



Figure 3 Roberts et al. 2017 update: Use of Ca and P to reconstruct penguin colonization history from the sediments of Ardley Lake, Antarctic Peninsula. a) Biplots of P and Ca versus Al measured by WD-XRF for Ardley Lake sediments, ornithogenic soils (Tatur et al., 1997) and local bedrock (Machado et al., 2005). Yanou Lake sediments are also plotted for comparison as they represent sediments from a lake in a similar geological setting but with no known history of penguin occupation (from Roberts et al., 2017). b) Biplots shown in (a) as centred log ratios (clr), which accounts for closed sum effects. These bi-plots show that the relationships in (a) are consistent for P and Ca. c) Profiles of natural log (log n) Ti-normalized P and Ca measured by WD-XRF and XRF-CS, plotted as Z-scores. These plots highlight guano zones 1–5 (green shading). Z-scores are used to show phases enriched in guano (values > 0).