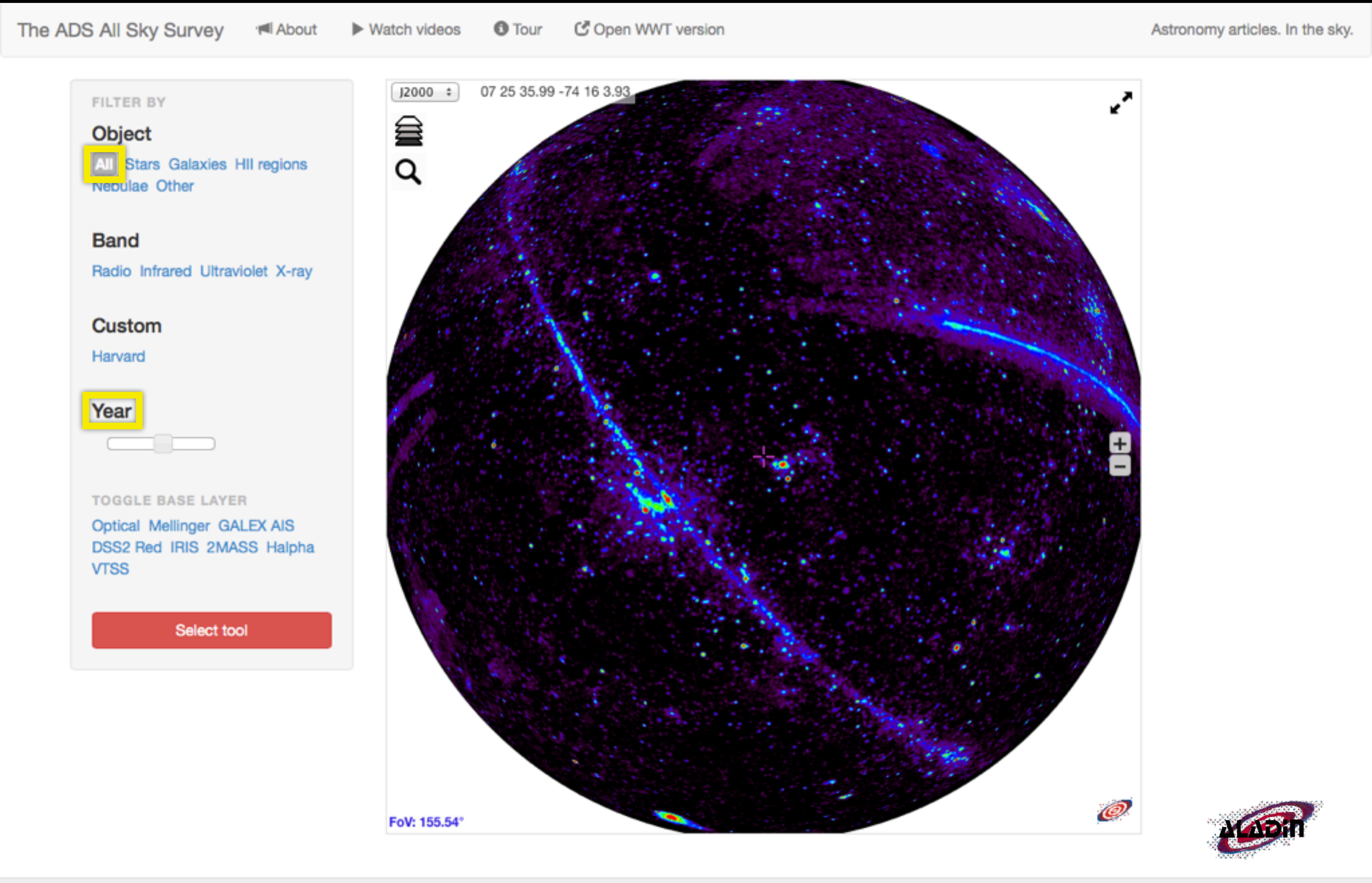
ADS ALL SKY SURVEY

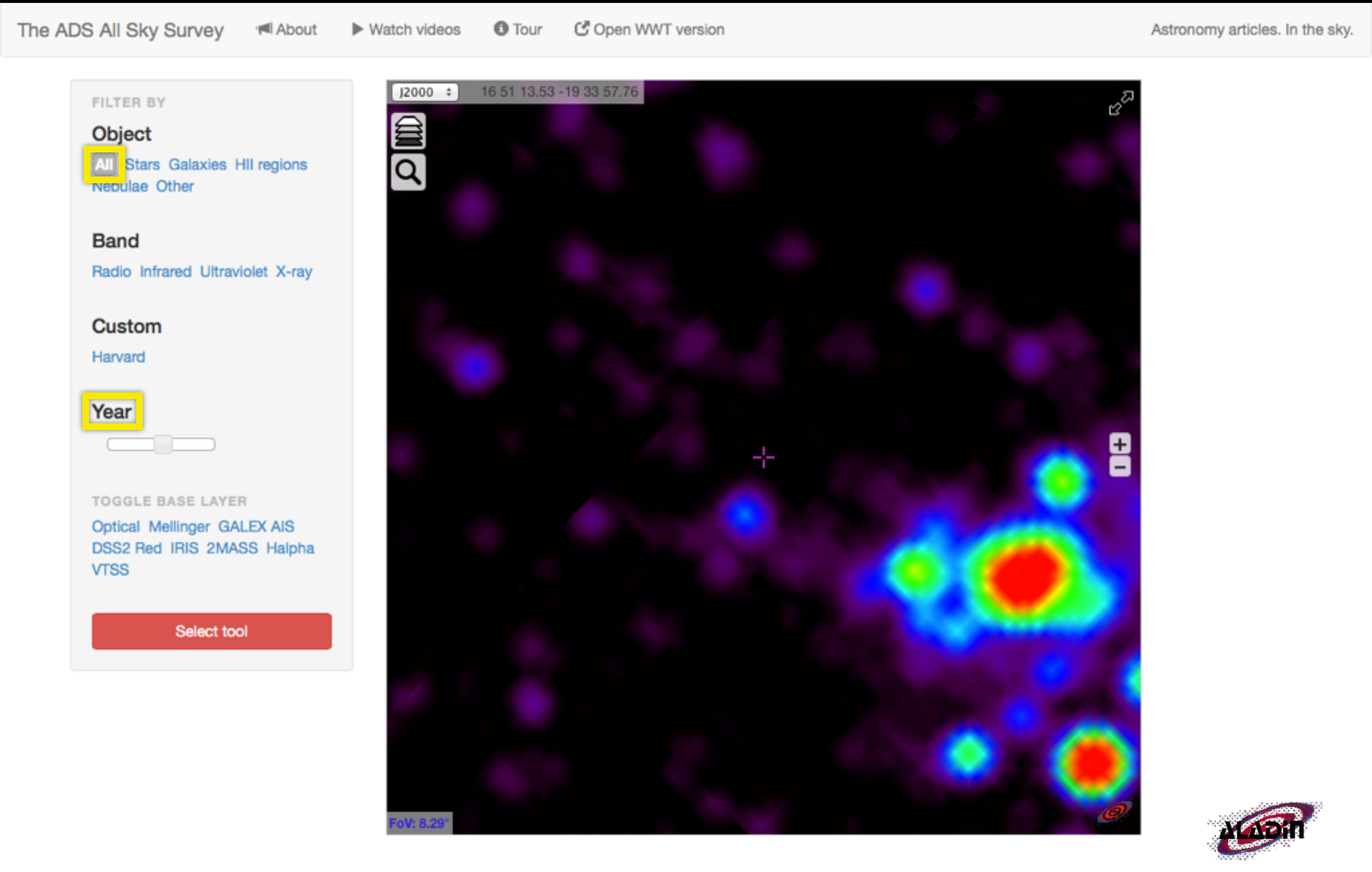
View in Aladin • View in WorldWide Telescope

adsass.org

here is a 180-degree heatmap of article density on all kinds of objects, on the Sky, over all time

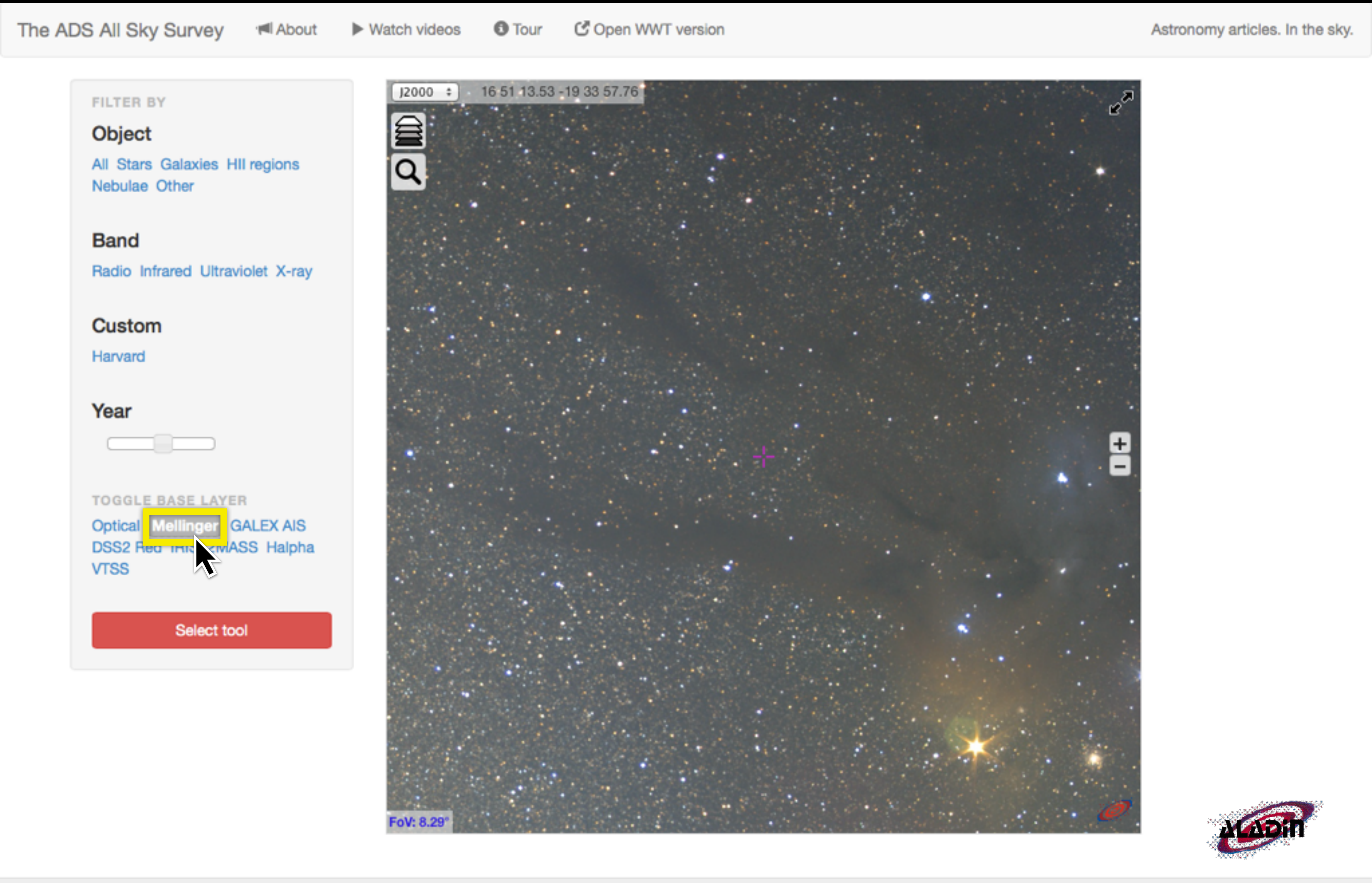


let's zoom in (on Ophiuchus)

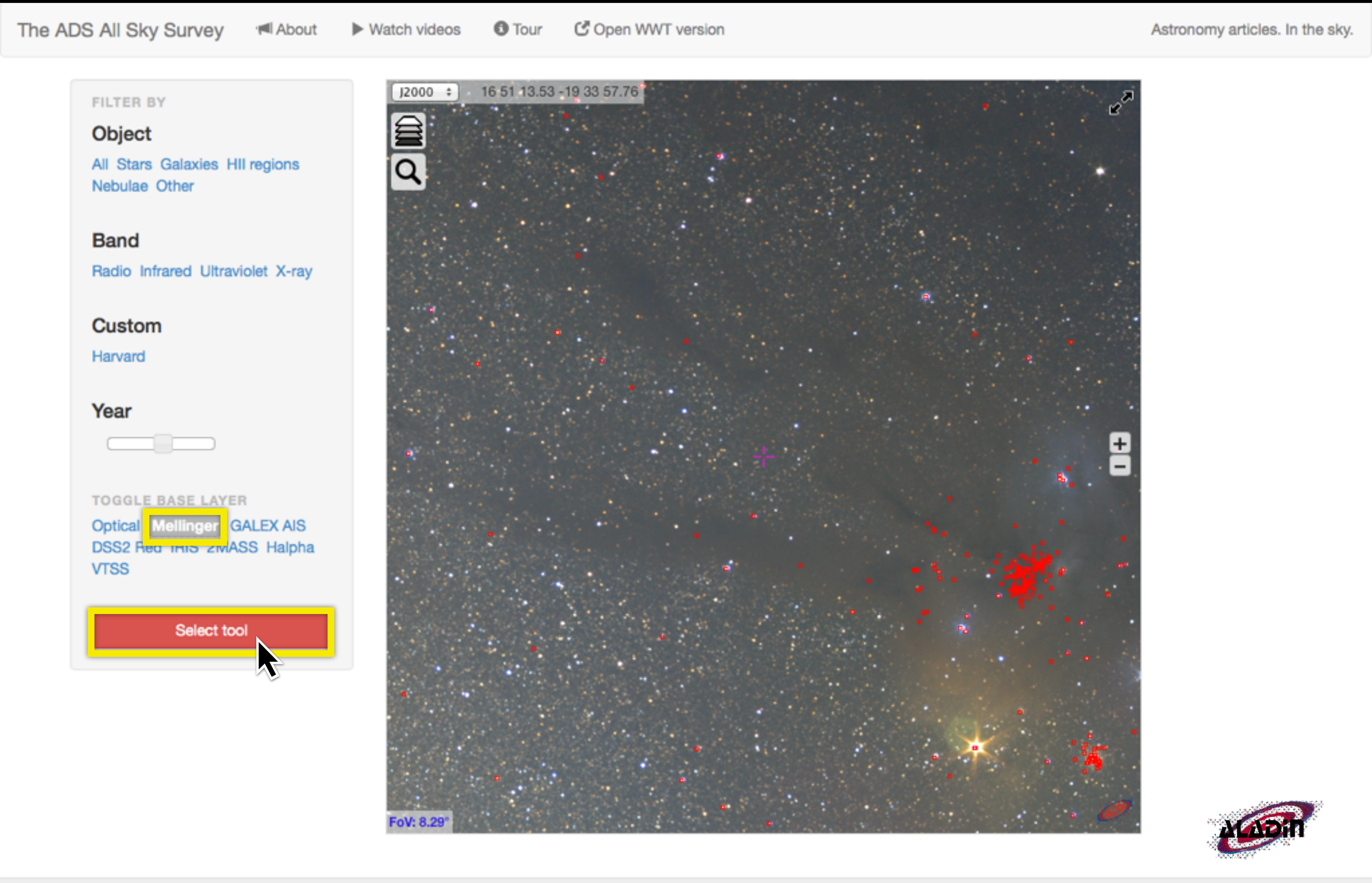


now, let's toggle on the "Mellinger" view of the Sky

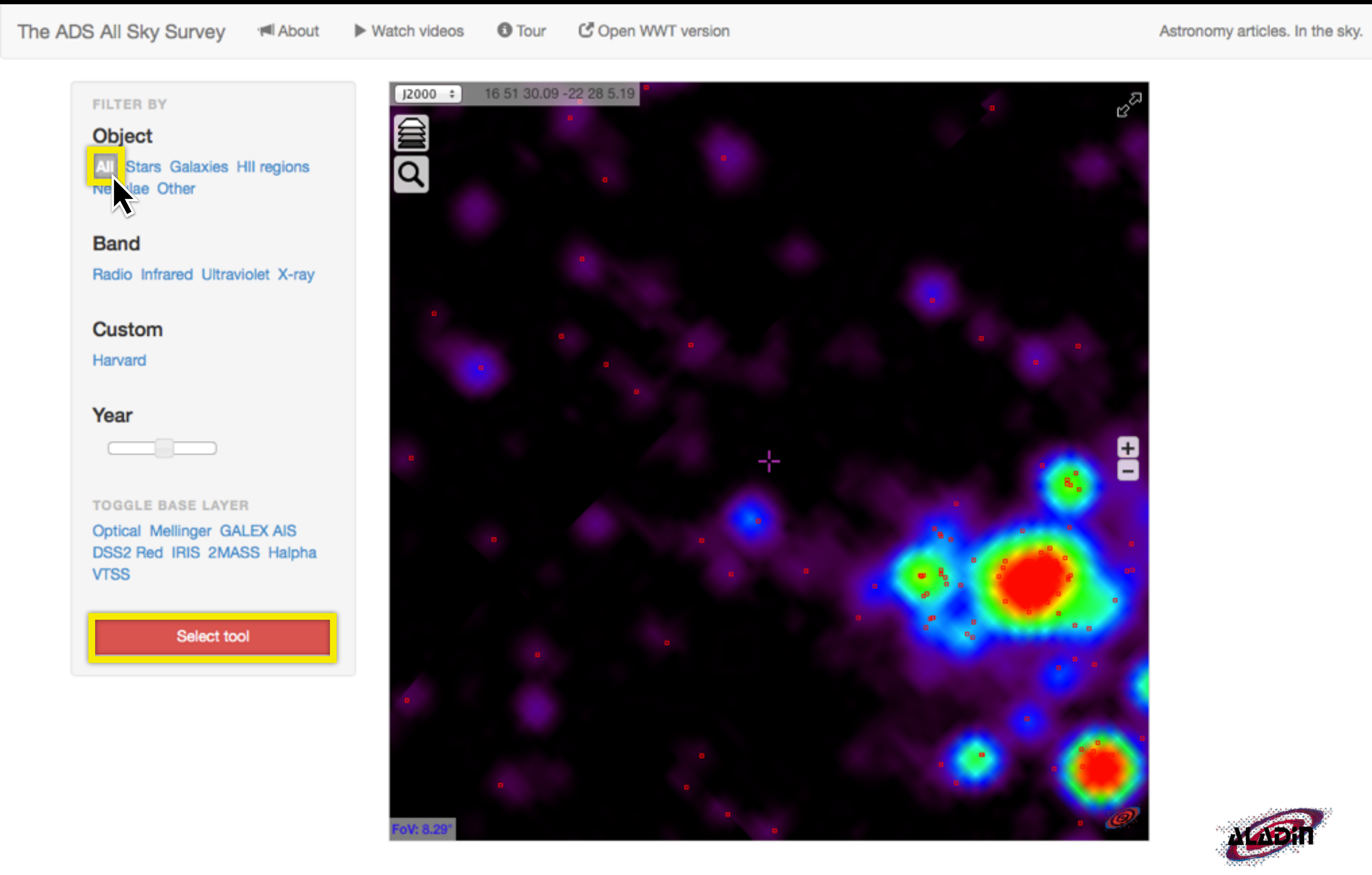
...to see a nice optical image of Ophiuchus



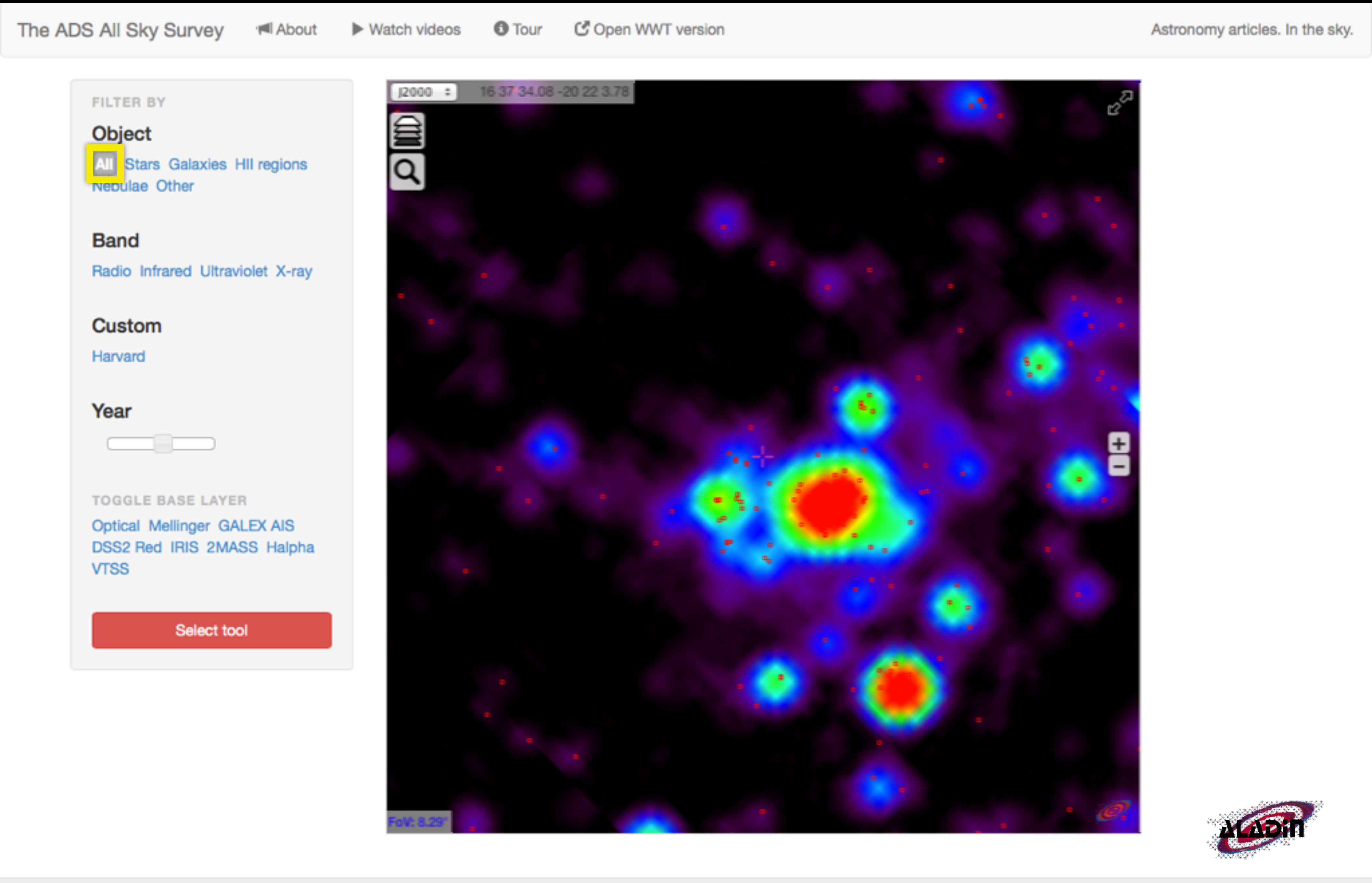
to add markers for SIMBAD sources, we can click the Select Tool



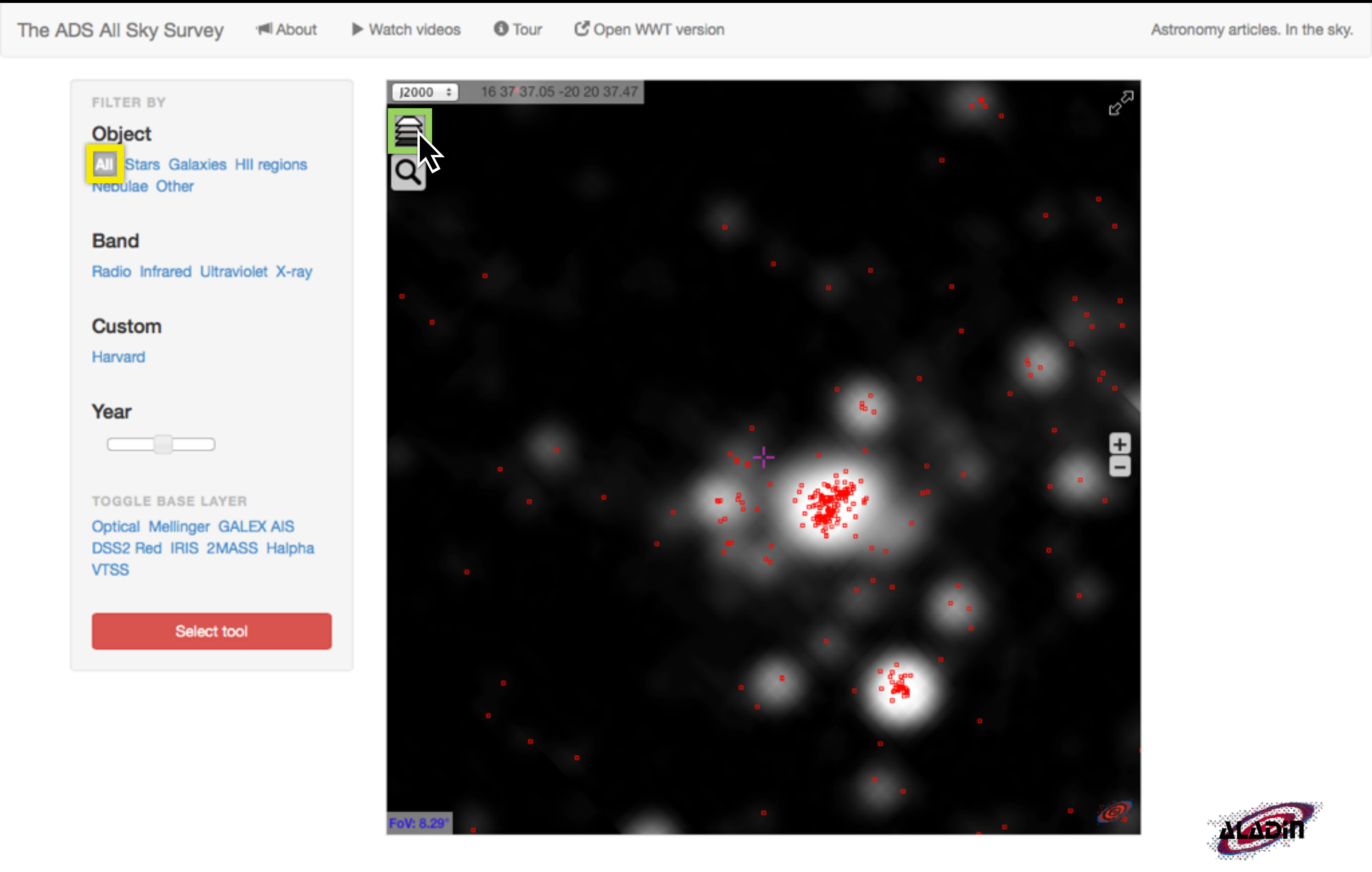
now, if we re-select "All," we see sources on article distribution



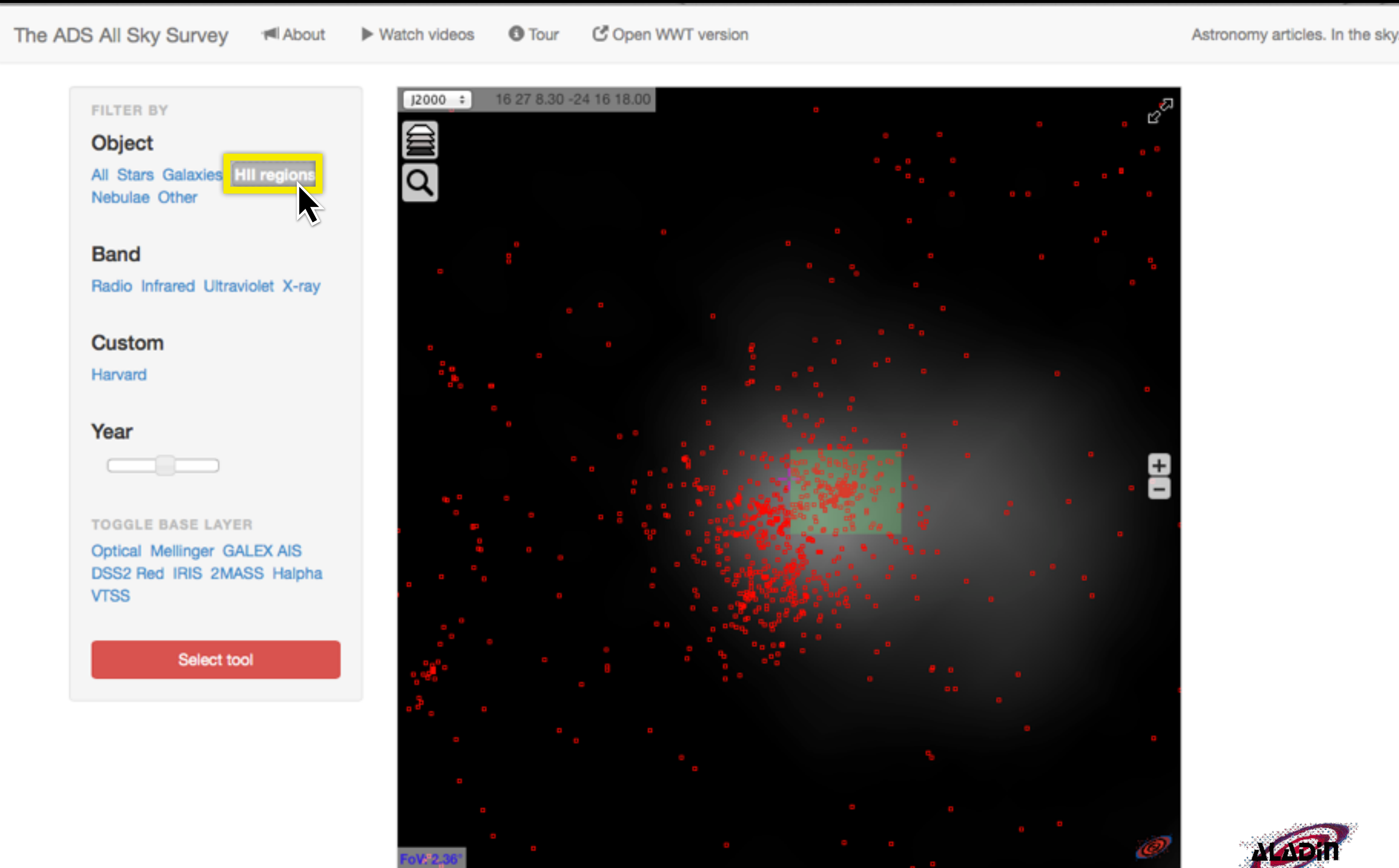
panning over a bit, we can center our region of interest



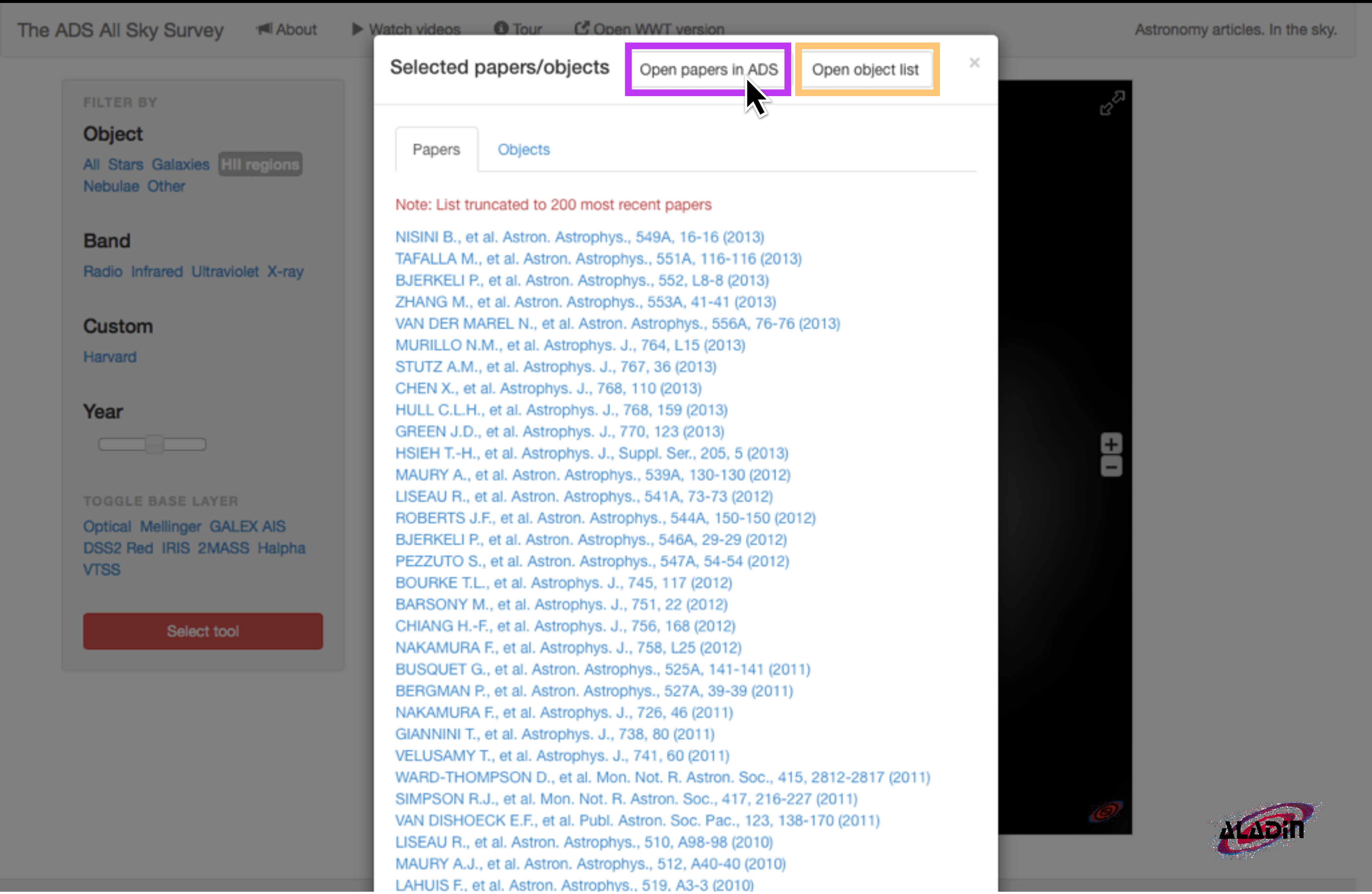
let's change the color table from rainbow to greyscale to make sources more apparent



let's look now at the distribution of articles about "HII regions" and *select* an area we're curious about

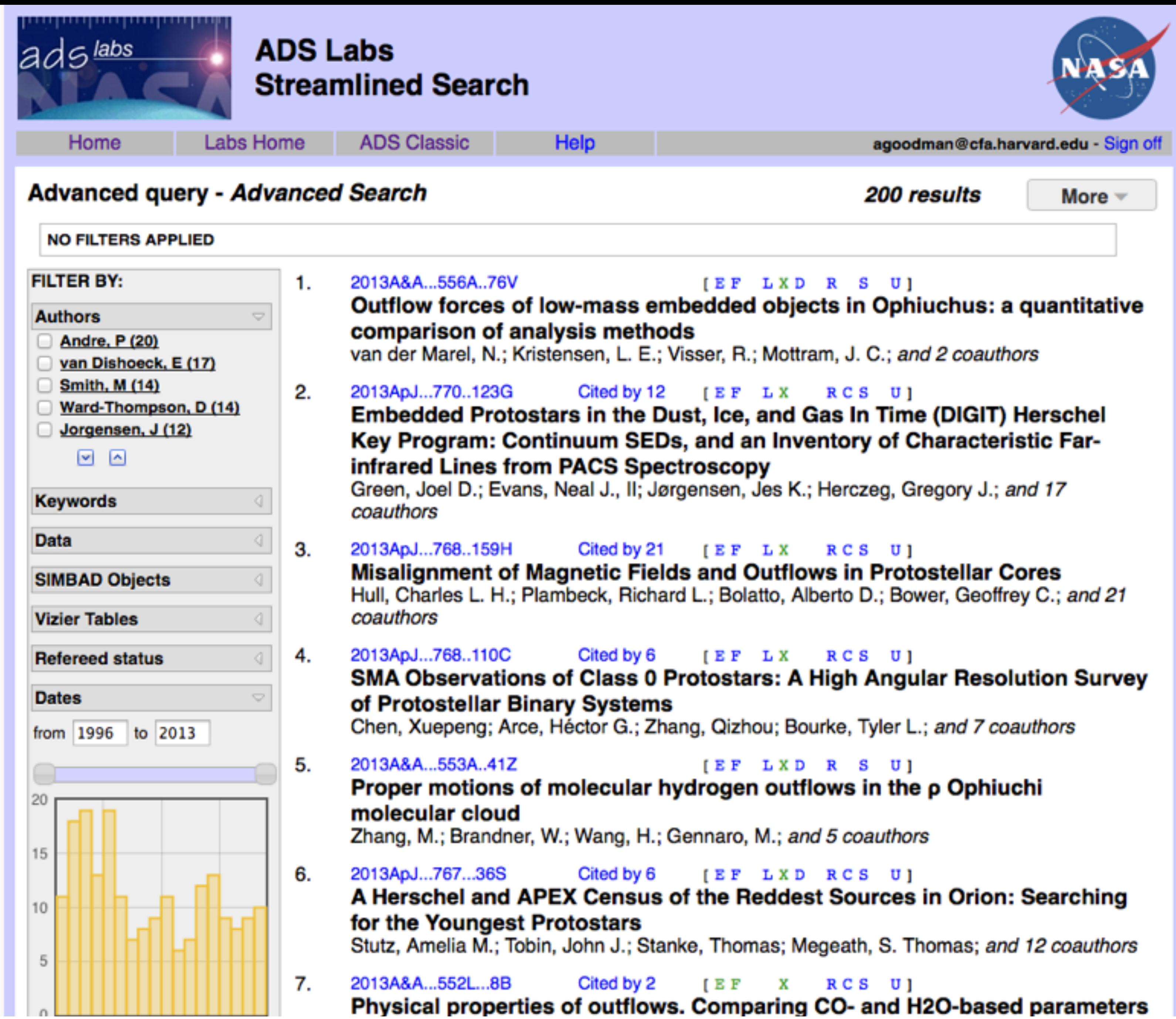


when we *release* the selection rectangle, we get a pop-up list of papers (ADS) mentioning these objects, or a list of the objects (CDS/SIMBAD) we highlighted

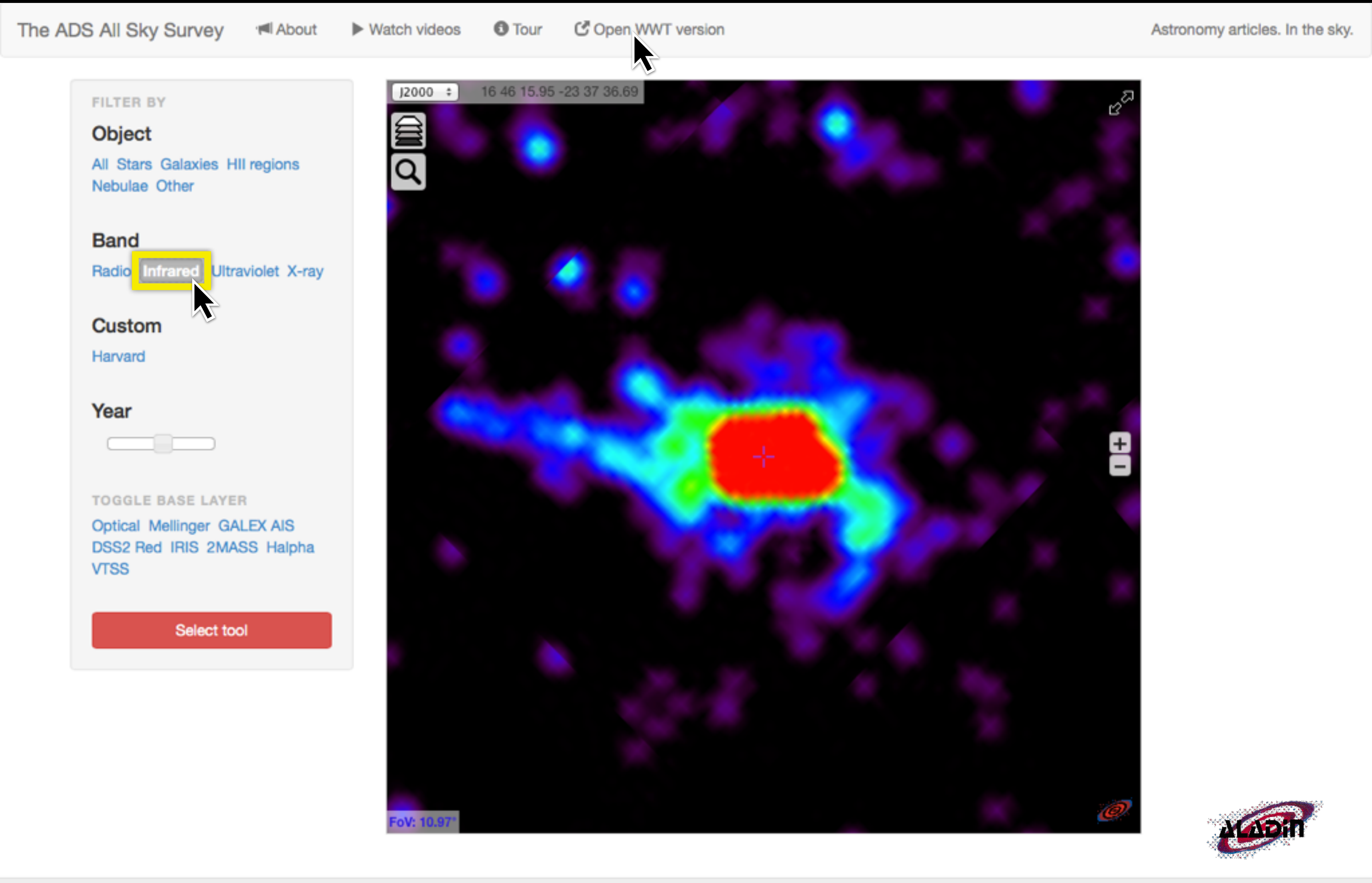


selecting "Open Papers in ADS" opens the paper list in ADS Labs

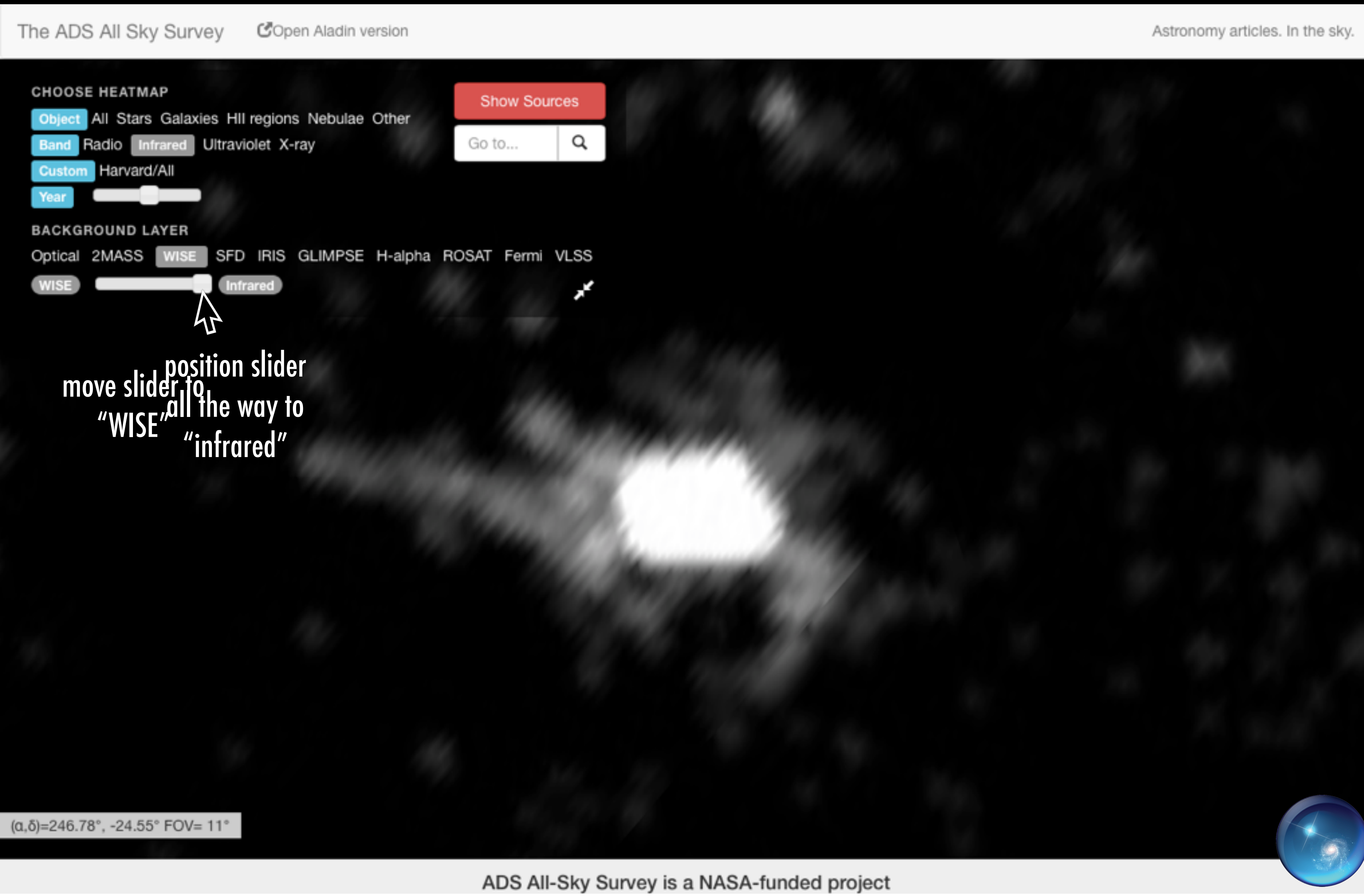
(From here, we can filter the list more, and more. e.g. clicking "SIMBAD Objects" lets us see particular objects in context on the Sky in WWT or Aladin.)



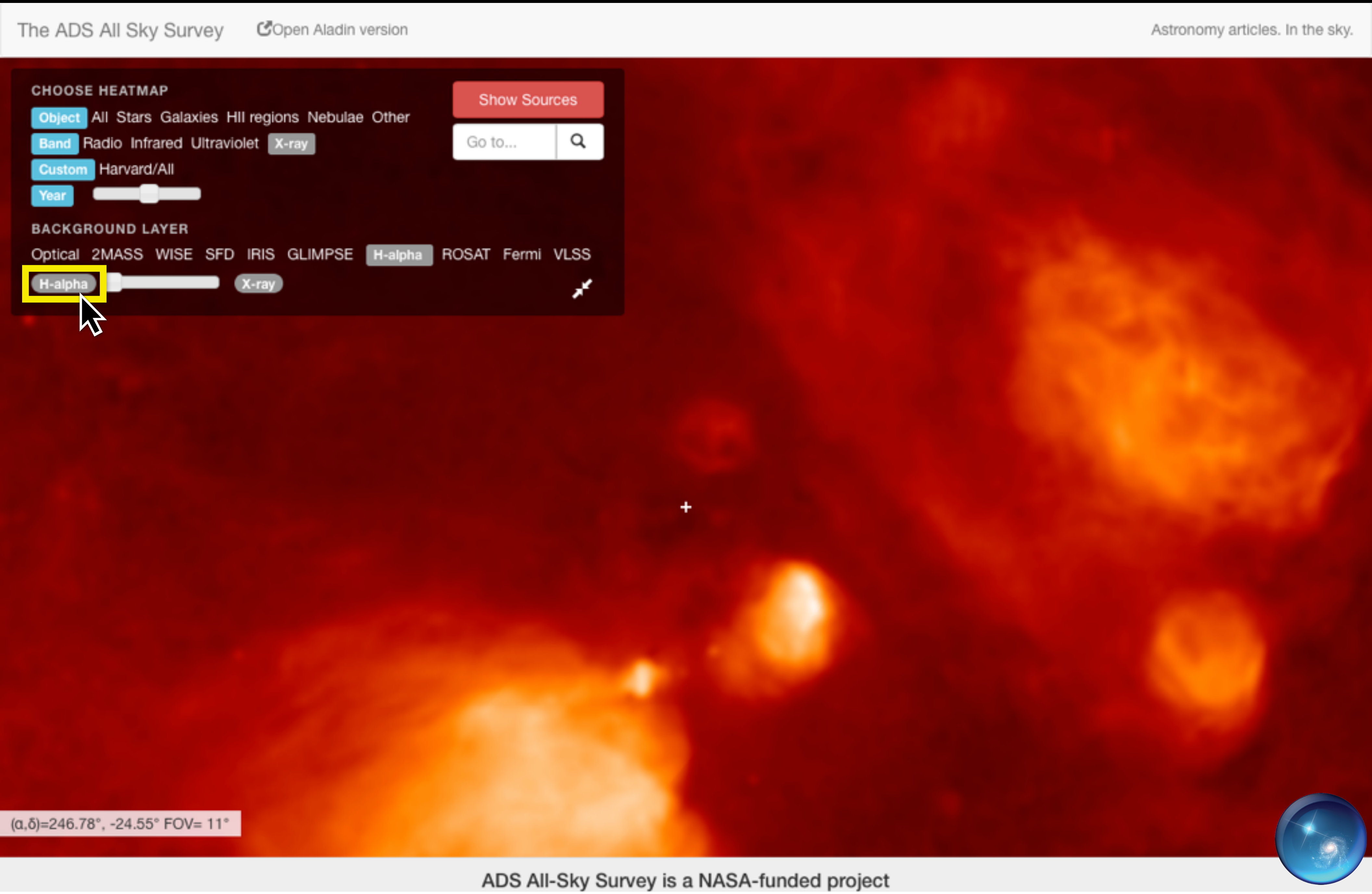
let's try "Open WWT Version," so we can see this same view in WWT, and use a transparency slider



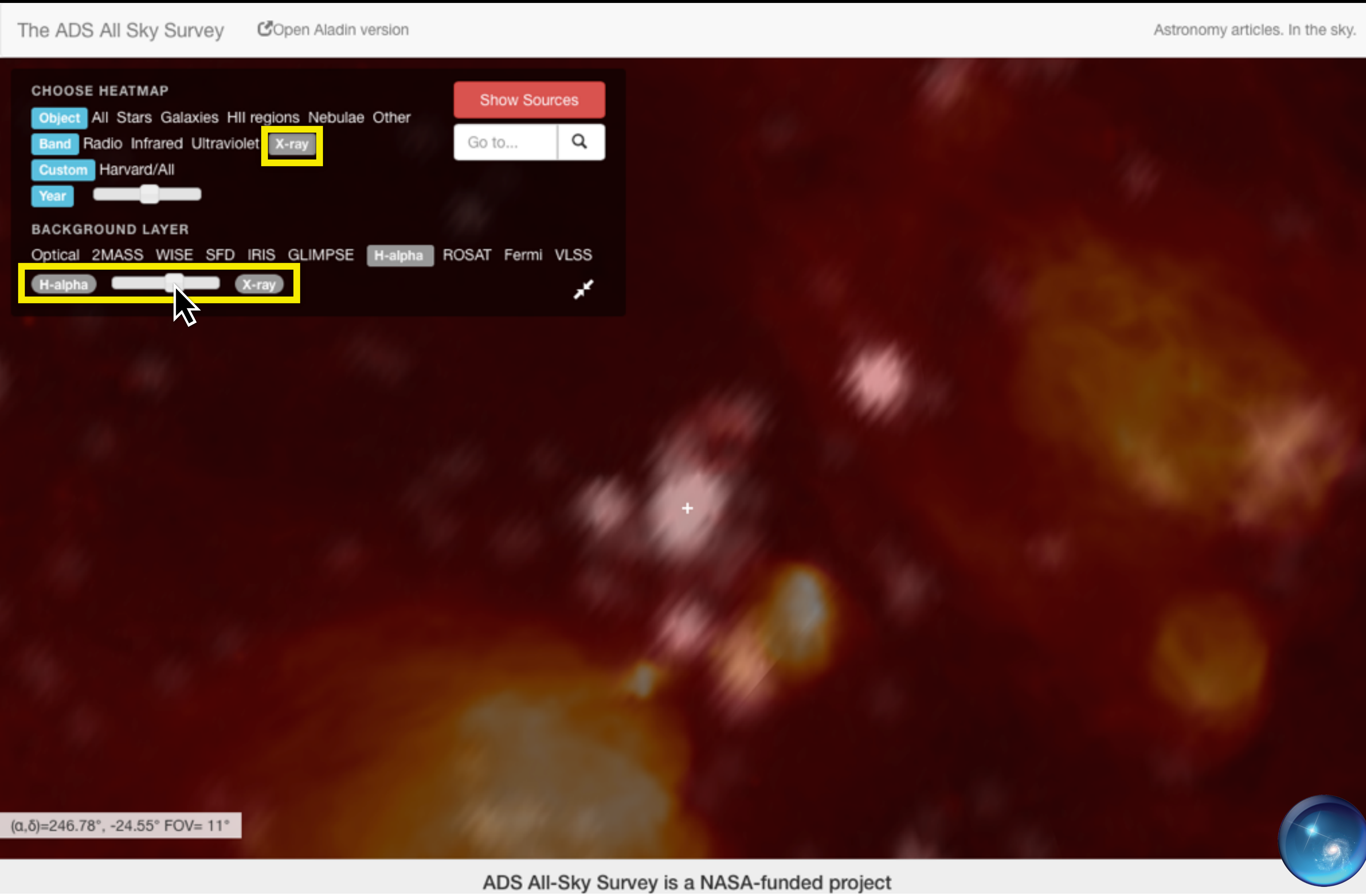
let's try the transparency (layer) slider in WorldWide Telescope



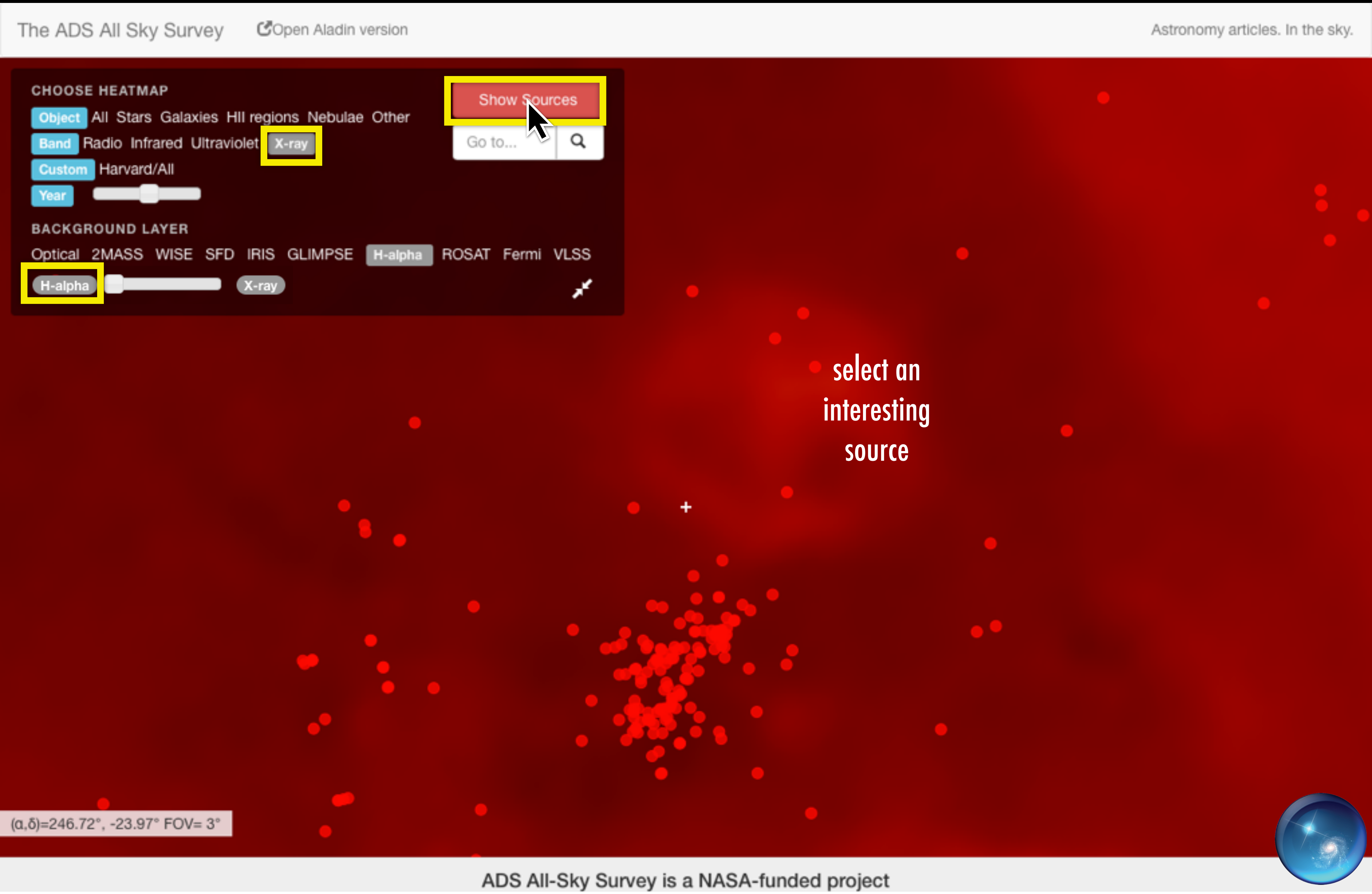
dust is nice, but we're curious about HII regions, let's change view to H-alpha



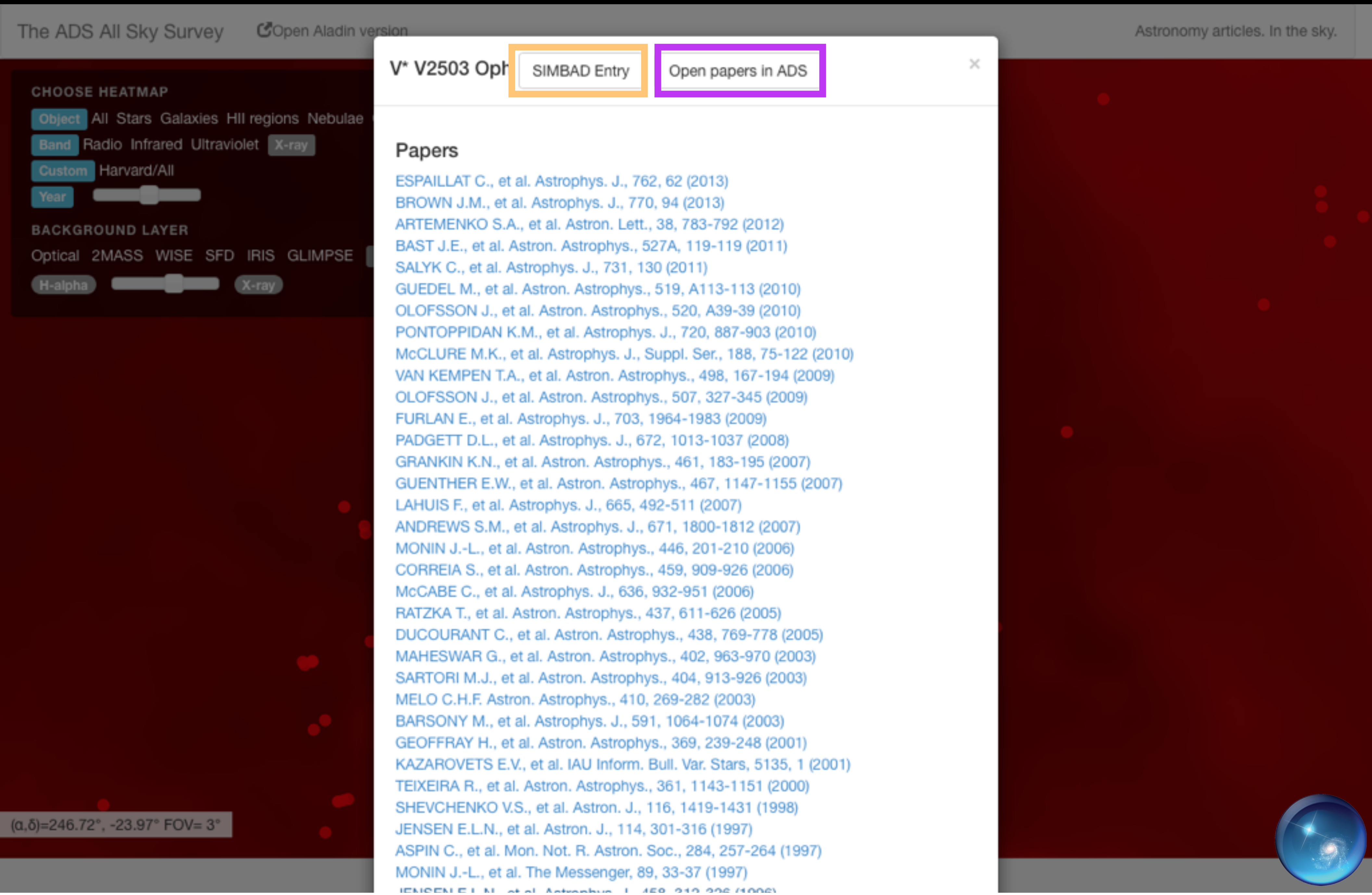
now we want to find X-ray observations and see if any are near the HII regions,
so we can slide between H-alpha and X-ray



now let's zoom in, and try "Show Sources" to see what the SIMBAD X-ray sources really are



and, we can have plenty of information on the source, via CDS/SIMBAD or via ADS.



Credits

funding **NASA ADAP** program

PI: Alyssa **Goodman**, Harvard-CfA

Co-I: Alberto **Pepe**, Harvard-CfA & Authorea

Co-I: August **Muench**, Smithsonian-CfA

with

Alberto **Accomazzi**, Smithsonian Institution, NASA/ADS

Christopher **Beaumont**, Harvard-CfA

Thomas **Boch**, CDS Strasbourg

Jonathan **Fay**, Microsoft Research

David **Hogg**, NYU, astrometry.net

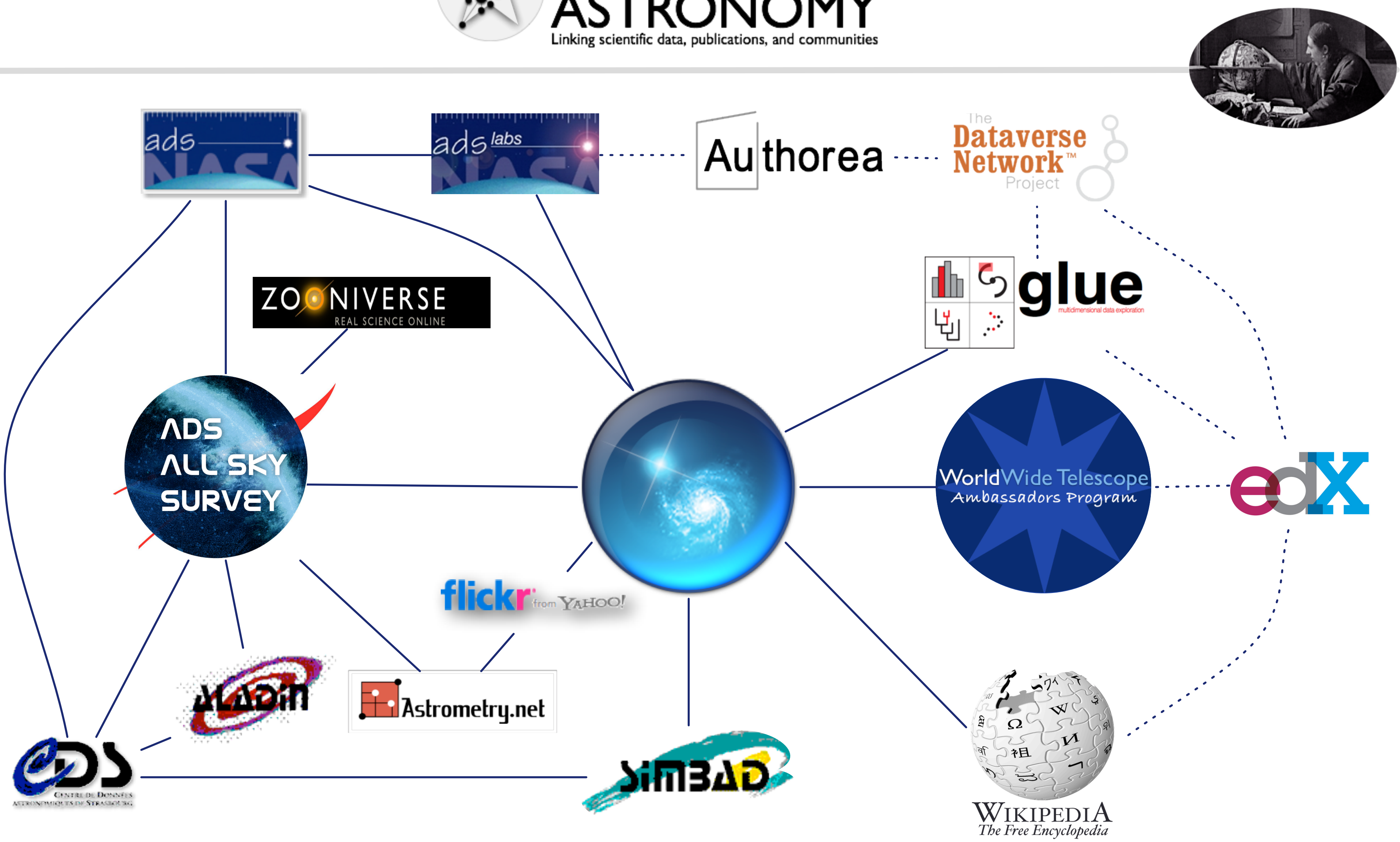
Alberto **Conti**, NASA/STScI, Northrup Grumman

SCIENTIFIC COMMUNICATION FOR THE 21ST CENTURY

Alyssa Goodman
Harvard-Smithsonian Center for Astrophysics

SEAMLESS ASTRONOMY

Linking scientific data, publications, and communities



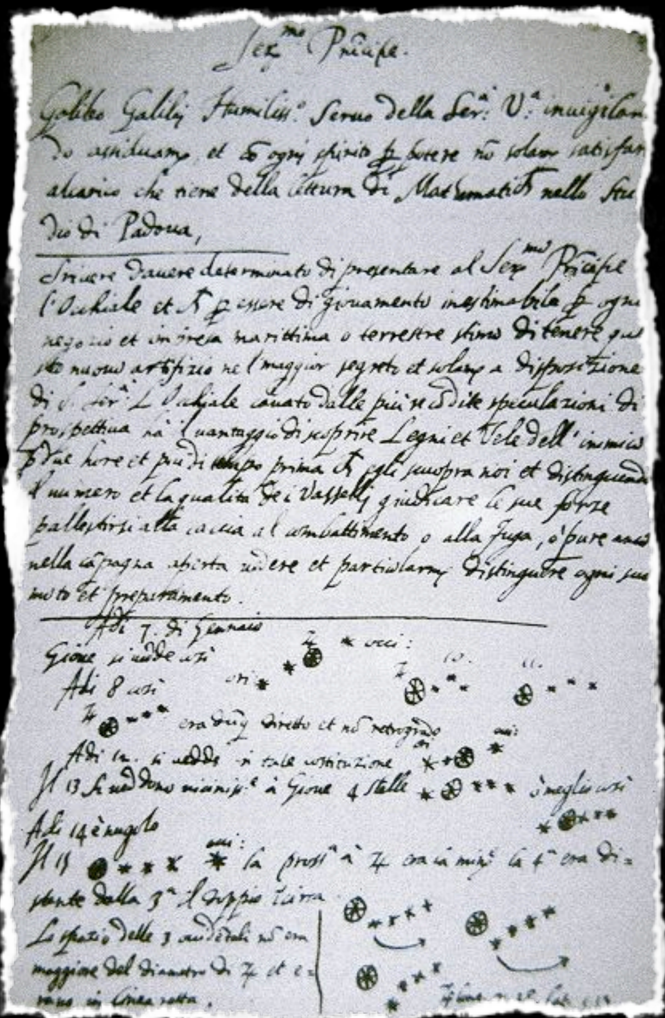
https://www.cfa.harvard.edu/~agoodman/seamless/

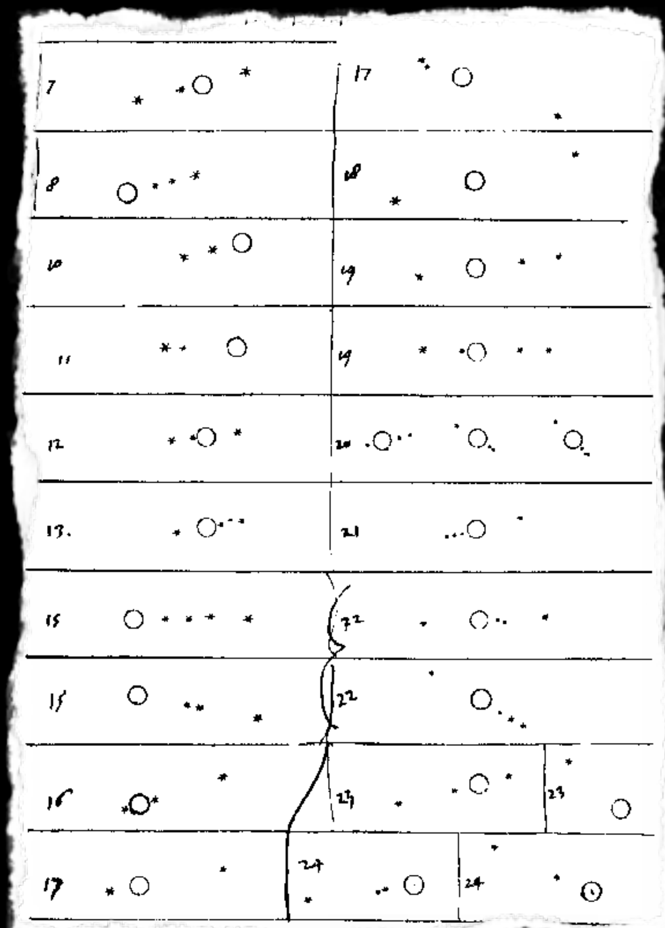
Supported by Microsoft Research NSF NASA Smithsonian

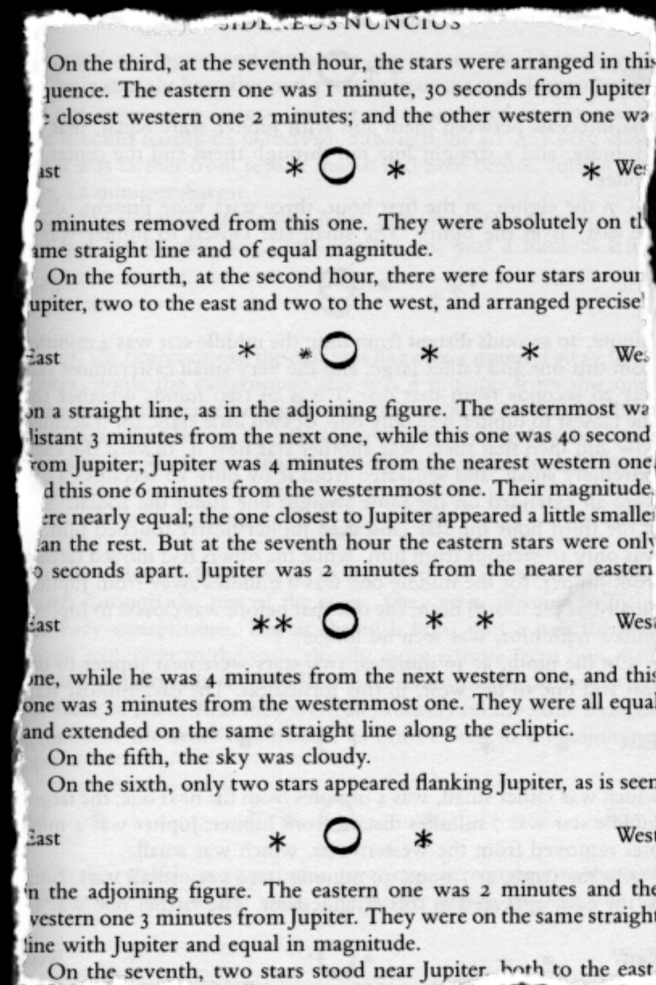
Made possible by MANY collaborators, listed at projects.iq.harvard.edu/seamlessastronomy

GALILEO GALILEI

(1564-1642)







On the third, at the seventh hour, the stars were arranged in this
quence. The eastern one was 1 minute, 30 seconds from Jupiter
closest western one 2 minutes; and the other western one wa

ast * O * * We

minutes removed from this one. They were absolutely on th
ame straight line and of equal magnitude.

On the fourth, at the second hour, there were four stars arour
upiter, two to the east and two to the west, and arranged precise

East * * O * * We

on a straight line, as in the adjoining figure. The easternmost wa
listant 3 minutes from the next one, while this one was 40 second
rom Jupiter; Jupiter was 4 minutes from the nearest western one
d this one 6 minutes from the westernmost one. Their magnitude
ere nearly equal; the one closest to Jupiter appeared a little smalle
an the rest. But at the seventh hour the eastern stars were only
seconds apart. Jupiter was 2 minutes from the nearer easter

East ** O * * West

one, while he was 4 minutes from the next western one, and this
one was 3 minutes from the westernmost one. They were all equal
and extended on the same straight line along the ecliptic.

On the fifth, the sky was cloudy.

On the sixth, only two stars appeared flanking Jupiter, as is seen

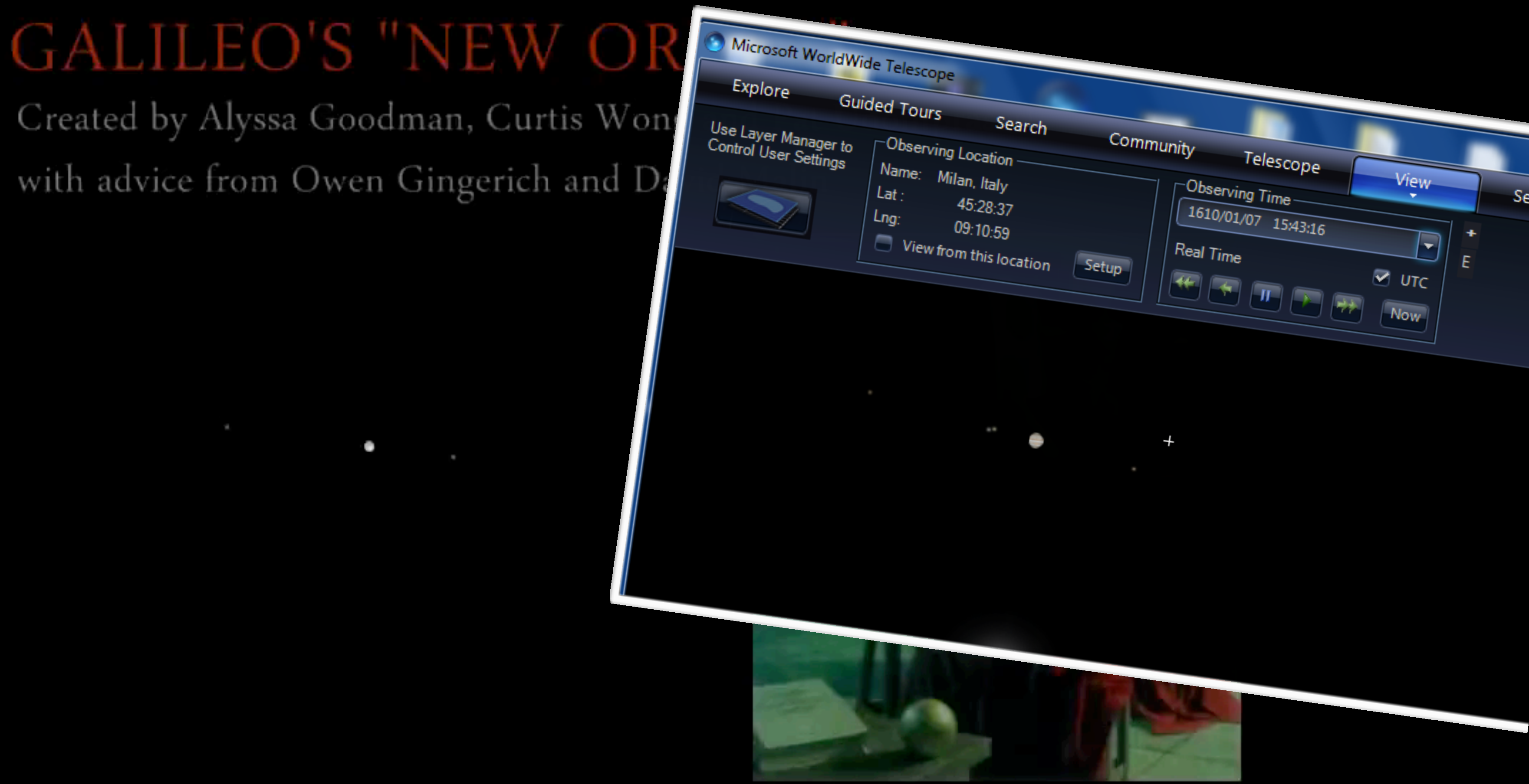
East * O * West

in the adjoining figure. The eastern one was 2 minutes and the
western one 3 minutes from Jupiter. They were on the same straight
line with Jupiter and equal in magnitude.

On the seventh, two stars stood near Jupiter, both to the east

Notes for & re-productions of Siderius Nuncius

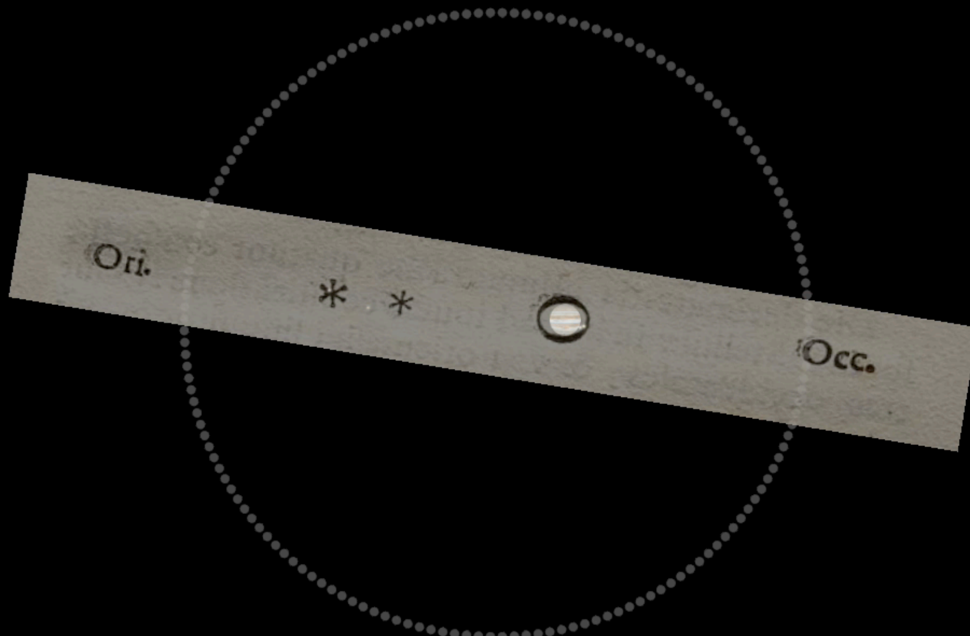
GALILEO GALILEI

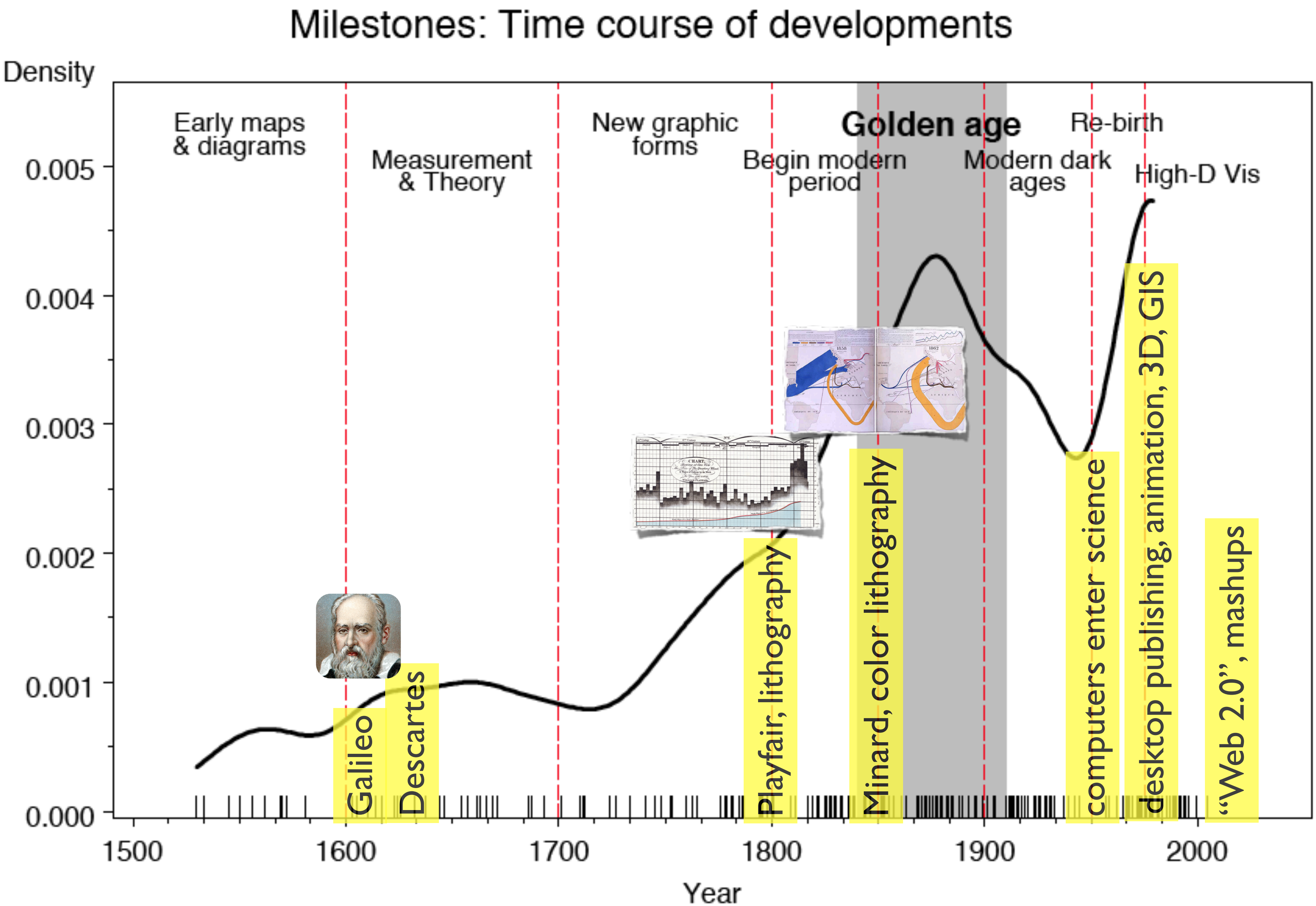


Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010

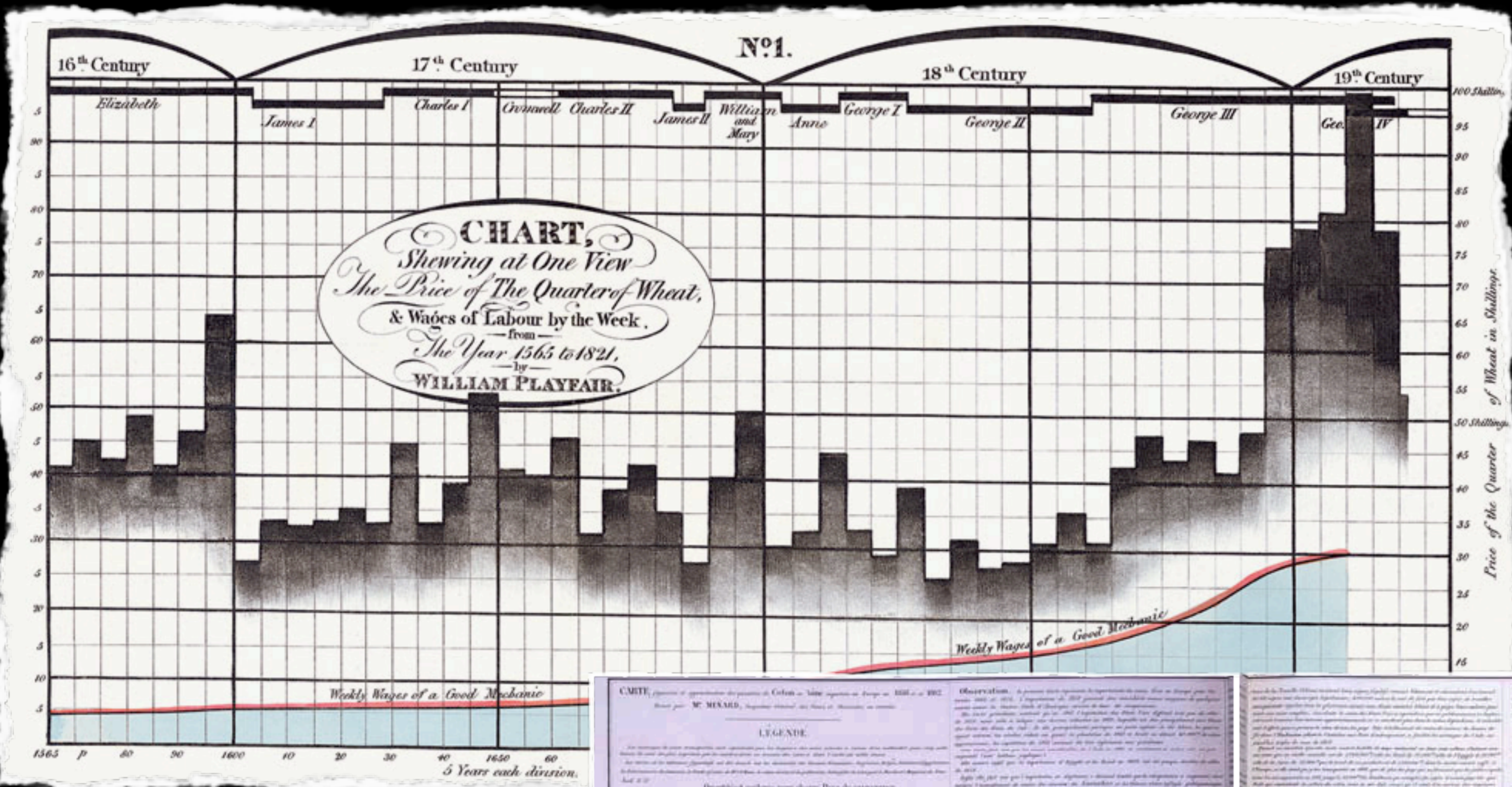
GALILEO GALILEI

January 11, 1610



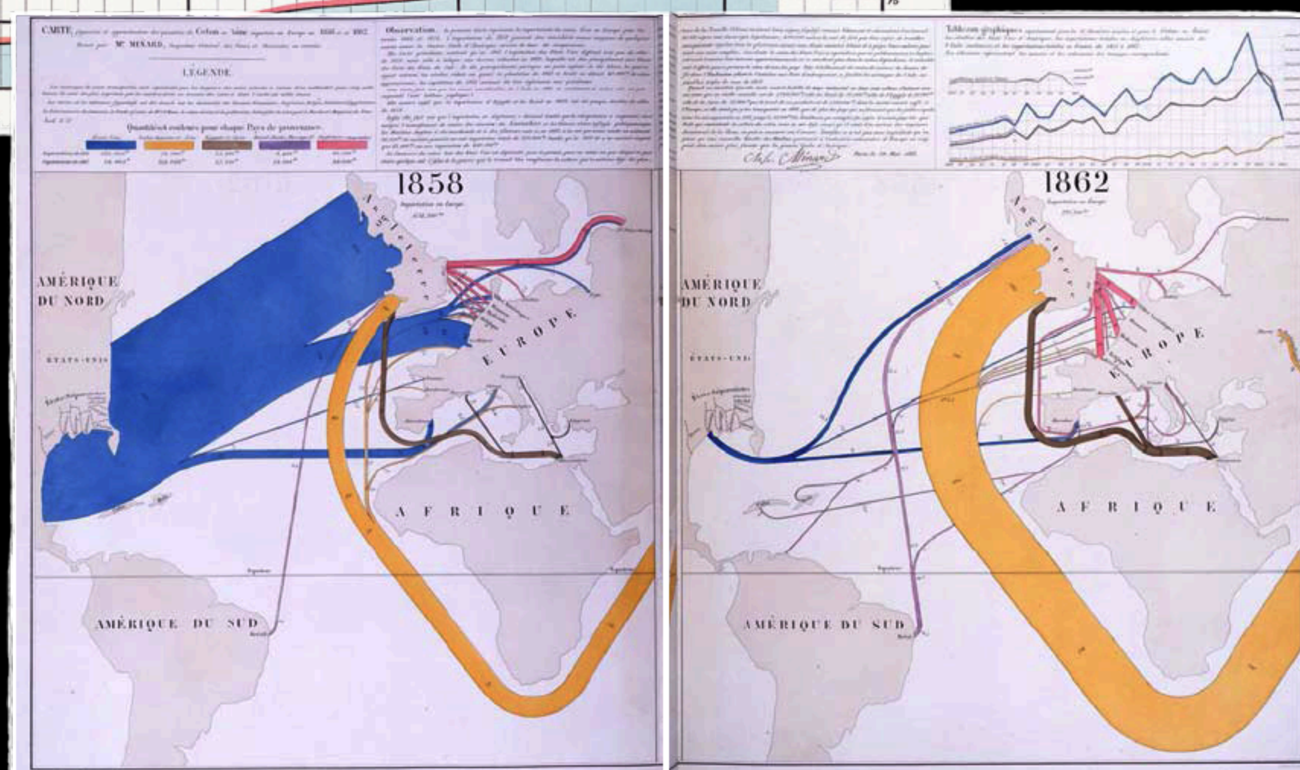


adapted from Friendly, "The Golden Age of Statistical Graphics," *Statistical Science*, 2009



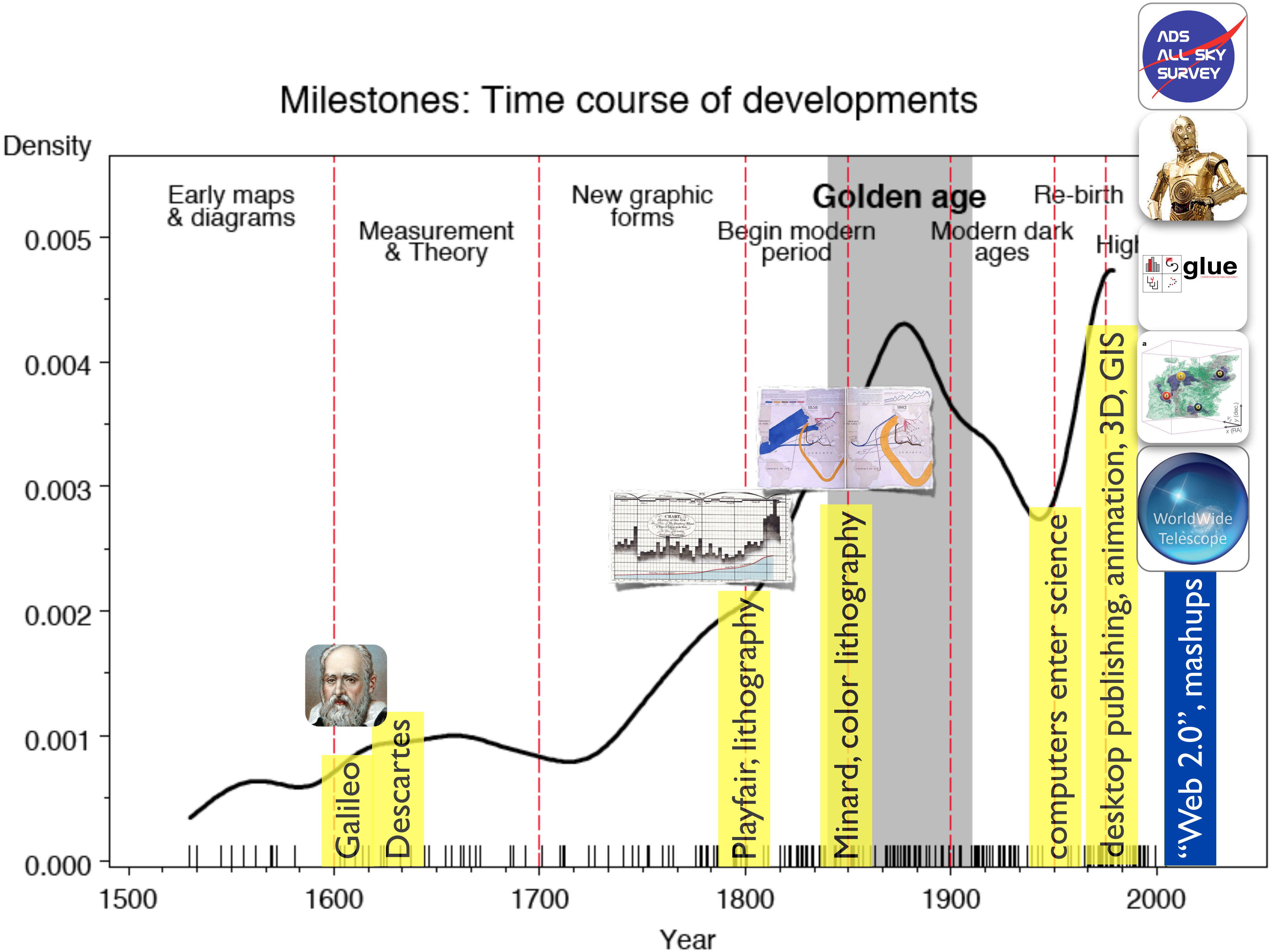
Playfair, lithography

William Playfair (1759-1823)

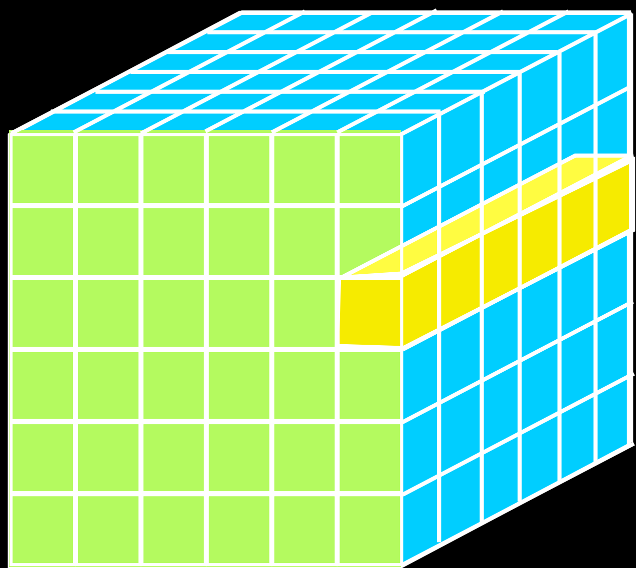


Minard, color lithography

Charles Joseph Minard (1781-1870)



adapted from Friendly, "The Golden Age of Statistical Graphics," *Statistical Science*, 2009



"DATA, DIMENSIONS, DISPLAY"

1D: Columns = "Spectra", "SEDs" or "Time Series"
2D: Faces or Slices = "Images"
3D: Volumes = "3D Renderings", "2D Movies"
4D: Time Series of Volumes = "3D Movies"

WIDE DATA, "IN 3D"

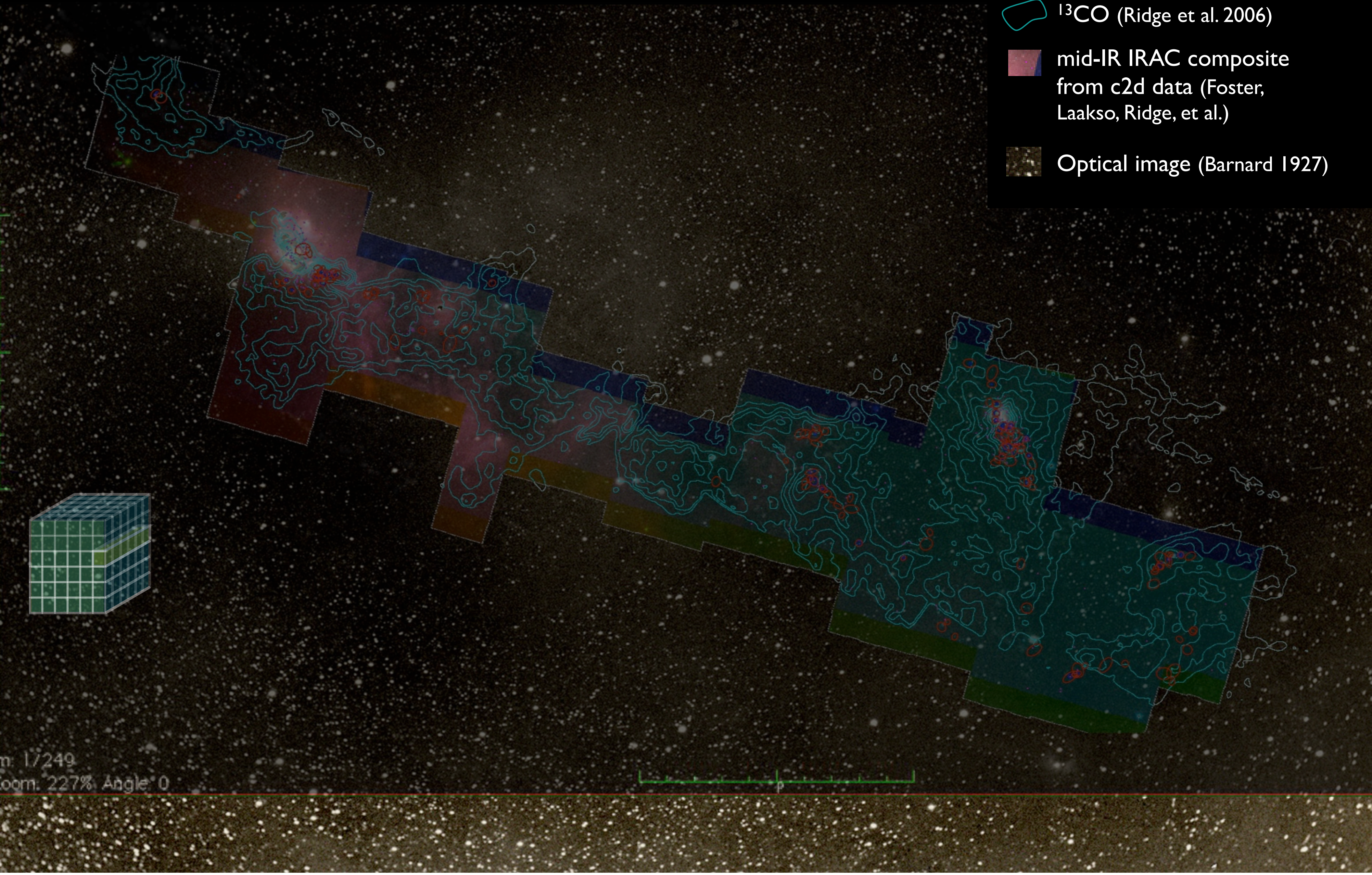
mm peak (Enoch et al. 2006)

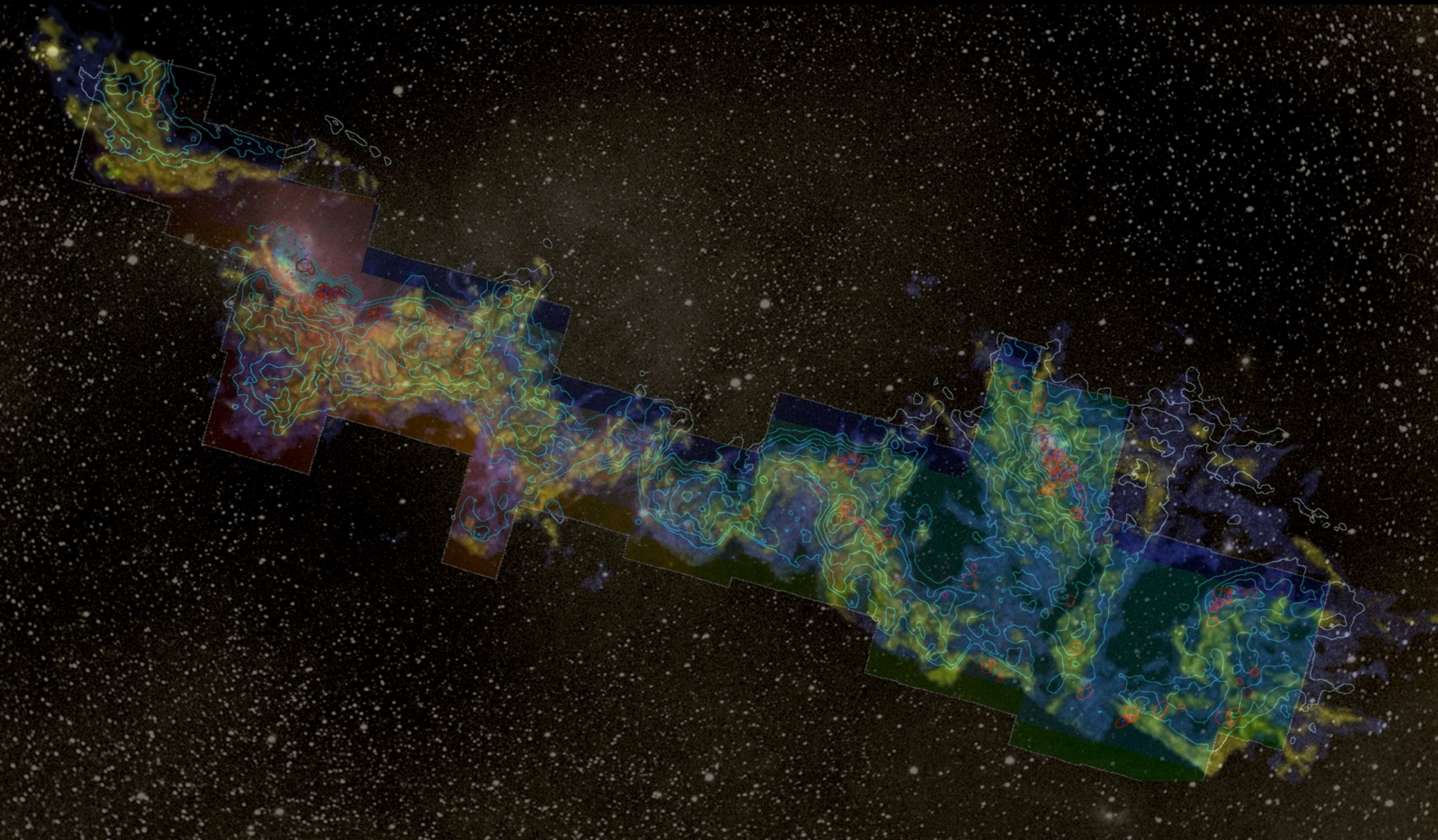
sub-mm peak (Hatchell et al. 2005, Kirk et al. 2006)

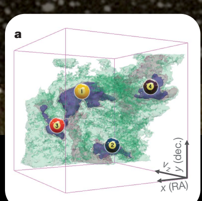
^{13}CO (Ridge et al. 2006)

mid-IR IRAC composite from c2d data (Foster, Laakso, Ridge, et al.)

Optical image (Barnard 1927)





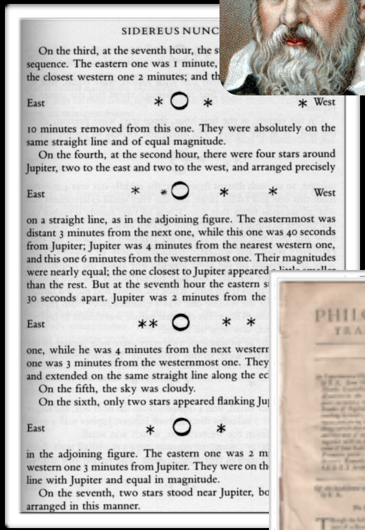


AstronomicalMedicine@IIC

COMPLETE

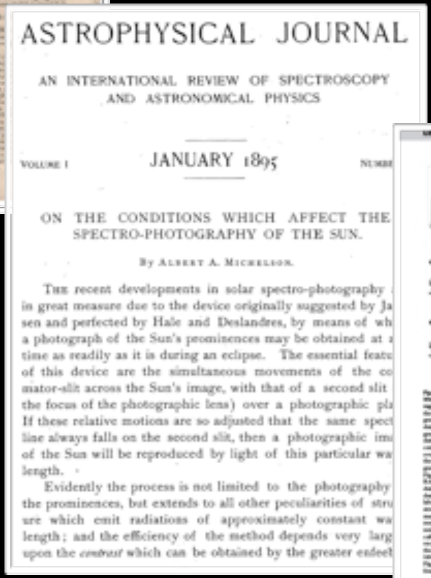
WHAT DO WE PUBLISH?

1610

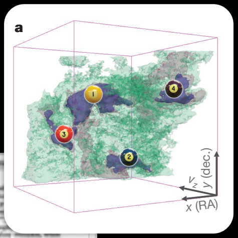


1665

1895



2009



2009

3D PDF

INTERACTIVITY IN A "PAPER"

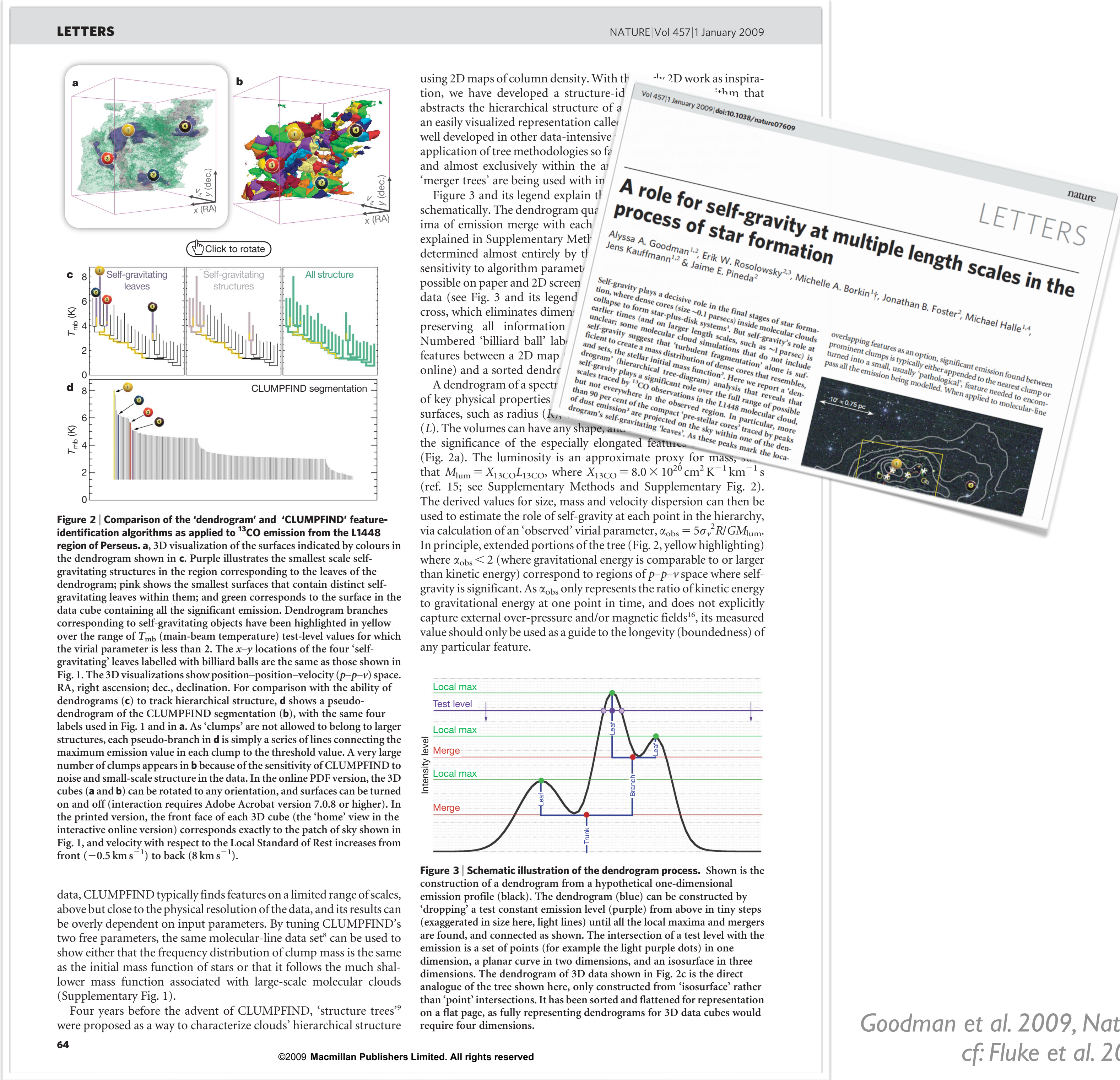

LETTERS NATURE|Vol 457|1 January 2009

Figure 2 | Comparison of the 'dendrogram' and 'CLUMPFIND' feature-identification algorithms as applied to ^{13}CO emission from the L1448 region of Perseus. a, 3D visualization of the surfaces indicated by colours in the dendrogram shown in **c**. Purple illustrates the smallest scale self-gravitating structures in the region corresponding to the leaves of the dendrogram; pink shows the smallest surfaces that contain distinct self-gravitating leaves within them; and green corresponds to the surface in the data cube containing all the significant emission. Dendrogram branches corresponding to self-gravitating objects have been highlighted in yellow over the range of T_{mb} (main-beam temperature) test-level values for which the virial parameter is less than 2. The *x*–*y* locations of the four 'self-gravitating' leaves labelled with billiard balls are the same as those shown in Fig. 1. The 3D visualizations show position–position–velocity (*p*–*p*–*v*) space. RA, right ascension; dec., declination. For comparison with the ability of dendrograms (**c**) to track hierarchical structure, **d** shows a pseudo-dendrogram of the CLUMPFIND segmentation (**b**), with the same four labels used in Fig. 1 and in **a**. As 'clumps' are not allowed to belong to larger structures, each pseudo-branch in **d** is simply a series of lines connecting the maximum emission value in each clump to the threshold value. A very large number of clumps appears in **b** because of the sensitivity of CLUMPFIND to noise and small-scale structure in the data. In the online PDF version, the 3D cubes (**a** and **b**) can be rotated to any orientation, and surfaces can be turned on and off (interaction requires Adobe Acrobat version 7.0.8 or higher). In the printed version, the front face of each 3D cube (the 'home' view in the interactive online version) corresponds exactly to the patch of sky shown in Fig. 1, and velocity with respect to the Local Standard of Rest increases from front ($-0.5\ \mathrm{km\,s^{-1}}$) to back ($8\ \mathrm{km\,s^{-1}}$).

data, CLUMPFIND typically finds features on a limited range of scales, above but close to the physical resolution of the data, and its results can be overly dependent on input parameters. By tuning CLUMPFIND's two free parameters, the same molecular-line data set[8] can be used to show either that the frequency distribution of clump mass is the same as the initial mass function of stars or that it follows the much shallower mass function associated with large-scale molecular clouds (Supplementary Fig. 1).

Four years before the advent of CLUMPFIND, 'structure trees'[9] were proposed as a way to characterize clouds' hierarchical structure

using 2D maps of column density. With th ... 2D work as inspiration, we have developed a structure-id ... ithm that abstracts the hierarchical structure of a ... an easily visualized representation calle ... well developed in other data-intensive ... application of tree methodologies so fa ... and almost exclusively within the a ... 'merger trees' are being used with in ...

Figure 3 and its legend explain th ... schematically. The dendrogram qua ... ima of emission merge with each ... explained in Supplementary Meth ... determined almost entirely by th ... sensitivity to algorithm paramet ... possible on paper and 2D screen ... data (see Fig. 3 and its legend ... cross, which eliminates dimen ... preserving all information ... Numbered 'billiard ball' lab ... features between a 2D map ... online) and a sorted dendro ...

A dendrogram of a spectr ... of key physical properties ... surfaces, such as radius (R), ... (L). The volumes can have any shape, and ... the significance of the especially elongated features ... (Fig. 2a). The luminosity is an approximate proxy for mass, so that $M_{lum} = X_{13CO} L_{13CO}$, where $X_{13CO} = 8.0 \times 10^{20}\ \mathrm{cm^2\,K^{-1}\,km^{-1}\,s}$ (ref. 15; see Supplementary Methods and Supplementary Fig. 2). The derived values for size, mass and velocity dispersion can then be used to estimate the role of self-gravity at each point in the hierarchy, via calculation of an 'observed' virial parameter, $\alpha_{obs} = 5\sigma_v^2 R / G M_{lum}$. In principle, extended portions of the tree (Fig. 2, yellow highlighting) where $\alpha_{obs} < 2$ (where gravitational energy is comparable to or larger than kinetic energy) correspond to regions of *p*–*p*–*v* space where self-gravity is significant. As α_{obs} only represents the ratio of kinetic energy to gravitational energy at one point in time, and does not explicitly capture external over-pressure and/or magnetic fields[16], its measured value should only be used as a guide to the longevity (boundedness) of any particular feature.

Figure 3 | Schematic illustration of the dendrogram process. Shown is the construction of a dendrogram from a hypothetical one-dimensional emission profile (black). The dendrogram (blue) can be constructed by 'dropping' a test constant emission level (purple) from above in tiny steps (exaggerated in size here, light lines) until all the local maxima and mergers are found, and connected as shown. The intersection of a test level with the emission is a set of points (for example the light purple dots) in one dimension, a planar curve in two dimensions, and an isosurface in three dimensions. The dendrogram of 3D data shown in Fig. 2c is the direct analogue of the tree shown here, only constructed from 'isosurface' rather than 'point' intersections. It has been sorted and flattened for representation on a flat page, as fully representing dendrograms for 3D data cubes would require four dimensions.

64

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nature

LETTERS

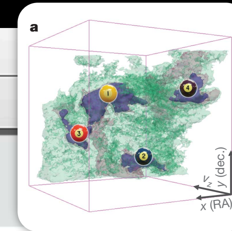
A role for self-gravity at multiple length scales in the process of star formation

Alyssa A. Goodman[1,2], Erik W. Rosolowsky[2,3], Michelle A. Borkin[1†], Jonathan B. Foster[2], Michael Halle[1,4], Jens Kauffmann[1,2] & Jaime E. Pineda[2]

Self-gravity plays a decisive role in the final stages of star formation, where dense cores (size ~0.1 parsecs) inside molecular clouds collapse to form star-plus-disk systems[1]. But self-gravity's role at earlier times (and on larger length scales, such as ~1 parsec) is unclear; some molecular cloud simulations that do not include self-gravity suggest that 'turbulent fragmentation' alone is sufficient to create a mass distribution of dense cores that resembles, and sets, the stellar initial mass function[2]. Here we report a 'dendrogram' (hierarchical tree-diagram) analysis that reveals that self-gravity plays a significant role over the full range of possible scales traced by ^{13}CO observations in the L1448 molecular cloud, but not everywhere in the observed region. In particular, more than 90 per cent of the compact 'pre-stellar cores' traced by peaks of dust emission[3] are projected on the sky within one of the dendrogram's self-gravitating 'leaves'. As these peaks mark the loca-

overlapping features as an option, significant emission found between prominent clumps is typically either appended to the nearest clump or turned into a small, usually 'pathological', feature needed to encompass all the emission being modelled. When applied to molecular-line

Goodman et al. 2009, Nature, cf: Fluke et al. 2009



Vol 457|1 January 2009|**doi:10.1038/nature07609**

LETTERS

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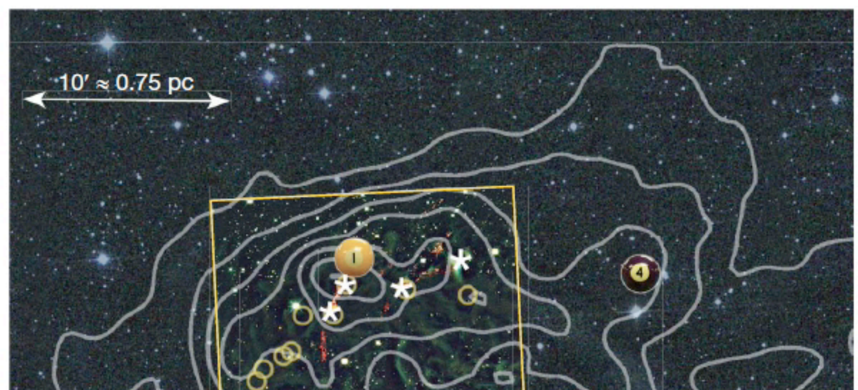
overlapping features as an option, significant emission found between prominent clumps is typically either appended to the nearest clump or turned into a small, usually 'pathological', feature needed to encompass all the emission being modelled. When applied to molecular-line



RIVETING SEQUEL TO COME, BUT, FIRST...

......HOW TO "UN"PUBLISH GRAPHICAL DATA

http://www.
ads
PHOTOGRAPHS OF THE MILKY WAY.
By E. E. Barnard.
In my photographic survey of the Milky Way with the 6-inch Willard lens of this Observatory, I have come across many very remarkable regions. Some of these, besides being remarkable for showing the peculiar structure of the Milky Way, are singularly beautiful as simple pictures of the stars. I have selected two of these for illustration in The Astrophysical Journal.
2000) +31° 25′
α (1875) 3h 30m 30s, δ (1875) +31° 00′
Area
In Perseus and Taurus
Galactic Coordinates
127°, -18°
Scale
1 cm = 18′.2 or 1 in = 46′.2
Chart
Plate & Chart
Table
Text
enlarge [+]
printable PDF
ADS ALL SKY SURVEY
Bar-pt1-pl003_sm
Barnard's Image of Perseus, from www.library.gatech.edu/bpdi/bpdi.php
December 17, 2003
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astrometry.net
Hello, this is the blind astrometry solver. Your results are: (RA, Dec) center: (54.3098782184, 31.431266374) degrees Orientation: 5.21349891764 deg E of N Pixel scale: 18.5163711997 arcsec/pixel Your field contains: NGC 1465 IC 1985 Per / Atik o Per 40Per 42Per NGC 1333 IC 348 IC 2003 View in World Wide Telescope ---- If you would like to have other images solved, please submit them to the
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More Surveys
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Bar-pt1-pl003_sm
WorldWide Telescope
Imagery
Digitized Sky Survey (Color)
Info
Image Crossfade
1 of 9
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California Nebula
IC348;IC 348
IC1911
IC1881
IC1985
IC1874
IC1900
Perseus
ADS ALL SKY SURVEY
WorldWide Telescope

AND, SOON...HUMANS WILL SEE THE INVISIBLE!

ADS ALL SKY SURVEY

+

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REAL SCIENCE ONLINE

CITIZEN SCIENCE ALLIANCE

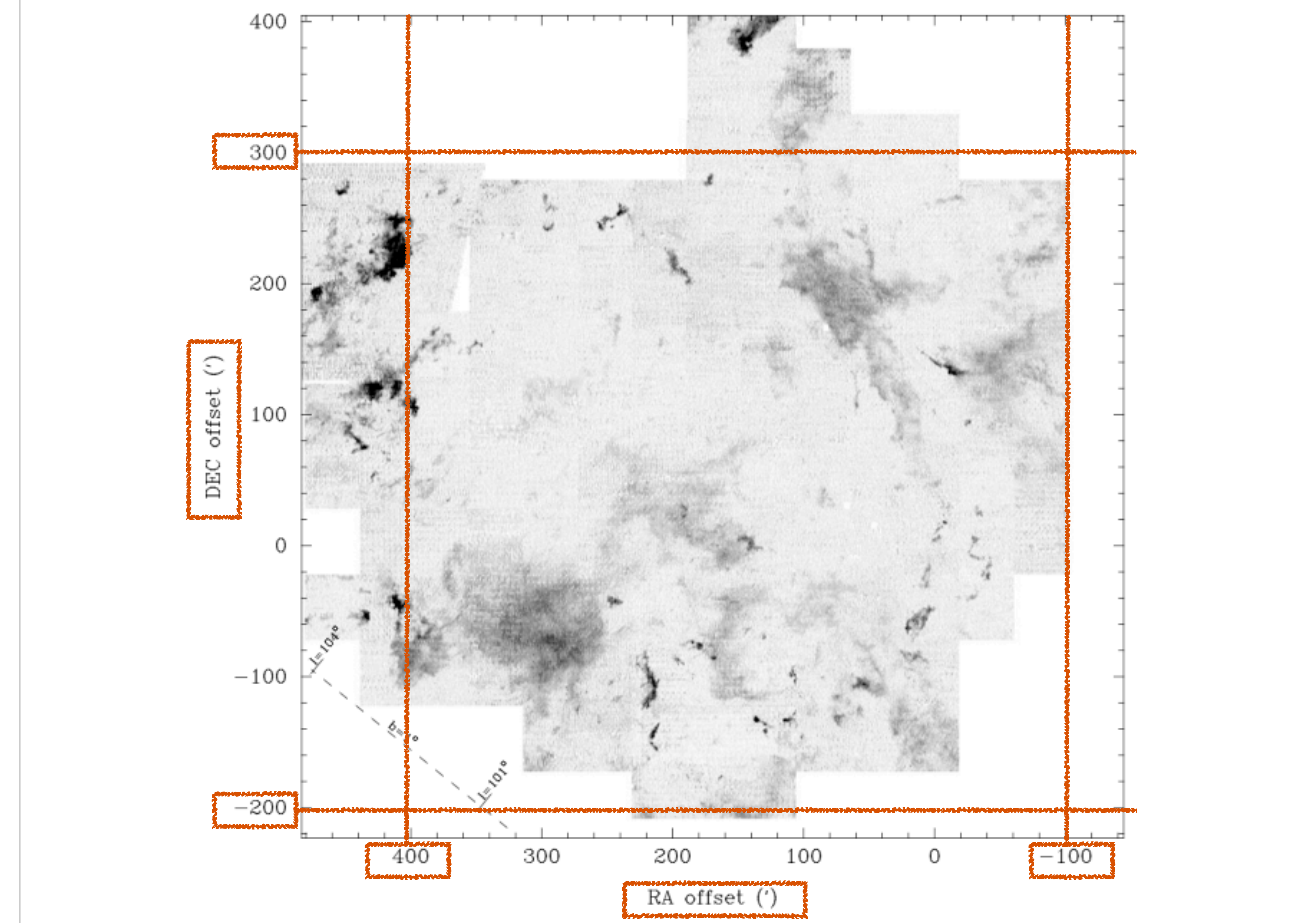
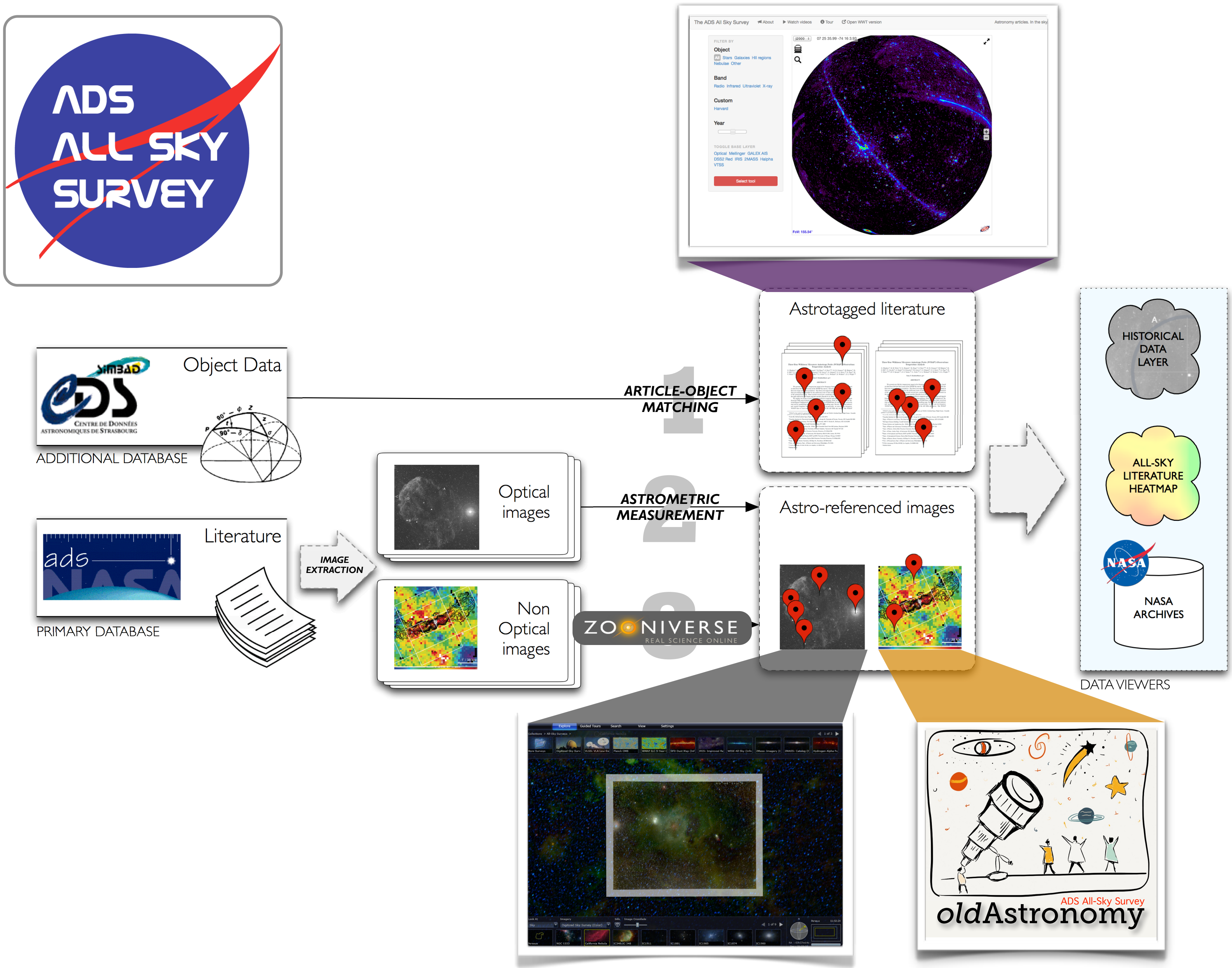

No. 1, 1998 ORIGIN AND EVOLUTION OF THE CEPHEUS BUBBLE 243

FIG. 1.—Peak intensity of CO 1–0 emission. The gray scale represents antenna temperature values scaled linearly between 0 and 3.5 K. The strongest emission occurs at the S140 region and globule A of IC 1396, where the peak antenna temperature is about 10 K. The position offsets are measured from $\alpha(1950) = 21^h18^m00^s$, $\delta(1950) = 59°30'00''$, near S129.

Patel et al. 1998, page 243, Figure 1, with markup (orange) to be made by a citizen scientist using oldAstronomy tools.



slide courtesy of Alberto Pepe

TRY IT AT
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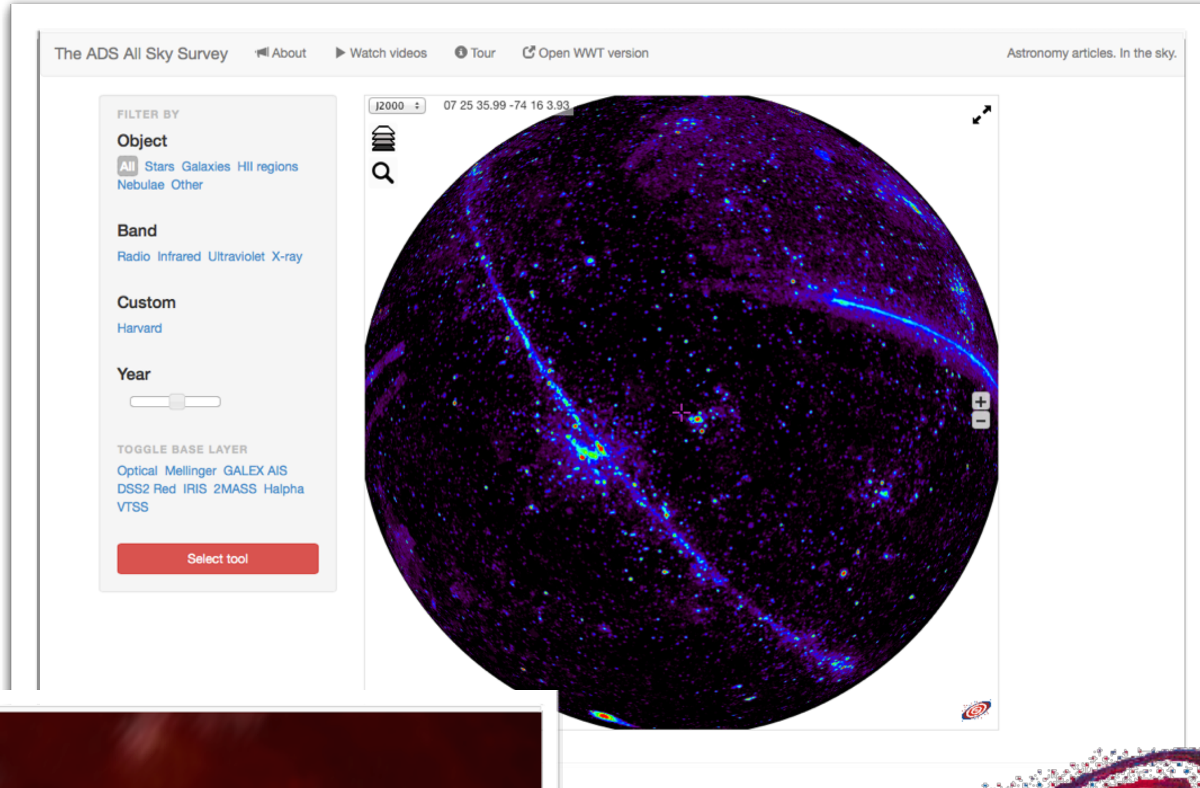

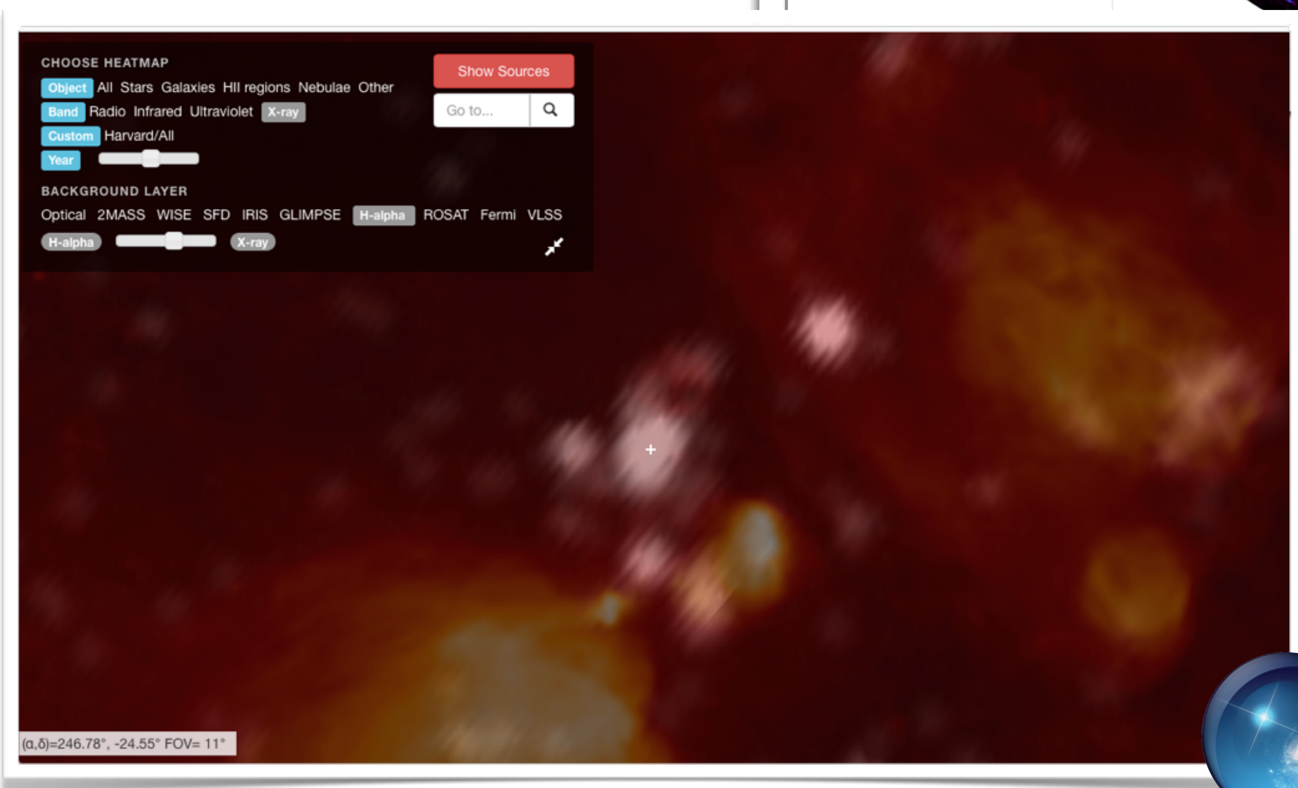

Aladin & WWT versions are both javascript.
No plugins required, use any browser, any platform


1610
SIDEREUS NUNC
1665
PHILOSOPHICAL TRANSACTIONS
1895
ASTROPHYSICAL JOURNAL
AN INTERNATIONAL REVIEW OF SPECTROSCOP
AND ASTRONOMICAL PHYSICS
JANUARY 1895
ON THE CONDITIONS WHICH AFFECT TH
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PHOTOGRAPHS OF THE MILKY WAY.
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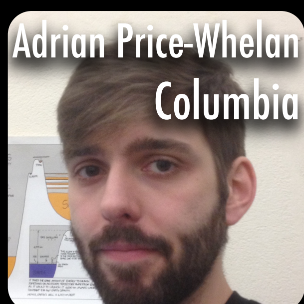
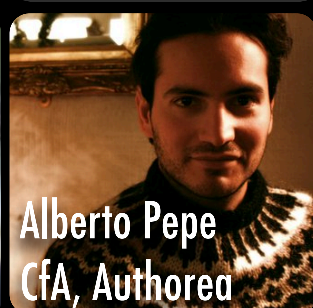
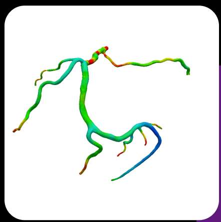
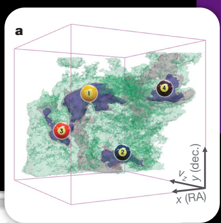
THE RIVETING SEQUEL

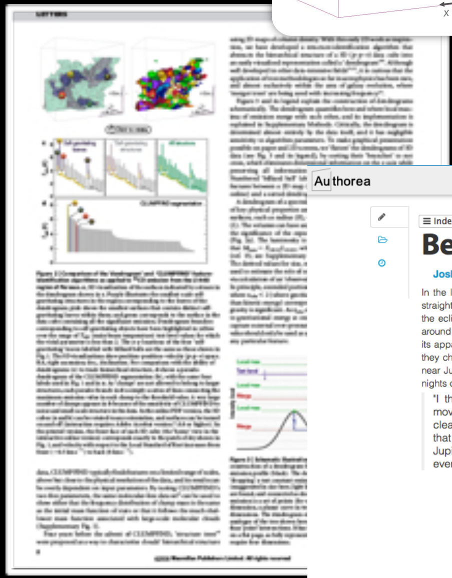




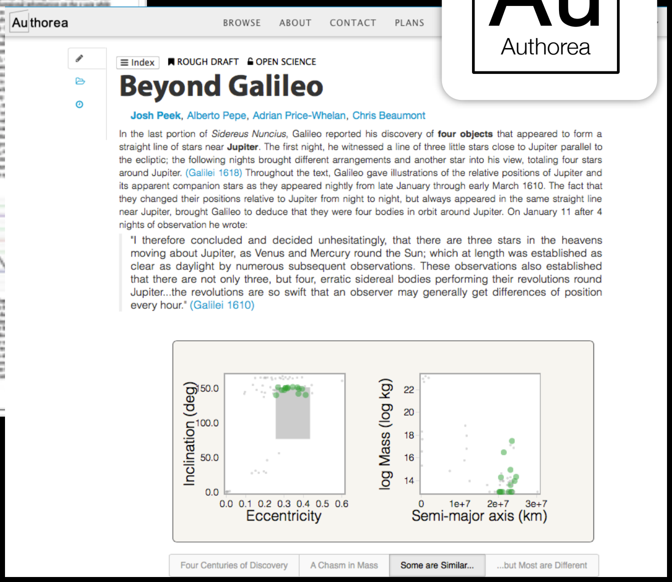
2009





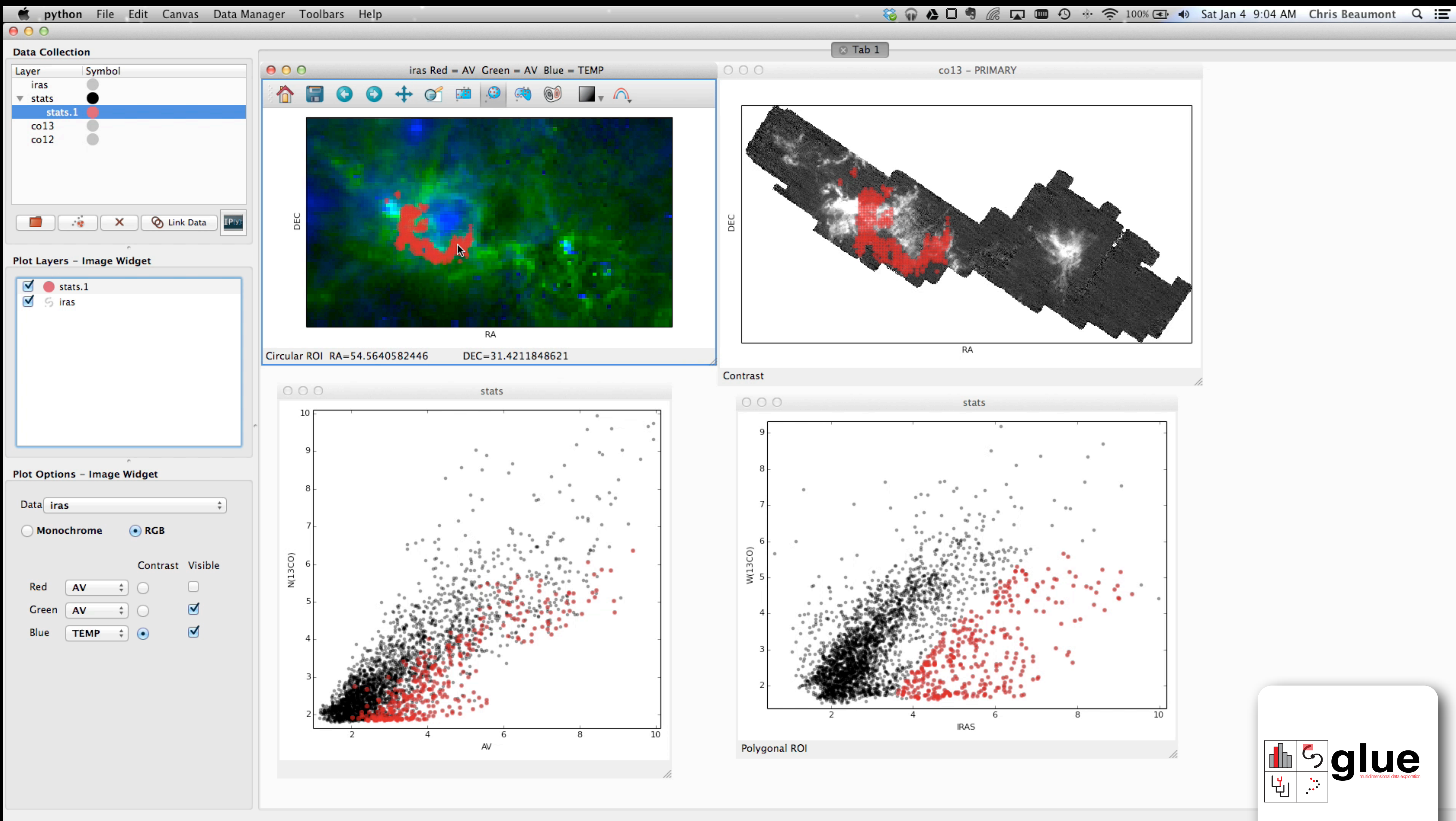


2014



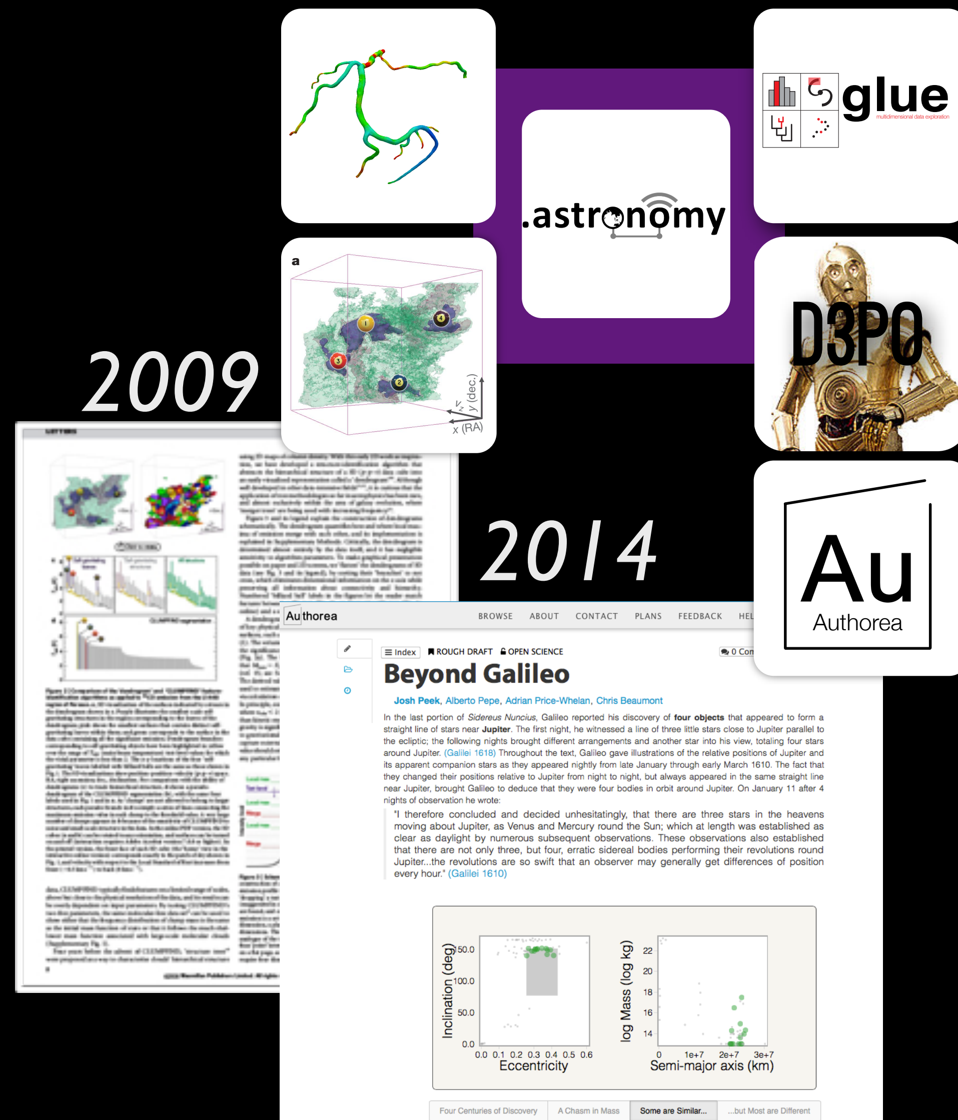
LINKED VIEWS OF HIGH-DIMENSIONAL DATA

GLUE



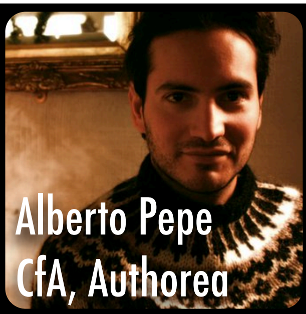
Beaumont, w/Goodman, Robitaille & Borkin

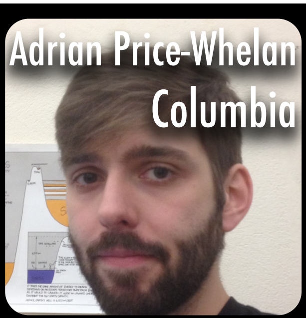
THE RIVETING SEQUEL

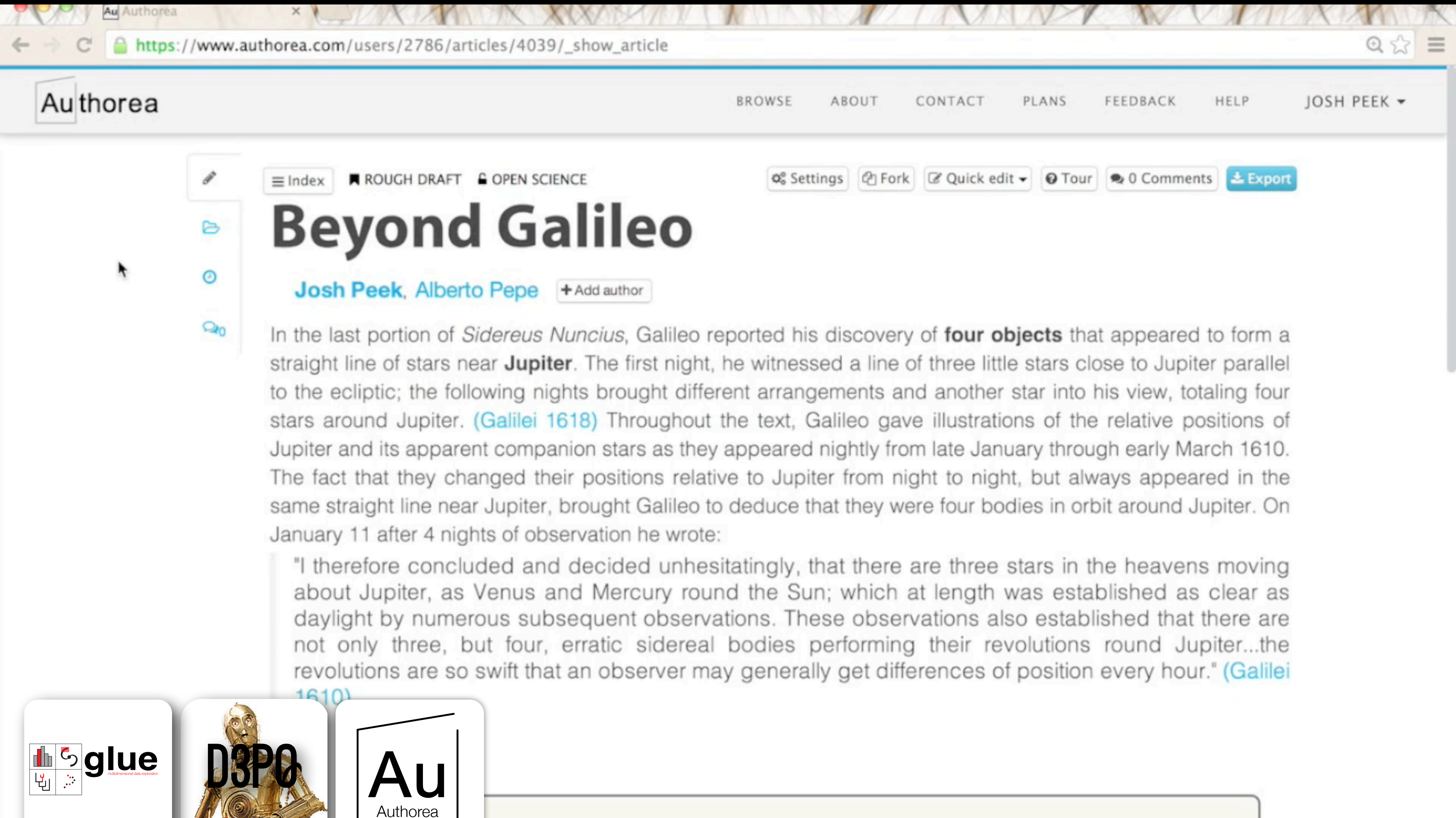


"THE STORY & THE SANDBOX"

(GLUE:D3PO:AUTHOREA)







Beyond Galileo

Josh Peek, Alberto Pepe + Add author

In the last portion of *Sidereus Nuncius*, Galileo reported his discovery of **four objects** that appeared to form a straight line of stars near **Jupiter**. The first night, he witnessed a line of three little stars close to Jupiter parallel to the ecliptic; the following nights brought different arrangements and another star into his view, totaling four stars around Jupiter. (Galilei 1618) Throughout the text, Galileo gave illustrations of the relative positions of Jupiter and its apparent companion stars as they appeared nightly from late January through early March 1610. The fact that they changed their positions relative to Jupiter from night to night, but always appeared in the same straight line near Jupiter, brought Galileo to deduce that they were four bodies in orbit around Jupiter. On January 11 after 4 nights of observation he wrote:

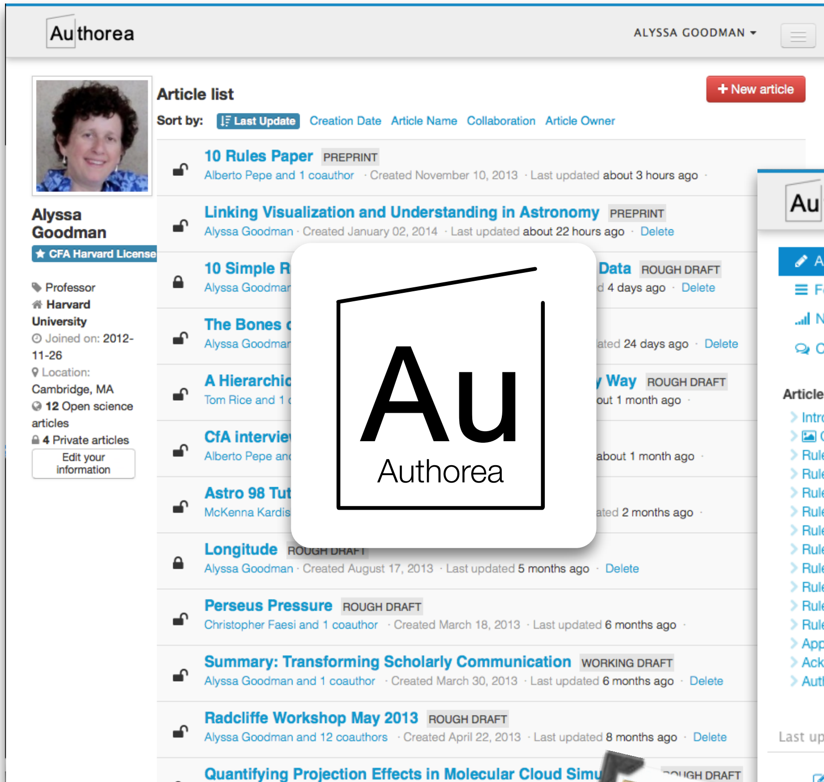
> "I therefore concluded and decided unhesitatingly, that there are three stars in the heavens moving about Jupiter, as Venus and Mercury round the Sun; which at length was established as clear as daylight by numerous subsequent observations. These observations also established that there are not only three, but four, erratic sidereal bodies performing their revolutions round Jupiter...the revolutions are so swift that an observer may generally get differences of position every hour." (Galilei 1610)

glue

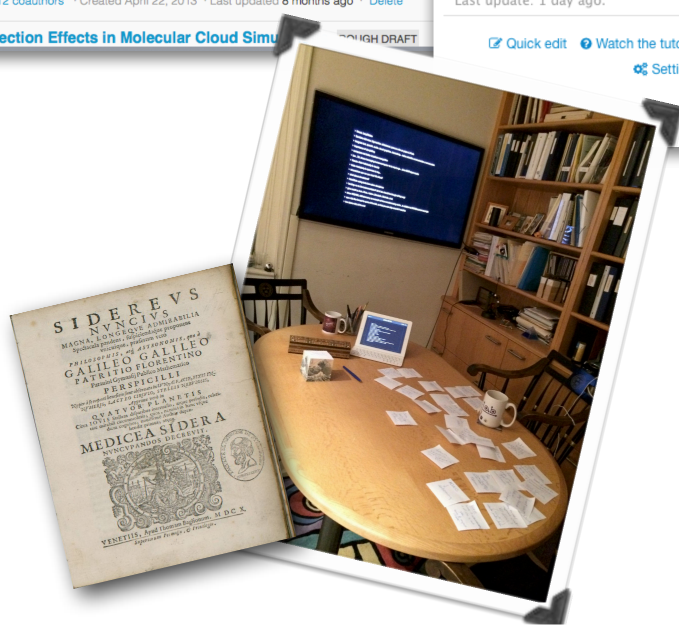
D3PO

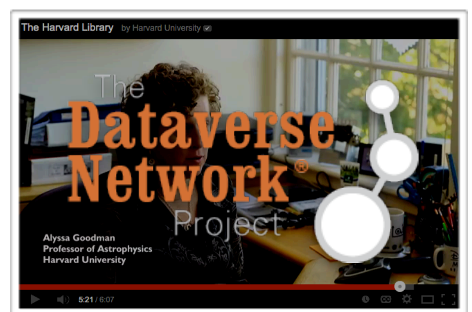
Au Authorea

THE FUTURE IS IN ONLINE



BUT WE DO NEED TO FIGURE OUT HOW NOT TO LOSE IT.





tinyurl.com/acidfreedigital

WHAT'S AN "ACID-FREE" DIGITAL RECORD?

EDITORIAL

Ten Simple Rules for the Care and Feeding of Scientific Data

Alyssa Goodman, Alberto Pepe, Alexander W. Blocker, Christine L. Borgman, Kyle Cranmer, Merce Crosas, Rosanne Di Stefano, Yolanda Gil, Paul Groth, Margaret Hedstrom, David W. Hogg, Vinay Kashyap, Ashish Mahabal, [...], Aleksandra Slavkovic, [view all]

Published: April 24, 2014 • DOI: 10.1371/journal.pcbi.1003542 • Featured in PLOS Collections

Figures

Citation: Goodman A, Pepe A, Blocker AW, Borgman CL, Cranmer K, et al. (2014) Ten Simple Rules for the Care and Feeding of Scientific Data. PLoS Comput Biol 10(4): e1003542. doi:10.1371/journal.pcbi.1003542

Editor: Philip E. Bourne, University of California San Diego, United States of America

Published: April 24, 2014

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"10 SIMPLE RULES"

Rule 1. **Love** Your Data, and Help Others Love It, Too

Rule 2. **Share** Your Data Online, with a **Permanent Identifier**

Rule 3. Conduct Science with a Particular **Level of Reuse** in Mind

Rule 4. Publish **Workflow** as Context

Rule 5. Link Your **Data to Your Publications** as Often as Possible

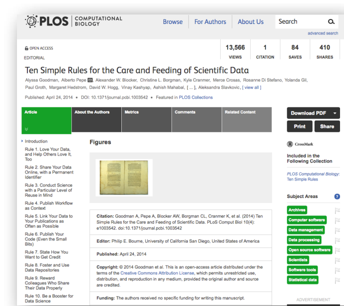
Rule 6. Publish Your **Code** (Even the Small Bits)

Rule 7. State How You Want to Get **Credit**

Rule 8. Foster and Use **Data Repositories**

Rule 9. **Reward Colleagues Who Share** Their Data **Properly**

Rule 10. Be a **Booster** for Data Science



LINKS TO USEFUL RESOURCES FROM "10 SIMPLE RULES" PAPER...

A: General Data Repositories

- **Dataverse** (**http://thedata.org**): A repository for research data that takes care of long-term preservation and good archival practices, while researchers can share, keep control of, and get recognition for their data.
- **FigShare** (**http://figshare.com**): A repository where users can make all of their research outputs available in a citable, shareable, and discoverable manner.
- Zenodo (http://zenodo.org): A repository service that enables researchers, scientists, projects, and institutions to share and showcase multidisciplinary research results (data and publications) that are not part of existing institutional or subject-based repositories.
- Dryad (http://datadryad.org): A repository that aims to make data archiving as simple and as rewarding as possible through a suite of services not necessarily provided by publishers or institutional websites.

B: Directories of Research Data Repositories

- DataBib (http://databib.org): Databib is a tool for helping people identify and locate online repositories of research data. Users and bibliographers create and curate records that describe data repositories that users can search.
- Re3data.org (http://www.re3data.org): Re3data is a global registry of research data repositories from different academic disciplines for researchers, funding bodies, publishers, and scholarly institutions.
- Open Access Directory (http://oad. simmons.edu/oadwiki/Data_repositories): A list of repositories and databases for open data.
- Force 11 Catalog (http://www.force11.org/catalog): A dynamic inventory of web-based scholarly resources, a collection of alternative publication systems, databases, organizations and groups, software, services, standards, formats, and training tools.

C: Workflow Management Systems

- Taverna (http://www.taverna.org.uk): An open-source and domain-independent workflow management system—a suite of tools used to design and execute scientific workflows and aid in silico experimentation.
- Kepler (https://kepler-project.org): Software designed to help scientists, analysts, and computer programmers create, execute, and share models and analyses across a broad range of scientific and engineering disciplines.
- Wings (http://www.wings-workflows.org): A semantic workflow system that assists scientists with the design of computational experiments.
- VisTrails (http://www.vistrails.org): An open-source scientific workflow and provenance management system that supports data exploration and visualization.
- Knime (http://www.knime.org): A graphical workbench for the entire analysis process: data access, data transformation, initial investigation, powerful predictive analytics, visualization, and reporting.

D: Source Code Repositories

- **Github** (http://github.com): A web-based hosting service for software development projects that use the Git revision control system, including many open-source projects.
- Git (http://git-scm.com): A free and open-source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.
- Mercurial (http://mercurial.selenic.com): A free, distributed source control management tool. It efficiently handles projects of any size and offers an easy and intuitive interface.
- BitBucket (https://bitbucket.org): A web-based hosting service for projects that use either the Mercurial or Git revision control systems.

E: Systems to Package, Access, and Execute Data and Code

- **IPython Notebook** (http://ipython.org/notebook.html): A web-based interactive computational environment where you can combine code execution, text, mathematics, plots, and rich media into a single document.
- ROpenSci (http://ropensci.org): A suite of packages that allow access to data repositories through the R statistical programming environment.
- Authorea (https://authorea.com): A collaborative online word processor for scholarly papers that allows the writing of web-native, living, dynamic, "executable" articles that include text, mathematical notation, images, and data. It currently supports inclusion and rendering of d3.js plots and IPython notebooks.
- Dexy (http://dexy.it): A multipurpose project automation tool for working with documents via a command-line interface.

F: Software Tools to Run Your Own Document Repository

- Invenio (http://invenio-software.org): Invenio is a free software suite enabling you to run your own digital library or document repository on the web. Invenio is an ideal solution for running document repositories of moderate to large sizes (several millions of records). Invenio is codeveloped by CERN, DESY, EPFL, FNAL, and SLAC.
- Eprints (http://www.eprints.org/software): EPrints is one of the easiest and fastest ways to set up small to medium-sized repositories of open-access research literature, scientific data, theses, reports, and multimedia. Developed at the University of Southampton, UK.
- DSpace (http://www.dspace.org): DSpace is a turnkey institutional repository application developed by the Duraspace organization.

G: Licensing and Privacy

- Open Source Initiative (http://opensource.org/licenses): Open-source licenses are licenses that comply with the Open Source Definition: they allow software to be freely used, modified, and shared. These include Apache, BSD, GNU (GPL), MIT, and the Mozilla Public License.
- Privacy Tools for Sharing Research Data (http://privacytools.seas.harvard.edu): A Harvard-based collaborative and multidisciplinary effort to help enable the collection, analysis, and sharing of personal data for research in social science and other fields while providing privacy for individual subjects.

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Totals	**12,285**	**1,236**	**45**	**13,566**
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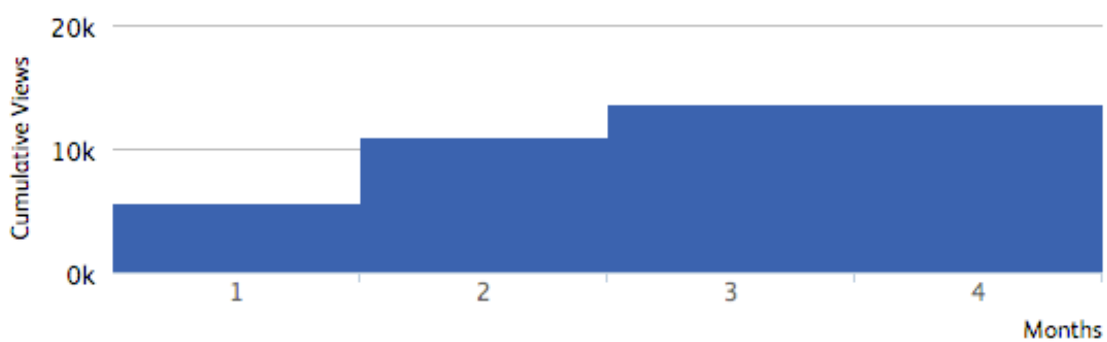

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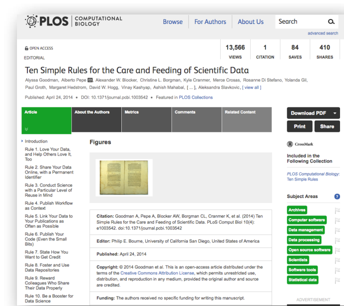

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