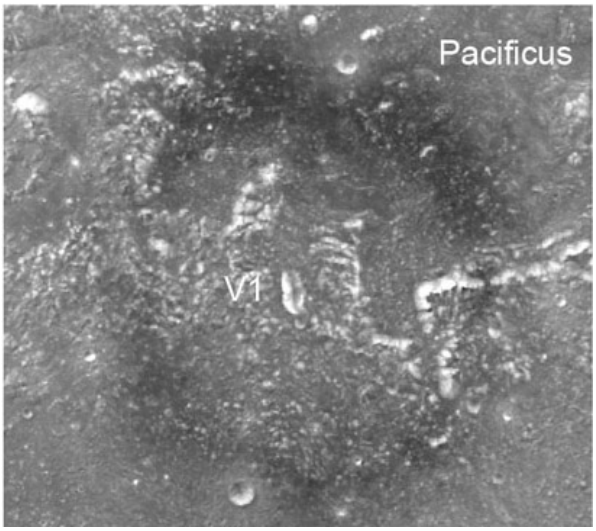
V IS FOR VENTS: CLOUD-SOURCING THE DISCOVERY, DESCRIPTION, DIMENSIONS AND DISTRIBUTION OF LUNAR V-VENTS. C.A. Wood[1], P. Leon[2], D. González[3], M. Zambelli[4], R. Hentzel[5], and M. Collins[6]. [1]Planetary Science Institute, 1700 East Fort Lowell, Tucson, AZ 85721 & Wheeling Jesuit University, Wheeling, WV, chuckwood@cet.edu; [2]ACHAYA, Casilla 3904, Correo Plaza de Armas, Santiago, Chile; [3]C/ Los Rosales 2, Soto de Llanera, 33423 Asturias, Spain; [4]29 Walmer Road, Newport, South Wales, UK; [5]12751 Foxhound Drive, Maryland Heights, Mo 63043; [6]10 Cargill Grove, Palmerston North, New Zealand.

Introduction: Although the Moon has extensive volcanic plains, a relatively small number of volcanic vents have been catalogued. Here we characterize a widespread class of vents that have short troughs, tapered ends and v-shaped cross-sections. The largest example is the vent at the center of the pyroclastic ring cutting the southern Cordillera Mountains of the Orientale Basin [1] That vent is 19.3 km long, 9.6 wide and 2.5 km deep. Despite the large number we have discovered (~200), this type of vent has not previously been recognized as a distinct class of feature.

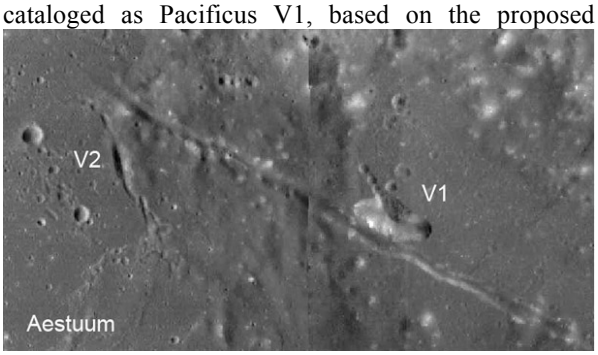
V-vents were discovered and characterized using a cloud-source approach by international volunteers who visit the Lunar Photo of the Day (2) blog. Wood checked random vent entries to insure consistency of types of features included and accuracy of measurements. We have detected 188 likely v-vents on the



Lunar Reconnaissance Orbiter mosaics available as QuickMap [3]. For each vent the following was determined: latitude, longitude, length, width, depth, certainty, notes and a link to an LRO close-up image. Our online catalog of v-vents is available at [4].

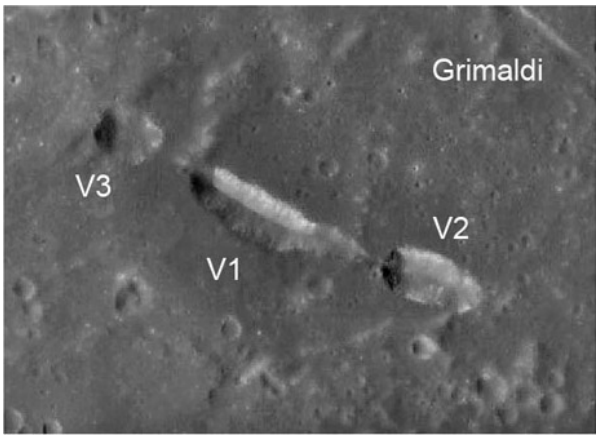
Vent Morphology: Identification of many vents is unambiguous because they have a characteristic morphology of a short tapered trough, and a v-shaped profile. Some vents occur at the heads of rilles or as wide spots in the middle of rilles. V-vents are morphologically similar to the often curved, scythe-like troughs that are the sources of some sinuous rilles such as the Hadley Rille. And v-vents are a different class of vent from the typically circular pits at the summits of lunar domes such as Kies Pi. The only landforms that may be confused with v-vents are short secondary crater chains. Usually this is not a problem unless the vent/chain is old, softened and not near obvious volcanic or secondary craters features. The catalog marks in red 14 entries that are more likely to be secondary craters than true vents.

Nomenclature: Because v-shaped vents typically do not have designations we denote them with the name of a nearby landform followed by the letter V and a number. Thus, the large vent mentioned above is cataloged as Pacificus V1, based on the proposed



Soviet name of Mare Pacificus for the ring of pyroclastics. Other familiar vents of this class include the 6.7 km long Aestuum V1, the source of the Aestuum pyroclastic deposit, and Grimaldi V1, V2 and V3 [5], just northeast of that crater.

Volcanic Origin of Vents: The volcanic origin of



v-vents is demonstrated by the observation that many vents – such as those pictured here - are sources of dark pyroclastic deposits. Vents that appear to be older, based on the lack of sharpness of their edges,

often do not exhibit dark mantling. Presumably all v-vents did erupt pyroclastics, and thus vents are markers for otherwise hidden deposits.

Dimensions: V-vents range in length from 0.5 to 22 km, and vary in depth from 5 m to 1 km, with averages of 4.4 km and 200 m. Vent widths average 37% of the lengths, and the depths are 5% of the lengths. The unusual Pacificus V1 vent is 2.5 km deep, much deeper than any other. If that depth were the eruption point, the 2.5 km rise to the surface may have collimated the up rushing pyroclastics, limiting the angles of ejection, resulting in a ring of deposition. All other vents apparently had eruption points much closer to the surface, allowing a wide range of ejection angles and spatially continuous deposition of particles.

Distribution: The adjacent three maps plot the locations of vents. The vast majority are along the edges of maria, similar to most other volcanic features such as sinuous rilles and floor-fractured craters. 35% of the vents are along rilles either as widenings or as sources. 28% have associated pyroclastic deposits. And 6% are within floor-fractured craters.

Most of the vents that appear to be away from maria are in or near local areas of lava.

Conclusions: V-vents are common and are distributed widely along edges of maria or within other lava patches. Pyroclastic deposits commonly surround sharp-edge vents and older ones may mark areas where such deposits were erupted but are no longer detected due to erosion.

About 1/3 of vents are associated with rilles either as the rille source or as a widening. These vents mark areas where explosive eruptions occurred, i.e., places where concentrations of gases occurred. Interestingly, a number of v-vents occur in floor-fractured craters (FFC), which are also the hosts for all volcanic dark-halo craters. These observations suggest that FFC are preferentially associated with explosive eruptions, i.e. for some reasons more gases are available in FFC environment than typical eruptions in maria. The occurrence of v-vents within both sinuous and linear rilles suggests that parts of rilles also are sites of more gas-rich eruptions than other places in maria.

References:

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