**BASALT UNITS AND THEIR DISTRIBUTION IN MARE FECUNDITATIS.** D. Rajmon[1,2] and P. Spudis[2], [1]Department of Geosciences, University of Houston, Houston TX 77204-5503, USA, [2]Lunar and Planetary Institute, Houston TX 77058, USA (drajmon@bayou.uh.edu).

**Introduction:** Mare Fecunditatis occupies a pre-Nectarian impact basin (center: 0.7°S, 56.3°E; 690 km diameter) filled by ejecta from younger basins (Nectaris (oldest), Crisium, and Imbrium (youngest)). On this brecciated, highlands-composition, basement were deposited multiple basalt flows ranging from ~3.5–3.75 b.y. to 3.4 b.y. (Late Imbrian) age [1]. Identification of the individual flows and estimating the lava thickness in Mare Fecunditatis serve to constrain the magmatic and thermal history of the Moon [4].

**Method:** Mosaics of Clementine images were made covering Mare Fecunditatis, using the 415, 750, and 950 nm filters. The mosaics were used to generate "true" color and false-color images and Fe and Ti concentration maps [2,5]. False color image (R = 750/415, G = 750/950, B = 415/750) exaggerates color differences of individual units within the mare and allows the identification of individual geologic units. High Fe contrasts between mare basalt and highland substrate allows identification of craters that have penetrated mare basalt. Such craters served to estimate total basalt thickness in Mare Fecunditatis [3] and Tranquillitatis [6]. The same approach applied to Ti map allows to track vertical and lateral extends of different basalt units defined by their Ti content.

**Preliminary Results:** Titanium concentration of the soils of Mare Fecunditatis vary from 0 to 10 % $TiO_2$. This variation is caused in part by highland contamination (as indicated by Fe map) but also by variation in the flow composition. We currently distinguish five basalt units defined by $TiO_2$ content: T (8–10%), A (6–8.5%), B (4.5-7%), C (1.5–3.5%), D (0–1.5%). The boundaries between these units have a transitional character. It is often not clear whether a given area is a certain unit or a very thin extension of a neighboring unit. Ti-rich units appear to be younger than Ti-poor units, which is indicated by crater density and by craters that penetrated several basaltic units. Unit T forms only a few thin (max. a few tens of meters) patches in NE part of the mare. Unit A is also thin (a few tens of meters) and covers NE part of the mare and several patches throughout the mare. It is often associated with rills. Unit B is laterally extensive but thin (>20 m). Units C and D are exposed in marginal areas and in craters throughout the mare. It appears that these units are very thick (most of the total basalt thickness, which is ~$10^2$ m [3]) and continuously extending over most of the Fecunditatis basin.

We also find a further evidence for a very uneven basalt thickness distribution. The total thickness may change from a few tens of meters to a few hundred meters over a distance of a few kilometers.

**Implications:** After creation of the Fecunditatis basin the basin floor was modified by a number of large impacts, which generated a substantial relief on the floor. Volcanism in the basin then started with Ti-poor lavas. These lavas were voluminous and covered the entire basin. Chemical composition of the lavas was gradually evolving toward higher Ti content. After the $TiO_2$ content reached 5-6% the volume of produced lavas dropped dramatically and volcanism localized in a number of smaller volcanic centers (e.g. parts of previously active long linear vents). The volcanism eventually ceased with a small amount of Ti-rich lavas.

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