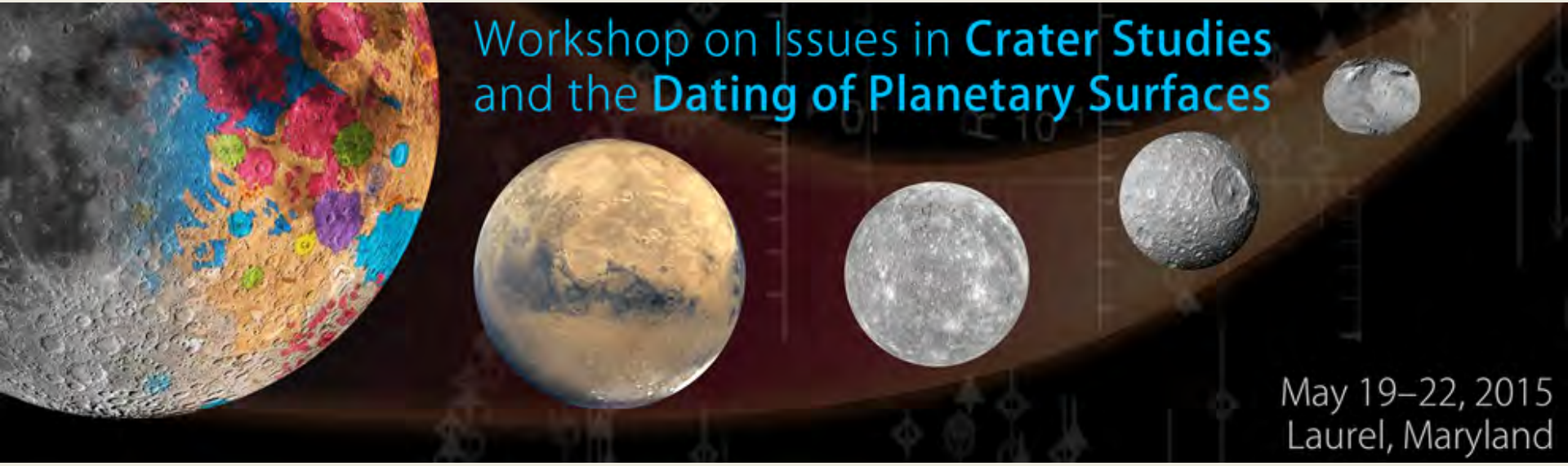
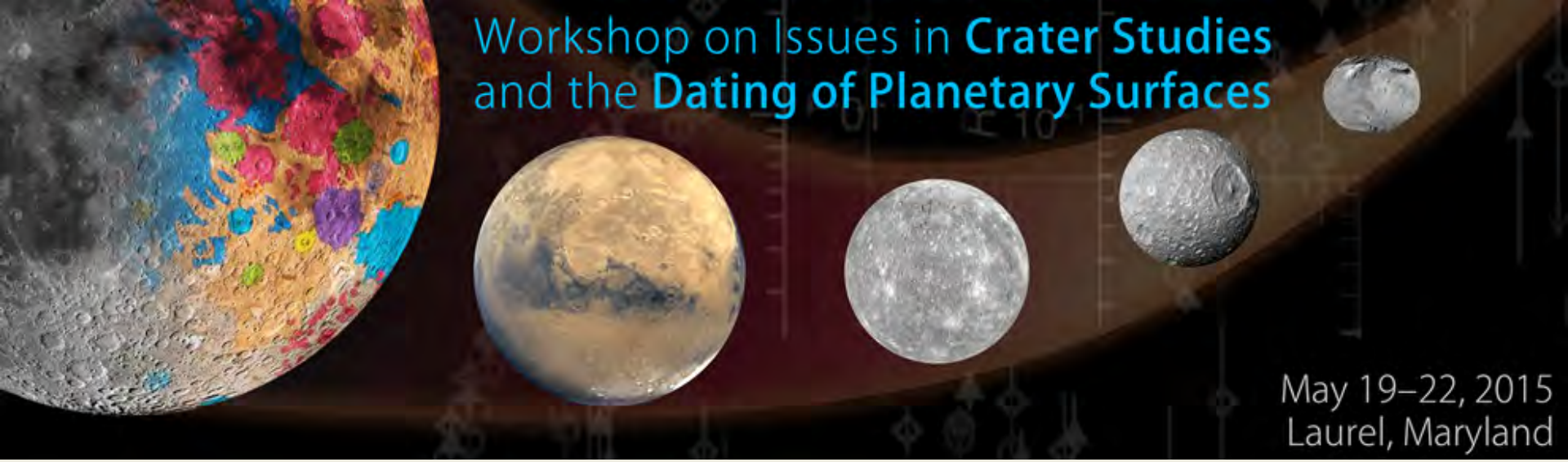
Report on the



Significance to Lunar Investigations

L.R. Ostrach, S.J. Robbins, F.S. Anderson, N.G. Barlow, J.W. Head, J.B. Plescia, and the Crater Workshop Participants

20 October 2015 – LEAG Annual Meeting



Primary goals:

- Discussion and improvement of understanding of impact crater data and interpretations
- Application/use of statistical tools in context of crater measurements (e.g., age derivation)

ICARUS 37, 467–474 (1979)

Standard Techniques for Presentation and Analysis of Crater Size–Frequency Data

CRATER ANALYSIS TECHNIQUES WORKING GROUP[1]

Received June 15, 1978

In September 1977, a crater studies workshop was held for the purpose of developing standardized data analysis and presentation techniques. This report contains the unanimous recommendations of the participants. This first meeting considered primarily crater size–frequency data. Future meetings will treat other aspects of crater studies such as morphologies.

Map-projection-independent crater size-frequency determination in GIS environments—New software tool for ArcGIS

T. Kneissl *, S. van Gasselt, G. Neukum

2011

Planetary surface dating from crater size–frequency distribution measurements: Multiple resurfacing episodes and differential isochron fitting

G.G. Michael

2013

The variability of crater identification among expert and community crater analysts

2014

Stuart J. Robbins [a,*], Irene Antonenko [b,c], Michelle R. Kirchoff [d], Clark R. Chapman [d], Caleb I. Fassett [e], Robert R. Herrick [f], Kelsi Singer [g], Michael Zanetti [g], Cory Lehan [h], Di Huang [h], Pamela L. Gay [h]

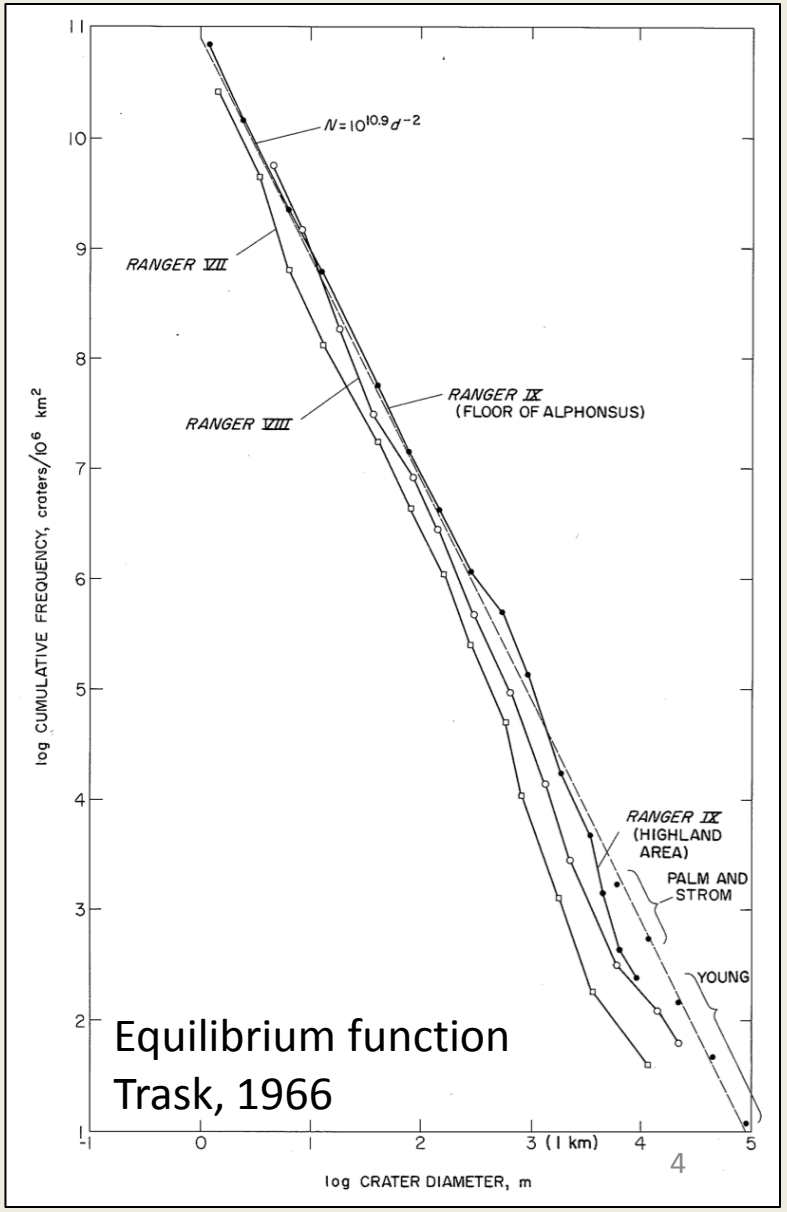
Key Findings (1): Crater déjà vu

Some of today's difficulties = "yesterday's" (earlier), unresolved problems

- e.g., "gray material," incl. UofA LPL reports; JPL Technical Reports

<u>Recommendation</u>

New review papers of current knowledge, outstanding questions: MAPS special issue, est. Aug. 2016



Key Findings (2): Community Outreach

Tips, tricks, accepted practices, and limitations not always described well in the literature

- e.g., uncertainties in measurement techniques, absolute *model* ages

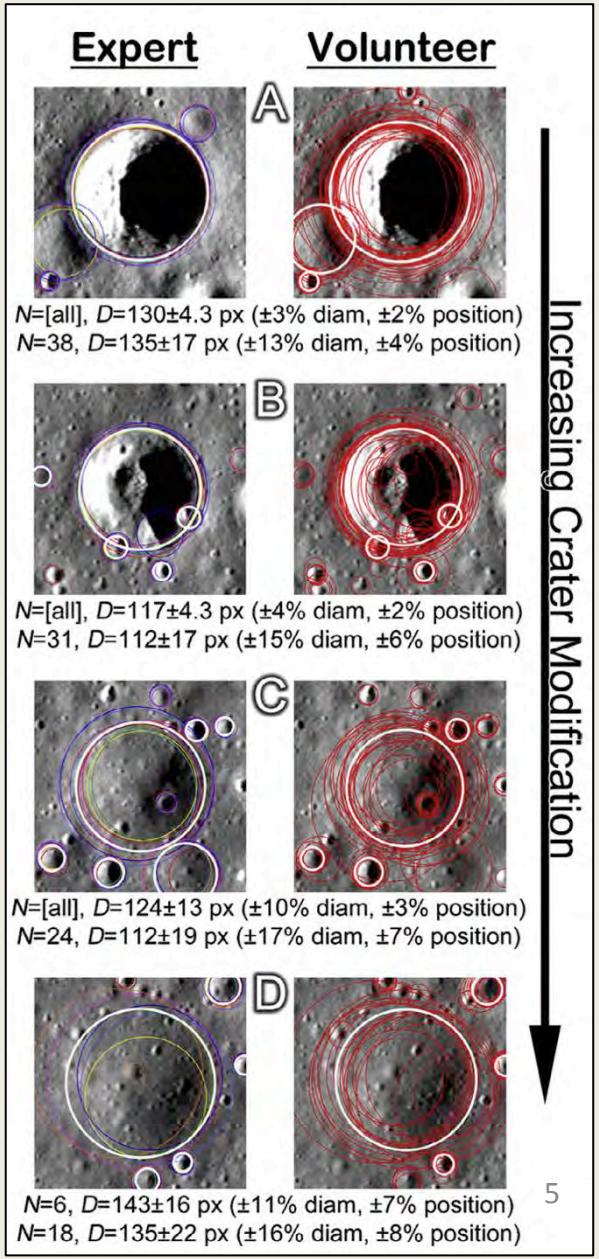


Fig. 1, Robbins et al., 2014

<u>Recommendation</u>

Educational opportunities – in-person and online workshops – to present accepted "best" practices.

- Best venues? Format? Topics?

Key Findings (3): Not simply “crater counting”

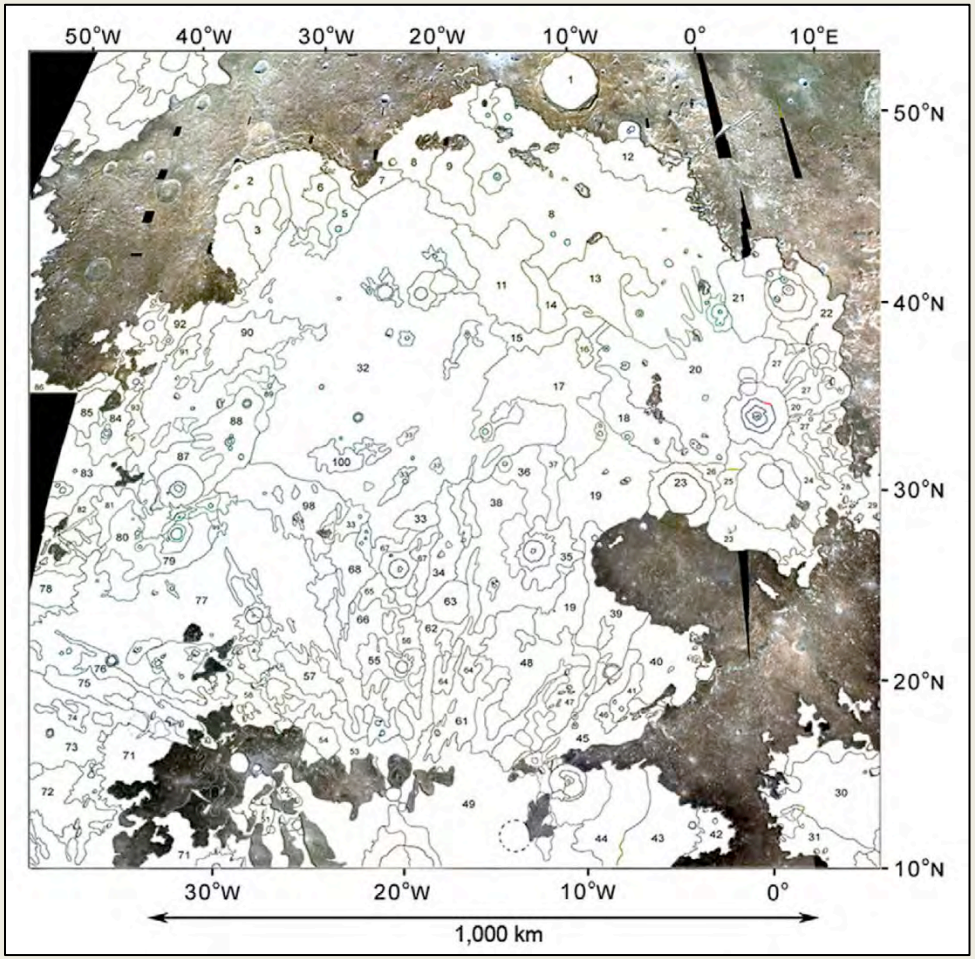
Interpretation of crater data requires geologic context

- e.g., age determination requires identification of: a single geologic unit, possible secondaries, etc.

<u>Recommendation</u>

Use “your” geologic knowledge and critical thinking!

– minimum requirements to be discussed in review paper



102 potential flow units mapped using Clementine; Fig. 3, Bugiolacchi & Guest, 2008

Key Findings (4): Statistics, computers, and standards = welcome!

Advances in measurement and statistical techniques may provide new understanding, (more) realistic estimates of uncertainties

- e.g., binning, uncertainty estimates based on 1979 CATWG

Modern computers and more data!

- Sampling, "repeatability" vs. "reproducibility," personal bias/error can be determined

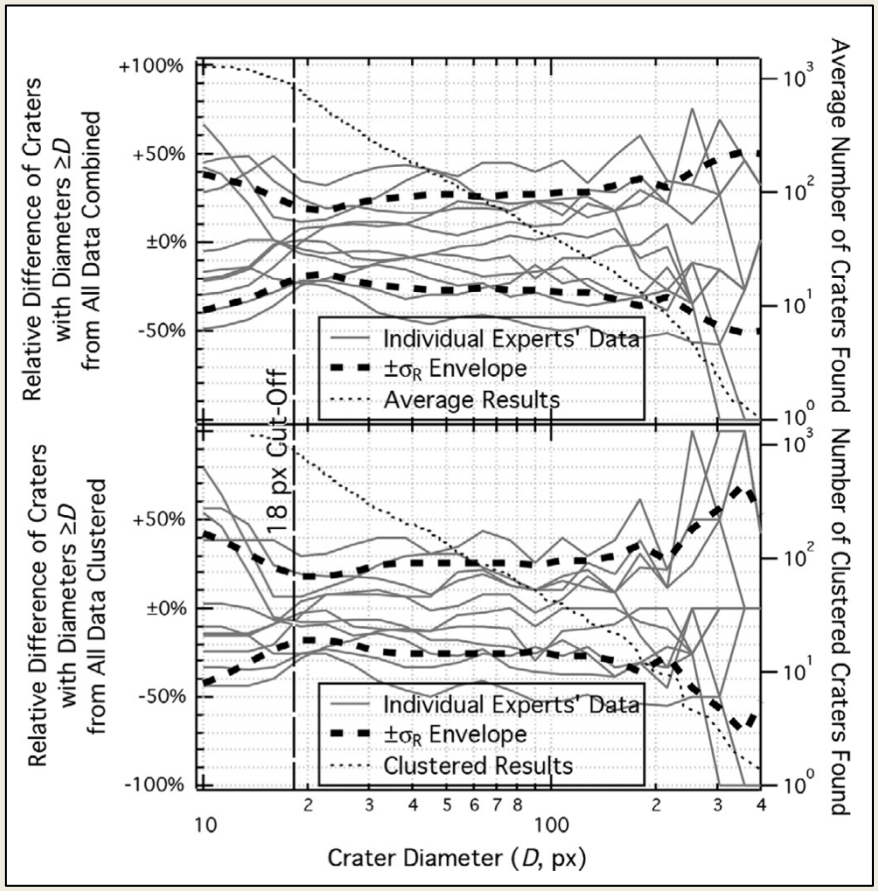


Fig. 3, Robbins et al., 2014

Recommendation

Development of crater counting standards and continued development/application of modern statistical methods

- collaboration with statisticians

Key Findings (5): Need more samples! <3 Ga! 4+ Ga!

Everyone in the room knows this statement to be TRUE.

'nuff said.

<u>Recommendation</u>

ONLY way to address uncertainties = *new* samples (yes, we all agree!)

– multiple terranes, addressing both age gaps

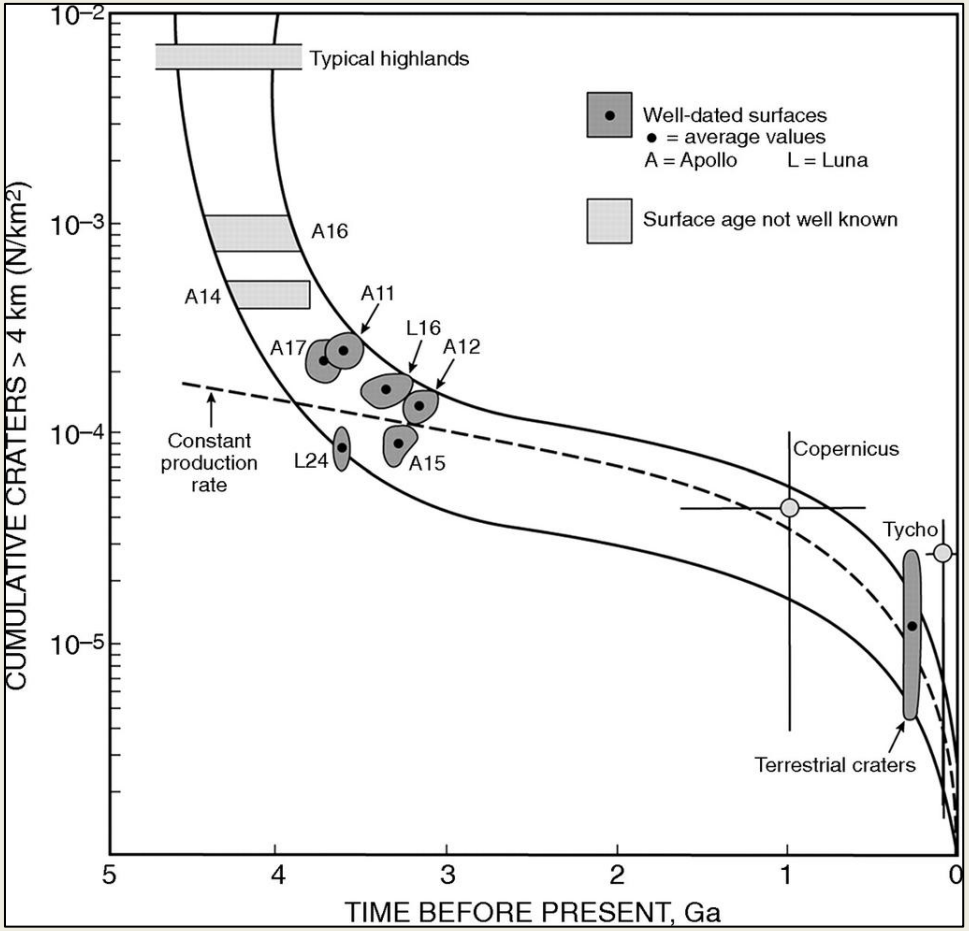


Fig. 4.15, Hörz et al., 1991

Input from LEAG desired!

★ Interested in contributing to review papers?

★Ideas about proposed educational opportunities/workshops?

★Got statistical skills?

★Just want to know more about crater counting tips, tricks, traps?

Gene Shoemaker's rock hammer!

Contact me! lillian.r.ostrach@nasa.gov

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