Table 6. Data for Determining the Peak-Ring Offset Direction and Magnitude[a]

Name	D_r	Lat_D_r	Lon_D_r	$D_{pr,fit}$[b]	Lat_$D_{pr,fit}$[b]	Lon_$D_{pr,fit}$[b]	Offset Distance (km)	Offset Azimuth (°)	Ring Elevation at Offset (km)[c]	Percentile[d]	Rim Elevation at Offset (km)[c]	Percentile[d]
Schwarzschild	207	70.3554	120.0916	61	70.0335	120.2059	9.83	173	-	-	0.84	0.90
D'Alembert	232	51.0543	164.8361	105	51.1668	164.6340	5.14	312	-	-	3.04	0.44
Bailly	299	−67.1813	−68.7959	134	−67.0459	−68.4476	5.81	45	−0.46	0.47	1.48	0.16
Schrodinger	326	−74.9047	133.5332	155	−74.7908	133.8736	4.38	38	−4.08	0.22	−1.79	0.11
Mendeleev	331	5.4436	141.1357	141	5.5547	141.5526	13.03	75	-	-	2.97	0.07
Korolev	417	−4.4430	−157.4701	201	−4.2140	−158.0561	19.03	291	4.25	0.60	7.03	0.33
Moscoviense	421	26.3355	147.3612	192	25.4982	146.4695	35.16	224	1.49	0.92	2.77	0.29
Apollo	492	−36.0934	−151.4845	252	−36.0985	−150.6966	19.31	91	-	-	0.10	0.72

[a]The diameters and center coordinates for circle fits to the rim crest [from *Baker et al.*, 2011a] (same as Table 1) and peak ring are shown for each basin. Also given are the offset distances and offset direction (i.e., azimuth), as well as the average elevations and the percentiles of the peak-ring and rim-crest elevations in the offset direction.

[b]Peak-ring diameter ($D_{pr,fit}$) in kilometers and center latitude (Lat_ $D_{pr,fit}$) and longitude (Lon_ $D_{pr,fit}$) of a small circle fit to the peak ring reference points for each basin.

[c]Ring and rim elevations were taken as an average over 10° of azimuth centered on the offset azimuth.

[d]The elevations of the peak ring and rim crest calculated as percentiles of the entire set of elevations for each basin.

interior or on its rim. While use of the median value and interquartile range should limit the influence of extrema in the calculated values, the highly irregular topography of the lunar highlands makes accurate determination of the target elevation difficult [*Pike*, 1976]. Apollo's rim-flank height is a negative value because the target surface is at an elevation that is generally greater than the rim-crest elevation (Table 3). This is largely due to Apollo's impact into the rim wall of South Pole-Aitken basin [*Garrick-Bethell and Zuber*, 2009]. Correcting for the regional slope caused by South Pole Aitken basin (section 4.5, Figure 8) still results in a negative value for the rim-flank height. This example suggests that pre-existing topography can highly influence determination of the rim-flank height even when corrected for regional slope. Calculating the rim-flank height for basins on the Moon is thus inherently difficult, and an improved technique for measuring this parameter is needed if its value is to be calculated accurately. Due to the highly variable nature of our rim-flank height measurements, we do not attempt to identify unique trends in the data but rather suggest that rim-flank height for protobasins and peak-ring basins may be roughly estimated by an extension of the *Pike* [1977] trend to peak-ring basin diameters.

5.3. Wall Width (*W*), Height (h_{wall}) and Slope (*S*)

[41] Other important geometric parameters deal with the crater wall. Measurements for the wall height and width were not explicitly included in the lunar crater catalog of *Pike* [1976]; however, wall slope was calculated, plotted as the tangent of the slope of the rim wall [*Pike*, 1977]. Since wall slope (*S*) is directly calculated from the values for wall width (*W*) and wall height (h_{wall}), we begin with a discussion of the trends for these two parameters as a function of rim-crest diameter.

5.3.1. Wall Width (*W*)

[42] Wall width is observed to increase in a well-defined manner as a function of rim-crest diameter for peak-ring basins and protobasins (Figure 9e). This increase in wall width is expected due to the increase in gravitational instability of the rim, which results from increased energy of impact, a deeper excavation cavity, and subsequent increase in gravitational potential and slumping of the rim wall. Interestingly, the ratio of the wall width to the crater radius (W/r_r), indicates a general decreasing trend with increasing rim-crest diameter (Figure 10e). A consequence of this trend is an associated increase in the fraction of floor material with increasing rim-crest diameter (i.e., increasing r_{floor}/r_r ratios) (Figure 10f). These observations are in line with previous observations that noted that flat floors in fresh craters >20 km in diameter comprise increasingly larger fractions of the crater interior, or rim-crest diameter, with increasing crater size [*Pike*, 1977]. Wall widths decrease from ∼30% to ∼17% of the rim-crest radius from protobasins to the largest peak-ring basins (Figure 10e), with an accompanying increase in the radius of the floor from ∼70% to ∼83% of the rim-crest radius (Figure 10f). In summary,

Figure 10. Log-log plots of the ratios of derived parameters for protobasins (dark gray squares, A = Antoniadi, Cm = Compton, H = Hausen), peak-ring basins (black circles), and the rings of Orientale basin (light gray diamonds, IR = Inner Rook, OR = Outer Rook, C = Cordillera) (Table 5). All parameters are plotted as a function of the rim-crest diameter, as reported by *Baker et al.* [2011a]. Data points are median values. Error bars are not plotted for clarity, as these can be very large due to the highly variable nature of the calculated parameters (Figures 6 and 7). The heavy dashed lines show qualitative trends interpreted from the data. (a) Basin depth (*d*) to rim-crest diameter (D_r) ratio slightly decreases with increasing rim-crest diameter. The ratios for the rings of Orientale plot below an extrapolation of the peak-ring basin trend. (b) Peak-ring height to depth ratio increases for peak-ring basins. This trend is not maintained for Orientale basin. (c) Wall height to depth ratio decreases for peak-ring basins; however, the scatter in the data and subtly of the trend could also be consistent with a flatter trend. The rings of Orientale have very small ratios compared to peak-ring basins. (d) Floor height to depth ratio increases with increasing rim-crest diameter, with the trend extending to Orientale basin. (e) Wall-width to rim-crest radius ratio decreases due to possible masking of the toes of rim-wall slump blocks by impact melt. (f) Floor radius to rim-crest radius ratio increases with increasing rim-crest diameter, consistent with the trends observed within complex craters [*Pike*, 1977].