

Comprehensive Measurements of Wind Systems at the Dead Sea

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The Dead Sea is a unique place on earth. It is located at the lowest point of the Jordan Rift valley and its water level is currently at -429 m above mean sea level (amsl). To the West the Judean Mountains (up to 1000 m amsl) and to the East the Moab mountains (up to 1300 m amsl) confine the north-south oriented valley. The whole region is located in a transition zone of semi-arid to arid climate conditions and together with the steep orography, this forms a quite complex and unique environment.

The Virtual Institute DEad SEa Research Venue (DESERVE) is an international project funded by the German Helmholtz Association and was established to study coupled atmospheric, hydrological, and lithospheric processes in the changing environment of the Dead Sea.

Previous studies showed that the valley's atmosphere is often governed by periodic wind systems (Bitan, 1974), but most of the studies were limited to ground measurements and could therefore not resolve the three dimensional development and evolution of these wind systems. Performed airborne measurements found three distinct layers above the Dead Sea (Levin, 2005). Two layers are directly affected by the Dead Sea and the third is the commonly observed marine boundary layer over Israel.

In the framework of DESERVE a field campaign with the mobile observatory KITcube was conducted to study the three dimensional structure of atmospheric processes at the Dead Sea in 2014. The combination of several in-situ and remote sensing instruments allows temporally and spatially high-resolution measurements in an atmospheric volume of about $10 \times 10 \times 10 \text{ km}^3$. With this data set, the development and evolution of typical local wind systems, as well as the impact of regional scale wind conditions on the valley's atmosphere could be analyzed. The frequent development of a nocturnal drainage flow with wind velocities of over 10 m s^{-1} , the typical lake breeze during the day, its onset and vertical extension as well as strong downslope winds in the afternoon, which are often intensified by regional scale wind systems like the Mediterranean Sea Breeze and the coupling of the synoptic flow, will be presented.

Bitan, A. (1974). *The wind regime in the north-west section of the Dead-Sea*. Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie B, 22(4), 313-335.

Levin, Z., Gershon, H., & Ganor, E. (2005). *Vertical distribution of physical and chemical properties of haze particles in the Dead Sea valley*. Atmospheric Environment, 39(27), 4937-4945.