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^{81}Kr dating of 1 kg Antarctic ice

ZHENG-TIAN LU[1], FLORIAN RITTERBUSCH[1], JIE WANG[1], XIN FENG[1], SARAH A SHACKLETON[2], EDWARD BROOK[3], JOHN A HIGGINS[2], ZE-HUA JIA[4], WEI JIANG[1], JEFFREY P SEVERINGHAUS[5], LIANG-TING SUN[4], GUO-MIN YANG[1] AND LEI ZHAO[1]

[1]University of Science and Technology of China
[2]Princeton University
[3]Oregon State University
[4]CAS Institute of Modern Physics
[5]Scripps Institution of Oceanography, University of California San Diego

Presenting Author: ztlu@ustc.edu.cn

Recovering earth's climate history from ice cores requires reliable dating of the ice. ^{81}Kr is ideal for radiometric dating up to more than one million years, but the isotope is so rare that it has long been a challenge to apply ^{81}Kr dating on ice cores where sample size is limited. We have realized ^{81}Kr dating of 1-kg ice-core samples from Taylor Glacier, Antarctica. This is made possible by a crucial advance in ^{81}Kr detection with an all-optical realization of Atom Trap Trace Analysis. The achieved sample-size reduction facilitates ^{81}Kr dating of basal ice-core sections with direct implications for open questions in paleoclimatology, such as the evolution of glaciers on the Tibetan Plateau or the stability of the Greenland and West-Antarctic ice sheets.