TH AND FE CONTENTS IN GEOLOGICAL UNITS OF THE APOLLO 12 AND 14 REGION. O. Gasnault and D.J. Lawrence, Los Alamos Nat. Lab. (MS D466, Los Alamos, NM 87545, USA. gasnault@lanl.gov)

Introduction: The Procellarum KREEP Terrane (PKT) has Th abundances above 3 ppm as defined in [1, 2]. Although the spatial resolution of the existing Th map is relatively large (~60 km^2, [3]), some pixels inside PKT overlay only mare basalts that show up with high Th contents (> 3 ppm) [1, 4]. This could be the result of three different explainations [1, 4, 5]: (a) mixing (lateral or/and vertical) of Th-poor mare materials with Th-rich non-mare materials, (b) Th-rich mare materials, and (c) instrumental "mixing" due to the spatial resolution. While Th-rich mare materials are not well represented in the lunar sample collection [4], their existence would be an important issue for the models of lunar surface evolution.

Here, we describe a comparison between recently reported Th and Fe abundance data from LP [3, 6], with recently digitalized geologic maps [7]. This work aims to find relations between remotely measured Th, Fe, and types of terranes.

Th vs. Fe. Regolith compositions plot in a triangle on a diagram of Th vs. Fe, which shows the effects of mixing between feldspathic highlands, mare basalts and KREEP [5]. Figure 1 shows where most of LP observations plot in such a diagram. The apices for mare basalts (low Th, high Fe) and for KREEP materials (high Th, intermediate Fe) differ from those proposed by Korotev [5] based on lunar sample analysis, but they are not incompatible. These differences are possibly due to the large spatial scale of LP pixels.

Apollo 12 & 14 region.. In this study, we are concentrating on a region around the Apollo 12 & 14 landing sites (lat. from 0 to 6°S, lon. from 14°W to 26°W), which are very rich in thorium. This region appears with oblique lines in Figure 1.

LP maps were projected on a 0.5x0.5 deg. grid, and then smoothed to match the instrumental spatial resolution. In each of these pixels, the presence of a particular geologic unit is given a number from 0 to 1 (1 means the given unit completely covers the pixel; 0 means the unit is absent within the pixel); those numbers are used to weight our data. We have then calculated the mean Th and Fe values, for each geologic unit present in this area. The results are given Figure 2, which is a scatter plot of Th vs. Fe of all the LP pixels in the studied region.

Figure 2 reveals that the 3 main units of the region around the Apollo 12 & 14 landing sites have mean Th and Fe values that roughly plot linearly along a straight line. Such a trend supports the existence of mixing effects. Part of this mixing could result from the instrument response, but we believe that part of it is real. In particular, the Imbrian age mare basalts (*Im* unit), which is mostly basaltic lavas, appears richer in Th content than the younger flows of the *Em* unit. This result could be explained by suggesting that the *Im* unit is contaminated by previously emplaced Imbrium ejecta that is rich in Th (as represented by the Fra Mauro formation (*If* unit)). The younger Eratosthenian basalt of the *Em* unit also seems enriched in Th, and its lower Th content may be explained by an exposure to mixing effects during a shorter period.

References: [1] Haskin L.A. et al. (2000) *JGR 105*. [2] Jolliff, B.L. et al. (2000) *JGR 105*. [3] Lawrence D.J. et al. (2000) *JGR 105*. [4] Jolliff, B.L. et al. (2001) *LPSC 32*, #2143. [5] Korotev R.L. (2001) *LPSC 32*, #1134. [6] Lawrence et al. (2001) *LPSC 32*, #1830. [7] Whilhelms D.E. and J.F. McCauley (1971) *USGS map I-703*.

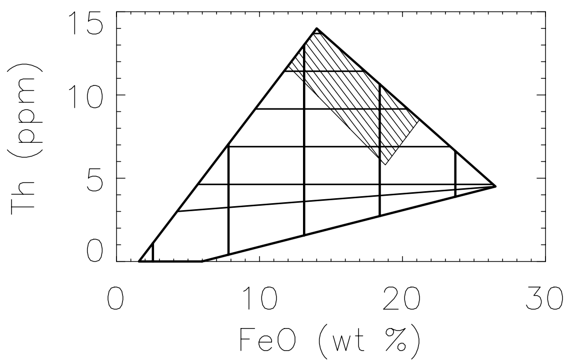

Figure 1. Vertical lines: entire Moon; horizontal lines: PKT; oblique lines: Apollo 12 & 14 region.

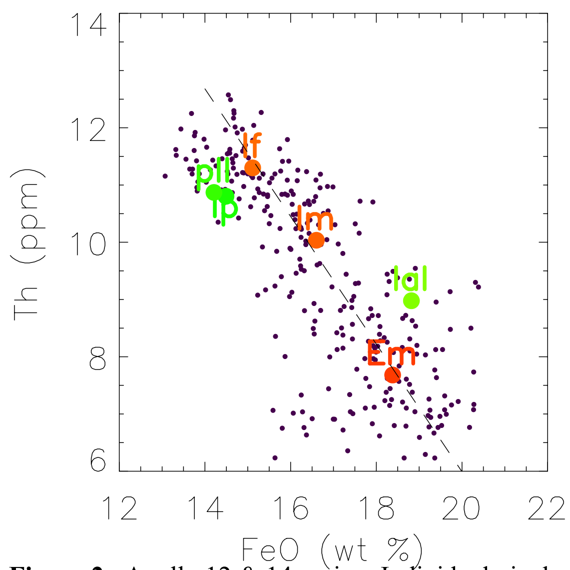

Figure 2. Apollo 12 & 14 region. Individual pixels are in purple. Orange points are mean values for the main formations: If, Im, Em. Green points are mean values of the other formations