International Astrostatistics Association

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IAA Newsletter – August 2016

9 August, 2016

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Members of the IAA,

With announcements of upcoming astrostatistical and astroinformatics conferences and workshops being posted on ASAIP and on the IAA website we do not generally need to have monthly Newsletters, although it will depend on events. In addition, Eric Feigelson and I have been issuing periodic ASAIP blog announcements, which in part have focused on newly posted items on ASAIP that may not be noticed when first signing on. I wish to remind you to check the websites to obtain updated information on conferences, workshop, books, related journal articles, and general IAA News.

An ever growing number of astrostatistically and astroinformatically (A&A) related articles are being published in the major astronomy journals. I have noticed several over the past few months being published by IAA members in *MNRAS*, as well as *Astronomy and Computing*. We'll try to post references to them. If you have (co)authored an Astrostatistics & Astroinformatics related journal article, white paper or book please let me know and we'll get the citation listed. Let me know also if you have a URL or a site for which IAA members can access an abstract or even a full PDF of the work. Statistics books and articles are welcome as well if you believe that they are relevant to astrophysical research. Joseph Hilbe <hilbe@asu.edu><j.m.hilbe@gmail.com>

One of the IAA goals is to find funding to support a Distinguished Lecture in Astrostatistics or Distinguished Lecture in Astroinformatics. An IAA member would be selected to present the Lecture at the IAU General Assembly (every 3 years), or at the ISI World Statistics Congress (every 2 years), or at the Joint Statistical Meetings of the American Statistical Association (JSM, every year), or at the

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TWITTER

I have established a new twitter address so that I can update those who are interested of any immediate news I may have related to astronomy or statistics – workshops, new books, journal articles, white papers or software that might be of interest to you (I'll send the URL or information on how to get it). Also other items which I think might be of interest to most followers. The address is @JosephHilbe.

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summer AAS or RAS conferences (every year), or some combination of conferences. I intend to ask the IAA Council to establish criteria and guidelines for the Lecture by 1 November of this year. We will discuss such a Lecture with the new IAU commission on Astroinformatics and Astrostatistics (for the IAU), with the A&A working group of the AAS, and committee on astrostatistics for the ISI. I am confident that we can find an outstanding forum, or fora, for the Lectures. What we do need, though, is funding to support the travel, lodging, and registration fees (if not waived) for the awarded Lecturer.

I will be working to find such support in the coming months, but many of you may have more knowledge than I of sources of such funding. A corporate sponsor for the Lecture would be ideal. Your help in identifying or securing a sponsor or a funding agency for this purpose, as well as for other goals, will be extremely helpful.

I believe that to have such a Lecture be presented on a regular basis at IAU, ISI, or other major astronomical or statistical conference can be of substantial benefit for our discipline. There are still many university astronomy departments and research groups that are not convinced of the worth of statistics to the astronomical sciences. Having a quality Lecture advertised and presented at a major astronomical or statistical convention on a yearly basis can help bring more notice of the importance of our discipline to astronomy and astrophysics.

I look forward to hearing from any of our members who can help us identify sponsorship for this Lectureship, as well as for other IAA activities.

URLs to record

IAA MAIN ADDRESS
http://iaa.mi.oa-brera.inaf.it/

IAA NEWSLETTERS & AWARDS DIRECT
http://www.brera.mi.astro.it/IAA/

IAA FACEBOOK WEBSITE <managed by Emille Ishida>
https://www.facebook.com/InternationalAstrostatisticsAssociation/

CAMBRIDGE UNIVERSITY PRESS WEBSITE FOR IAA AWARDS SPONSORSHIP
http://www.cambridge.org/us/academic/international-astrostatistics-association-award-winners/

ASAIP PORTAL
https://asaip.psu.edu

IAA SECTION NEWS

3rd Cosmological Initiative (CORE) Workshop

The third IAA CORE program workshop is to be held in Budapest, Hungary from 21-28 August, 2016. Participants reside at the workshop and collaborate on cosmologically related projects throughout the week. The goal is to produce interesting and substantial journal articles related to group selected study projects. In past workshops some four to five journal articles resulted from each. In addition, several published software packages were developed. These workshops have been very focused and productive.

A description of the upcoming COIN workshop is on the IAA website, in the **Meetings and Events** module. Go to the IAA website at
http://iaa.mi.oa-brera.inaf.it/ , or
http://iaa.mi.oa-brera.inaf.it/adm_program/index.php

and sign-in. Then click on **Meetings and Events** and access the COIN announcement. All of the relevant information and websites are provided, as well as information on past workshops. IAA VP for Development **Rafael de Souza** chairs the workshop. You can reach him at *rafael.2706@gmail.com*.

The COIN workshop has the following URL: http://iaacoin.wixsite.com/crp2016
COIN also has a twitter address at *@iaa_coin* and Instagram at *iaa.coin.*

Solar Physics and Planetary Sciences Section

Jamie Riggs <jamie.riggs@northwestern.edu>

Impact craters and their morphological properties are used inform planetary scientists of the surface characteristics (strength, e.g.), surface age, and collectively across the solar system's planets and moons, when different kinds of activity were active on these bodies. Asteroids are considered the primary cause of impact craters inside the asteroid belt, with comets playing a the primary role beyond the asteroid belt. The principal measurements of impact craters are the diameter (size) and quantity by diameter (called size and frequency) within a given region, with the regions being local to global.

While a casual examination of determining the size and frequency of impact craters within a given region seems straightforward, conscientious investigation into the processes of size measurements and crater counting quickly reveal the difficulties and often contentious issues associated with these processes. For example, choosing the points around a crater rim to determine its diameter is often subjective. Processes such as lava flows can obscure portions of an individual crater which forces researchers to subjectively decide whether to count what is visible as a crater. Detector resolution (film granularity or pixel coverage) affects both diameter measurements and the choice of counting size limits.

Early lunar and Martian space probe image research led to a seminal paper by planetary scientists recommending how the planetary science community should apply various statistical methods to provide a common ground for reporting research findings. However, these recommendations were and still are subject to interpretive application, thus resulting in much of the current statistical applications controversies within the planetary science community.

Jamie Riggs began working with planetary scientists, primarily with Stuart Robbins, first of the Laboratory for Atmospheric and Space Physics, at the University of Colorado, Boulder, CO, and later at the Southwest Research Institute (SwRI), Space Sciences Division, Boulder, CO, on a number of crater issues related to spatial statistics applications. Stuart began research into statistical best practices, and recruited Jamie to help plan and produce the Workshop on Issues in Crater Studies and the Dating of Planetary Surfaces, held May 19 - 22, 2015, at Yhe Johns Hopkins University Applied Physics Laboratory, Laurel, MD. The invited statisticians were Joseph Hilbe, IAA President, and IAA members Jamie Riggs (Northwestern University), and Brian Weaver (Los Alamos National Laboratory). Joseph wrote a report on this workshop in the November, 2015 IAA Newsletter.

A follow-on meeting to further work the issues brought to and brought up in the May 2015 workshop was hosted by Stuart Robbins (SwRI) with Jamie and Brian as invited statisticians and held at the Southwest Research Institute, Boulder, CO, January 25 - 27, 2016. Brian presented the use of Bayesian estimation, which was well received. Further, the attending planetary scientists recognized a paradigm shift from crater size/frequency distributions (SFDs) not being the population, but rather, that the SFD is a sample of the unobserved impact crater population that caused them. As one result, traditional fixed-width crater diameter (size) bins to generate the distributions were expanded to include the use of kernel density functions.

Brian Weaver and the Los Alamos National Laboratory hosted Jamie Riggs and Stuart Robbins to begin finalizing the SFD issues. The working group was held 18 - 22 July, 2016. The major outcome of this collaboration was the comparison of current SFD fitting by the planetary scientists with binning and least squares, with kernel density and maximum likelihood, and with kernel density and Bayesian estimation. Our findings will be presented at the 7th Planetary Crater Consortium to be held 16 - 19 August, 2016, at Brown University in Providence, RI. We anticipate that the recommended methods will make crater science statistics more consistent within the planetary sciences field.

Stellar Dynamics

A study is underway to explore possible functional links between the traditional visual observations and the recent charge-coupled device (CCD) detector observations of long period variable (LPV) stars. Historical LPV catalogs begin in approximately 1901 and are telescopically-aided human eye, visual magnitude measurements integrating the visual spectrum from approximately 380 nm - 770 nm (blue, green, red). Recent CCD observations are band-differentiated into blue (351nm - 539 nm), green (463nm - 639 nm), red (520 nm - 1297 nm), and infrared (657 nm - 2103 nm) approximate magnitude bandpasses. A time series regression model is explored in which the model parameters translate the four-band CCD magnitudes into an integrated visual magnitude, thereby allowing the four-band CCD observations to couple with the historical visual observation measurements.

This is a preliminary investigation on comparing long term visual observations recorded in the American Association of Variable Star Observers (AAVSO) AID database with recent CCD photometry of large red-giant long period variable stars, to see what effect recent CCD photometry may have on the uncertainty of accurately recording the period-luminosity number or ratio of these stars. The investigators are Mark Heiple, Northwestern University, Rodney Howe, AAVSO, and IAA member Jamie Riggs, Northwestern University.