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# The ETH Zurich in situ $^{14}C$ extraction line: A progress report

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With its short half-life (5370 years) in situ cosmogenic $^{14}C$ represents a welcome addition to the growing field of cosmogenic nuclide applications. Complementary to the commonly used cosmogenic nuclides such as $^{10}Be$, $^{26}Al$ and $^{21}Ne$, in situ $^{14}C$ can be particularly useful when studying younger exposure ages and/or fast eroding environments. It allows to infer local cosmogenic nuclide production rates and, combined with nuclides of longer half-life, has the potential to reveal complex exposure histories by identifying burial episodes or changes in tectonic or climatic conditions. The low concentration of in situ $^{14}C$ in terrestrial samples makes its extraction especially challenging due to a high susceptibility to blank contamination.

Following basically the $^{14}C$ extraction scheme developed by N. Lifton and J. Pigati (University of Arizona, Tucson) an all-metal extraction line has been built at the Institute of Isotope Geochemistry at ETH Zurich. A new furnace device was constructed for sample degassing using a Pt-crucible as sample holder hanging inside a sapphire tube. This allows higher heating temperatures and no longer requires the addition of a flux agent. Up to now a large number of yield tests were performed to investigate the performance of the cryogenic trap system used for gas purification. $CO_2$ recovery was consistently exceeding 99.8 %. Line blanks of the complete extraction cycle were collected first in a cold state and subsequently with the sample combustion furnace at about 1350˚C. $CO_2$ was directly taken off the line in a glass tube. It was measured with

the gas ion source at the MICADAS AMS system at ETH/PSI omitting a graphitization step at the extraction line. Results for cold blanks do not exceed 1.2 x $10^4$ $^{14}C$ atoms while blanks including the hot combustion furnace are about 1.8 x $10^5$ $^{14}C$ atoms. Tests have shown that the detected blank $CO_2$ is almost entirely introduced by the combustion furnace and that it can be considerably reduced by thorough $O_2$ flow through the furnace. Degassing experiments on purified quartz samples will be presented at the meeting.