

Keywords: Nevado Coropuna, Cloudiness, Radiation, Tropical Andes.

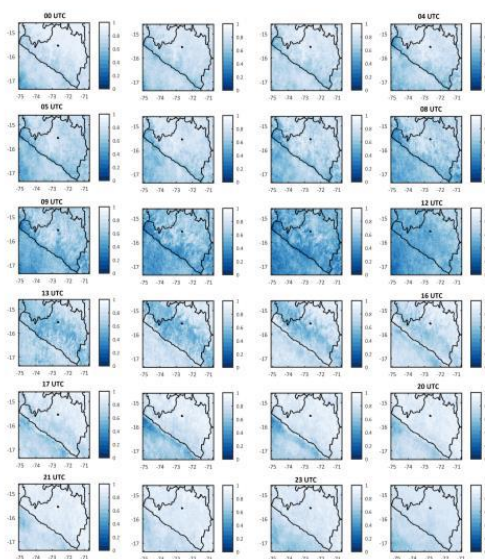


Figure 1. Diurnal and nocturnal variation of cloudiness in the summer of 2015, observe that in the early morning there no much cloud, but the afternoon and night is generally cloudy.