Noble gases in permafrost perrenial groundwater springs, Fishing Branch River, Yukon, Canada

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There has been limited research on noble gases in permafrost terrain, with most research to date focusing on saline springs in the high arctic [1], and brines deep below the surface [2]. In this study noble gases have been used to better understand flow of perennial groundwater springs in permafrost terrain along the Fishing Branch River, Yukon, Canada. Noble gas samples have been collected from five groups of springs using diffusion samplers and copper tube samplers. Samples have been analysed for ^{3}He, ^{4}He, Ne, Ar, Kr and Xe. It is expected that groundwater springs will be a mix of perennial groundwater and acitive layer melting [3]. The R/R_a of these samples suggests that there are two groundwater sources with mixing between active layer water, river water and perennial groundwater. The perennial groundwater system has a lower R/R_a due to addition of crustal helium, while shallow active layer water will be dominated by ingrowth of ^{3}He from tritium. Many samples are characterized by high excess air, which is likely due to recharge in the permaforst environment, with large water table changes and freeze thaw cycles.

[1] McKay *et al.* (2005). Polar Lakes, Streams, and Springs as Analogs for the Hydrological Cycle on Mars, *Water on Mars and Life, Advances in Astrobiology and Biogeophysics*. Springer, Berlin. [2] Greene (2005) *Noble Gases of the Canadian Shield from the Lupin and Con Mines, Canada, as indicators of deep groundwater flow dynamics and residence time*. M.Sc., University of Ottawa. [3] Clark & Lauriol (1997) *Arctic and Alpine Research* **2**, 240-252.

Relations between Mediterranean cyclones and African Monsoon from speleothems of Negev Desert, Israel

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Carbonate cave deposits (speleothems) from the central and southern Negev Desert, southern Israel, were used to reconstruct the paleoclimate conditions on the northern boundary of Saharan-Arabian Desert. Speleothem deposition does not occur today in this arid to hyper arid region (150-30 mm/year), but the presence of speleothems in many caves indicates that humid conditions prevailed in the past.

Speleothems have been continuously deposited throughout glacial and interglacial intervals for at least the last 500 ka in the present-day Mediterranean climate zone of northern and central Israel (>350 mm/year). In contrast, in the central and southern Negev Desert only clusters of short humid episodes occurred, resulting in minor speleothem deposition during: interglacial Marine Isotopic Stage (MIS) 9 at 350-310 ka (Negev Humid Period (NHP)-4), glacial MIS-8 at 310-290 ka (NHP-3), interglacial MIS-7.3-7.1 at 225-185 ka (NHP-2), and NHP-1, which encompasses the transition between glacial MIS-6.1 and interglacial MIS-5.5, and interglacial MIS-5.5-5.4 at 142-109 ka.

Progressive thinning of the speleothem cross sections from the north to the south, speleothem δ^{18}O values and the δD values of speleothem fluid inclusions all indicate that the precipitation came from the Atlantic-Mediterranean cyclones.

The NHP were contemporaneous with periods of high Northern Hemisphere insolation with African monsoon index of 51 cal/cm^{2}day and higher. Contemporaneous Intensification of the Mediterranean cyclones and the African monsoon can possibly be explained by warming of subtropical Atlantic SSTs by the increased insolation. Higher SSTs weakened the Azorian High Pressure Cell, contributing to higher intensity of African Monsoon in the summer and decreasing NAO index in the winter, consequently intensifying the cyclonic activity above the Mediterranean Sea and northern margins of Saharan-Arabian Desert.