

Strong influences of Subtropical Central Andes on wintertime precipitation

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This study documents the strong influence of the Andes on winter precipitation in the Subtropical Central region (32°-35°S) using daily precipitation gauge observations for 1970-1976. During the winter, the approaching storms from Southern South Pacific Ocean are profoundly modified and blocked when it impinge on the high barrier of the Andes in this region. The typical orographic precipitation pattern with enhanced and reduced precipitation on windward (Chilean) and leeward (Argentinean) slopes was explored by the cross-mountain section of winter mean precipitation around 33°S and 35°S. On the northernmost sector, the precipitation rate is enhanced on upslope by upwind effect in a factor of 2,5 in relation to lowlands of Chile, and abruptly reduced by downwind effect in a factor of 3, immediately lee of the highest crests, and up to 13, on lee-side lowlands of northern Mendoza province in Argentina. On the southernmost sector, the decreased precipitation in lee side is lower due to the lower mean height of the mountains, and thus the blocking effect is lower.

In order to examine the precipitation decrease in lee-side lowlands of northern sector according to the precipitation intensity in the high mountains, the area daily mean precipitation in the high mountains was classified in weak and moderate, intense, and extreme. It was defined as "weak and moderate" those days with precipitation lower than 14 mm, "Intense" when the amount was between 14mm and 45 mm, and "extreme" if precipitation was greater than 45 mm. These thresholds represent the 80%, 15%, and 5% of the daily precipitation distribution; and the 25%, 40% and 35% of total winter precipitation, respectively. It was found that the precipitation intensity (frequency) in lee side decrease (increase) when increase the daily precipitation in high mountain from weak and moderate to extreme. The rain shadow in lee-side lowlands only represent 1% of total precipitation accumulated in high mountains for extreme cases.