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Long-term carbon accumulation in Andes peatlands

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High-altitude peatlands of the Andes still remain relatively unexplored since most of the studies on carbon capture in tropical soils have focused on peatlands in low altitude areas, leaving aside the importance of the study of high mountain wetlands, currently called “bofedales” located between 3000 and 5000 masl, covering most of the Andes mountains in South America. These peatlands in turn may also represent important paleoclimatic records.

In this study, we investigated three peatland cores (APA-01, APA2-01, and APA2-02) at different altitudes (4210 m, 4420 m and 4432 m, respectively) in high Andean Peatlands of southern Peru. The peatland studied is located at the headwater basin Cachi River, in the town of Ayacucho, Peru. The aim of this study was to evaluate the role played by past climatic changes on the peatlands carbon accumulation.

Each core was sectioned centimeter by centimeter and sub samples (n = 31) were collected for radiocarbon dating by AMS (acceleration mass spectrometer) and were used to create a sedimentological model based on the program Clam2.2R. The concentrations of carbon and nitrogen were determined from a C / H / N elemental analyzer and the stable carbon and nitrogen isotopes (δ13C and δ15N) were also analyzed. The bulk density was determined based on the volume occupied by the sediment (g /cm3). Finally, the carbon accumulation rate (gC m^{-2}año^{-1}) was determined.

The three cores were characterized by two sedimentary units, the results present in the first sedimentary unit of APA01 an average long-term carbon accumulation rate of 59 gC m^{-2}año^{-1}, APA2-01 with 32 gC m^{-2}año^{-1} and finally APA2-02 with 24 gC m^{-2}año^{-1}; for the second sedimentary unit we have: APA01 on average 17 gC m^{-2}año^{-1}, APA2-01 with 33 gC m^{-2}año^{-1} and finally APA2-02 with 49 gC m^{-2}año^{-1}.

In conclusion, we can say that the carbon accumulation rate for the first sedimentary unit of the three cores decreases as the altitude increases; on the other hand, we have the second sedimentary unit showing that the carbon accumulation rate increases with respect to the altitude. Our preliminary results show that the soil carbon accumulation in this “bofedal” can be an important carbon reservoir during the last 3000 years, but it also seems to be sensitive to changes in the climate due to the observed variations in the rates of sedimentation as well as in carbon concentrations.