NOBLE GAS RETENTION AGES OF ANGRITES NWA 1296, NWA 2999/4931, NWA 4590 AND NWA 4801. D. Nakashima\textsuperscript{1,2}, K. Nagao\textsuperscript{1}, and A. J. Irving\textsuperscript{3}. \textsuperscript{1}Laboratory for Earthquake Chemistry, University of Tokyo, Tokyo 113-0033, Japan; \textsuperscript{2}Dept. of Geol. & Geophys., University of Wisconsin, Madison, USA; naka@geology.wisc.edu; \textsuperscript{3}Dept. of Earth & Space Sci., University of Washington, Seattle, USA.

Introduction: It has been reported that three angrites NWA 2999/4931 (N29/49), NWA 4590 (N45), NWA 4801 (N48) contain \textsuperscript{244}Pu-derived Xe (T\textsubscript{1/2} \sim 80 Myr) [1], indicative of very ancient formation. Here we report new noble gas data for angrite NWA 1296 (N12), and calculate Pu-Xe ages and U/Th-\textsuperscript{4}He ages based on noble gas data and chemical compositions [2-4].

NWA 1296: He, Ne and Ar are dominated by spallogenic and radiogenic components. The \textsuperscript{3}He exposure age (0.6 Ma) is shorter than those of \textsuperscript{21}Ne and \textsuperscript{38}Ar (2.3 Ma on average), suggesting \textsuperscript{3}He loss during the transit to the Earth. Kr may be affected by terrestrial contamination, and \textsuperscript{81}Kr exposure age cannot be estimated. Xe is dominated by spallogenic and \textsuperscript{244}Pu-derived Xe. No \textsuperscript{129}Xe excess from \textsuperscript{129}I decay (T\textsubscript{1/2} \sim 16 Myr) is observed, despite the fact that this angrite has an Al-Mg age of 4561 Ma [5].

U/Th-\textsuperscript{4}He ages: The U/Th-\textsuperscript{4}He ages of the four angrites studied are estimated as 170 - 4480 Ma (<3 % contribution of \textalpha-decay of \textsuperscript{244}Pu), indicating radiogenic \textsuperscript{4}He loss. Given the \textsuperscript{3}He exposure ages comparable to those of \textsuperscript{21}Ne, \textsuperscript{38}Ar and \textsuperscript{81}Kr (except for N12), the radiogenic \textsuperscript{4}He would have been lost by parent body processes. For N12, the radiogenic \textsuperscript{4}He loss could have also occurred with spallogenic \textsuperscript{3}He loss during the meteoroid flight.

Pu-Xe ages: The \textsuperscript{244}Pu-\textsuperscript{136}Xe ages relative to Angra dos Reis (ADOR) are estimated in two ways: method (i) using \textsuperscript{150}Nd as proxy for the primordial \textsuperscript{244}Pu content [6] and method (ii) using spallogenic \textsuperscript{126}Xe as proxy for \textsuperscript{150}Nd [7]. The Pu-Xe ages of N12 estimated by the both methods and those of N29/49 estimated by method (i) are almost zero within the errors, suggesting contemporaneous formation with ADOR. Method (ii) gives extremely old ages for N29/49, because of high Ba content due to terrestrial contamination [8]. The Pu-Xe ages of N45 and N48 obtained by the two methods exceed zero even if taking 2\sigma errors. Given the Pb-Pb ages of N45 and N48 comparable to that of ADOR (~4558 Ma; [9]), the old Pu-Xe ages are attributed to overabundant fission \textsuperscript{136}Xe, i.e., parentless fission Xe. The parent body processes may not have affected fission Xe, but may have led to significant loss of radiogenic \textsuperscript{4}He.

Acknowledgements: We are grateful to N. Shirai for his help and constructive discussion.