



# The AAS Working Group on Accessibility and Disability (WGAD): Year 1 Highlights and Database Access

**K. Knierman (1\*), A. Aarnio (2), J.A. Monkiewicz (1), W. Diaz Merced (3), B. Garcia (4), N.A. Murphy (5), WGAD/Access: Astronomy Team**

1-School of Earth and Space Exploration - Arizona State University, 2-University of Colorado Boulder, 3-Office of Astronomy for Development SAO, 4-Instituto de Tecnologías en Detección y Astropartículas (ITeDA), 5-Harvard-Smithsonian Center for Astrophysics, \*NSF AAFP Fellow

## Database Access

Space Science is data driven (Hassan 2011). In data analysis, the first interaction with data is during the retrieval of that data. Retrieval is followed by perception of the data before any reduction or filtering algorithm is applied to begin analysis. Astronomers mainly analyze data. Therefore, the data retrieval interface should be easy to use and understand. Then, the researcher will engage in data exploration and not spend too long on data retrieval. For people with disabilities, the process of data retrieval is determined by the accessibility of the interface and the data to be retrieved. **Accessibility of data retrieval (e.g., bibliographic or observational) determines whether people with disabilities flourish in Astronomy where metrics of productivity put almost all the weight on published papers.** This is a major challenge as accessibility to observational and bibliographic data may take people with disabilities away from the current productivity curve.

We want to support interoperability efforts by proposing a user-centered design system for data retrieval. This will create a culture where people with different disabilities can perform their data analysis at the same level as able-bodied peers and allows them to use the coping strategies in which they perform at their best. **It is also important that usability evaluations include the targeted user.** Upon naive evaluation by a single blind professional astronomer of mainly NASA interfaces (HEASARC, SPDF, SSDC) it was clear that **accessibility must become a culture in our field.** For example, the evaluated data retrieval interfaces were found to create cognitive overload for that single user with that particular sensorial disability. The interfaces also presented Information Architecture challenges, referring to elements in the interface that cause problems to the users with disabilities. This cognitive overload may be associated with extraneous complexity of the system output (e.g., cognitively disorganized, unnecessary features that distract users attention when completing a task, etc.).

The cognitive overload that may be experienced by users of current databases may be mitigated by use of multi-modal interfaces such as xSonify. WGAD is partnering with the IAU Commission C1 WG Astronomy for Equity and Inclusion to develop such accessibility tools for databases and methods for user testing. To support the ongoing efforts for data accessibility by able-bodied astronomers and astronomers with disabilities, we propose a framework to carry out remote login usability evaluations using a fusion-based multimodal interface that gives the user flexibility to exercise their own intuitions, strategies, modalities, etc. about when to use one mode or the other, or both, thereby leveraging greater robustness. The interaction has to be designed experimentally and tested with target users before implementation.

**The database team does not have to change anything in the database. We propose an architecture that may work parallel to or outside the original databases called xSonify.** xSonify is a multimodal prototype the user may employ to display the data auditorily and visually. The first prototype for the sonification of space physics data was launched in September 2005 (Candey et al. 2005). The prototype was launched by the heliophysics division at NASA Goddard Space Flight Center (GSFC), with an interest of using sound parameters to perform more detailed exploration of plasma and particle data corresponding to the solar wind.

Experience Wanda Diaz Merced's TED Talk:



<https://www.youtube.com/watch?v=hY9QSDaReY>

## iPoster



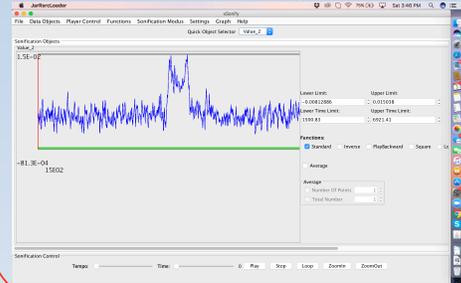
<http://goo.gl/gpKZ6a>

Audio narration:



<https://youtu.be/evYvLDx4kM>

## xSonify: Turning Data into Sound



**Listen to AGC 7849:**



<https://youtu.be/UIR8HD9af-4>

**Left: An example of sonification using xSonify for an M profile of AGC 7849.**

## Social Media

### Twitter

WGAD now has a presence on Twitter through the account @AAS\_WGAD. Starting in January 2017, the account has grown steadily with now over 160 followers. Topics of tweets have included: statistics of persons with disabilities in STEM, soliciting accessibility concerns at meetings, and highlighting individual astronomers with disabilities.



### Website

The official website for WGAD is <https://wgad.aas.org/>. The website includes sections for the mission of WGAD, projects, contacts, and links. Currently, the Recommendations tab links to the file for the Journal Accessibility Recommendations.

### Blog

The Access: Astronomy blog, located at <http://accessastronomy.blogspot.com/>, highlights various accessibility issues and also includes personal stories from astronomers with disabilities. The current spotlight theme is mental health in academia.



## Journal Access

Our recommendations document for journals, publishers, and authors is a living document that focuses on users of all abilities. To unwittingly deny people with disabilities the same amount and quality of information has the exclusionary effect of severing our links with the field and society.

The complete recommendation document, Improving Accessibility of Astronomical Publications, is linked in full at our website, <https://wgad.aas.org/>, under the Recommendations tab.

The recommendations document is being acted upon by IOP and AAS publishers. IOP is updating their PDF accessibility based on external review. A list of author guidelines relating to accessibility is currently in preparation. Also, we emphasize to journals that frequent user testing is paramount as technology changes and improves.

## Meeting Accessibility

Creating barrier-free, accessible meetings for all astronomers is one of the priorities of WGAD. Anticipating barriers before they are encountered mitigates the need for astronomers with disabilities to bear the logistical and emotional load of constant access requests.

While large meetings such as the Winter and Summer AAS meetings should lead the way, smaller meetings should also begin the process of evaluating their overall accessibility and taking steps to promote a universally-accessible environment in advance of formal accommodation requests from individual attendees.

To collect data on practical astronomical conference and meeting accessibility considerations, WGAD solicited feedback from January and Summer AAS attendees via a web form or email address: [wgad.aas229@gmail.com](mailto:wgad.aas229@gmail.com)

The WGAD meeting accessibility document will scale its recommendations according to meeting size and budget, but will encourage all astronomical conferences to implement aspects of barrier-free design. The WGAD meetings accessibility recommendations are intended to be an evolving document, incorporating the lessons learned in the next few years to create more comprehensive recommendations down the road.

Fill out Accessibility Suggestion form or email: [wgad.aas229@gmail.com](mailto:wgad.aas229@gmail.com): <https://goo.gl/forms/b5505tUioJXBFa9x1>



## Site Visit Program

A Climate Site Visit program is currently under development by the diversity committees of AAS. This program aims to create a procedure to assess individual departments who request an external review on diversity criteria.

## References

- Hassan, Amr, & Fluke, Christopher J. 2011, Scientific Visualization in Astronomy: Towards the Petascale Astronomy Era, Publications of the Astronomical Society of Australia, Volume 28, Issue 2, pp. 150-170.
- Sonnert, Gerhardt, 2012, Star Songs: From X-rays to Music, [https://www.cfa.harvard.edu/sed/projects/star\\_songs/index.html](https://www.cfa.harvard.edu/sed/projects/star_songs/index.html), accessed May 2017
- Improving Accessibility of Astronomical Publications, URL: [https://wgad.aas.org/sites/wgad.aas.org/files/Recommendations\\_WGAD\\_2016.pdf](https://wgad.aas.org/sites/wgad.aas.org/files/Recommendations_WGAD_2016.pdf)

## Acknowledgement:

K. Knierman is supported by an NSF Astronomy and Astrophysics Postdoctoral Fellowship under award AST-1501294.