

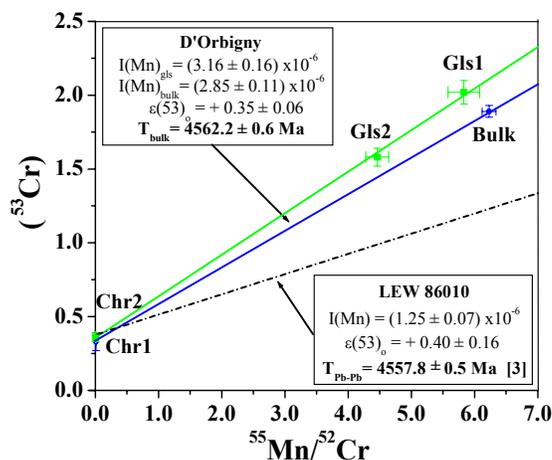
Mn-Cr CHRONOLOGY OF THE D'ORBIGNY ANGRITE.

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Introduction: Previous Pb-U-Th and Mn-Cr isotopic investigations of the Angra dos Reis (ADOR) and LEW86010 (LEW) angrites demonstrated that the relative ⁵³Mn-⁵³Cr chronometer could be mapped onto an absolute time scale [1]. We have extended this research to include the D'Orbigny angrite where a precise Pb-Pb age for pyroxenes in this meteorite has recently been obtained [2]. Here we report Cr isotopic abundances and Mn/Cr ratios in chromite (Chr), glass (Gls), and bulk rock samples from D'Orbigny.

Results and Discussion: The figure below shows ⁵³Cr excesses and Mn/Cr ratios determined for the various fractions of D'Orbigny. The data points for the bulk rock and chromite define an isochron whose slope corresponds to an initial ⁵³Mn/⁵⁵Mn, $I(\text{Mn}) = (2.85 \pm 0.11) \times 10^{-6}$ and an initial ⁵³Cr/⁵²Cr, $\epsilon(53)_o = 0.35 \pm 0.06$ at the time of isotopic closure. The ⁵³Mn/⁵⁵Mn ratio for D'Orbigny is more than two-fold the ⁵³Mn/⁵⁵Mn ratio of $(1.25 \pm 0.07) \times 10^{-6}$ previously calculated for LEW [1]. Since the Pb-Pb age of LEW has been precisely measured at 4557.8 ± 0.5 Ma [3], we calculate an absolute Mn-Cr age of 4562.2 ± 0.6 Ma for the D'Orbigny bulk rock, which is in close agreement with the Mn-Cr age of 4561.6 ± 0.5 Ma determined by Nyquist et al. [4]. Although the Pb-Pb age of 4557 ± 1 Ma for pyroxenes in D'Orbigny [2] is comparable to the Pb-Pb ages for ADOR and LEW [4], this age is considerably younger than the Mn-Cr bulk rock age for D'Orbigny. The older Mn-Cr age of the D'Orbigny bulk rock relative to the Pb-Pb age of pyroxenes could be due to the presence of glass in D'Orbigny, which has a higher ⁵³Mn/⁵⁵Mn ratio than the bulk sample (see Figure).

Conclusion: The Mn-Cr age for the D'Orbigny bulk rock sample of ~4562 Ma is 4 to 5 Ma older than the Pb-Pb ages reported for the angrites ADOR and LEW, therefore D'Orbigny likely represents an earlier stage in the evolution of the angrites.



Acknowledgments: We thank M. E. Varela and G. Kurat for providing the D'Orbigny samples, and O. Bogdanovski for assistance with the analyses.

References: [1] Lugmair, G. W. and Shukolyukov, A. (1998) *GCA*, 62, 2863-2886. [2] Jagoutz, E. et al. (2003) This meeting. [3] Lugmair, G. W. and Galer, S. J. G. (1992) *GCA*, 56, 1673-1694. [4] Nyquist, L. E. et al. (2003) *LPSC XXXIV*, A1388.