OBSERVATIONS OF STRATOCUMULUS CLOUDS AT THE WEST COAST OF SOUTH AMERICA

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Marine stratocumulus clouds of the eastern Pacific play an essential role in the Earth's energy and radiation budget. Parts of these clouds off the west coast of South America form the major source of water to the Atacama at the northern coast of Chile. The DFG collaborative research center 'Earth evolution at the dry limit', investigates how the extreme aridity of the Atacama influences evolution of landscape and life. Within this framework, and in close cooperation with Centro del Desierto de Atacama (Pontificia Universidad Católica de Chile), three state of the art ground based remote sensing instruments were installed for one year at the airport of Iquique/Chile (20.5°S, 70.2°W, 56m a.s.l.). This installation provides for the first time, a long-term study of the vertical structure of stratocumulus clouds and their environment governing the moisture supply to the coastal part of the Atacama is available.

A microwave radiometer (RPG HATPRO) provides information about water vapour in the atmosphere and liquid water in the clouds. A cloud radar (RPG-FMCW-94) allow derivation of cloud vertical extent and cloud droplet properties. A Doppler wind lidar (HALO Photonics Streamline-XR, kindly provided by FMI) gives information about vertical and horizontal wind. The instruments provide vertical profiles of wind, turbulence and temperature, as well as integrated values of water vapor and liquid water. The Cloudnet algorithm (Illingworth et al. 2007) is applied to use instrument synergy and provides vertical cloud structure information. The Doppler wind lidar is used to describe the state of the boundary layer especially below the stratocumulus cloud using the method described in Manninen et al . (2018).

We observe a land-sea circulation with a super-imposed southerly wind component. Highest wind speeds can be found during the afternoon. Clouds show a distinct seasonal pattern with a maximum of cloud occurrence during winter (JJA) and a minimum during summer (DJF). Clouds are higher and vertically less extended in winter than in summer. Liquid water path shows a diurnal cycle with highest values during night and morning hours and lowest values during noon. Furthermore, the clouds contain much more liquid water in summer. The turbulent structure of the boundary layer, together with the temperature profile, can be used to characterize the mechanism driving the cloud life cycle.

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