



A New Look at Copernican and Eratosthenian Crater Populations on the Moon

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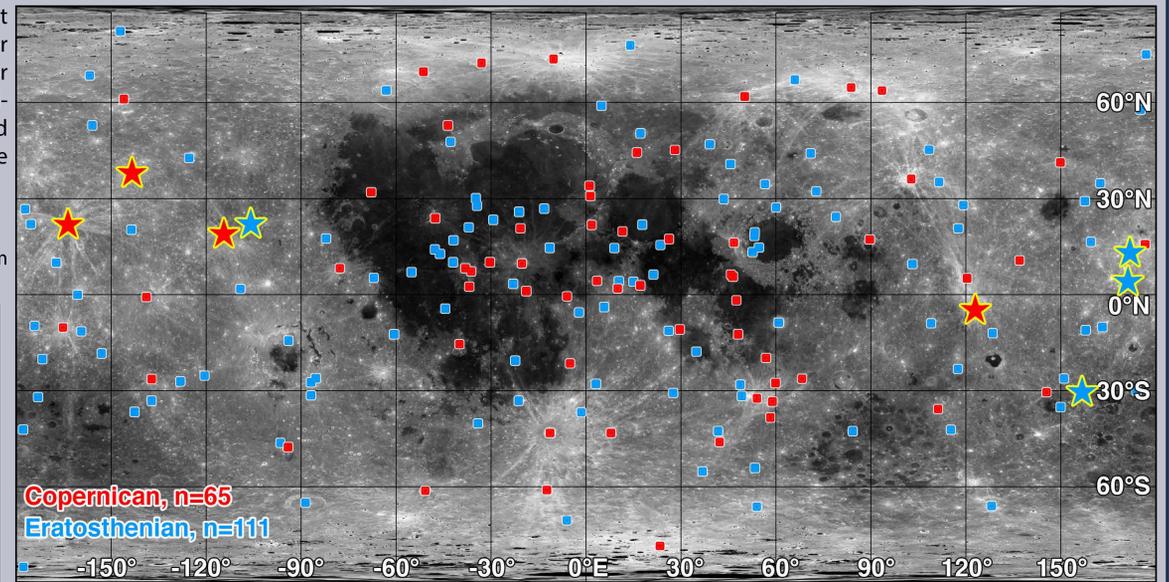
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Motivation Identifying and characterizing young impact crater populations is key to improving the understanding of the recent geological history of the Moon, as well as the rate at which impact craters degrade and the lunar regolith evolves. Investigating impact craters from the two youngest lunar geological epochs (the Copernican and Eratosthenian) with recently acquired lunar mission data enables re-assessment of the accepted age classification scheme for these crater populations [1,2]. In addition, the higher resolution and increased geographic coverage of recent datasets enables craters to be classified to smaller diameters than previously possible, thus improving local stratigraphic assessments and characterization of these young crater populations on the Moon. Here, we present a progress report on our efforts to date.

Distribution of named impact craters ≥ 10 km in diameter and assigned a Copernican or Eratosthenian chronostratigraphic age [1,3-5] included in our assessment. Stars are examples shown below.

Basemap is LROC WAC 643 nm normalized reflectance [6].



Four Lunar Reconnaissance Orbiter datasets used are highlighted in this poster.

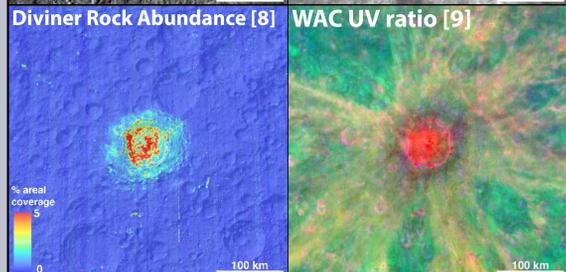
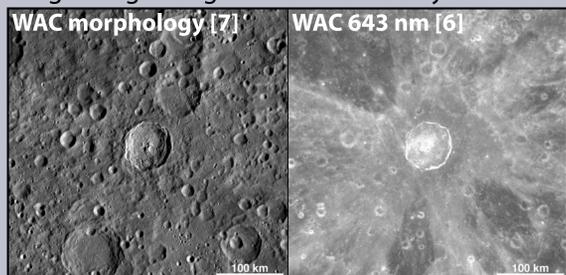
- ✪ **LRO WAC morphology mosaic** [7] facilitates observations of crater morphology (e.g., presence of impact melt).
- ✪ **LRO WAC 643 nm normalized reflectance mosaic** [6] enables observations of variations in surface reflectance and is particularly useful for identifying and mapping crater ejecta rays.
- ✪ **Diviner Rock Abundance** [8] is the rock fraction versus fine grain soil based on day to night comparison; younger craters with blockier ejecta and interiors typically have higher rock abundance values [e.g. 10].
- ✪ **LRO WAC UV ratio mosaic** (R=415 nm, G=321/415 nm ratio, and B=321/360 nm ratio) [9] measures the effects of space weathering on the lunar surface; these ratios are compositionally dependent and have subtle variations due to maturity differences.

COPERNICAN CRATER EXAMPLES

JACKSON

~71 km diameter (22.050°N, -163.319°E)

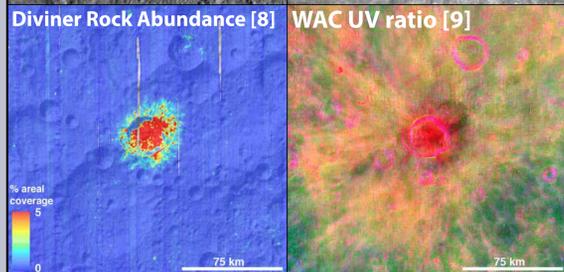
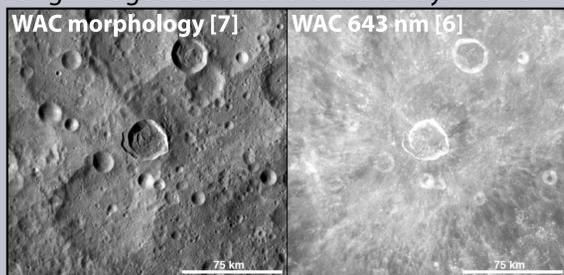
Originally classified as **Copernican** in age by [1].
Original age assignment validated by this work.



NECHO

~37 km diameter (5.248°S, 123.244°E)

Originally classified as **Copernican** in age by [1].
Original age assessment validated by this work.

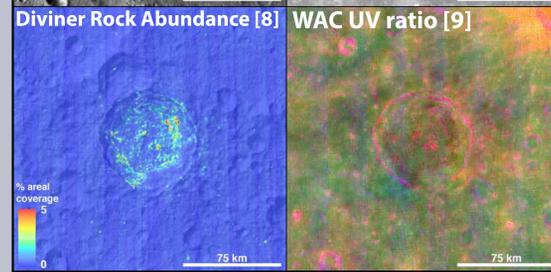
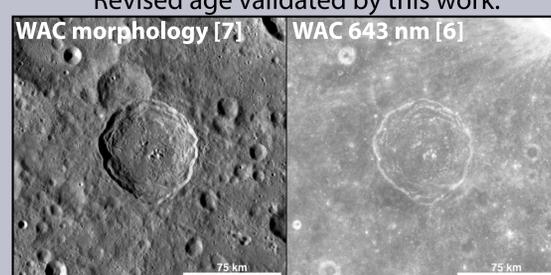


ERATOSTHENIAN CRATER EXAMPLES

SHARONOV

~75 km diameter (12.373°N, 173.099°E)

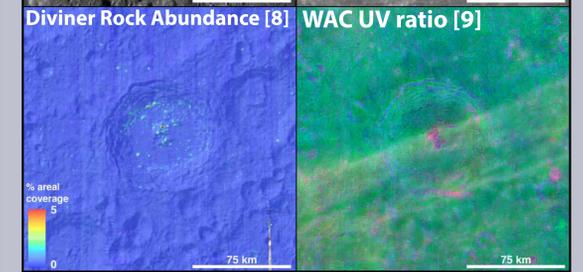
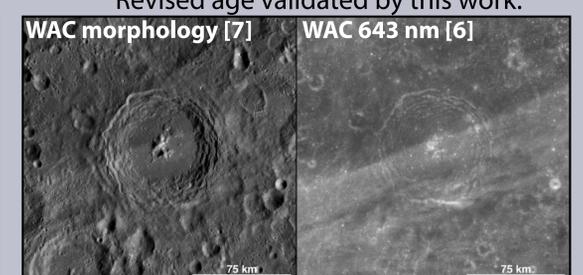
Originally classified as **Copernican** by [1],
later revised to **Eratosthenian** [3].
Revised age validated by this work.



ROBERTSON

~90 km diameter (21.841°N, -105.365°E)

Originally classified as **Copernican** by [1],
later revised to **Eratosthenian** [3].
Revised age validated by this work.

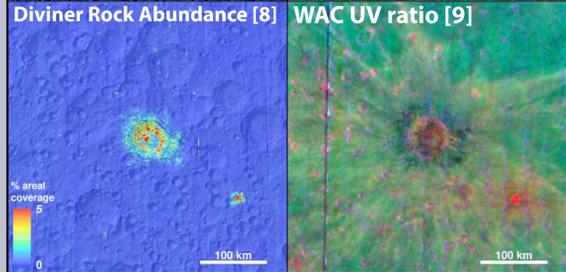
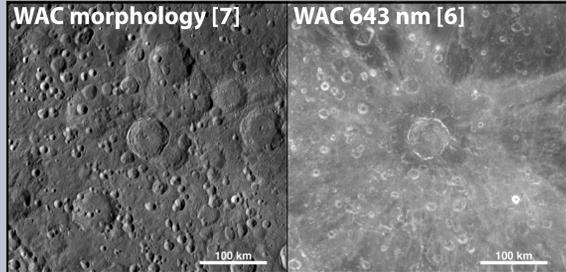


OHM

~62 km diameter (18.320°N, -113.776°E)

Originally classified as **Eratosthenian** by [1],
later revised to **Copernican** [3].

CONFIRMED Copernican by this work.

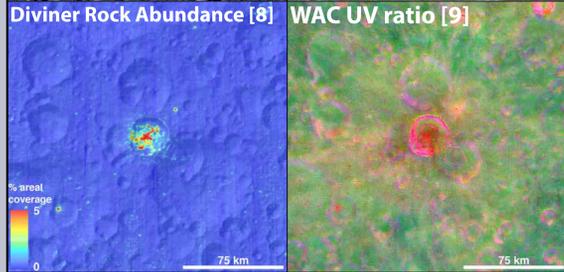
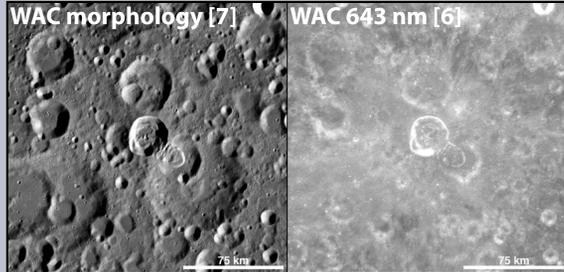


KLUTE W

~31 km diameter (37.983°N, -143.309°E)

Originally classified as **Eratosthenian** by [1];
identified as "**Possibly Copernican**" by [3].

CONFIRMED Copernican by this work.

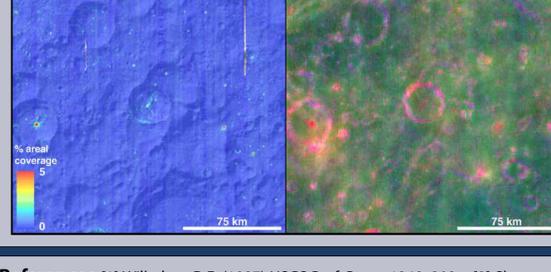
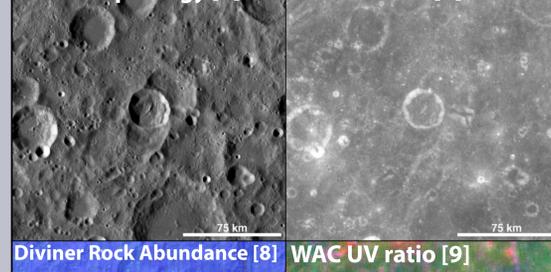


CORIOLIS Y

~31 km diameter (3.573°N, 170.959°E)

Originally classified as **Copernican** by [1],
later revised to "**Probably Eratosthenian**" [3].

CONFIRMED Eratosthenian by this work.

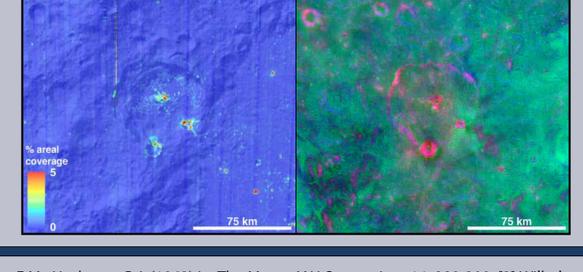
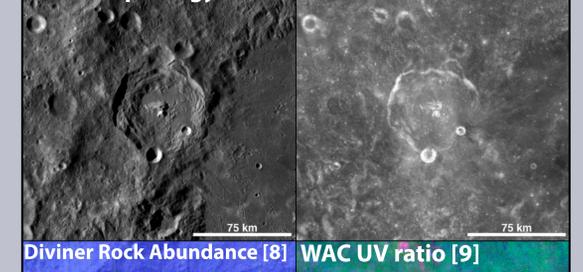


O'DAY

~70 km diameter (30.424°S, 157.293°E)

Originally classified as **Copernican** by [1],
identified as "**Possibly Eratosthenian**" by [3].

CONFIRMED Eratosthenian by this work.



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References [1] Wilhelms, D.E. (1987) USGS Prof. Paper 1348, 302p. [2] Shoemaker, E.M., Hackman, R.J. (1962) in: The Moon-IAU Symposium 14, 289-300. [3] Wilhelms, D.E., Byrne, C.J. (2009) <http://www.imageagain.com/Strata/StratigraphyCraters.2.0.htm>. [4] Losiak, A. et al. (2009) LPS 40, abst. 1532. [5] Ohman (2015) <http://www.lpi.usra.edu/lunar/surface/index.shtml>. [6] Boyd, A.K. et al. (2013) AGU Fall Meeting, P13B-1744. [7] Speyerer, E.J. et al. (2011) LPS 42, abst. 2387. [8] Bandfield, J.L. et al. (2011) JGR 116, E00H02. [9] Denevi, B.W. et al. (2014) JGR Planets 119, 976-997. [10] Ghent, R.R. et al. (2014) Geology 42, 1059-1062.