

Posting type Advisory

Subject Positive interference in PIXE titanium determinations

Module/Species A/ Ti

Sites entire network

Period Before 12/1/2001

Recommendation Estimate Ti from Fe and other crustal elements in pre-12/1/2001 samples.

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Supporting information

In samples collected before 1 December 2001, the elements Na – Mn were determined by Proton-Induced X-ray Emission (PIXE) on the Crocker cyclotron. These elements have since been determined by conventional X-Ray Fluorescence (XRF), which has an order-of-magnitude lower detection limit for Ti. Most titanium in ambient particles is attributed to [soil dust](#), but concentrations determined by PIXE were high and variable relative to other crustal elements (Figure 1). The PIXE readings appear to have included stray contributions from the Ti-containing slide frames in which filters are mounted. The proton beam used for PIXE is less stable than the tube and collimator used for XRF, and the timing of the observed variations suggests a sensitivity to beam tuning. The cyclotron runs for PIXE analysis were organized by the indicated climatological sample quarters, and these analytical boundaries coincide with the main transitions between periods of generally high or low reported Ti/Fe ratios.

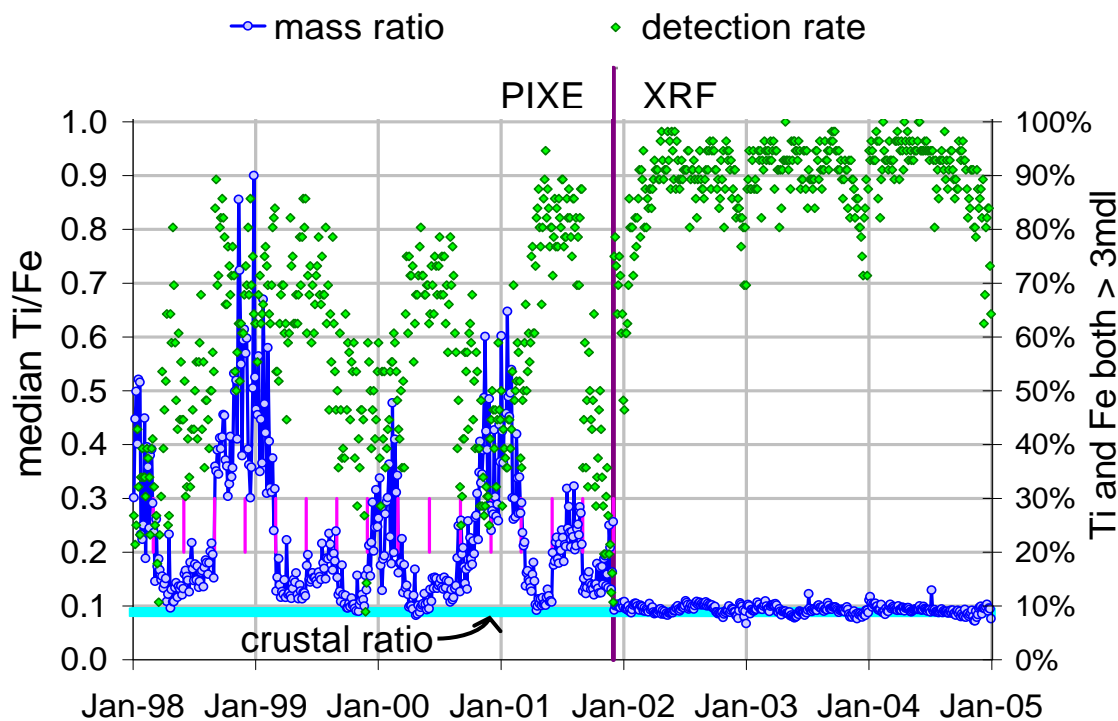


Figure 1. Median Ti/Fe ratios in individual 24h samples, from 56 sites operated throughout 1998 – 2004. Calculations include only samples in which reported Ti and Fe values were both greater than $3 \times mdl$. Vertical pink lines show PIXE analytical quarters. Indicated crustal ratio Ti/Fe = 0.88 is from Table 3.5 of Mason and Moore (1982) *Principles of Geochemistry*, John Wiley & Sons, NY.