Fig 1: ∂D vs. $\partial^{18}O$ plot showing the isotopic composition of Kenticha serpentinites, and the fields for oceanic and continental lizardite and crysotile, continental antigorite, deweylites and Trodos serpentinites (after Wenner and Taylor, 1973, 1974, Kyser, 1999).

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The Austrian Network for Isotopes in Precipitation (ANIP)

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The Austrian Network for Isotopes in Precipitation (ANIP) started in 1972. At some stations samples have already been taken since the 1960s. 71 stations ranging from 120 to 2250 m in altitude are presently in operation all over Austria with some preference given to the Karst areas north and south of the Alpine mountain range (Fig. 1). The precipitation water is collected on a daily basis in ombrometers (500 cm^2) and mixed to monthly samples. All samples not measured immediately have been stored in 1L bottles in a specially dedicated cellar (16000 samples) in Vienna and are available for analysis in the future. The aim of ANIP is to provide input data for hydrological and hydrogeological investigations and a data-base for climatological research.

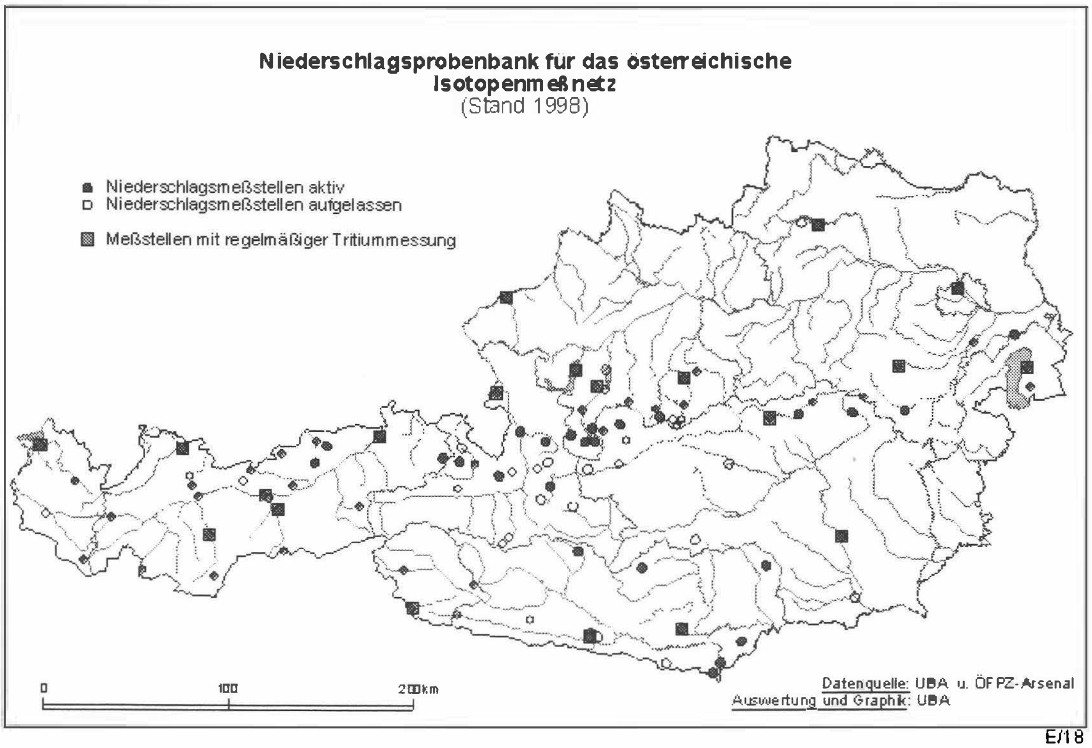

FIG. 1. Sampling stations of the Austrian precipitation network.

The amount of precipitation in Austria is highly influenced by the Alpine mountain range (400-3000 mm/a). The amount of annual precipitation increases towards the mountain ranges, in particular at the high altitude regions. However, strong regional differences exist between the windward and the lee side of the Alpine ranges. Furthermore, the Alps as a weather divide sharply distinguish precipitation events caused by different air flow directions.

The isotope time series of the stations of the Austrian precipitation network show significant but not uniform long-term trends [1, 2]. While the 10-year running mean of some mountain stations exhibits a pronounced increase in $\delta^{18}O$ of about 1 ‰ since 1975, the change of $\delta^{18}O$ at the valley stations is much lower (Fig. 2). There are also differences in the time behaviour. The differences in the $\delta^{18}O$-values of sampling stations at similar altitudes can be explained by the origin of the air moisture. An Atlantic influence (moisture from NW) causes lower $\delta^{18}O$-values (e.g. Patscherkofel and Bregenz) than a Mediterranean one (e.g. Villacher Alpe and Graz). The main reason for this different ^{18}O-content is the longer way of the Atlantic air masses over the continent along which the moisture becomes stepwise depleted in heavy isotopes by successive rainout (continental effect).

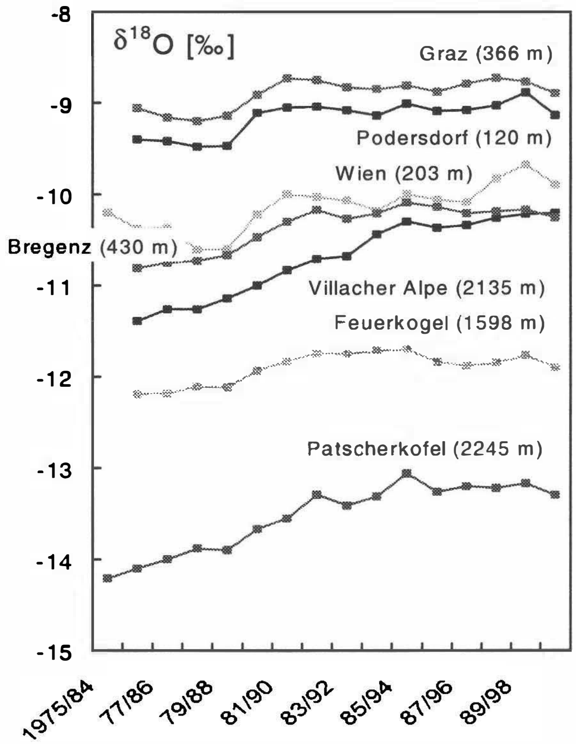

FIG. 2. Long-term $\delta^{18}O$ variations (10-year running means) at several stations of the Austrian precipitation network [1, 2].

The stable isotope variations in precipitation are a consequence of the isotope effects accompanying each step of the water cycle. Temperature is the most influencing parameter, but there are also other influences like changes in the origin of air masses or in rain formation mechanisms [2, 3, 4].

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