The chromium isotopic composition of an early to middle Ordovician marine carbonate platform, eastern Precordillera, San Juan, Argentina

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A broad suite of redox proxy data suggest that despite ocean and atmosphere oxygenation in the late Neoproterozoic, euxinic conditions persisted in the global deep oceans until the at least Ordovician [1-3]. Major changes in the sulphur isotopic composition of carbonate associated sulphate and co-existing pyrite in the later Middle Ordovician are consistent with oxygen mixing at depth and ventilation of euxinic bottom waters [4]. We measured the Cr isotopic composition of an Early to Middle Ordovician carbonate platform to test whether Cr isotopes record ocean oxygenation. The Cr isotopic composition of seawater is controlled by inputs from oxidative weathering on land and redox transformations in marine environments. Preliminary results indicate a major shift in $d^{53}Cr$ values from +0.5‰ to 0‰ across the Early to Middle Ordovician boundary, accompanied by an increase in Cr concentration from 0.1 to 0.25 ppm. By contrast, $^{87}Sr/^{86}Sr$ ratios, however, remain relatively stable (0.70898 $\pm$ 0.00001) throughout the section, suggesting that Cr isotope shifts were not associated with changes in continental or hydrothermal weathering fluxes, but instead reflect primary changes in ocean redox conditions. This hypothesized change in redox at the Early to Middle Ordovician boundary may preface more widespread ventilation in the later Middle Ordovician.

[1] Hurtgen *et al*., 2009, *EPSL* v **281** p. 288-297 [2] Gill *et al*., 2011, *Geochim Cosochim Ac* v **72** p. 4699-4711 [3] Thompson and Kah, 2012 *Palaeogeogr. Palaeoclimatol. Palaeoecol. V.* ***313-314****, p. 189-214 [4] Thompson and Kah, 2010, GSA Annual Meeting, v.* ***42*** *p. 513.*