NEWLY IDENTIFIED POTENTIAL LUNAR PYROCLASTIC DEPOSITS. J.O. Gustafson[1], J.F. Bell III[2,3], L.R. Gaddis[4], B.R. Hawke[5], T.A. Giguere[6] and the LROC Science Team. [1]Dept. Earth & Atmospheric Sciences, Cornell University, Ithaca, NY 14853; [2]Astronomy Dept., Cornell University, Ithaca, NY 14853; [3]School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85281; [4]Astrogeology Program, U.S. Geological Survey, Flagstaff, AZ 86001; [5]Hawaii Institute of Geophysics and Planetology, University of Hawaii, Honolulu, HI 96822; [6]Intergraph Corporation, Kapolei, HI 96707.

Introduction and Background: Pyroclastic deposits have been recognized all across the Moon, identified by their low albedo, smooth texture, and mantling relationship to underlying features [1-3]. Localized pyroclastic deposits (LPDs) have been interpreted to form by the explosive release of pressure resulting from degassing of shallow magma intrusions [4]. Characterizing the frequency and distribution of such deposits will help constrain estimates of the concentration and distribution of volatile constituents in the lunar crust. At least 55 potential LPDs have been identified during previous studies (e.g. [5]). Lunar Reconnaissance Orbiter (LRO) camera data [6] are being used to search for dark mantle deposits of potential pyroclastic origin that have not been previously catalogued.

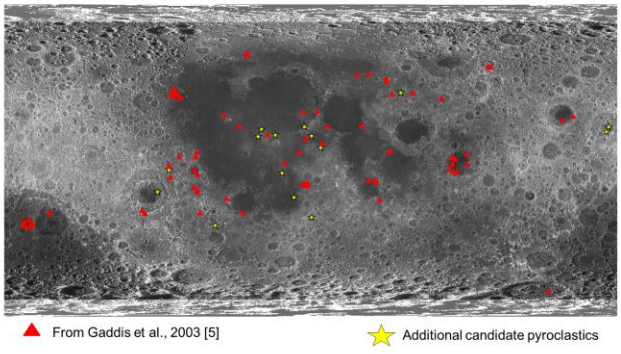
Methods: We examined LROC WAC and NAC images for dark deposits with morphologic indicators of pyroclastic origin, such as:

- mantle and subdue subjacent terrain
- exhibit diffuse margins
- do not embay adjacent topographic lows
- associated with rilles or possible vents

Results and Discussion: We have identified approximately 15 candidate deposits that we consider to be of "possible" or "probable" pyroclastic origin. "Possible" deposits generally have low albedo, lack sharp margins, and exhibit some evidence of mantling the local topography. In addition to these features, "probable" deposits typically either exhibit strong evidence of mantling or are associated with possible vents.

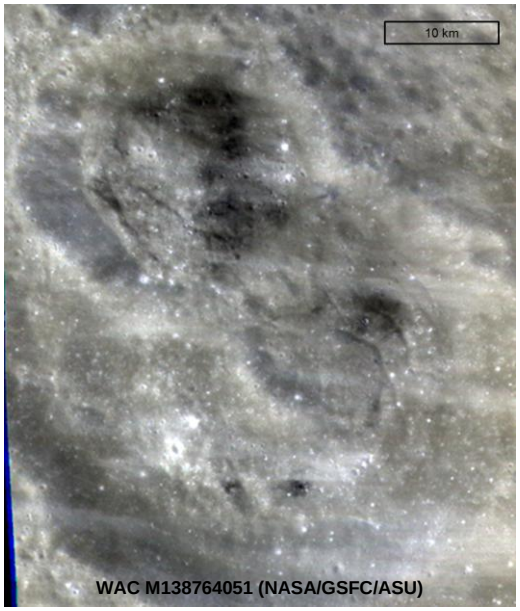
These potential newly identified pyroclastic deposits are located primarily on the near side, in both the highlands and the maria. The most common setting is either highlands adjacent to maria or within basalt-flooded highlands craters (Fig. 1). The deposits are usually found in areas exhibiting other evidence of volcanic activity (e.g. effusive deposits, rilles, domes, or possible vent structures). Suspected vents often appear as irregular depressions 1-2 km wide and 2-5 km long, although in some cases individual vents may be contained within larger depressions of possible tectonic origin. Two "probable" locations are the dark-halo craters and associated deposits within farside craters Anderson E&F (Fig. 2).

Fig. 1 - Previously cataloged locations of pyroclastic deposits and additional candidate locations



Conclusions and Future Work: An examination of LROC images has indicated that there are potential localized lunar pyroclastic deposits that have not been cataloged in previous surveys, most likely due to their small size or subtle features. Consistent with previous studies, they are concentrated on the near side, typically near the margins of basins and in floor-fractured craters. However, our survey has located probable LPDs within Anderson E&F on the lunar farside that are distant from previously known deposits. Cataloging deposits such as these is important for understanding the number and distribution of these volatile-driven pyroclastic eruptions.

Fig. 2 – Probable pyroclastic deposits in Anderson E&F



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