AN EXAMINATION OF CRATERS IN THE ORIENTALE BASIN

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The new resource of the LROC images has allowed the possibility of new research throughout the lunar field, particularly on the far side of the moon where images had been previously unreliable due to low quality. Using these new images, we chose a data pool that had been previously data poor and was expanded by the LROC mission. The Orientale basin offered an ideal location to investigate craters with remarkable features or characteristics. With the new imagery, we intended to further scientific knowledge by investigating an area that had been previously unavailable and uninvestigated.

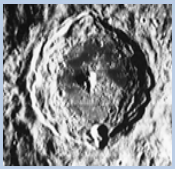
Schluter

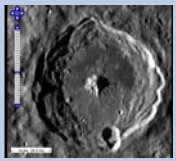
Observations

Schluter is a large complex crater with significant impact melt and an odd wall structure. The crater also contains a large amount of normal faulting which appears to skirt the peaks perimeter.

Hypothesis

We hypothesize that the wavy pattern pressed on the crater walls is a result of the cooling and contracting which eventuated the slumping collapse of said walls. Additionally the cooling and contraction caused the majority of the faults present. The shape of the faults can be explained by the forces involved in their formation. The skirting of the peak by the fault was caused as the rock contracted, pulling towards a point of strength: the crater's peak.





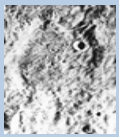
Hartwig

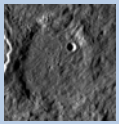
Observation

Between the "parent" crater and Hartwig A, there is great difference in weathering due to crater impacts.

Hypothesis

There is a discrepancy in age as seen in the difference in crater density and texture. It is highly unlikely that Hartwig A is contemporaneous with its supposed "parent" crater, let alone its secondary. It is far more likely that an impactor completely independent of the Hartwig event came later, and only happened to coincide geographically, causing it to be misnamed.





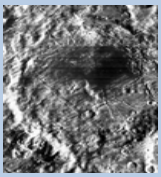
Riccioli

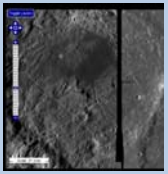
Observations

It is a crater without a central peak that also exhibits extensive weathering. This is shown by the excessive faulting and has a high crater density. Additionally it is filled with non-impact generated basalt.

Hypothesis

In order to exhibit this kind of localized basaltic filling in an area where one would expect to find a central peak in a crater of this size, it is hypothesized that a second, unrelated impactor could have caused a crater, overlapping and destroying Riccioli's central peak as well as providing low ground for the basalt.





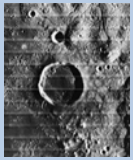
Kopff

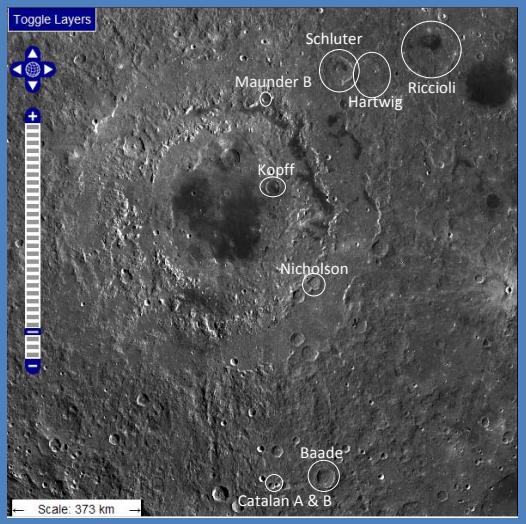
Observations

Kopff is a large crater found in the Orientale impact basin that is both filled with, and surrounded by, mare basalts. Additionally, this crater appears to lack any ejecta.

Hypothesis

In order for this crater to have not been annihilated by the Orientale impact, this crater must have arrived after the impact occurred, but while the basin was volcanically active. A lull in activity could have allowed the mare basalt time to sufficiently solidify for the Kopff impactor to arrive and create its resulting crater. This crater was then filled with basalt and its object obscured by later volcanic activity.





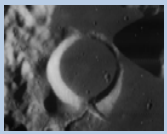
Maunder B

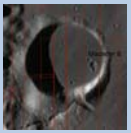
Objective

Maunder is a large, relatively unweathered crater found in the central region of the Orientale basin. Maunder B, unlike its "parent" crater, does not have superposition on the mare basalts and has been unevenly filled in relation to its rim.

Hypothesis

The fact that Maunder and its secondary crater do not have the same positioning in relation to the basalt repudiates the claim that Maunder B is in fact a secondary of Maunder. It is hypothesized that Maunder B predates the Orientale impact and that the reason for its uneven filling of basalt is because of the valley formed between the two areas of uplift later cause by the Orientale impact. The flood basalts then followed this valley and eventually partially filled the crater.





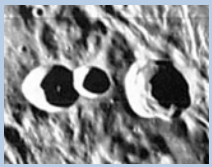
Catalan

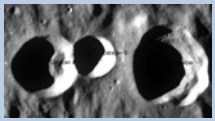
Observations

Catalan's secondary craters, Catalan A and Catalan B, are large overlapping craters that are close in proximity and size to their "parent" crater. In addition, there is a large kidney-shaped deposition in the western portion of Catalan B.

Hypothesis

Based on both the proximity and size of both of the supposed secondary craters, it is unlikely that they are actually secondary of Catalan. The configuration can be explained if Catalan B came in first, and then Catalan A came in, partially overlapping it and its ejecta, causing the kidney shape in the western portion of Catalan B.





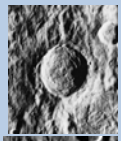
Baade

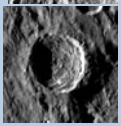
Observations

Baade is a large crater having a diameter approaching 55km that lacks a central peak and has widespread slumping.

Hypothesis

Its almost perfect hemispherical nature and its lack of a central peak can be explained by the large volume of material that has slumped into the center of the crater, obscuring its central peak.





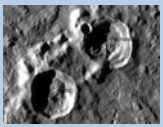
Nicholson

Observations

Nicholson exhibits extensive slumping of its crater wall due its steep slope, which appears to be anomalous in its northeastern edge. An additional interesting feature of the crater is the ridge-like object that overlaps its rim.

Hypothesis

We hypothesize that the crater existed before the Orientale impact and subsequent uplift. This uplift of the Les Montes Rook could be the cause of both the slope anomalies and the ridge feature by claiming that the rook continues on the northern edge and that the ridge feature was in fact a mountain caused by the same event.



Conclusion:

We conclude that with the new resource of the LROC images, it is possible to reevaluate currently held theories about many craters throughout the moon and arrive at a different conclusion than previous investigations. This new resource also allows new avenues of investigation into the chronology of the formation of craters where there are previously unknown, or overlooked, opportunities for furthering scientific knowledge.

Future Directions:

The nomenclature of the moon must be revised. The decisions made in respect to secondary or lettered craters were rushed and flawed. However, until the LROC mission and the images it sent back to Earth, they were the best that could be done economically. Now, with this resource and the research that we have conducted with it, it is obvious that revision is necessary, and for the first time able to be done on such a large scale that is worthwhile and cost effective to once again attempt a large scale analysis of craters and there formation chronologies.

Works Cited

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