



Stability Indices derived from Atmospheric Measurements on a Cable Car

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Stability indices are meteorological parameters to describe vertical atmospheric layering and therefore it is possible to predict convective events such as thunderstorms.

Commonly, weather balloons with radiosondes are used for the analysis of vertical atmospheric layering. These weather balloons reach high altitudes and atmospheric layering can be determined for the entire troposphere. On the other hand, these balloon ascents are expensive, require the appropriate equipment and permissions and cannot be conducted several times a day on an operational basis. Due to the limitations of the application of weather balloons the unconventional idea came up to equip a cable car with meteorological instruments for vertical profile measurements. To some extent the meteorological instruments had to be customized to the particular requirements and data are transmitted via GSM.

The investigated area is a small alpine catchment which is prone to flash floods and thus a reliable forecast for such floods mostly caused by convective rainfall events is important. Therefore the purpose of this contribution is to proof if a cable car can be used for measuring continuous data during the operating hours and whether it is possible to derive reliable conclusions about the stability in the lower troposphere.

Several stability indices (e.g. Lifted-, Showalter-, Boyden- and Convective-Index) were investigated. Indices which are calculated on the basis of the "Lifted Parcel Theory" were tested with different approaches to determine the most unstable parcel and therefore the initial values of the required parameters. The derived indices were flagged in active (thunderstorms) and non-active (no thunderstorms) cases. The classification results from available lightning maps in this region. Threshold values were established to distinguish stable, potential indifferent and unstable atmospheric conditions. On the basis of this division pre-warnings for the occurrence of thunderstorms are declared. The verification of the quality of these predictions is done by a skill score statistic.