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Temperature Observations in Dolines in the Northern Calcareous Alps, Styria, Austria

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Concave landforms (e.g. valleys and particularly totally enclosed basins) turn coldest during radiation weather conditions in particular during nighttimes, while convex landforms (e.g. slopes) stay relatively warm. Already some 80 years ago scientists discovered that temperatures in basins can turn extremely low (e.g. Grünloch Doline, 1270m a.s.l., -52.6˚C in 1932) with enormous differences on very short distances. In winter 2006/2007 measurements of air temperature were initiated at four dolines between 1320 and 2380m a.s.l. located in the Northern Calcareous Alps in the Austrian federal province of Styria. At each study site miniature temperature dataloggers (temperature range -55 to +85˚C) with radiation shields were installed at the bottoms and margins. First results of the winter 2006/2007 indicate that minimum temperatures below -35˚C can occur even during relatively mild periods, with differences of up to 30K on an elevation difference less than 50m. Under cloudless and weak wind conditions, the cooling process is most intensive during the first hours after sunset, while the rate of temperature decrease is reduced during the second half of the night. However, even very short periods of cloudless and weak wind conditions during generally unfavourable conditions are sufficient to initiate the development of a cold pool. Based on our data as well as from other comparable sites in the Alps, it can be assumed that in normal-tempered winters temperature minima below -40 ˚C will occur frequently at the bottoms of the four studied dolines and during optimal weather conditions (arctic air mass, cloudless and weak wind, snow cover) even -50 ˚C are possible. To enhance knowledge about the processes of cold air formation and drainage it is planned to take additional measurements (e.g. wind, radiation, ground surface temperature, balloon

soundings) in the future.