**Introduction:** The Antarctic Peninsula is one of the world wide regions with the highest temperatures increase. The stability of ice shelves around Antarctica reacts faster to the climate change than previously believed. Several nations are presently carrying out climate monitoring programs, which include a restricted temporal (50 years) and geographical distribution. Based on geochemical analyses, ice cores have been used to extend the available meteorological record into the past. Water stable isotope composition is mainly linked to mean annual air temperature (MAAT) and sea surface conditions. However, the interpretation of the isotopic variations requires a detailed characterization of local and regional hydrological conditions. Here, we focus on the northern Antarctic Peninsula, a region lacking of glaciological and geochemical information of snow and ice. In this project, the drilling of a medium-depth (100-150 m) ice core is planned.

**Study area 2008/09:**

- **a)** Fildes Peninsula, King George Island (Southern Shetlands), Antarctica. During a summer expedition, two firm cores at the positions FP-1 and FP-2 were retrieved (both 16m depth), additionally snow pits (SP) at the same location were excavated (FP-SP-1 and FP-SP-2, respectively).
- **b)** North Antarctic Peninsula, at the Chilean Station “O’Higgins” precipitation samples were collected in a daily schedule by the over-wintering crew in 2008. During the same location were excavated (FP-SP-1 and FP-SP-2, respectively).

**b) North Antarctic Peninsula, at the Chilean Station “O’Higgins”**

**Results:** Isotope and meteorological data of both study areas (Figure 1). Top: Snow Pits from Fildes Peninsula are plotted against depth in meters water equivalent (m w.e.) and δD values. Snow pits (blue line) and precipitation samples (green squares and triangles) data of the O’Higgins Station is also displayed. Stable water isotope data of precipitation was smoothed using a 3-points mean running function. At the bottom the daily temperatures are shown for both Fildes (red line) and O’Higgins blue line. Temperatures were smoothed using a mean running function with an interval of 5 days. A common peak in δD is notable for all data sets, registered in the precipitation samples on 08 August 2008 and at approximately 0.7 m depth for all snow Pits. The correlation between smoothed air temperature data and stable isotope data for O’Higgins Station (Antarctic Peninsula) is good, with a coefficient of determination $r^2$ of 0.9 and a relationship of 0.31°C/‰.

**Conclusions:** In spite of the evidence of melting processes in the firn/ice column and the proximity to the ocean of both regions, annual isotopic signals from snow pits are relatively well preserved. Moisture originates from few exceptions from a region between 50°S and 70°S at the pacific ocean. OH shows the most suitable conditions to recover a deeper ice core in the future, since meteorological and glaciological conditions, as well as logistical support are most appropriate for this purpose. Until the present, several scientific efforts to model the climate variability are not entirely reliable because of the lack of appropriate glaciological and geochemical antecedents.

**Local meteoric water lines:** LMWL derived from the co-isotope correlation are very similar for the two areas (Figure 2), implying similar evaporation/condensation conditions in this area. Both LMWL deviate slightly from the GMWL ($\delta D = 8 * \delta^{18}O + 10$‰). For the calculation of the LMWL, some samples were eliminated because of their inconsistent isotope composition for precipitation samples (around 9‰ for both δD and δ18O). These samples represent marine aerosols and are related to strong wind storms, as shown in Figure 2 (bottom). From the summary table (a) a latitudinal gradient is observed from the data of Fildes Peninsula and O’Higgins. An altitude effect is observed between snow pit data from Fildes (FP-SP-1 @ 700 m a.s.l.) and FP-SP-2 (400 m a.s.l).