

The essential role of amateur astronomers in enabling the Juno mission interaction with the public

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Abstract

JunoCam was added to the payload of the Juno mission largely to function in the role of education and public outreach (E/PO). For the first time, the public is able to engage in the discussion and choice of targets for a major NASA mission. The discussion about which features to image is enabled by a bi-weekly updated map of Jupiter's cloud system, thereby engaging the community of amateur astronomers as a vast network of co-investigators, whose products stimulate conversation and global public awareness of Jupiter and Juno's investigative role. The contributed images provide the focus for ongoing discussion about various planetary features over a long time frame. Approximately two weeks before Juno's closest approach to Jupiter on each orbit, the atmospheric features that have been under discussion and are available to JunoCam on that perijove are nominated for voting, and the public at large votes on what to image at low latitudes, with the camera always taking images of the poles in each perijove. Public voting was tested for the first time on three regions for PJ3 and has continued since then for nearly all non-polar images. The results of public processing of JunoCam images range all the way from artistic renditions up to professional-equivalent analysis. All aspects of this effort are available on:
<https://www.missionjuno.swri.edu/junocam/>.

1. Introduction

The JunoCam instrument [1] on the Juno spacecraft is returning many good and unexpected scientific results, particularly around Jupiter's poorly explored polar regions [2]. However, the instrument was conceived as a way to engage the public with the Juno mission by direct interaction. The primary goals of the outreach effort are to allow the public: to choose where to point the camera and to process the data we get. To achieve this, four steps were envisioned that

are proceeding: planning, discussing, voting and processing. A fifth area is evolving, which involves quantitative analysis of the images. Although the initial "planning" stage absolutely requires input by the entire astronomical community, opportunities are both possible and enthusiastically encouraged in each. This process is ongoing and examples will be shown at each stage.

2. Planning

In order to be informed about what to point at in Jupiter's dynamic atmosphere, we need to know what's there. We rely on the amateur community for this. Anybody taking images of Jupiter is invited to submit them to the Mission Juno / JunoCam site: First log into the Mission Juno site, and link to JUNOCAM. From there, link to "PLANNING" (Figure 1), which brings you to an upload page (Figure 2).

3. Discussion

We then invite the public to select a feature, identified as a "Point of Interest" (Figure 3) and to discuss why that feature deserves to be imaged up close.

4. Voting

We then establish which points of interest will be available on the next orbit. Five voting days start 12 days before perijove. The available points of interest for orbit 5 are shown in Figure 4.

5. Processing

JunoCam images are made available on our web site within 2-3 days of their reception from the spacecraft. The public is free to upload all of their processed images, which have ranged from fanciful to processing to enhance detail and clarity.

6. Analysis

Some participants engage in their own detailed analysis of morphology and motions. An example is shown in Figure 5.

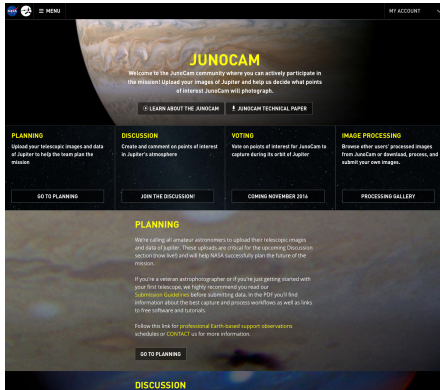


Figure 1: Selections available on the JunoCam link.

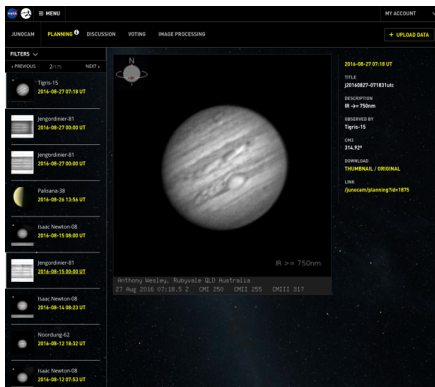


Figure 2. Display and upload page.

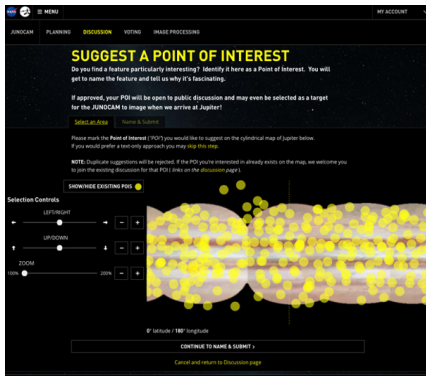


Figure 3. Identification of points of interest page.

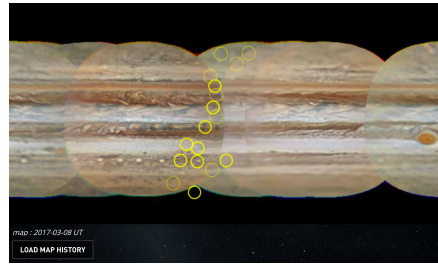


Figure 4. Features available for voting on perijove 5, with winners of the voting shown in bold.

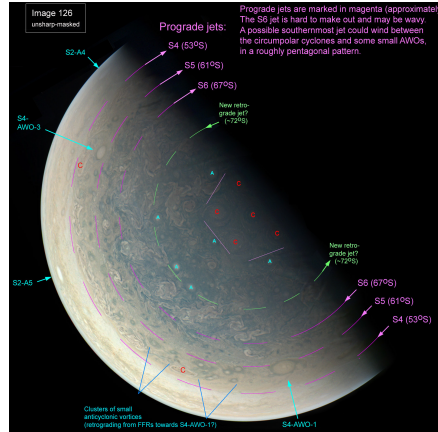


Figure 5. Example of analysis in terms of known latitudinal variability of winds by John Rogers and Gerald Eichstädt posted on the Mission Juno site.

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References

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- [2] Orton, G. S., et al. The first close-up images of Jupiter's polar regions: Results from the Juno mission JunoCam instrument. Geophys. Res. Lett., 2017. doi 10.1002/2016GL02443.