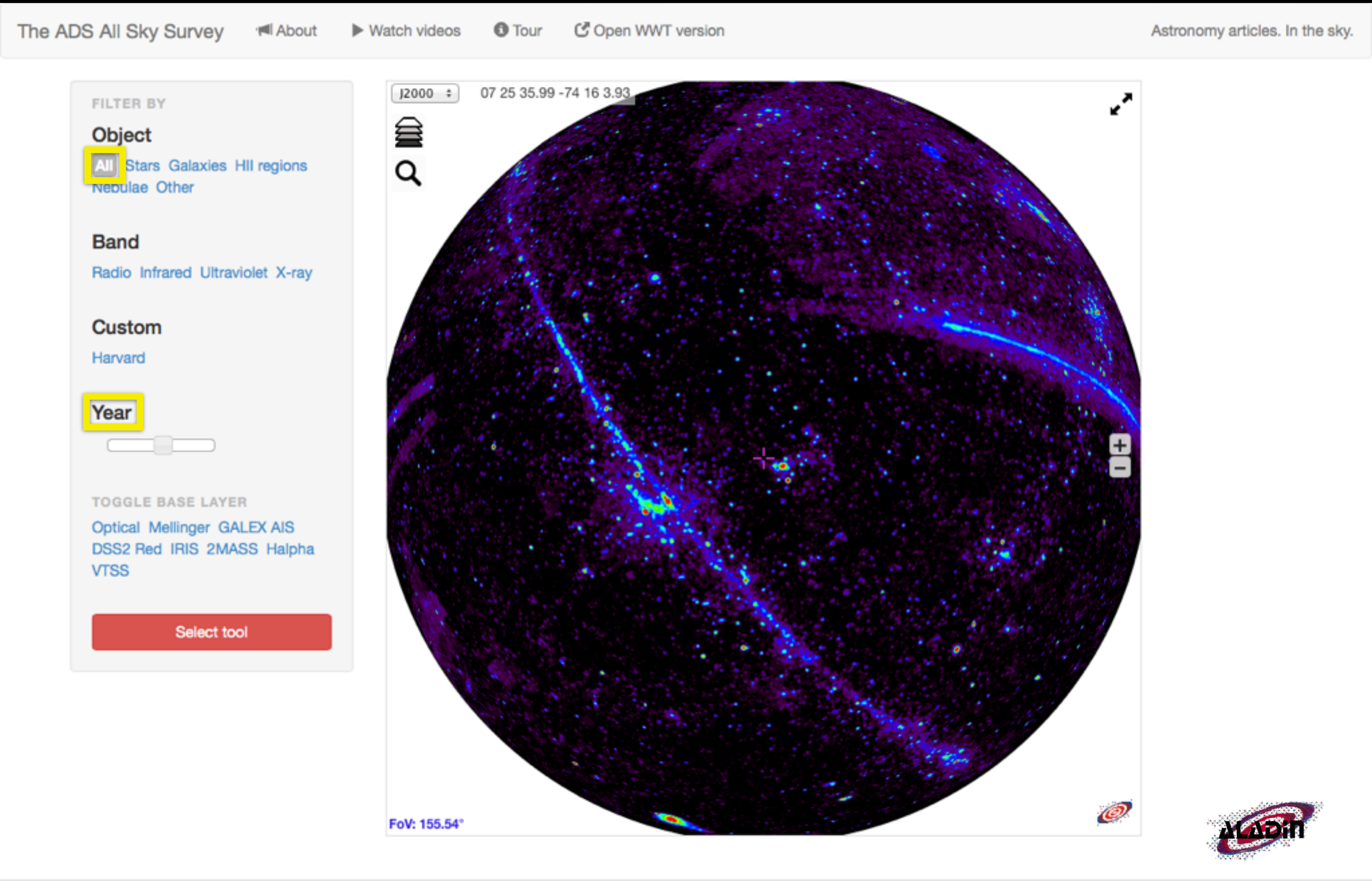
ADS ALL SKY SURVEY

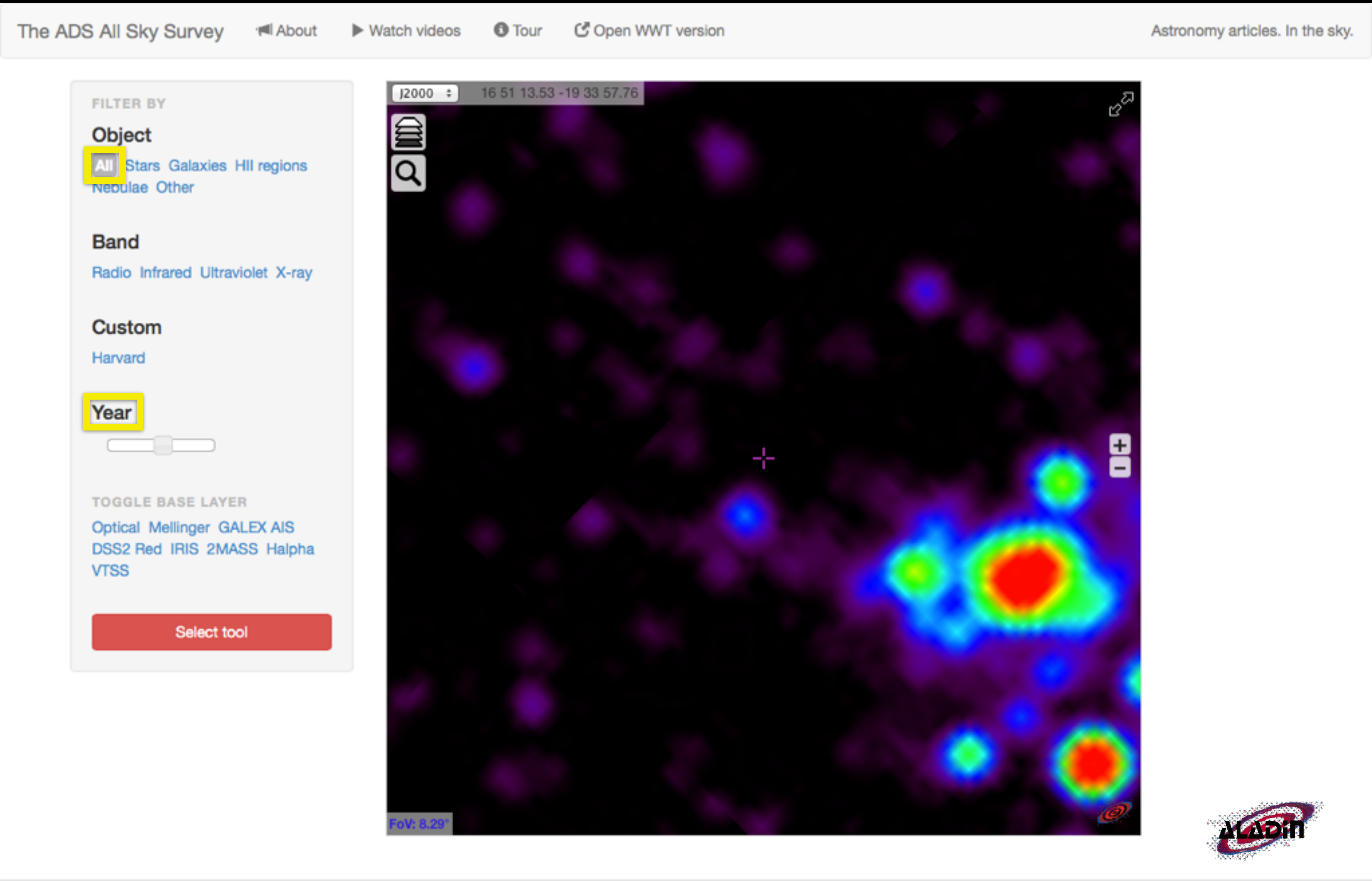
View in Aladin • View in WorldWide Telescope

adsass.org

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

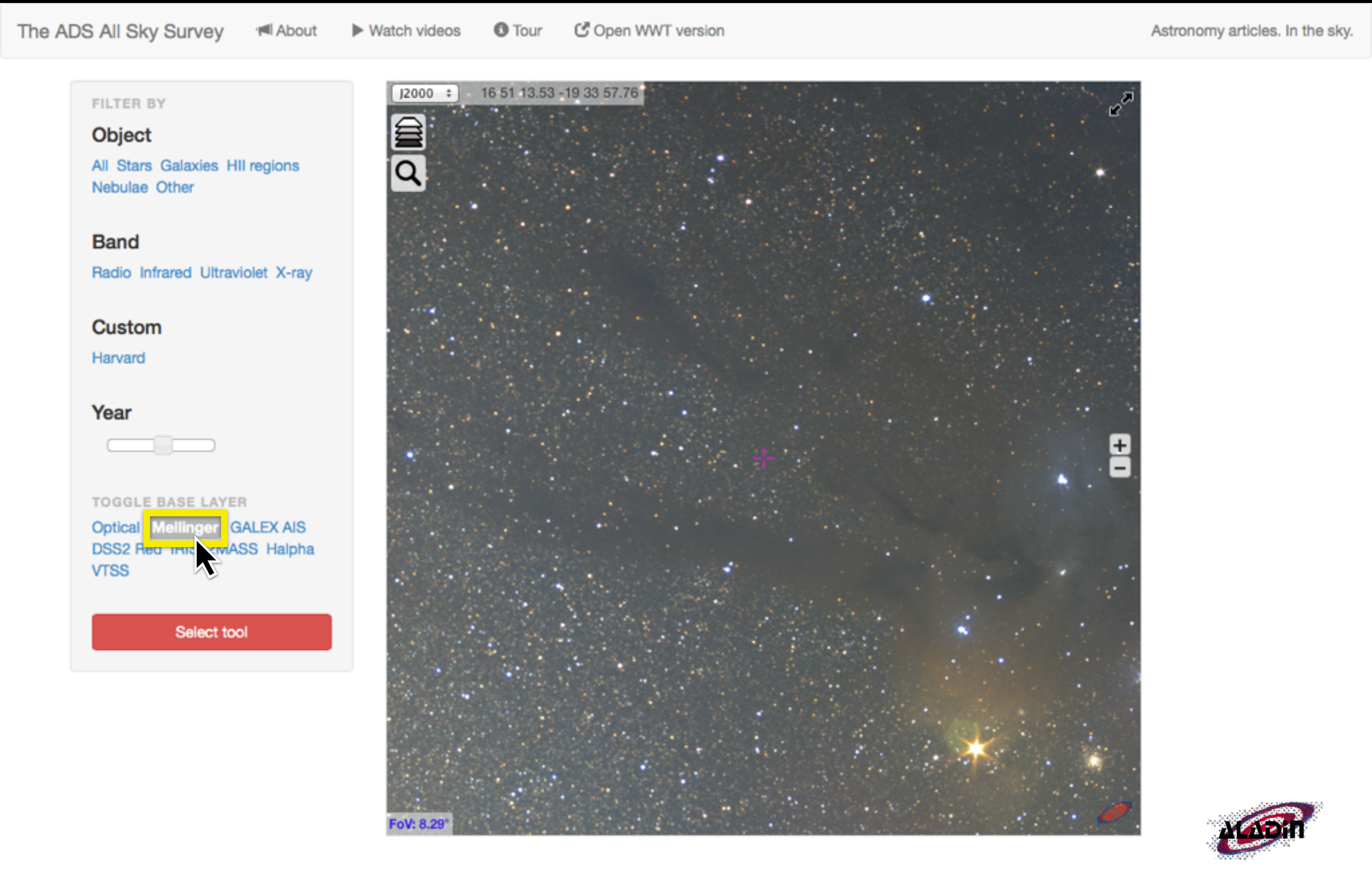


let's zoom in (on Ophiuchus)

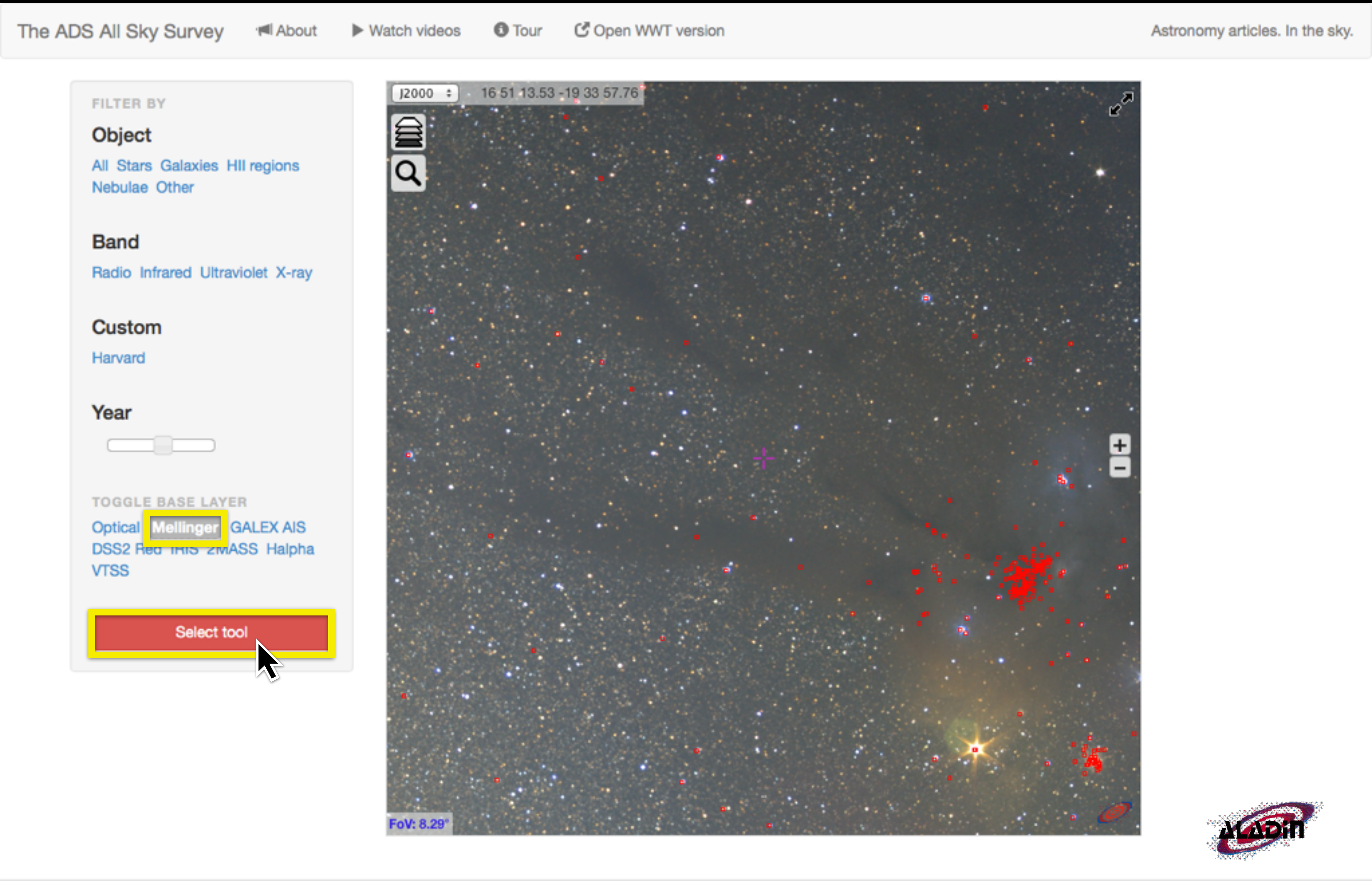


now, let's toggle on the "Mellinger" view of the Sky

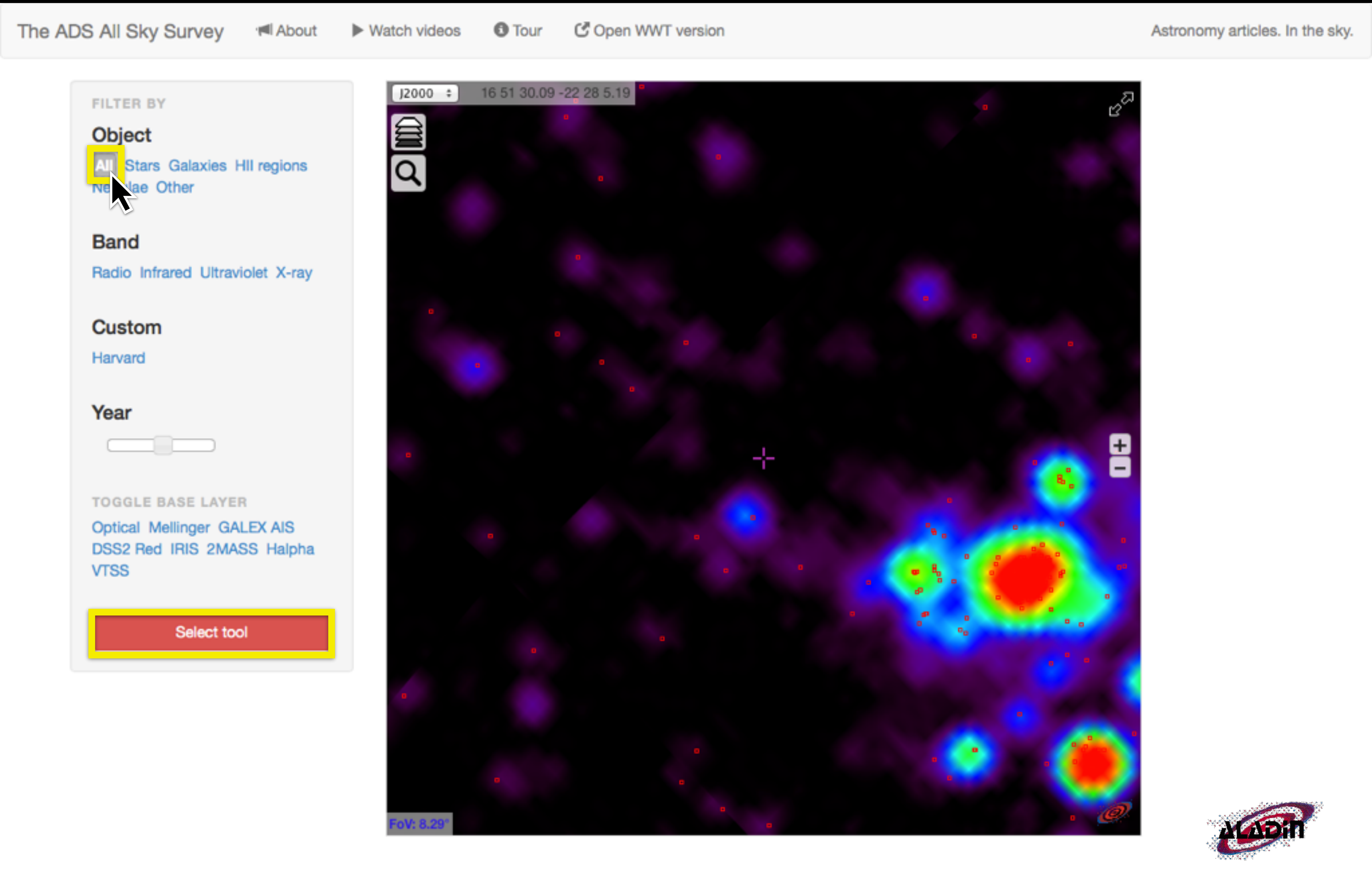
...to see a nice optical image of Ophiuchus



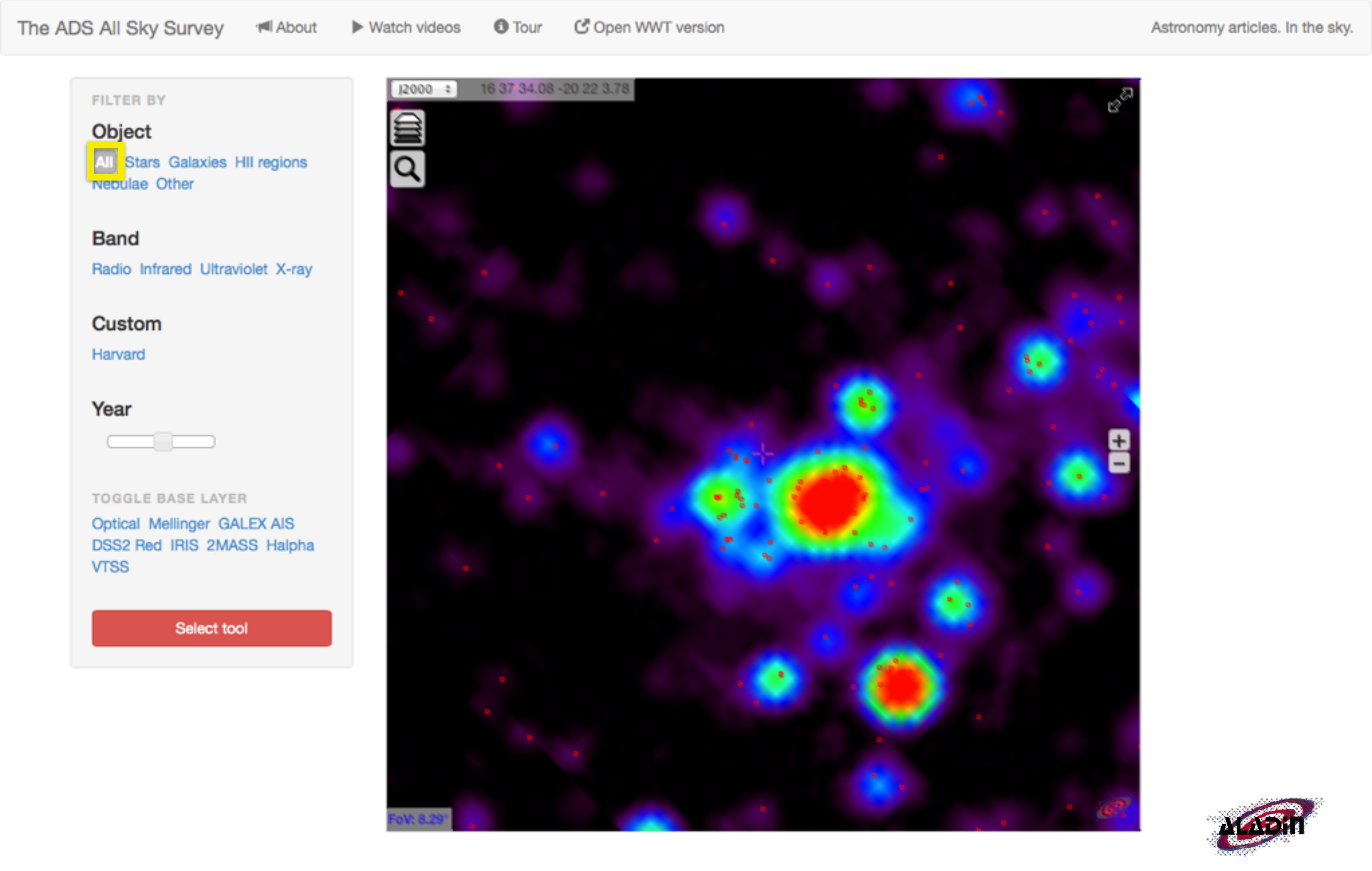
to add markers for SIMBAD sources, we can click the Select Tool



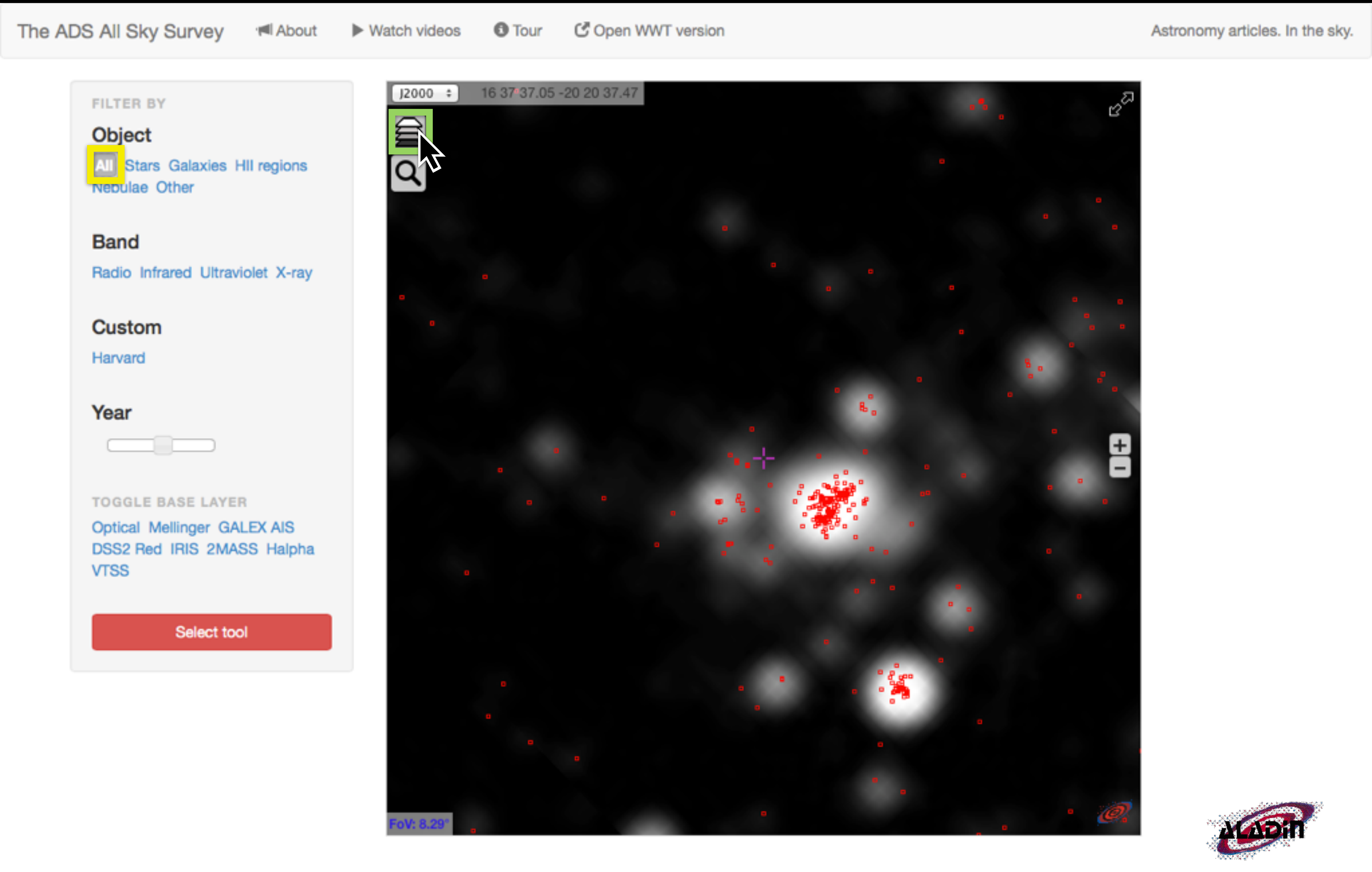
now, if we re-select "All," we see sources on article distribution



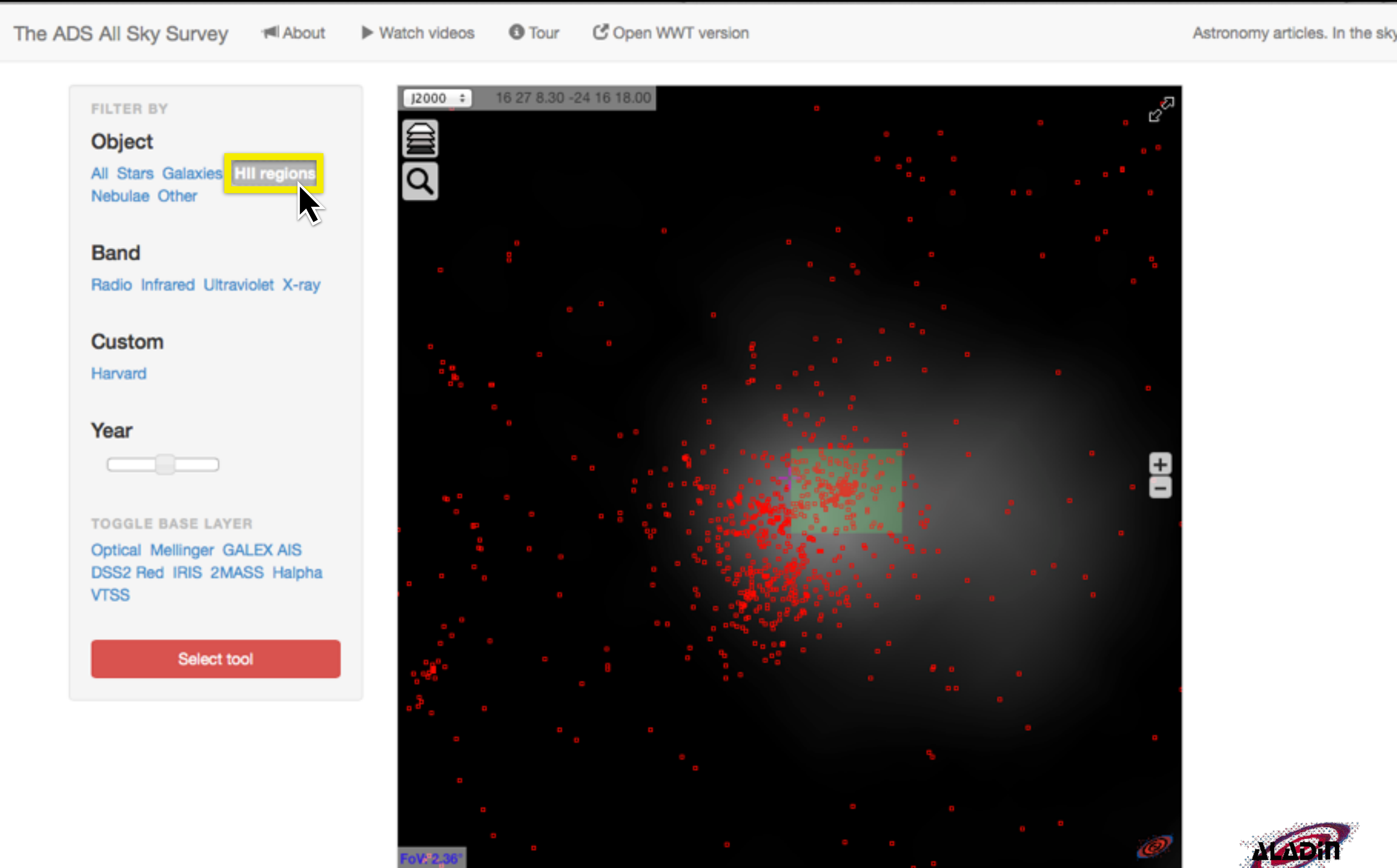
panning over a bit, we can center our region of interest



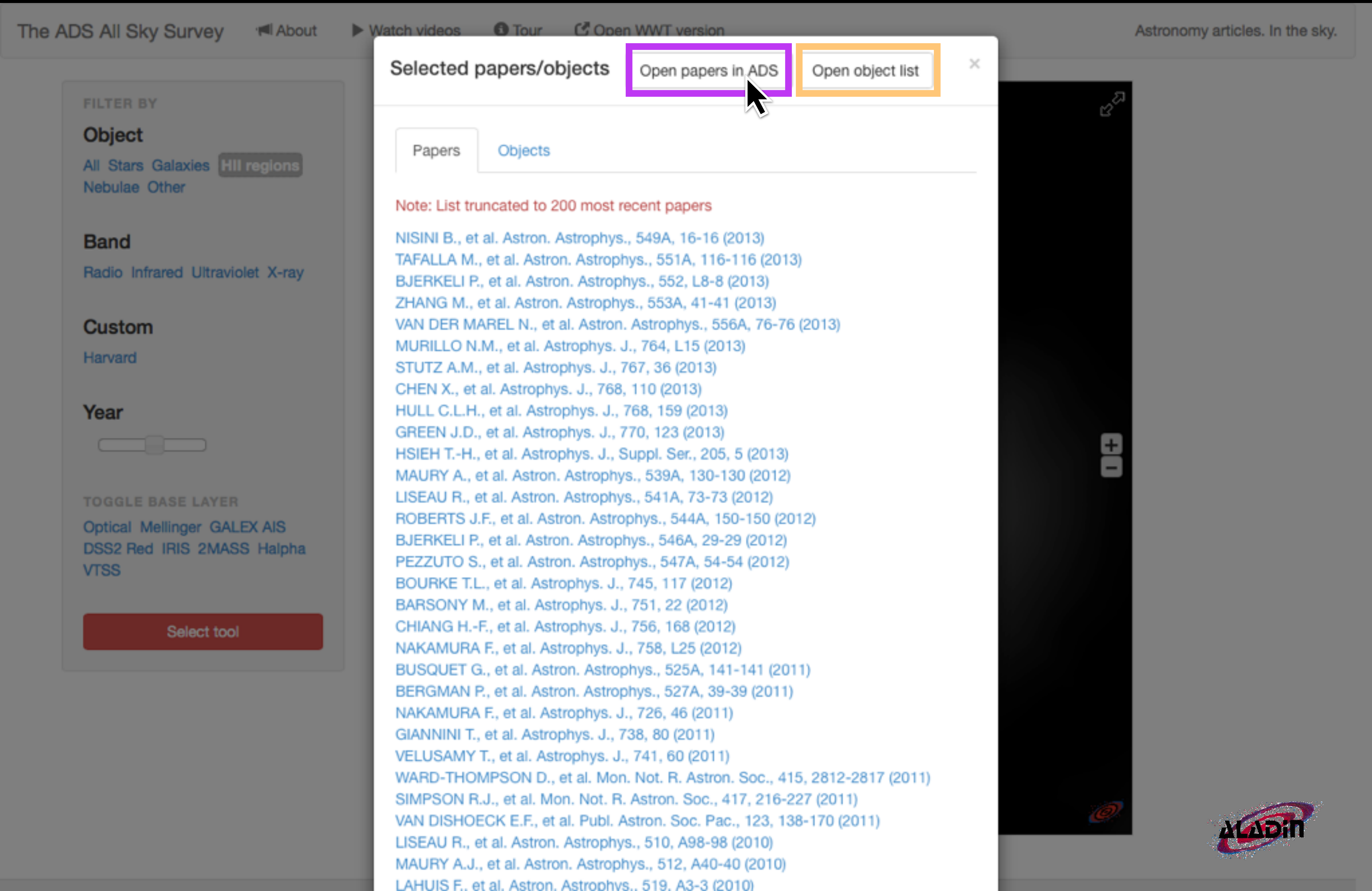
let's change the color table from rainbow to greyscale to make sources more apparent



let’s look now at the distribution of articles about “HII regions” and select an area we’re curious about

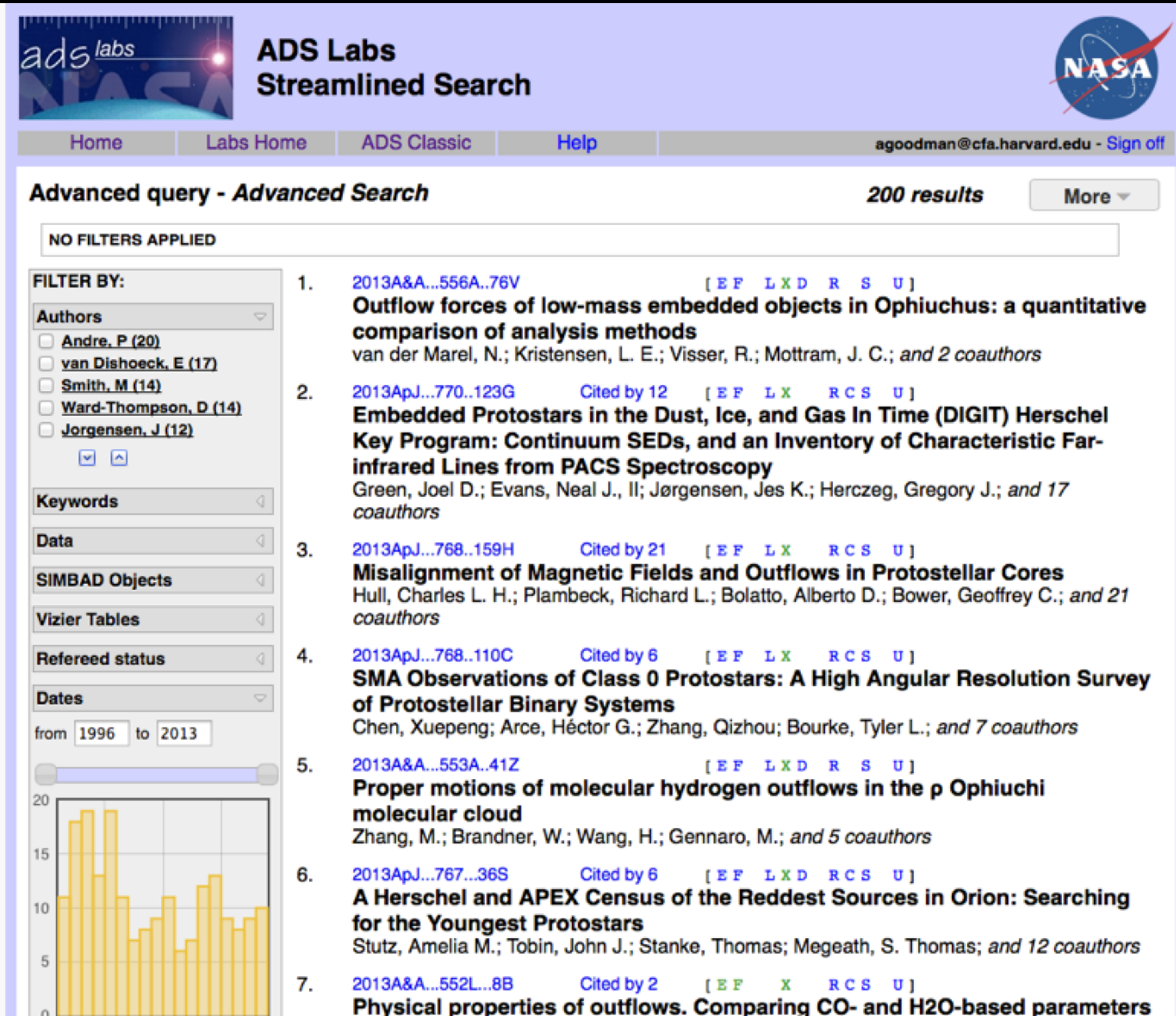


when we release the selection rectangle, we get a pop-up list of papers (ADS) mentioning these objects, or a list of the objects (CDS/SIMBAD) we highlighted

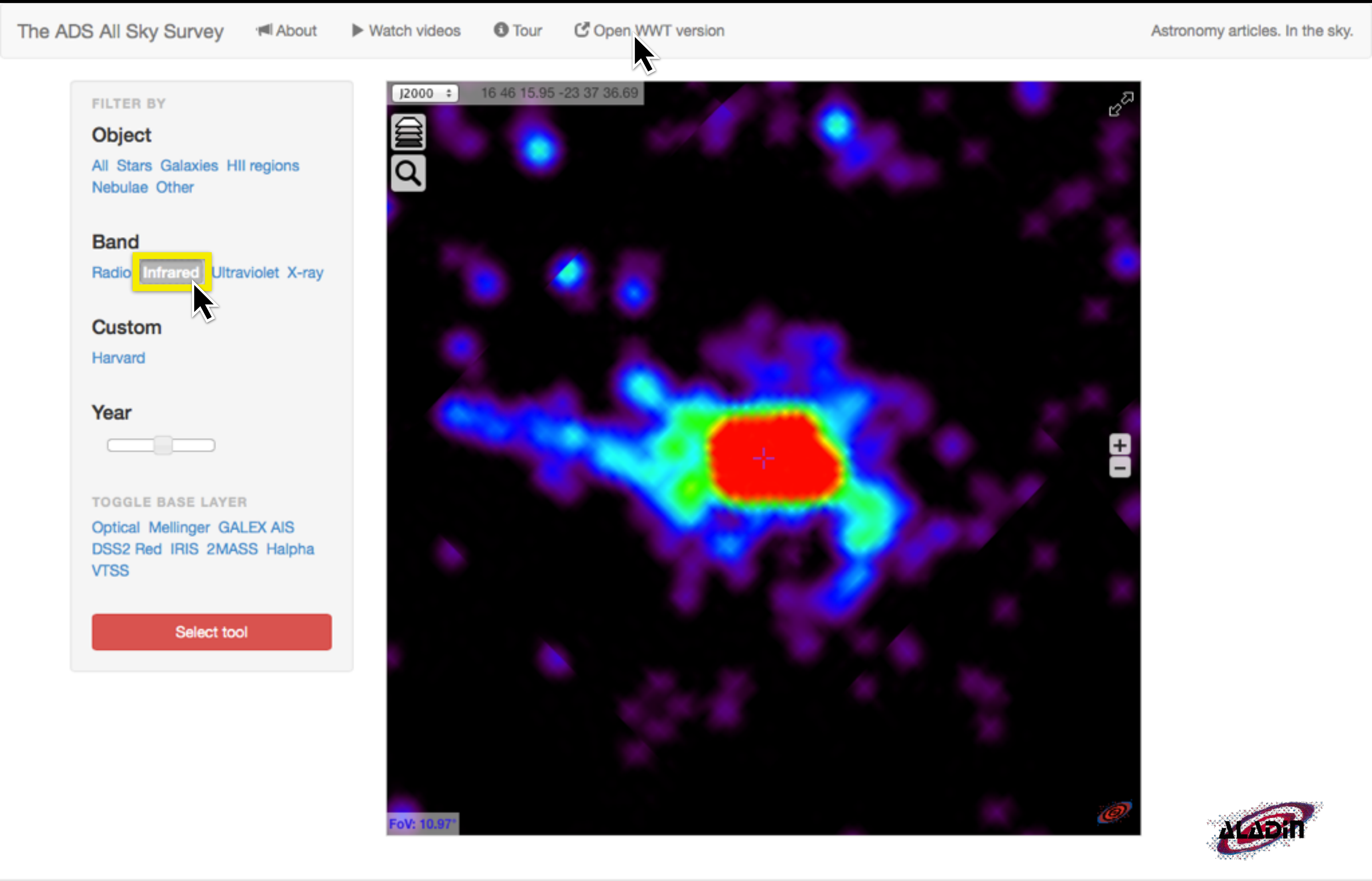


selecting "Open Papers in ADS" opens the paper list in ADS Labs

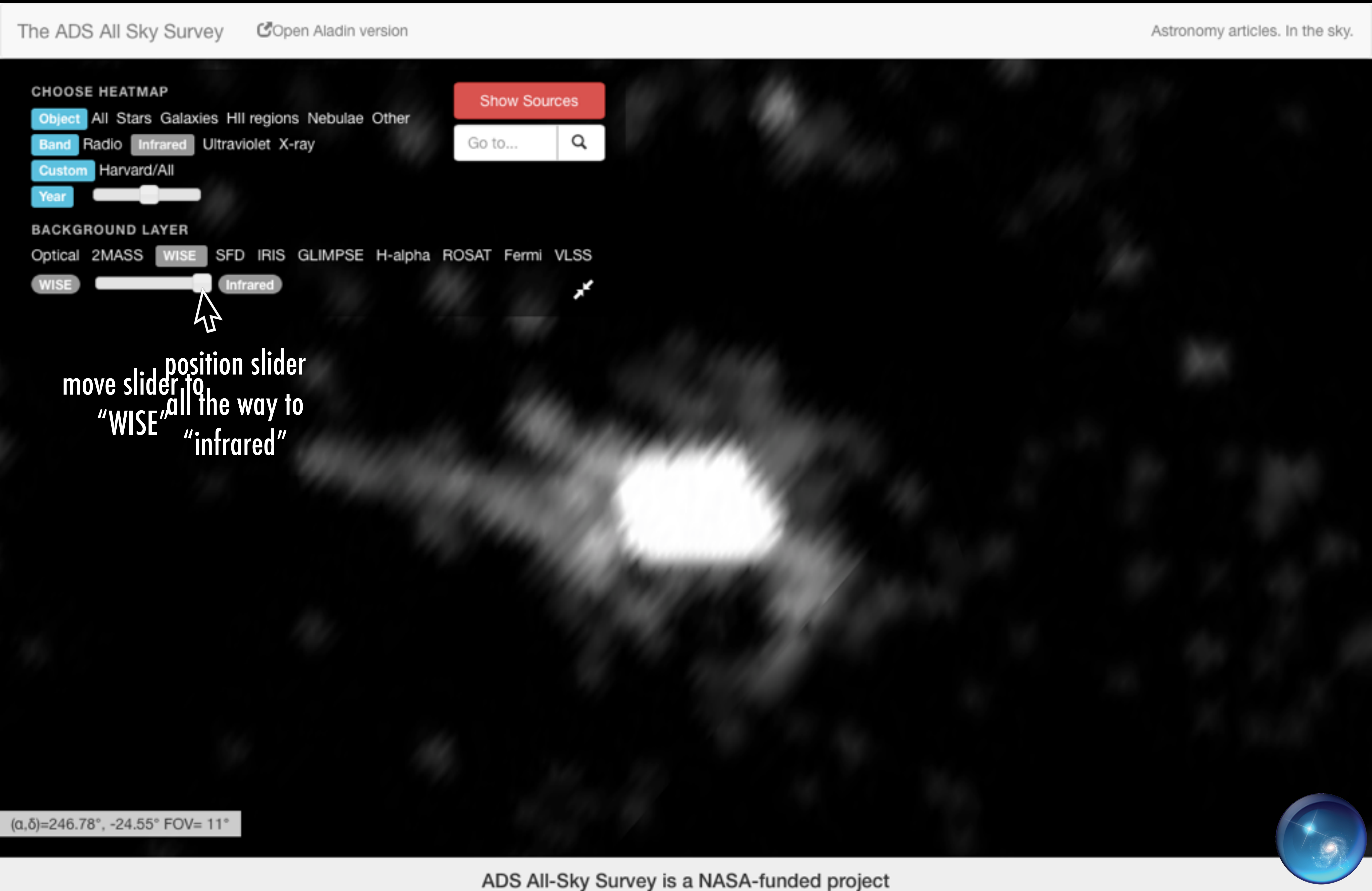
(From here, we can filter the list more, and more. e.g. clicking "SIMBAD Objects" lets us see particular objects in context on the Sky in WWT or Aladin.)



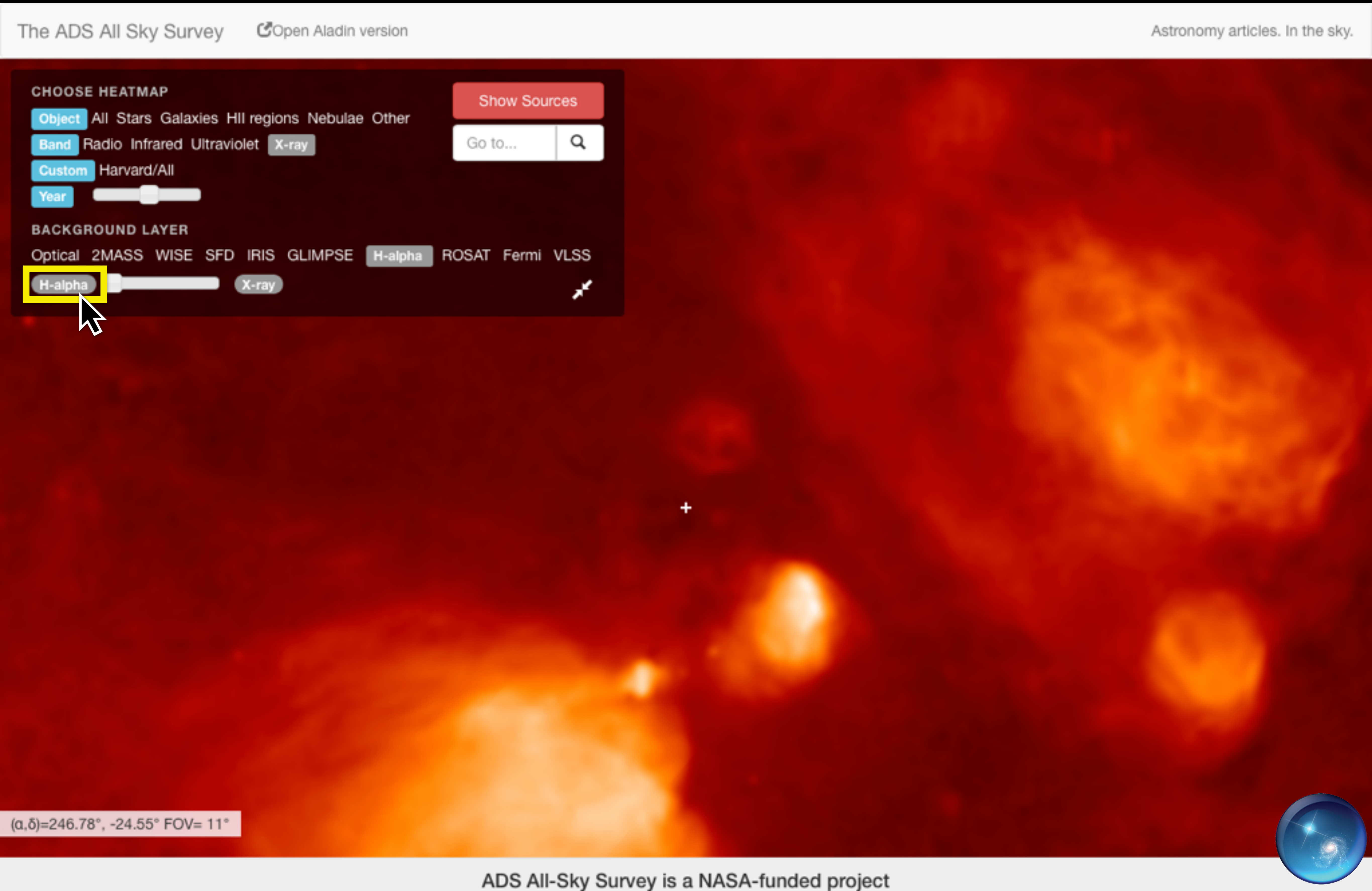
let's try "Open WWT Version," so we can see this same view in WWT, and use a transparency slider



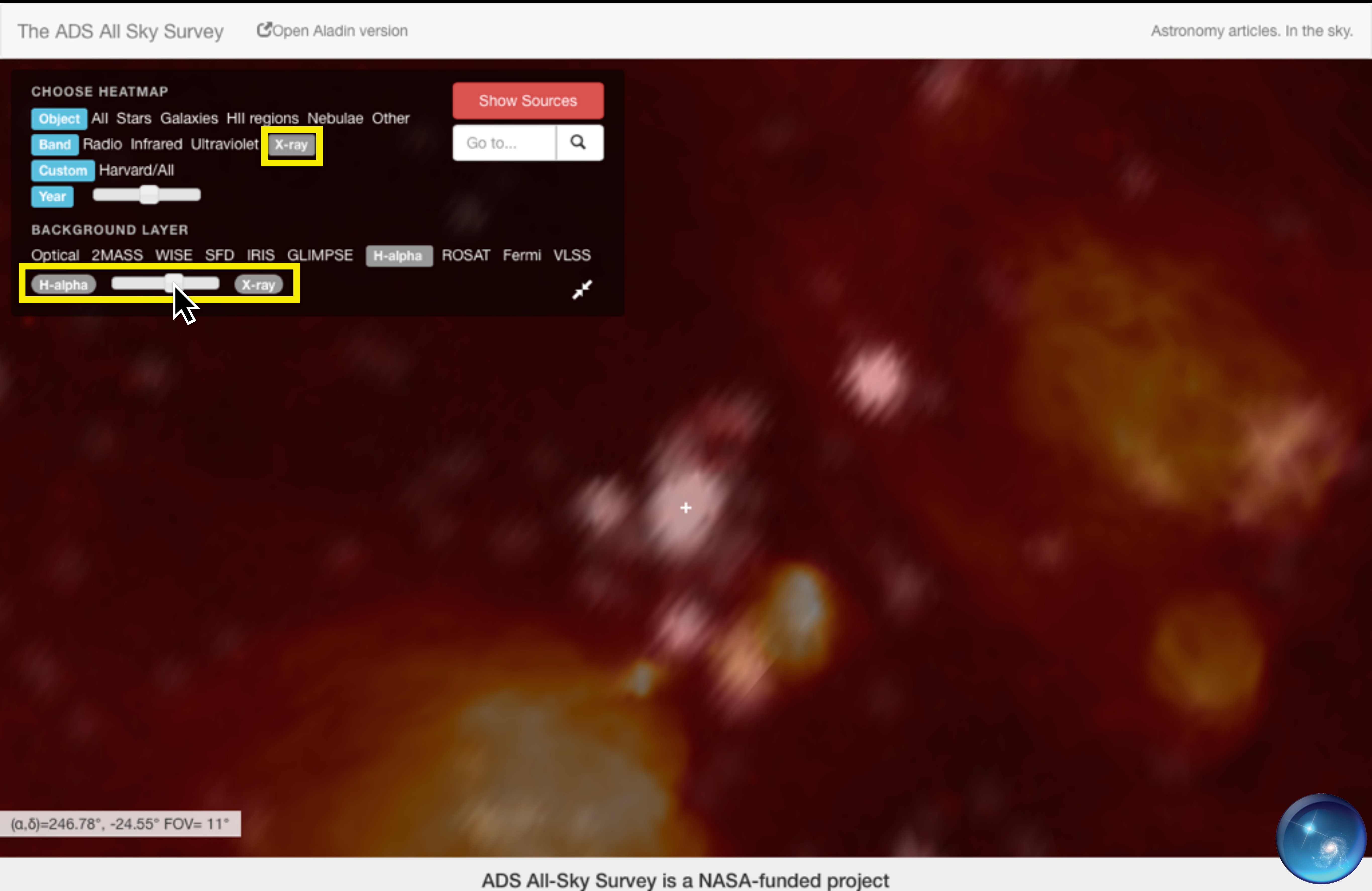
let's try the transparency (layer) slider in WorldWide Telescope



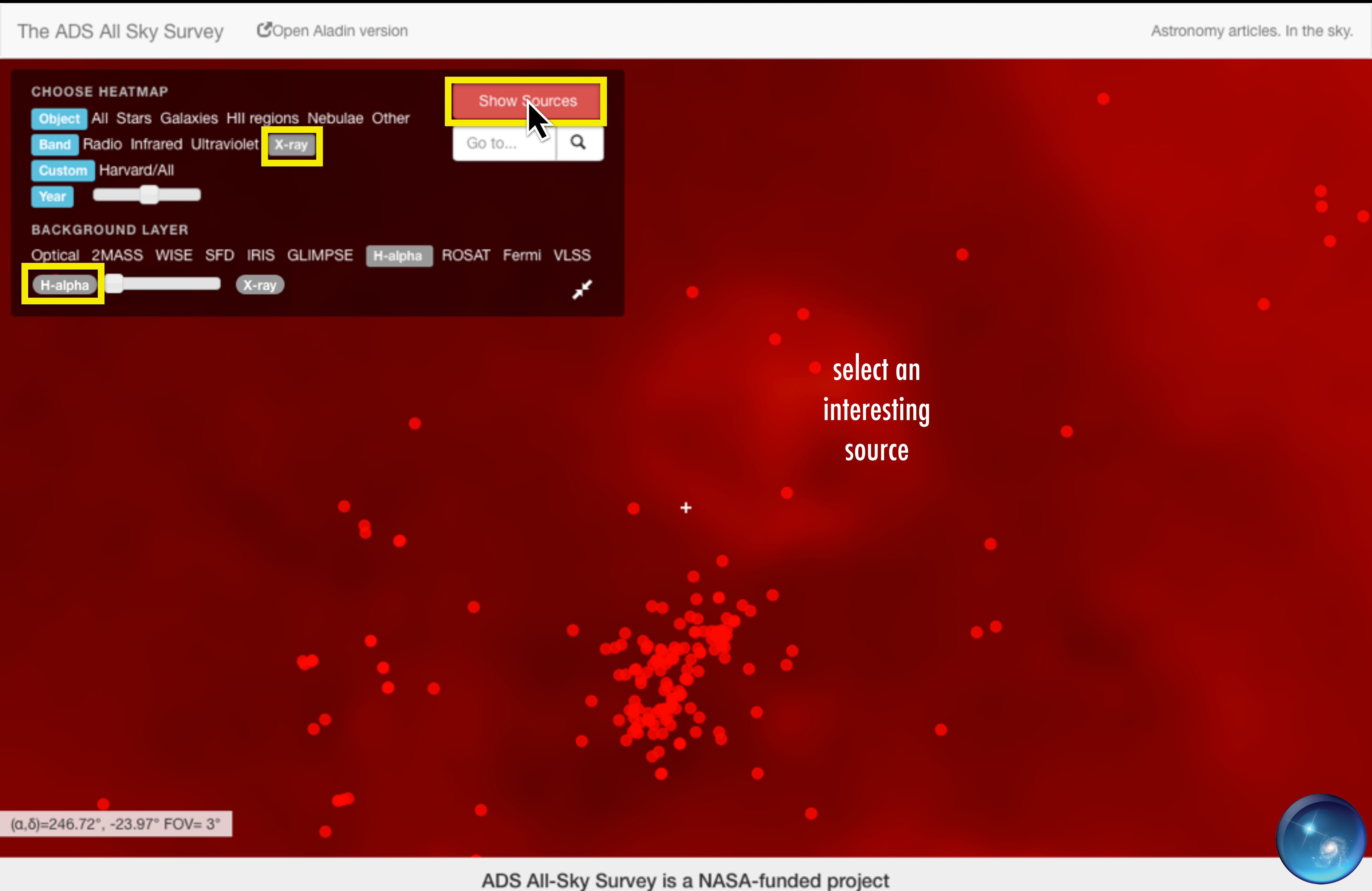
dust is nice, but we're curious about HII regions, let's change view to H-alpha



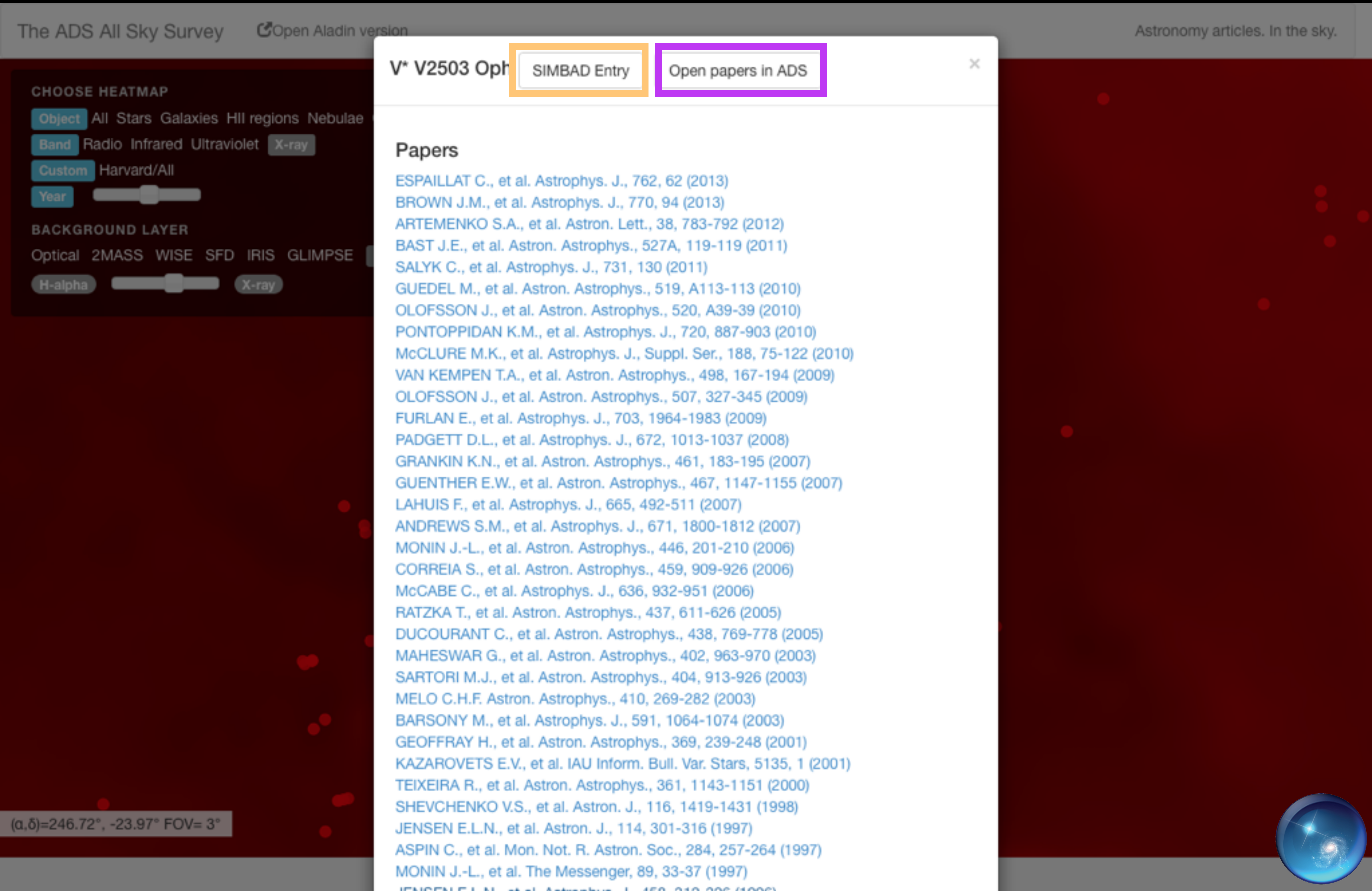
now we want to find X-ray observations and see if any are near the HII regions, so we can slide between H-alpha and X-ray



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

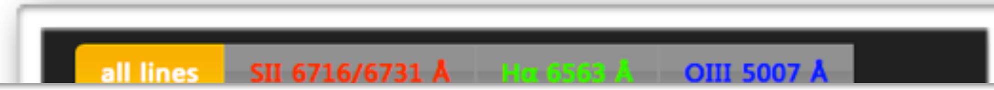
Thomas **Boch**, CDS Strasbourg

Jonathan **Fay**, Microsoft Research

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

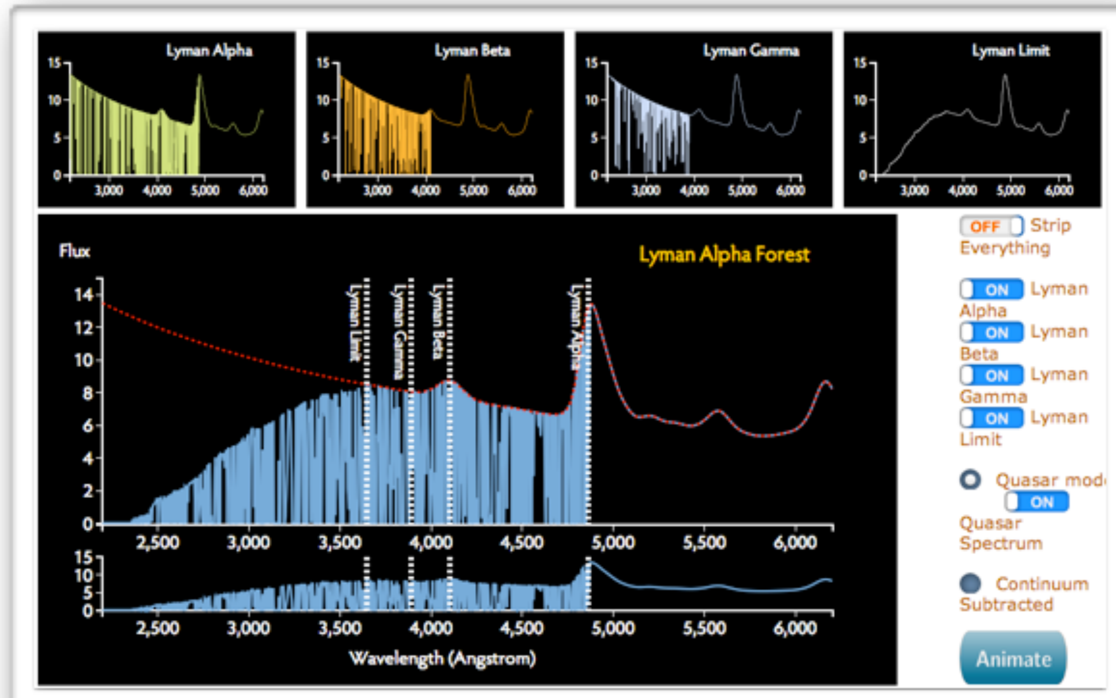
Alberto **Conti**, NASA/STScI, Northrup Grumman

Stephen



Yuan-Sen **Ting**

Interstellar Absorption and the Lyman Alpha Forest



JavaScript JavaScript https://www.cfa.harvard.edu/~yuan-sen.ting/lyman_alpha.html

JavaScript JavaScript http://portillo.ca/nebula/

see: A New Approach to Developing Interactive Software Modules through Graduate Education, Sanders, Faesi & Goodman 2013

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The Past, Present & Future of Scholarship, with Pictures

Alyssa A. Goodman
Harvard-Smithsonian Center for Astrophysics

3500 years of Astronomy

Stonehenge, 1500 BC

Ptolemy in Alexandria, 100 AD

Observatory Tower, Lincolnshire, UK, c. 1300

Galileo, 1600

The "Scientific Revolution"

Reber's Radio Telescope, 1937

NASA/Explorer 7 (Space-based Observing) 1959

"The Internet"

Long-distance remote-control/ "robotic" telescopes 1990s

"Virtual Observatories" 21st century

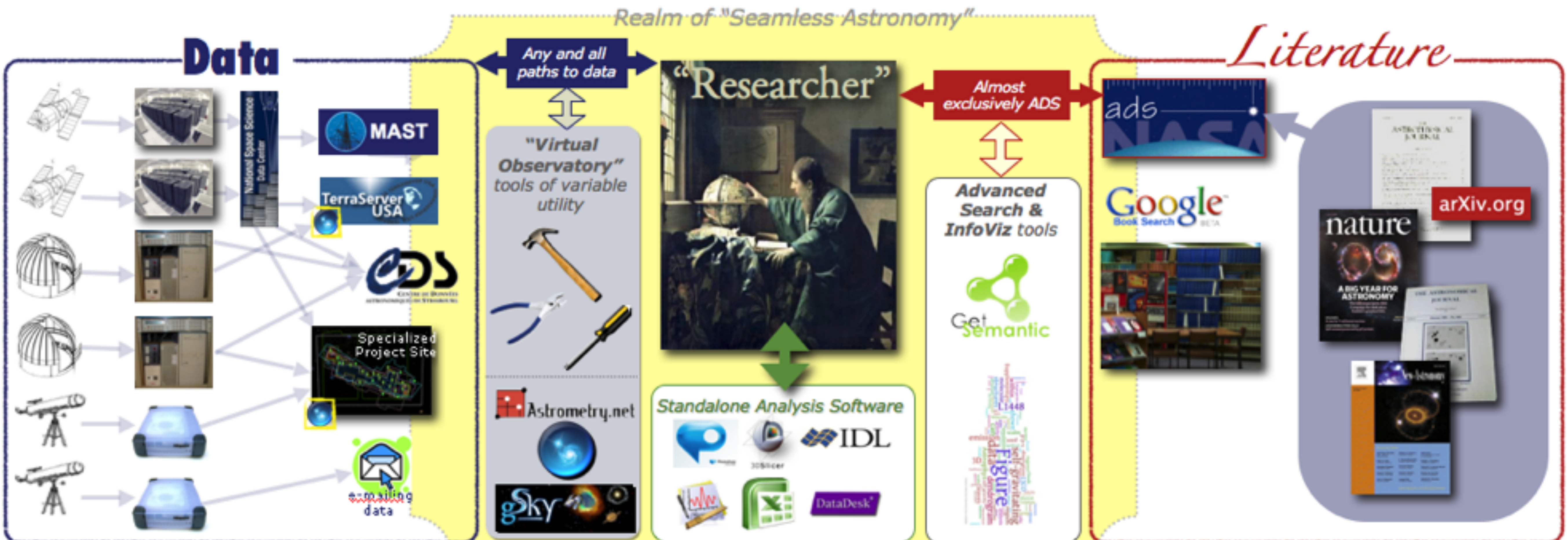
"Seamless Astronomy"

3500 Years of Writing

•••

SEAMLESS ASTRONOMY

Linking scientific data, publications, and communities

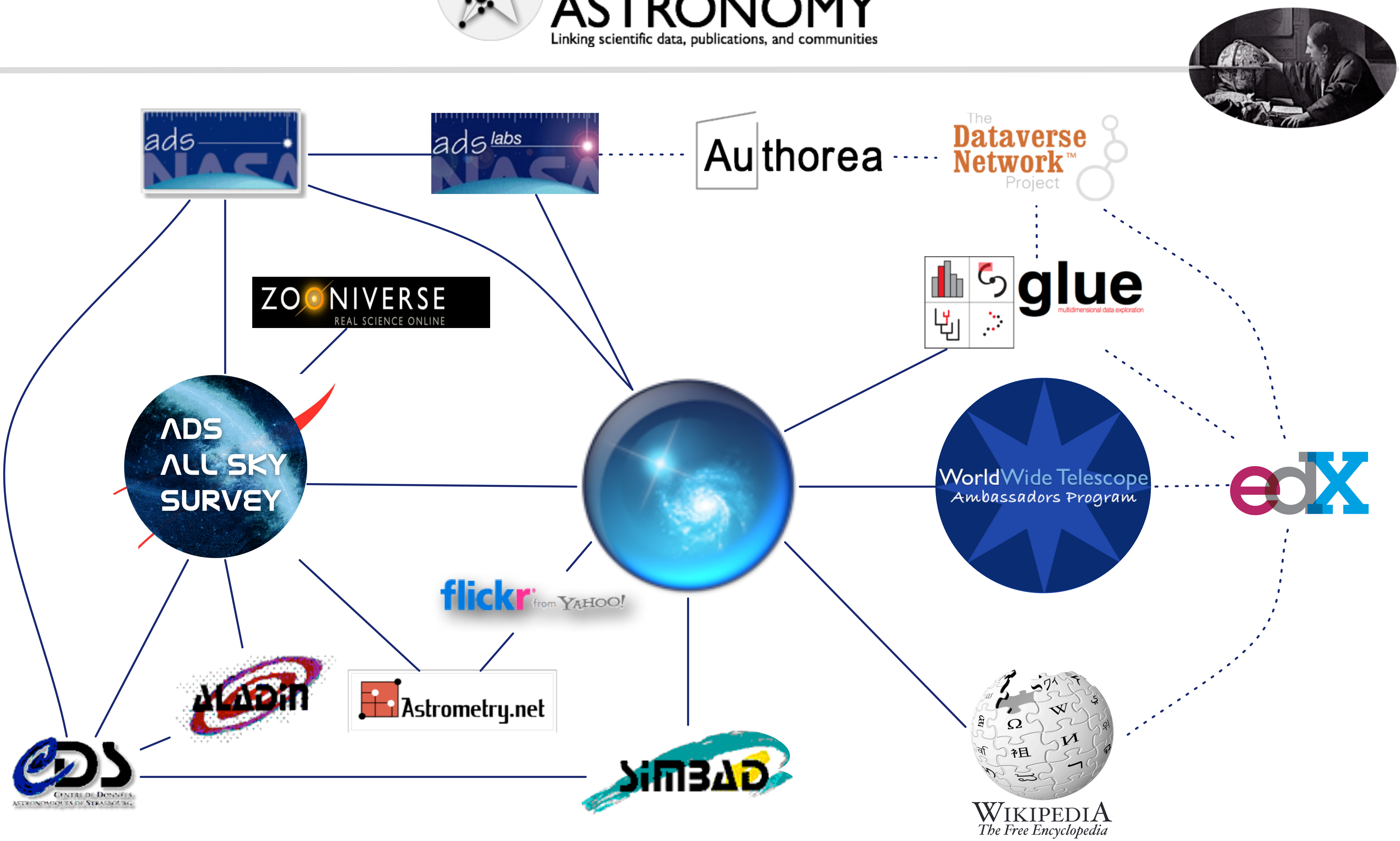


projects.iq.harvard.edu/seamlessastronomy

Alberto Accomazzi, Christopher Beaumont, Douglas Burke, Raffaele D'Abrusco, Rahul Davé, Christopher Erdmann, Pepi Fabbiano, Alyssa Goodman, Edwin Henneken, Jay Luker, Gus Muench, Michael Kurtz, Max Lu, Victoria Mittelbach, Alberto Pepe, Arnold Rots, Patricia Udomprasert (Harvard-Smithsonian CfA); Mercé Crosas (Harvard Institute for Quantitative Social Science); Christine Borgman (UCLA); Jonathan Fay & Curtis Wong (Microsoft Research); Alberto Conti (Space Telescope Science Institute)

SEAMLESS ASTRONOMY

Linking scientific data, publications, and communities



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

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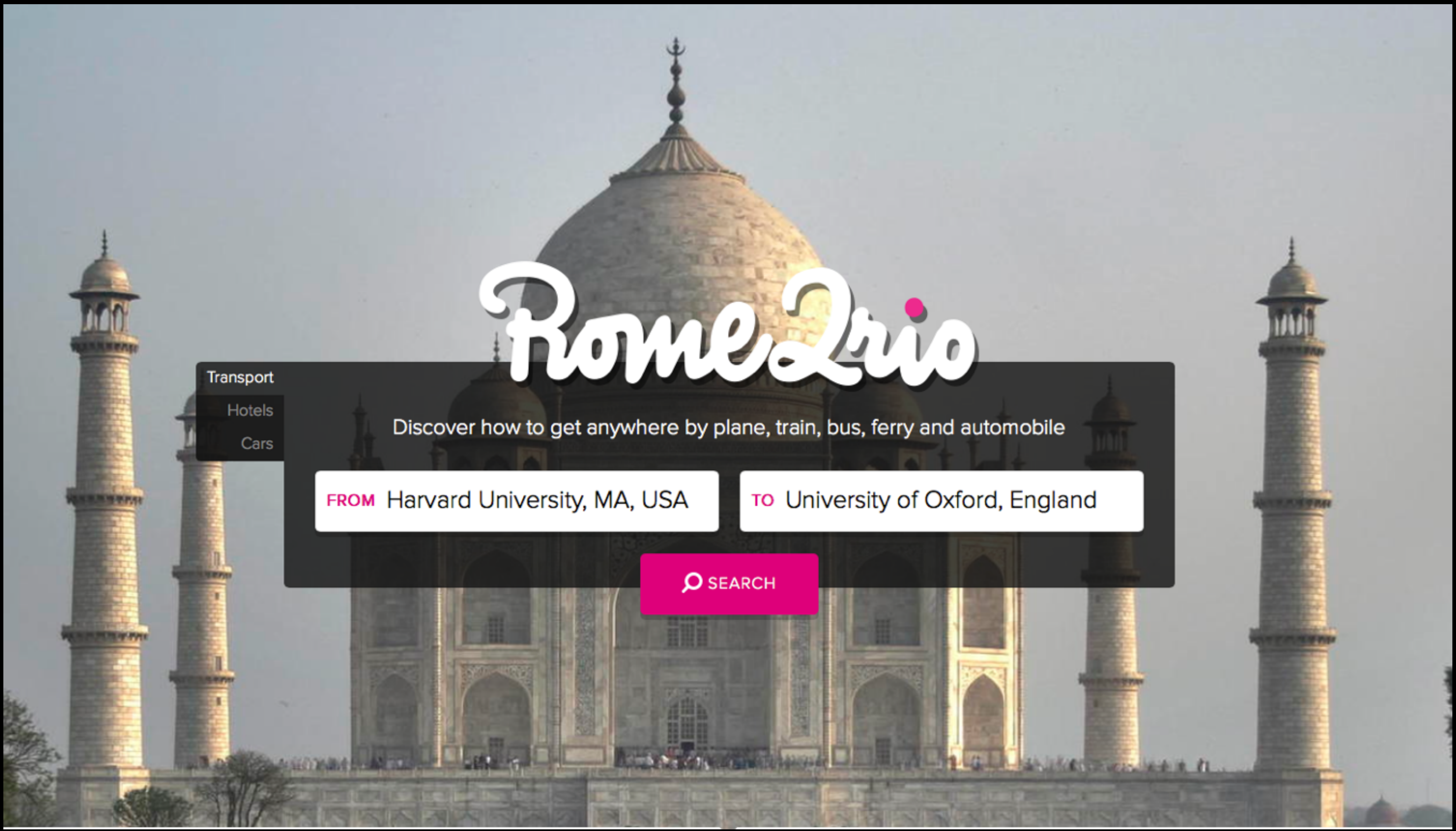
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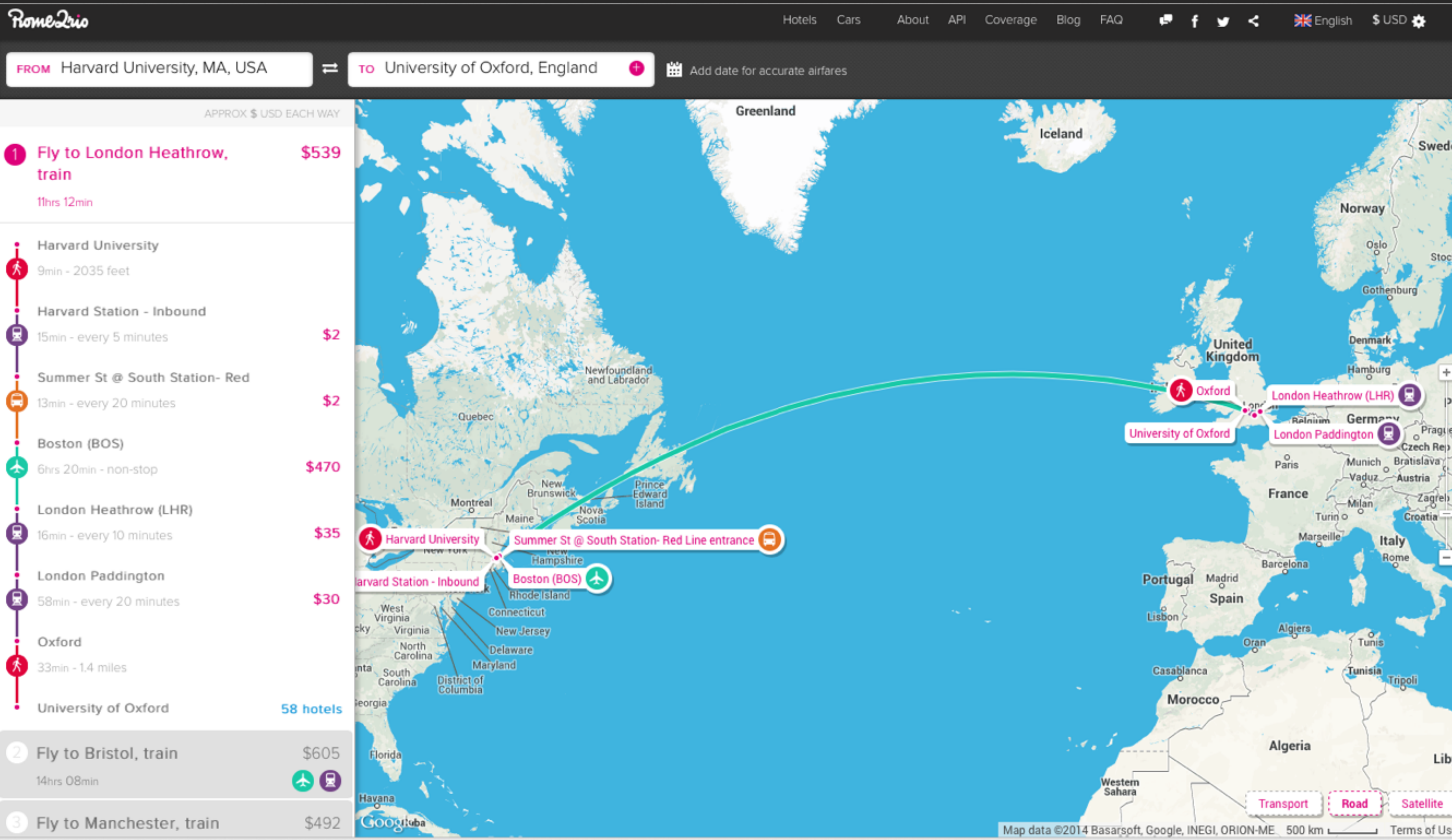

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9min - 2035 feet
Harvard Station - Inbound
15min - every 5 minutes $2
Summer St @ South Station- Red
13min - every 20 minutes $2
Boston (BOS)
6hrs 20min - non-stop $470
London Heathrow (LHR)
16min - every 10 minutes $35
London Paddington
58min - every 20 minutes $30
Oxford
33min - 1.4 miles
University of Oxford 58 hotels
2 Fly to Bristol, train $605
14hrs 08min
3 Fly to Manchester, train $492
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Iceland
Sweden
Norway
Oslo
Gothenburg
Denmark
Hamburg
United Kingdom
Oxford
London Heathrow (LHR)
University of Oxford
London Paddington
Germany
Prague
Czech Rep
Paris
Munich
Bratislava
Vaduz
Austria
France
Milan
Zagreb
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New Hampshire
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North Carolina
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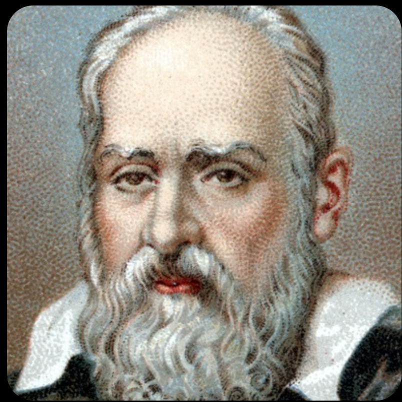
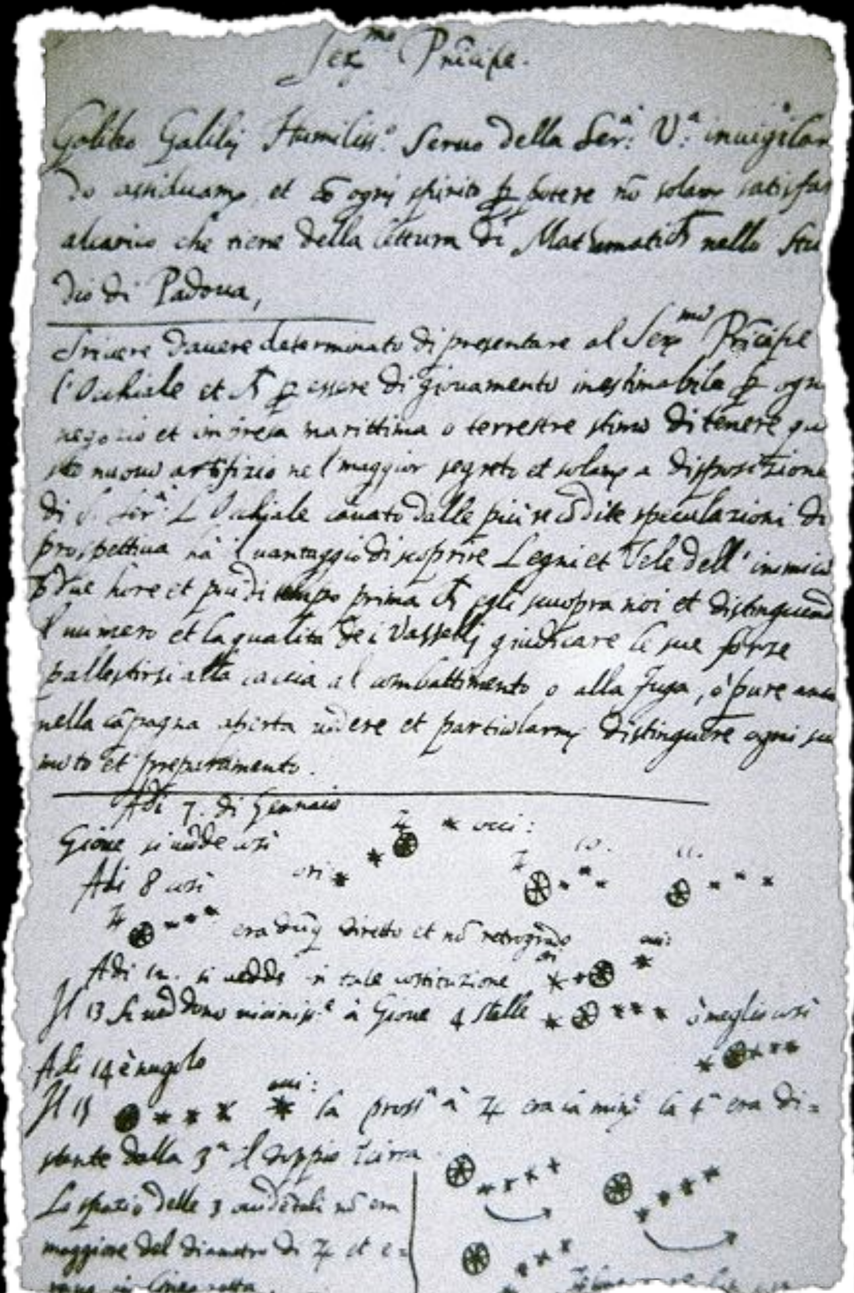
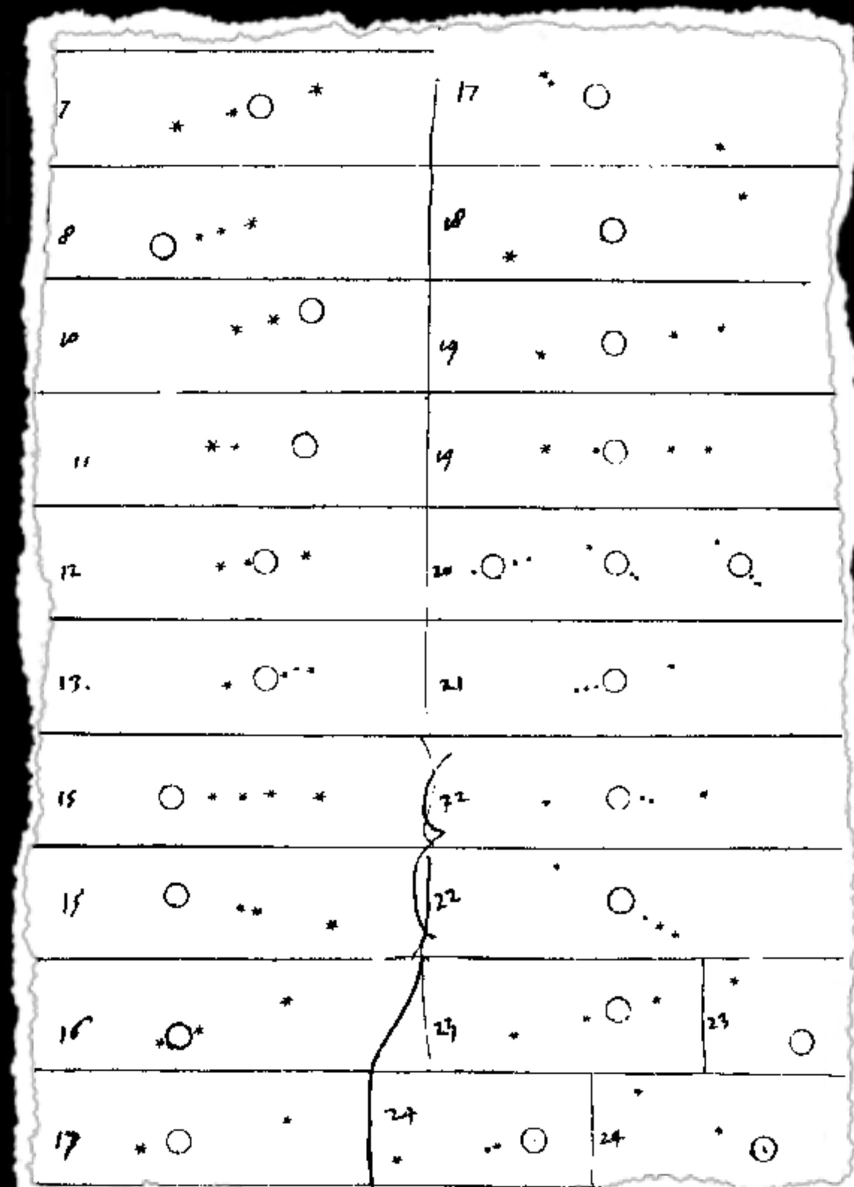
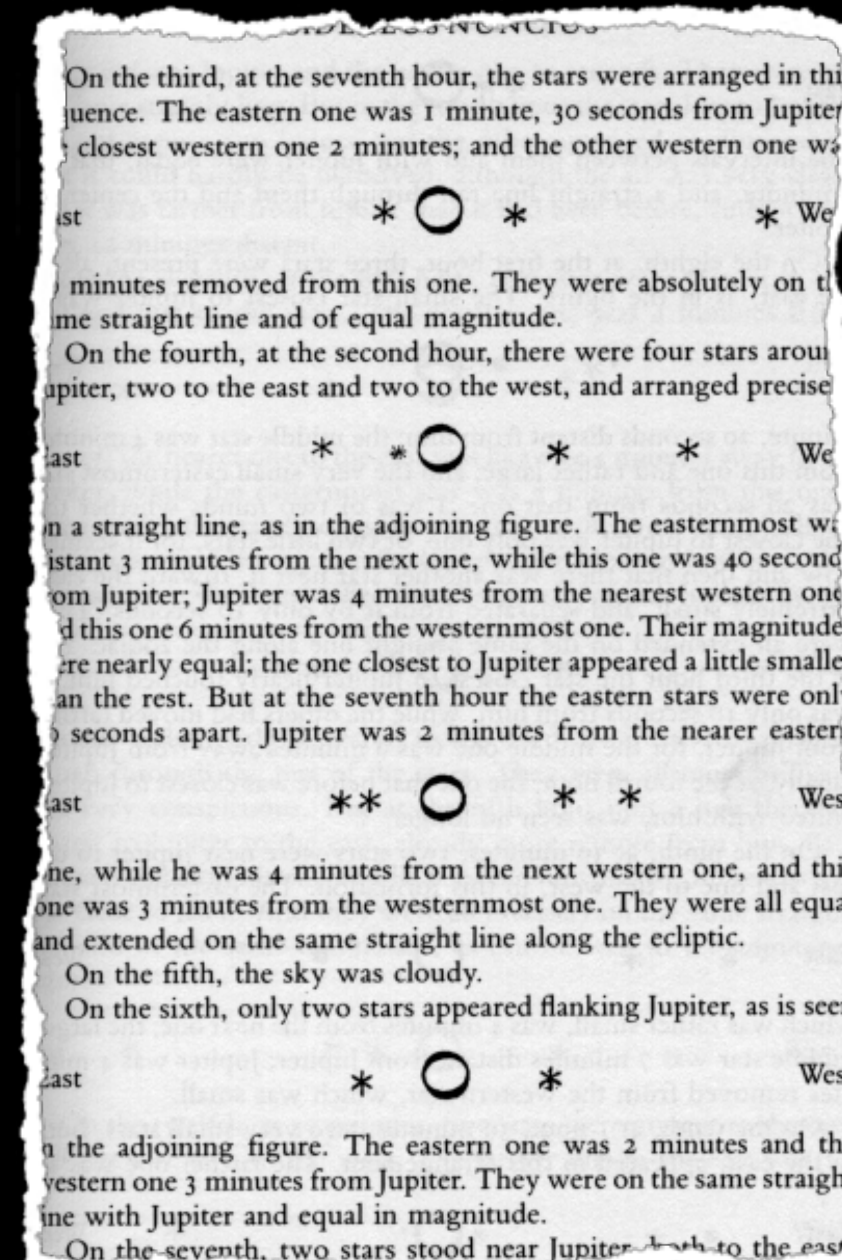


Galileo Galilei

(1564–1642)







On the third, at the seventh hour, the stars were arranged in thi
juence. 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 t
me straight line and of equal magnitude.
On the fourth, at the second hour, there were four stars arou
upiter, two to the east and two to the west, and arranged precise

ast * *O * * We

n a straight line, as in the adjoining figure. The easternmost w
istant 3 minutes from the next one, while this one was 40 second
om 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

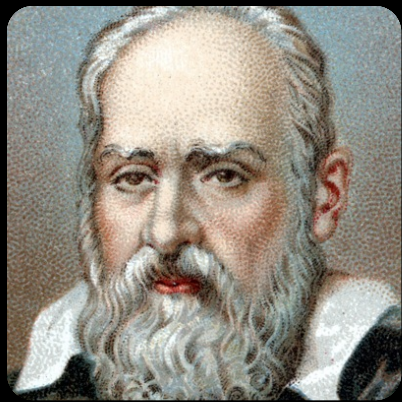
ast ** O * * Wes

ne, while he was 4 minutes from the next western one, and thi
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

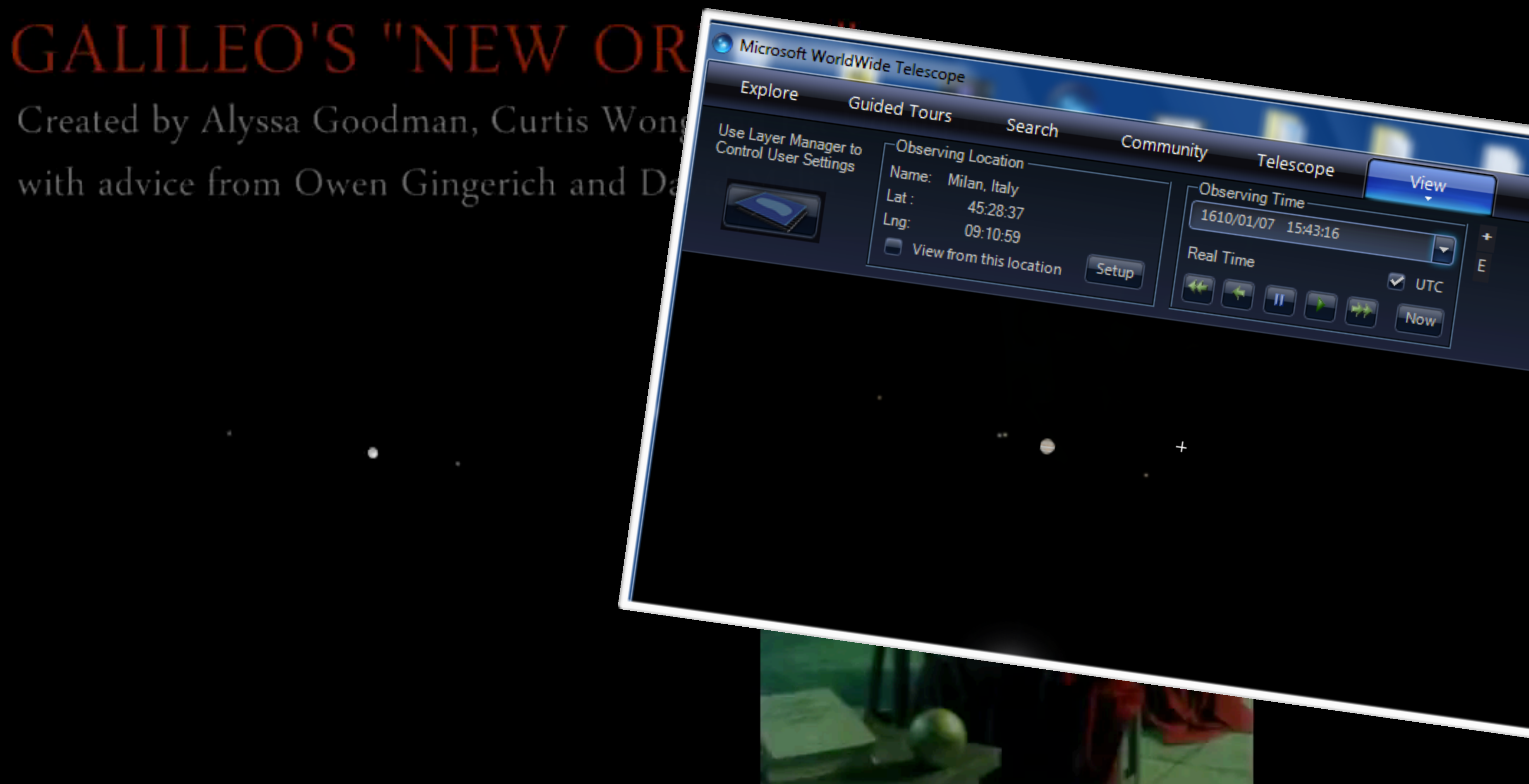
ast * O * Wes

n the adjoining figure. The eastern one was 2 minutes and the
western one 3 minutes from Jupiter. They were on the same straigh
ine with Jupiter and equal in magnitude.
On the seventh, two stars stood near Jupiter

Notes for & re-productions of Siderius Nuncius



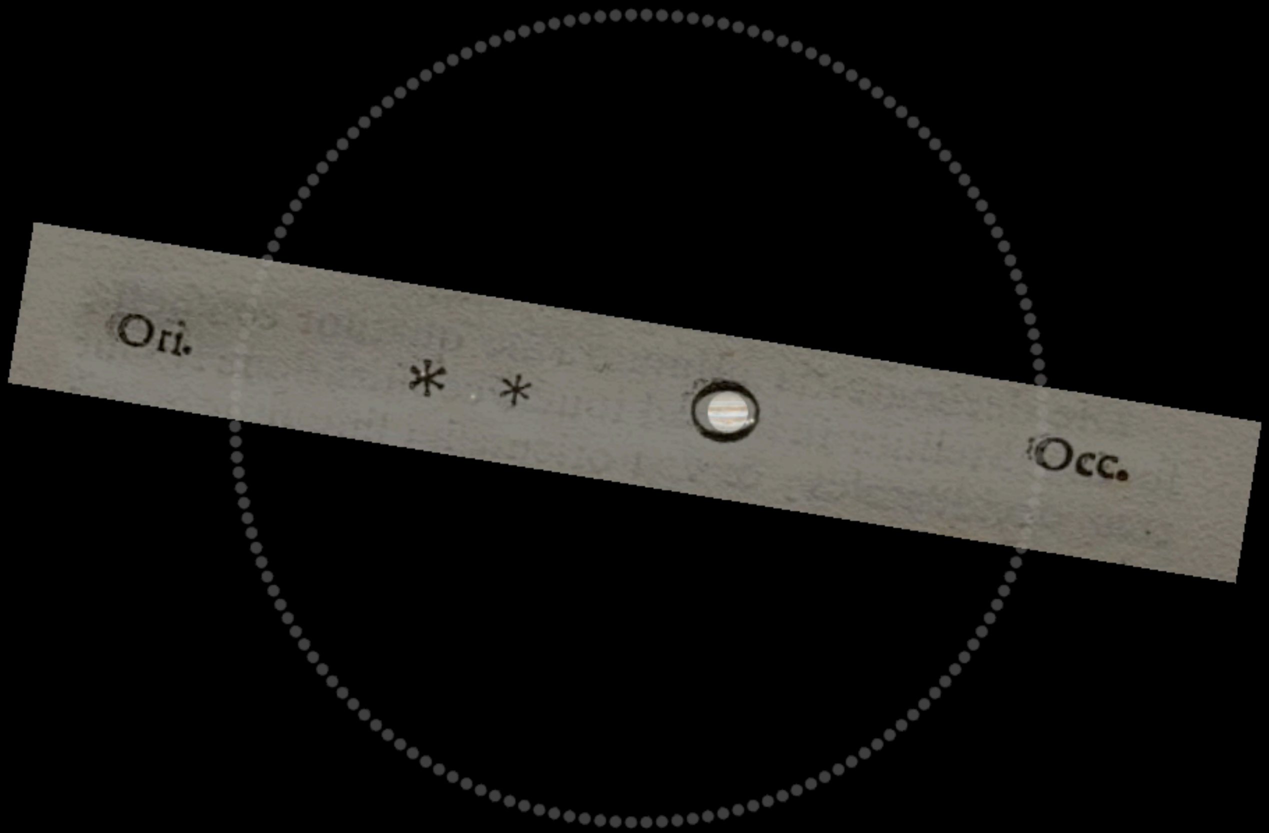
Galileo Galilei



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

Galileo Galilei

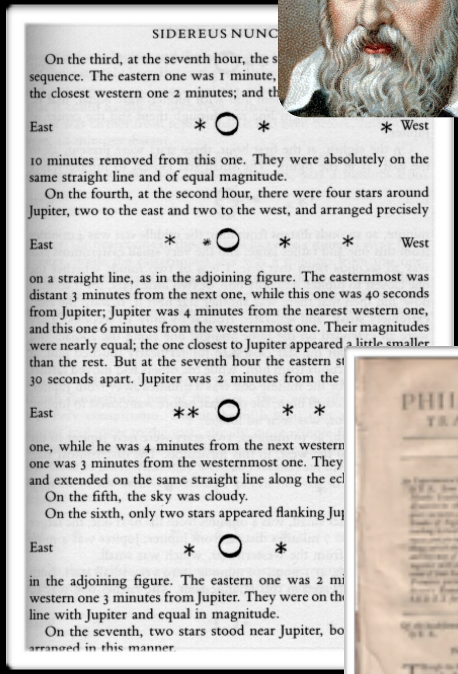
January 11, 1610



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

what do we publish?

1610



SIDEREUS NUNC

On the third, at the seventh hour, the s
sequence. The eastern one was 1 minute,
the closest western one 2 minutes; and th

East * ○ * * West

10 minutes removed from this one. They were absolutely on the same straight line and of equal magnitude.

On the fourth, at the second hour, there were four stars around Jupiter, two to the east and two to the west, and arranged precisely

East * *○ * * West

on a straight line, as in the adjoining figure. The easternmost was distant 3 minutes from the next one, while this one was 40 seconds from Jupiter; Jupiter was 4 minutes from the nearest western one, and this one 6 minutes from the westernmost one. Their magnitudes were nearly equal; the one closest to Jupiter appeared a little smaller than the rest. But at the seventh hour the eastern st
30 seconds apart. Jupiter was 2 minutes from the

East ** ○ * *

one, while he was 4 minutes from the next western
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and extended on the same straight line along the ecl

On the fifth, the sky was cloudy.

On the sixth, only two stars appeared flanking Jup

East * ○ *

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western one 3 minutes from Jupiter. They were on th
line with Jupiter and equal in magnitude.

On the seventh, two stars stood near Jupiter, bo

1665

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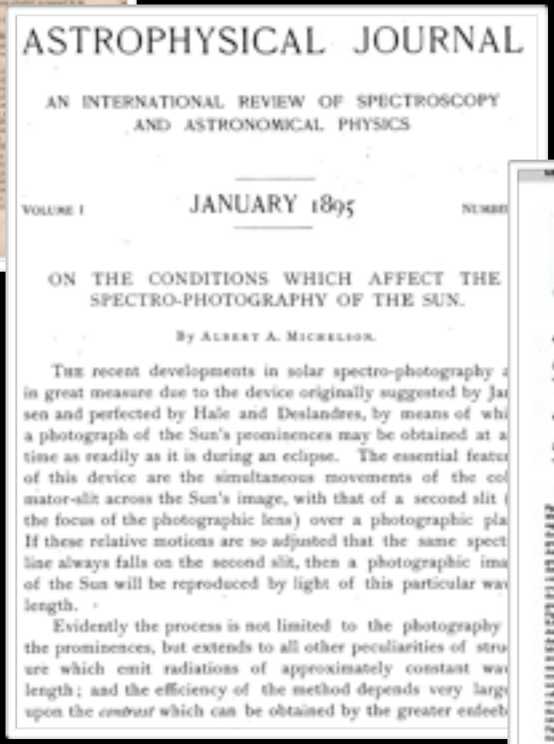


ASTROPHYSICAL JOURNAL

AN INTERNATIONAL REVIEW OF SPECTROSCOPY AND ASTRONOMICAL PHYSICS

VOLUME I JANUARY 1895

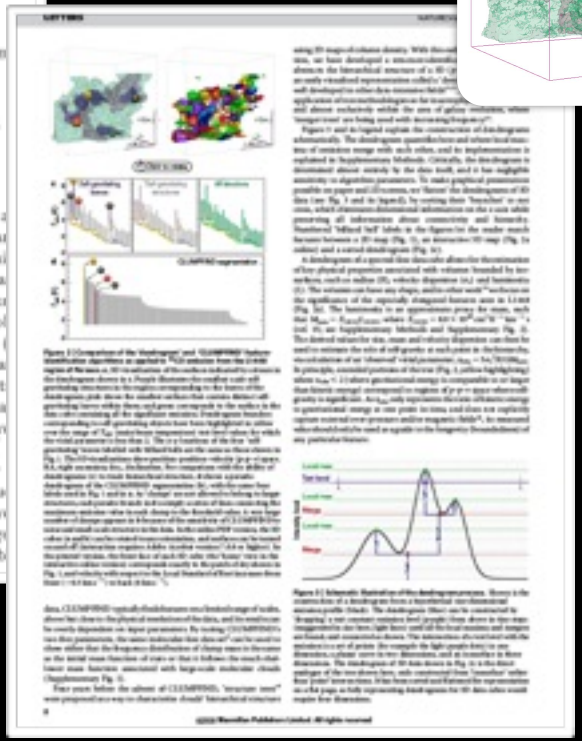
ON THE CONDITIONS WHICH AFFECT THE SPECTRO-PHOTOGRAPHY OF THE SUN.

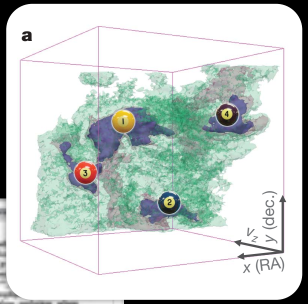
By Albert A. Michelson.

The recent developments in solar spectro-photography a
in great measure due to the device originally suggested by Jan
sen and perfected by Hale and Deslandres, by means of whi
a photograph of the Sun's prominences may be obtained at a
time as readily as it is during an eclipse. The essential featu
of this device are the simultaneous movements of the col
mator-slit across the Sun's image, with that of a second slit
the focus of the photographic lens) over a photographic pla
If these relative motions are so adjusted that the same spect
line always falls on the second slit, then a photographic ima
of the Sun will be reproduced by light of this particular wav
length.

Evidently the process is not limited to the photography
the prominences, but extends to all other peculiarities of stru
ure which emit radiations of approximately constant wav
length; and the efficiency of the method depends very larg
upon the *contrast* which can be obtained by the greater enfeeb

2009





2009

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interactivity in a "Paper"

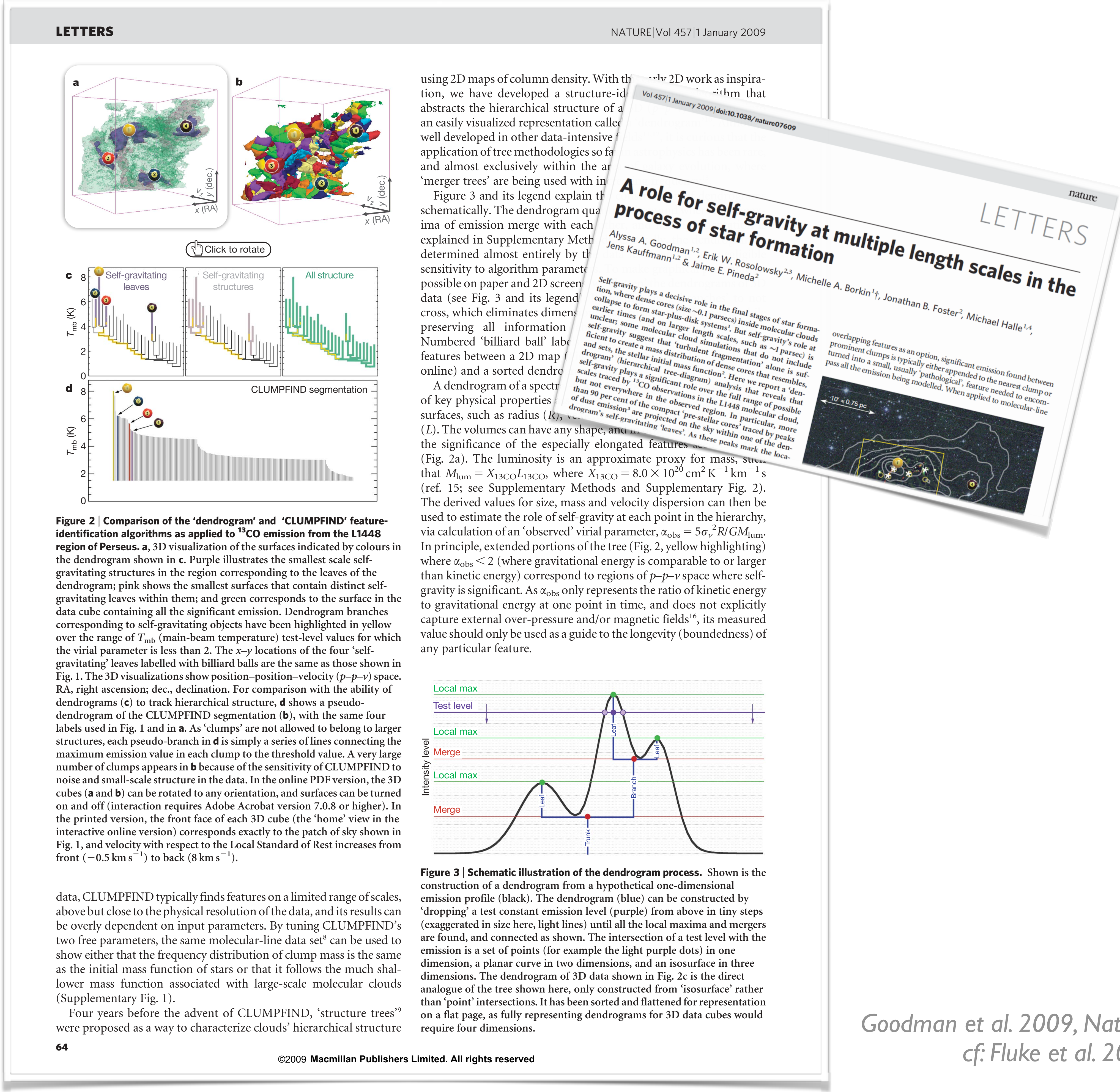


Figure 2 | Comparison of the 'dendrogram' and 'CLUMPFIND' feature-identification algorithms as applied to ^{13}CO emission from the L1448 region of Perseus. a, 3D visualization of the surfaces indicated by colours in the dendrogram shown in **c**. Purple illustrates the smallest scale self-gravitating 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 km s^{-1}) to back (8 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... early 2D work as inspiration, we have developed a structure-id... rithm that abstracts the hierarchical structure of a... an easily visualized representation calle... well developed in other data-intensive f... application of tree methodologies so fa... and almost exclusively within the ar... '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 paramete... possible on paper and 2D screen... data (see Fig. 3 and its legend... cross, which eliminates dimens... preserving all information... Numbered 'billiard ball' labe... features between a 2D map (... online) and a sorted dendro...

A dendrogram of a spectr... of key physical properties... surfaces, such as radius (R), ve... (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, such that $M_{lum} = X_{13CO} L_{13CO}$, where $X_{13CO} = 8.0 \times 10^{20}$ 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, $\alpha_{obs} = 5\sigma_v^2 R/GM_{lum}$. 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.

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

nature

LETTERS

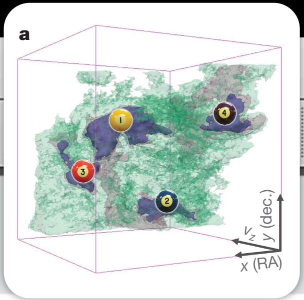
A role for self-gravity at multiple length scales in the process of star formation

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

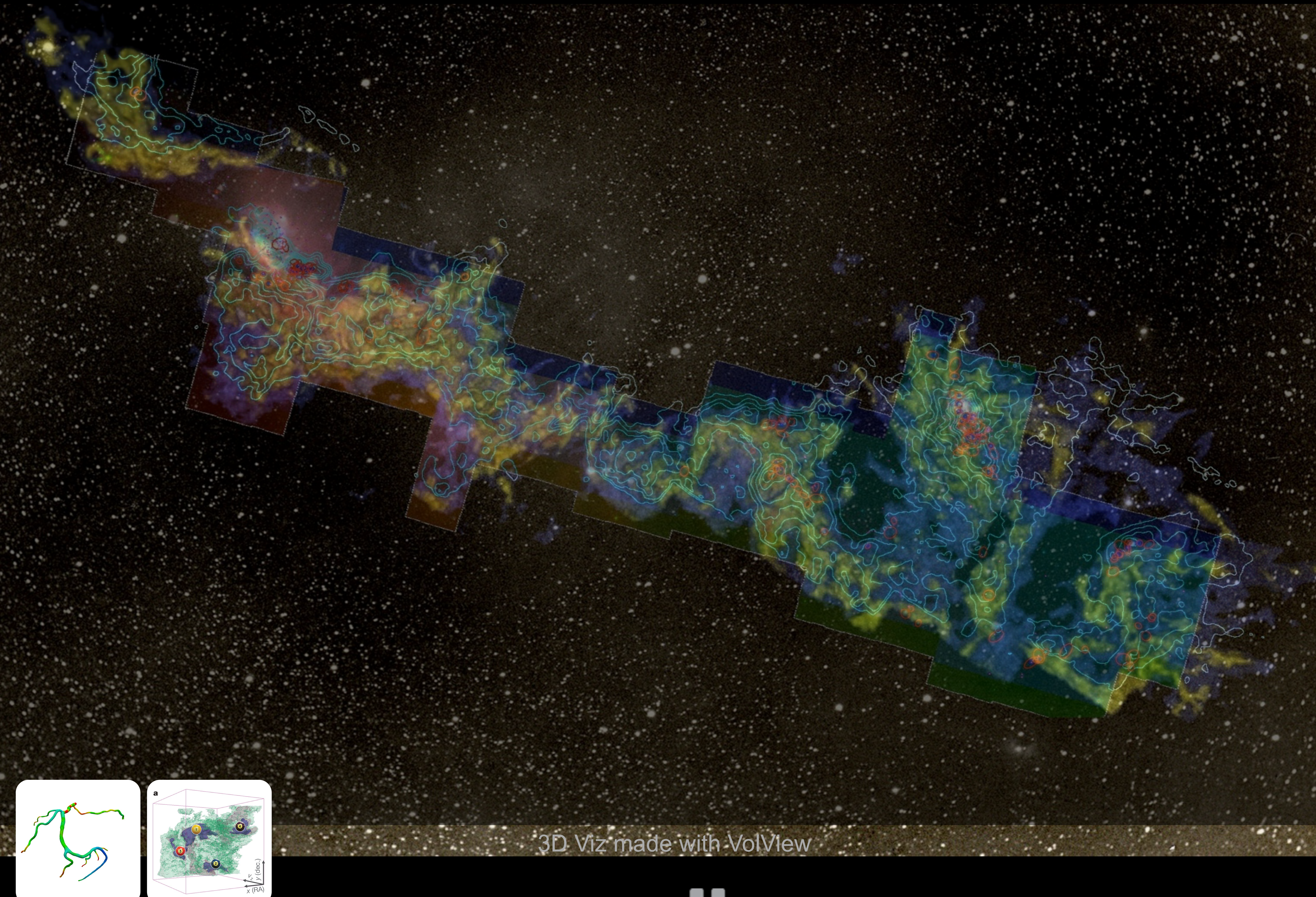
LETTERS

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 locations of already-forming stars, or of those probably about to form, a self-gravitating cocoon seems a critical condition for their exist-

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



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COMPLETE

The "old" way

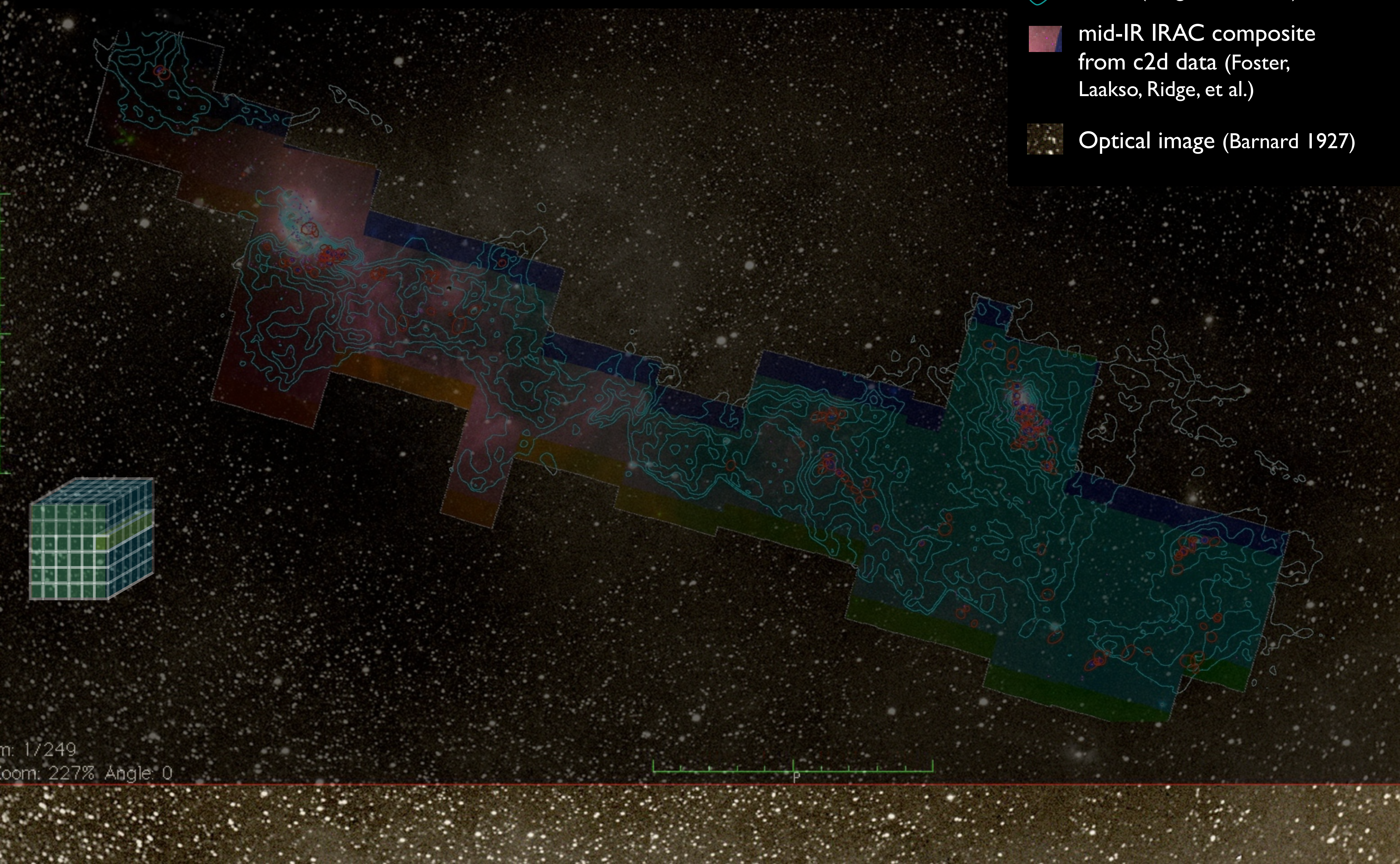
mm peak (Enoch et al. 2006)

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)



The "Paper" of the Future

Alyssa Goodman, Josh Peek, How-Huan Hope Chen, Nathan Jenkins, August Muench, Chris Beaumont, Christine L. Borgman, Alberto Pepe, Alberto Accomazzi, Christopher Erdmann, Curtis Wong + Add author

1 Preamble

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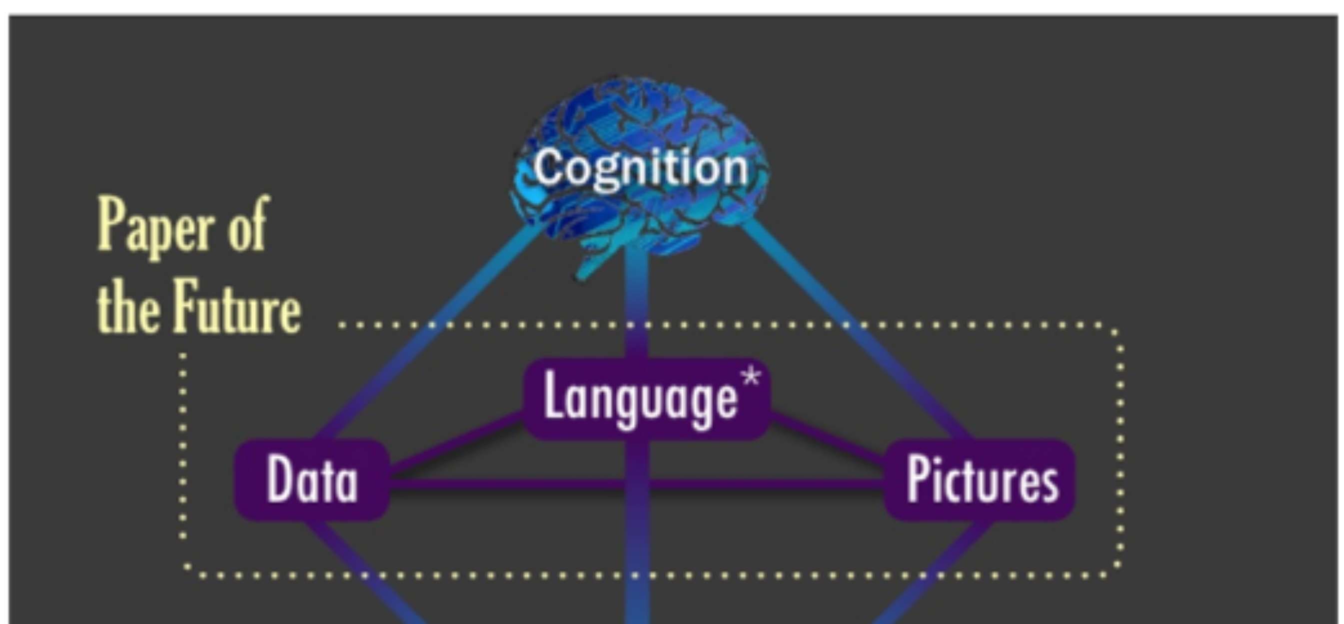

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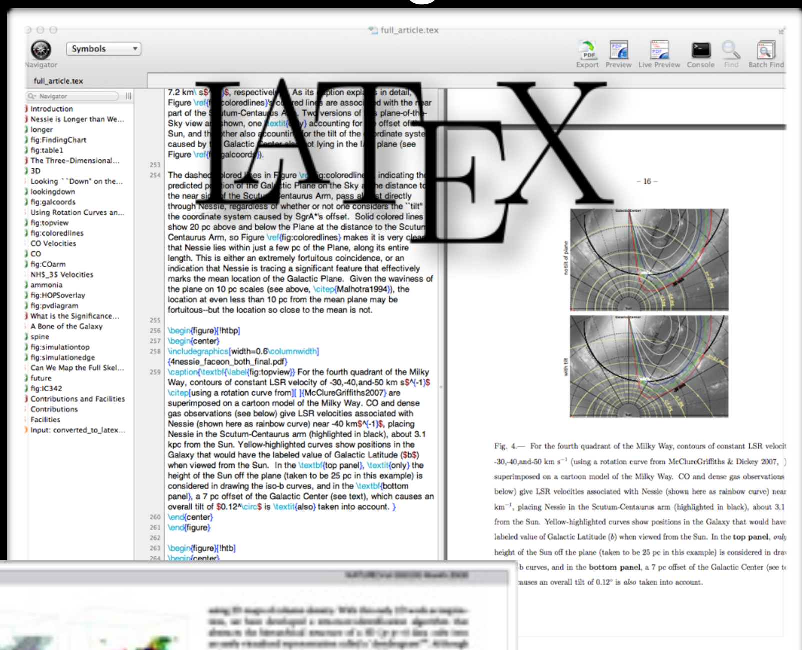

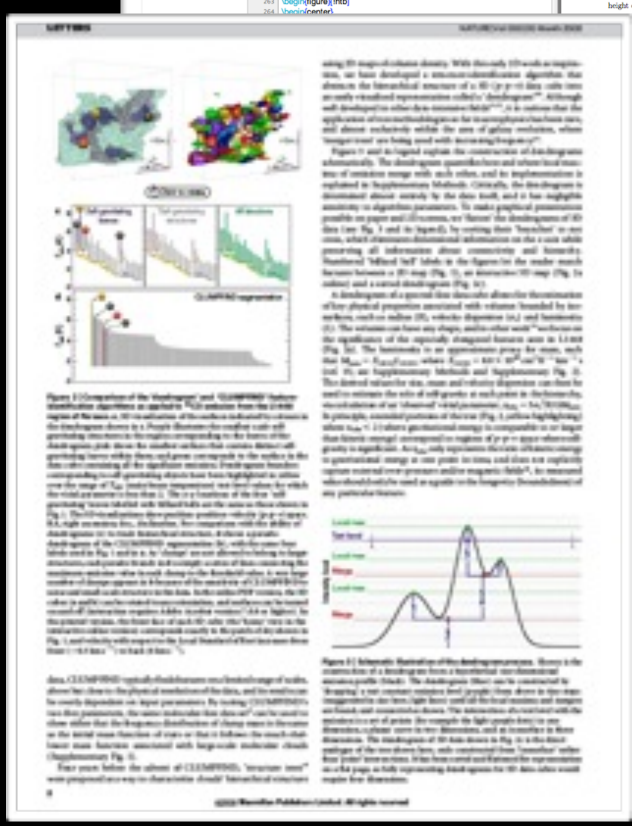

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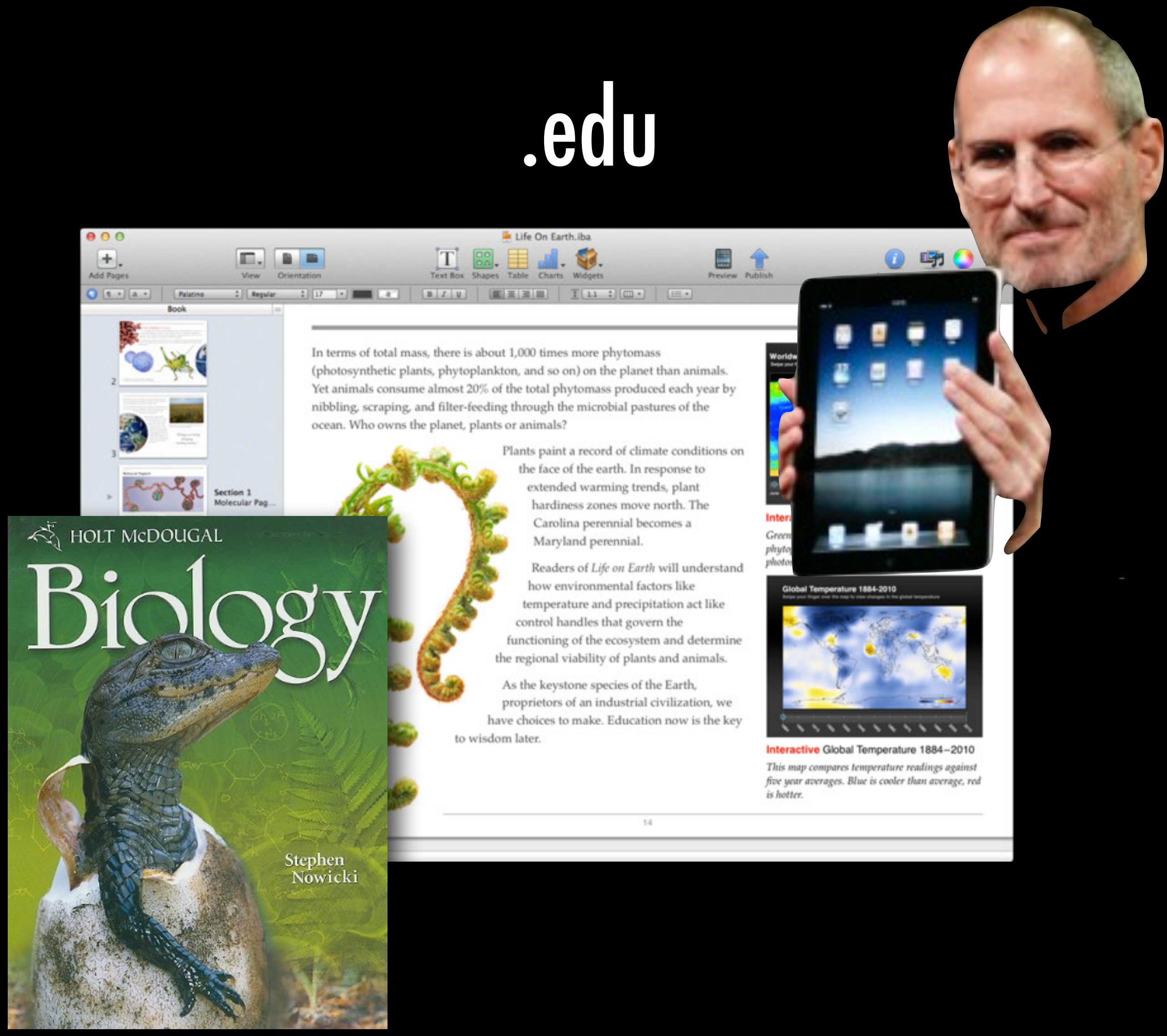

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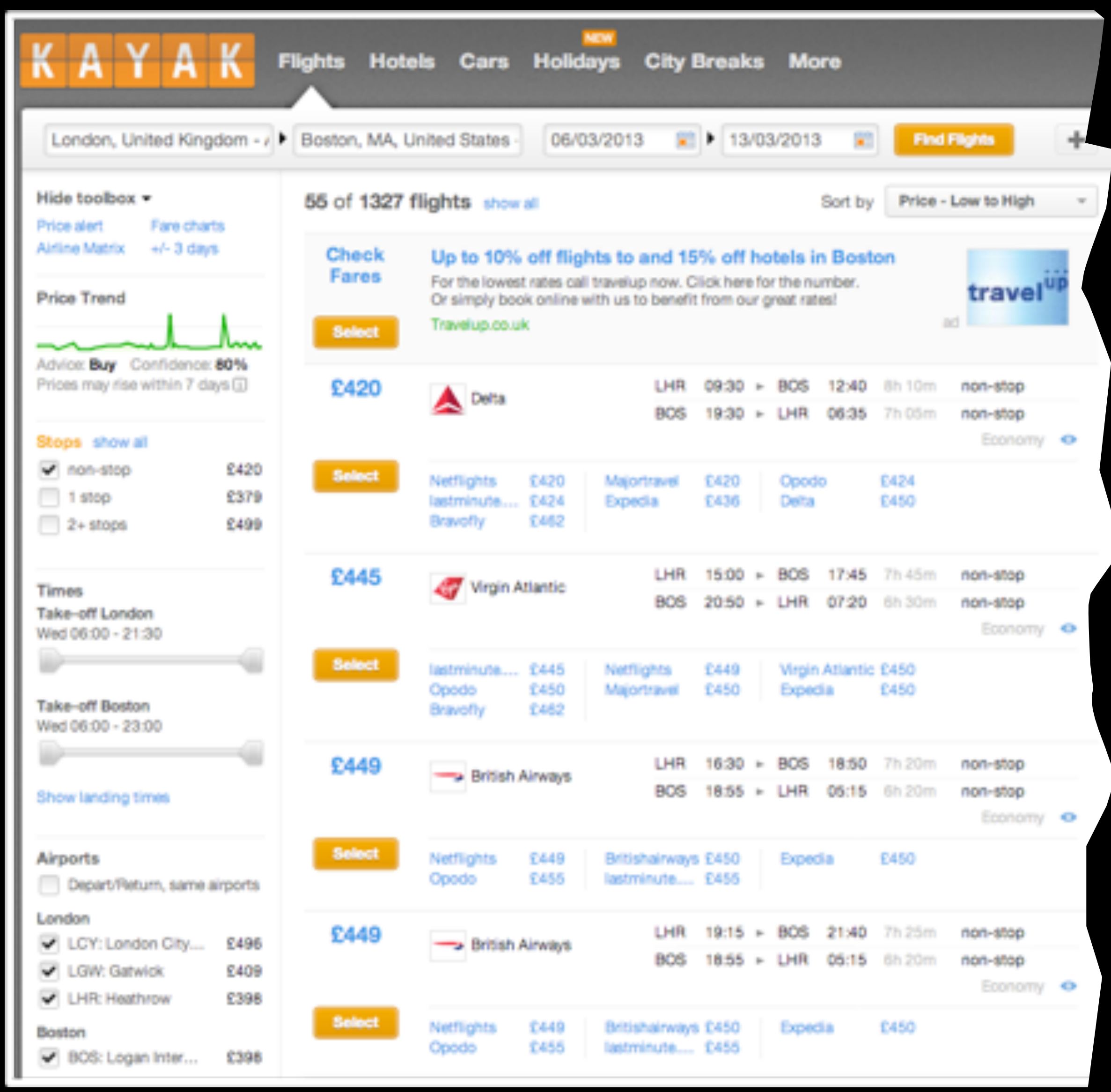
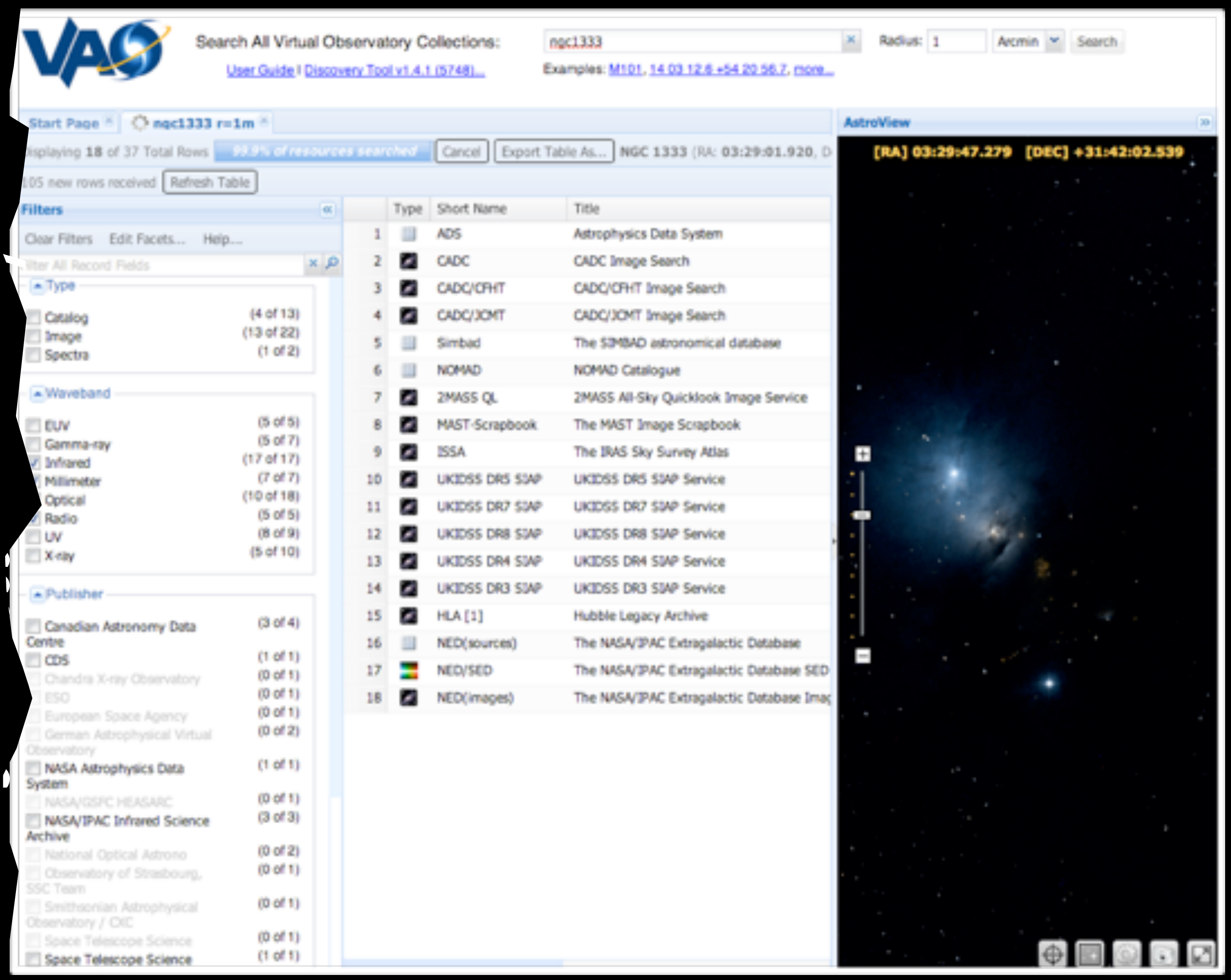
Real Life

"Science"





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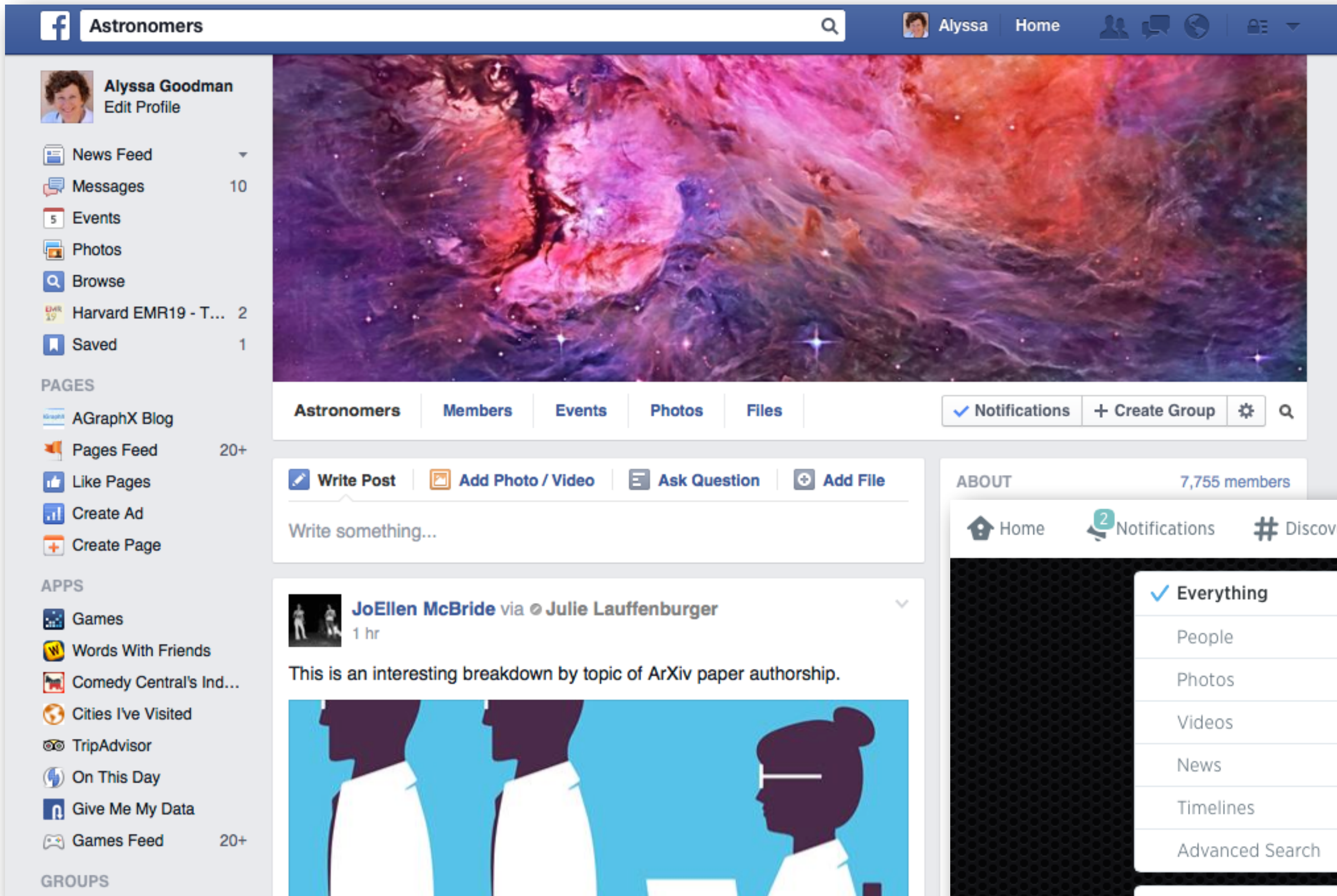

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Comedy Central's Ind...
Cities I've Visited
TripAdvisor
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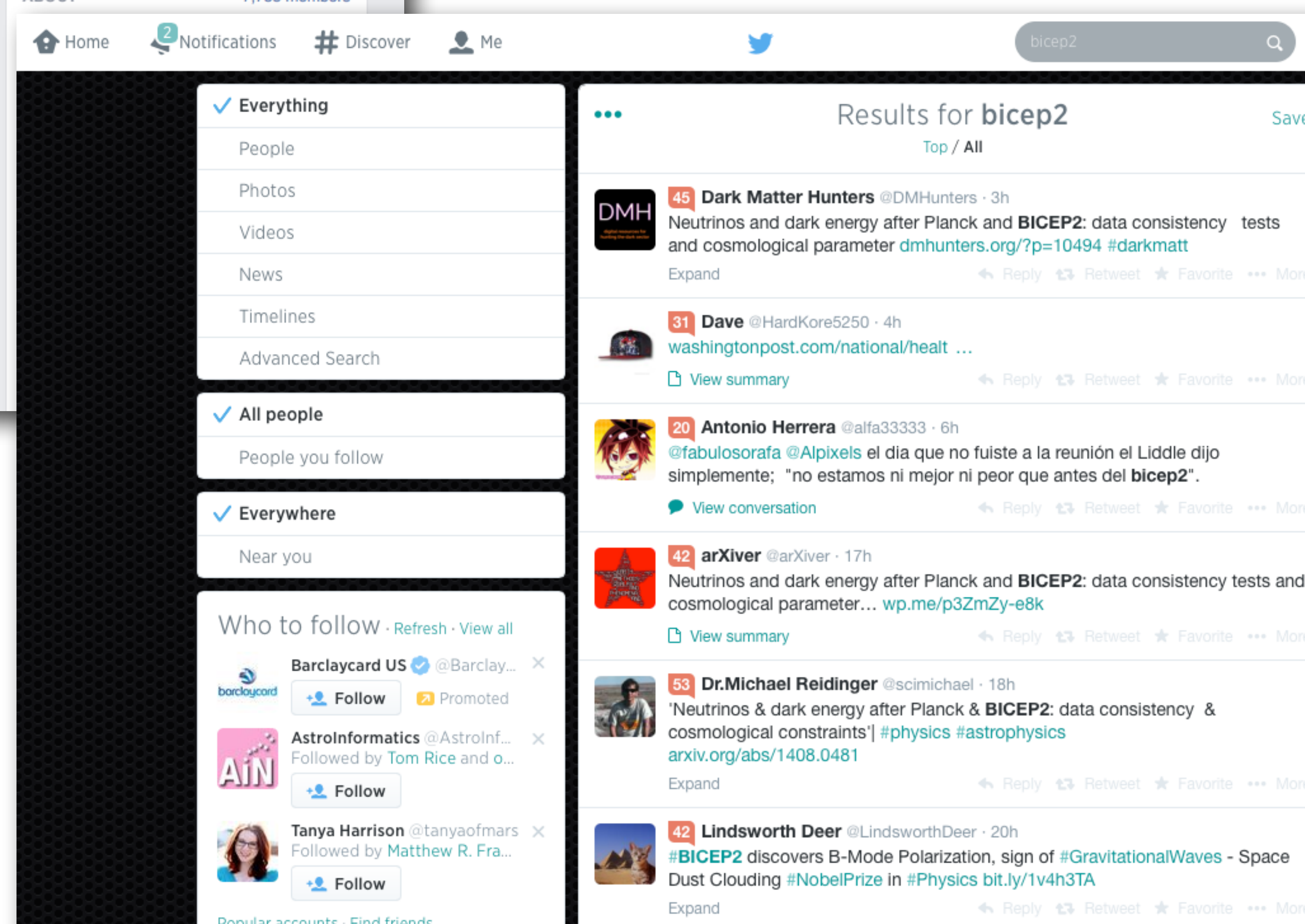
This is an interesting breakdown by topic of ArXiv paper authorship.



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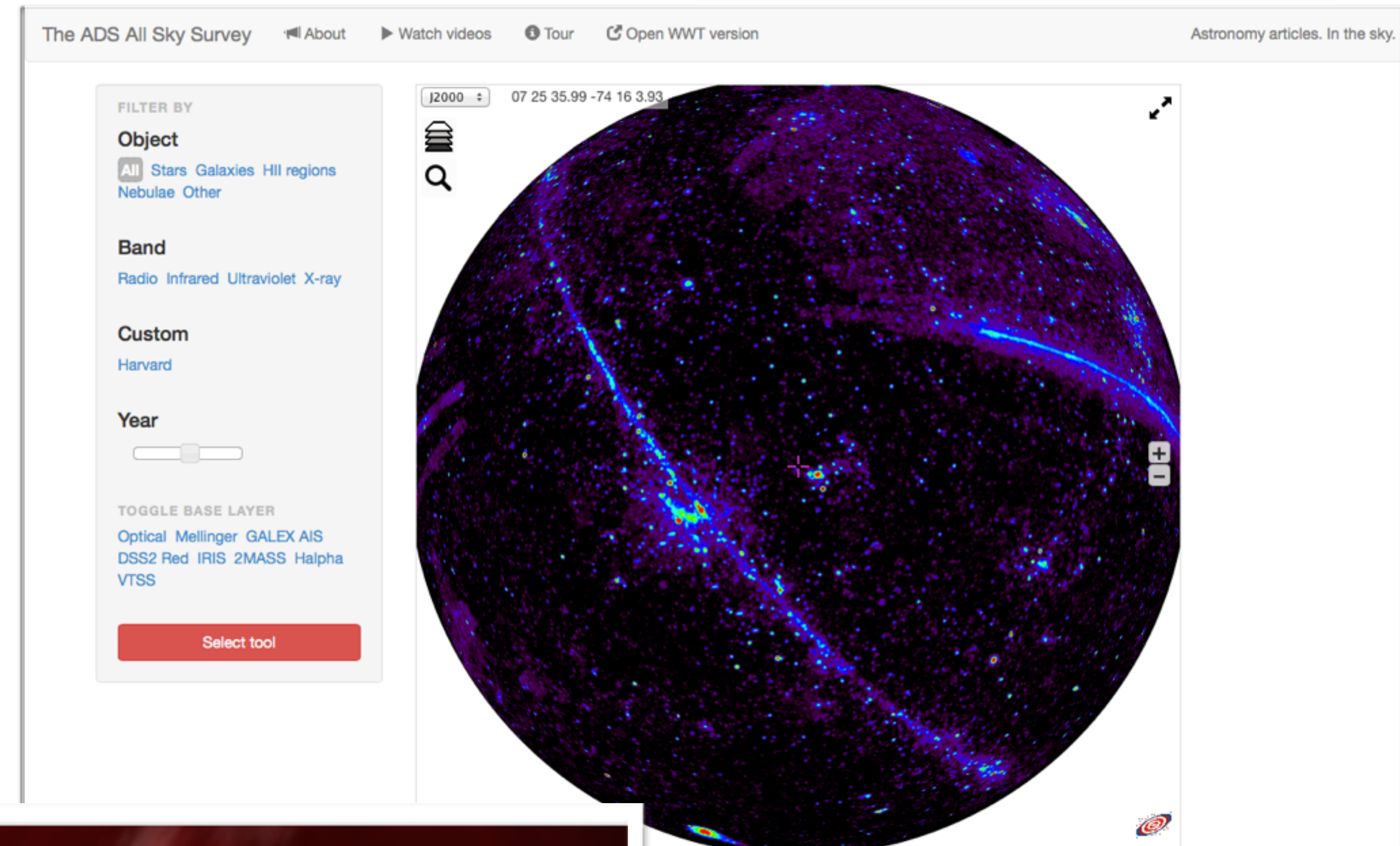

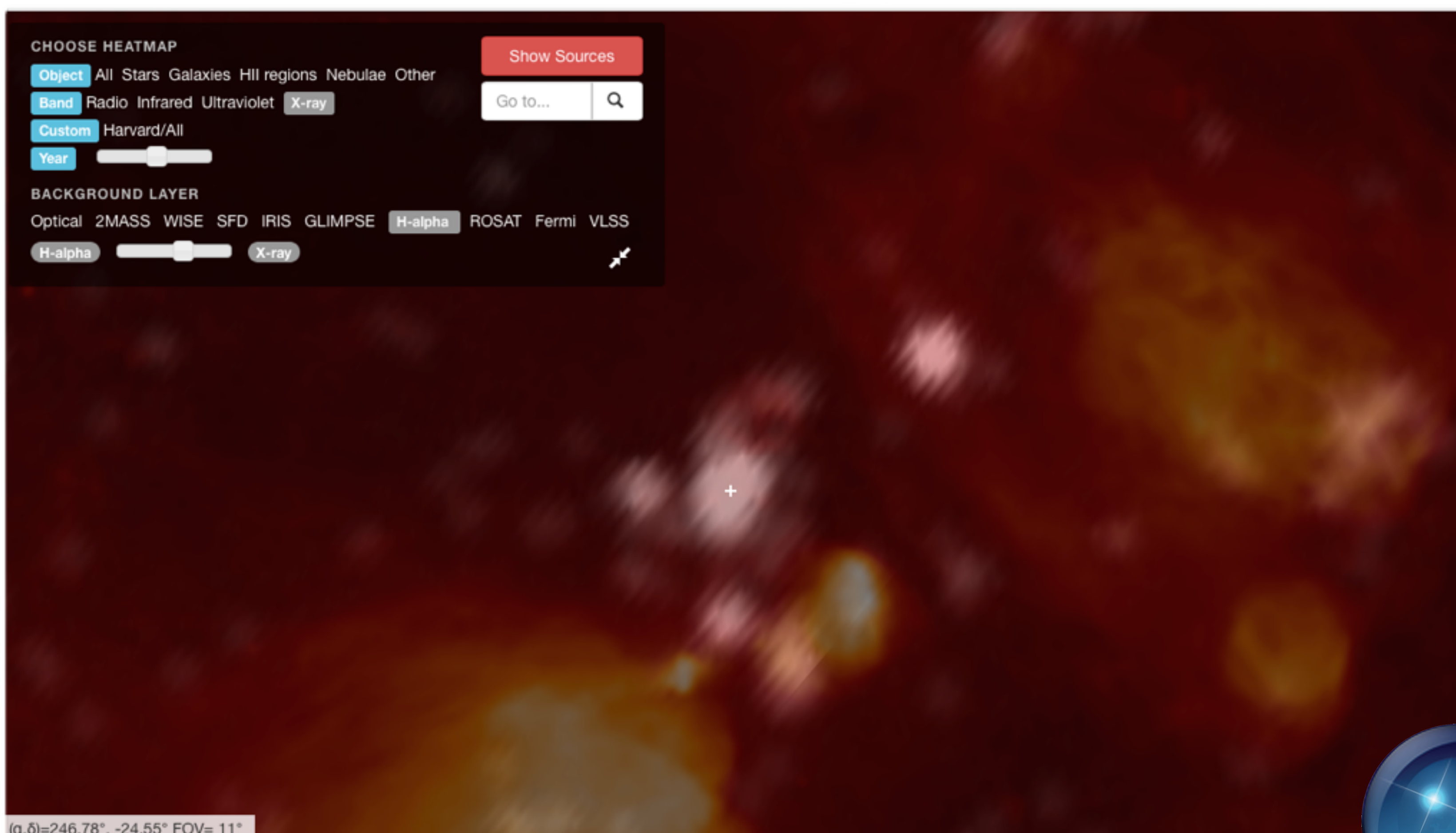

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The "Paper" of the Future

Alyssa Goodman, Josh Peek, How-Huan Hope Chen, Nathan Jenkins, August Muench, Chris Beaumont, Christine L. Borgman, Alberto Pepe, Alberto Accomazzi, Christopher Erdmann, Curtis Wong + Add author

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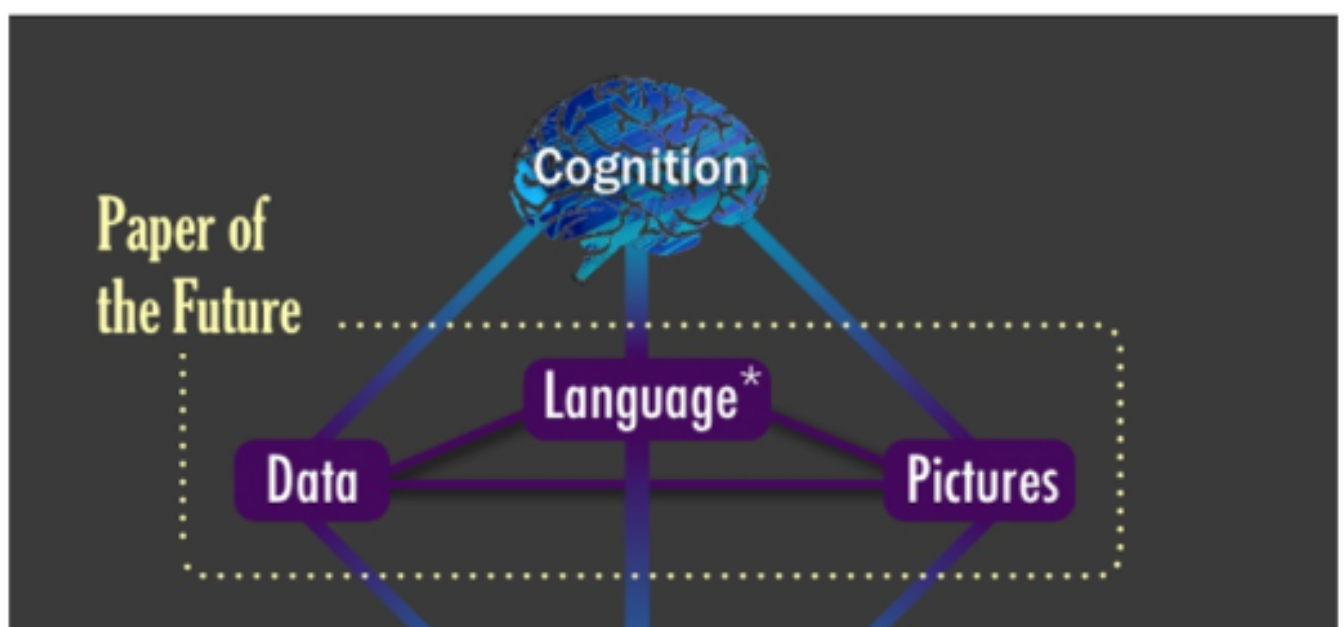

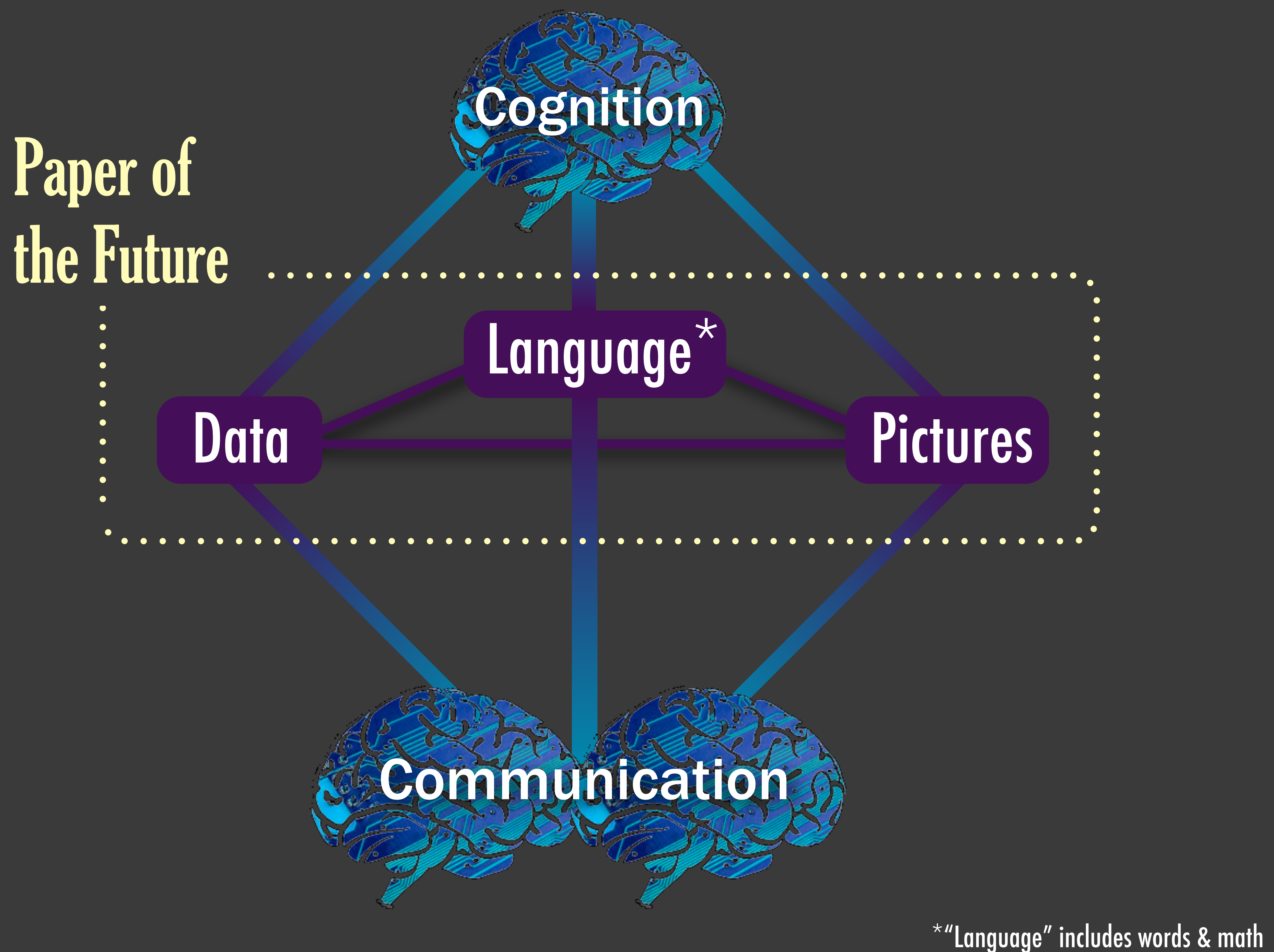
Cognition
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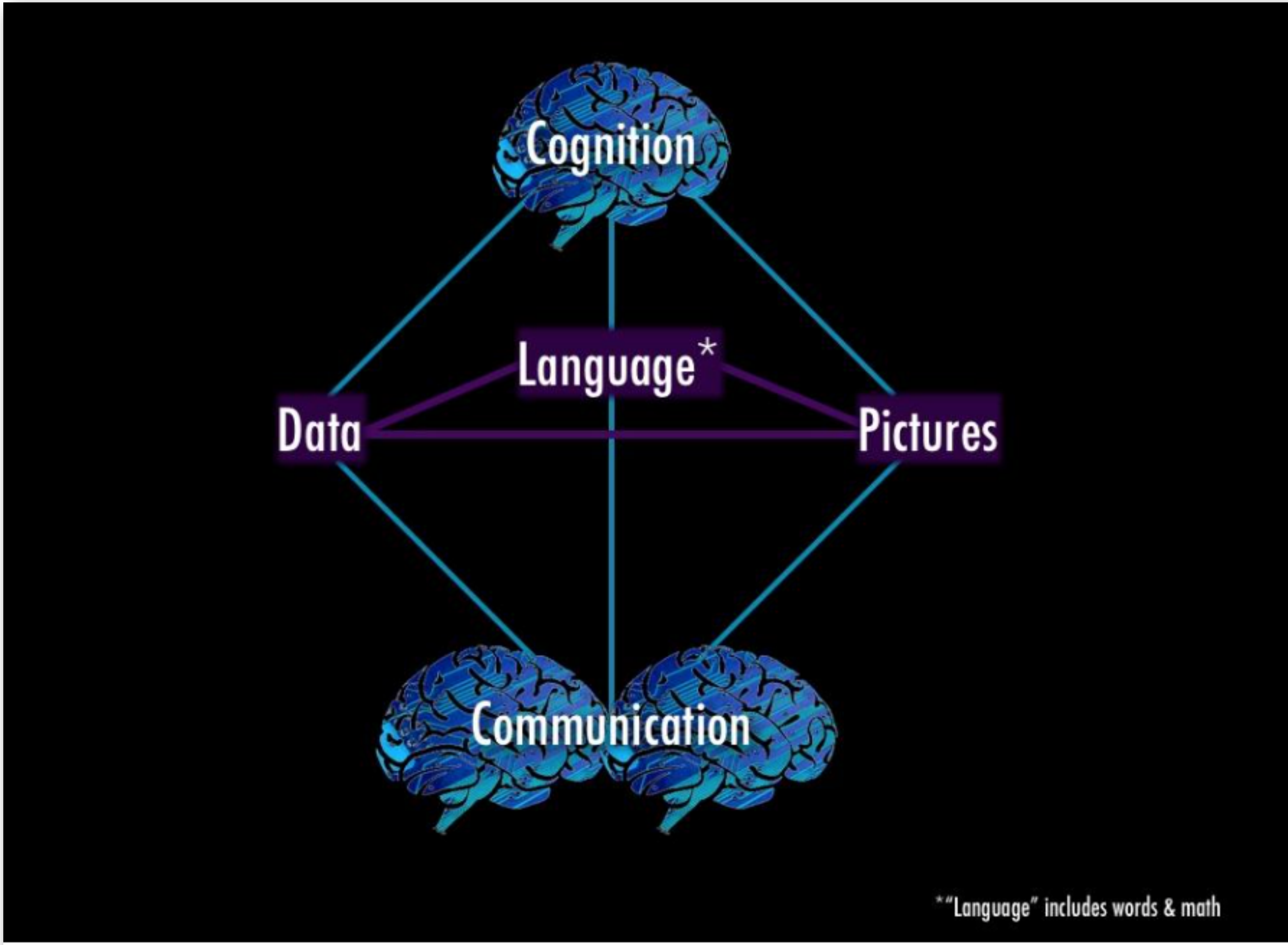
Language*
Data
Pictures
Communication
*"Language" includes words & math



55 **Alyssa Goodman** @aagie · 11s

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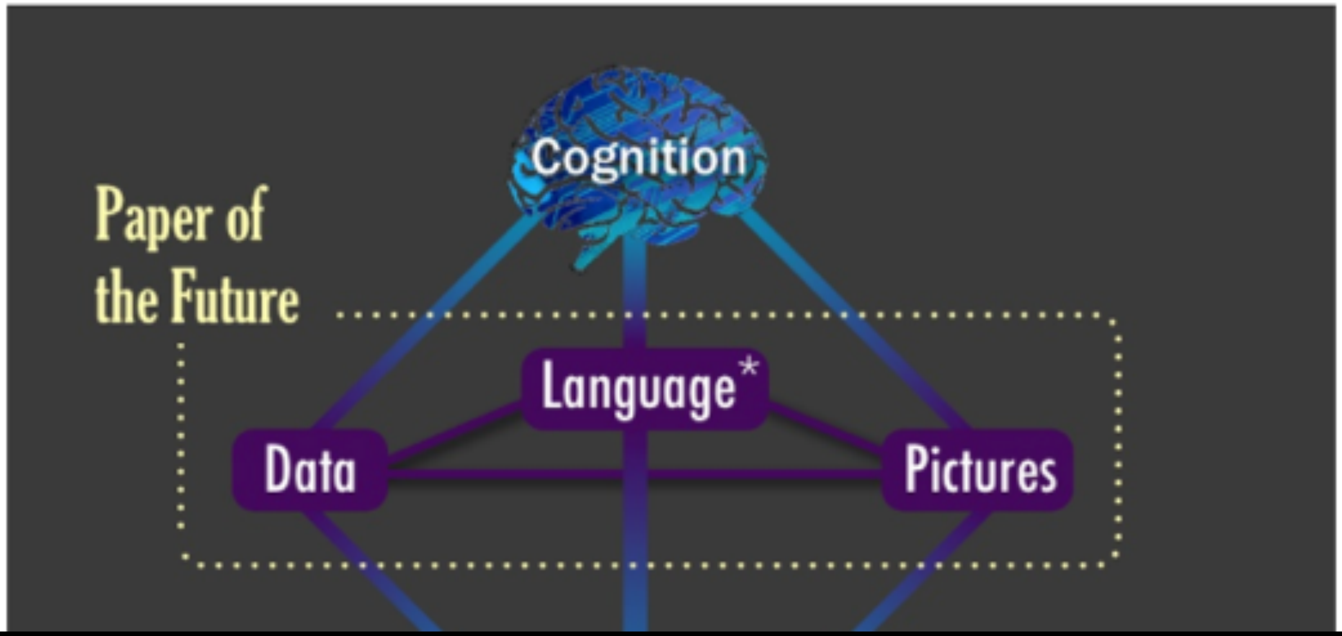
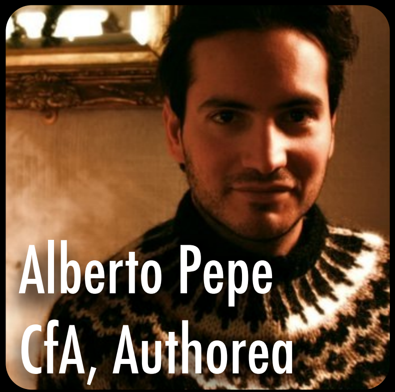
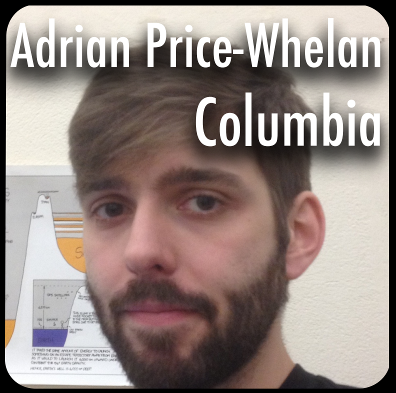
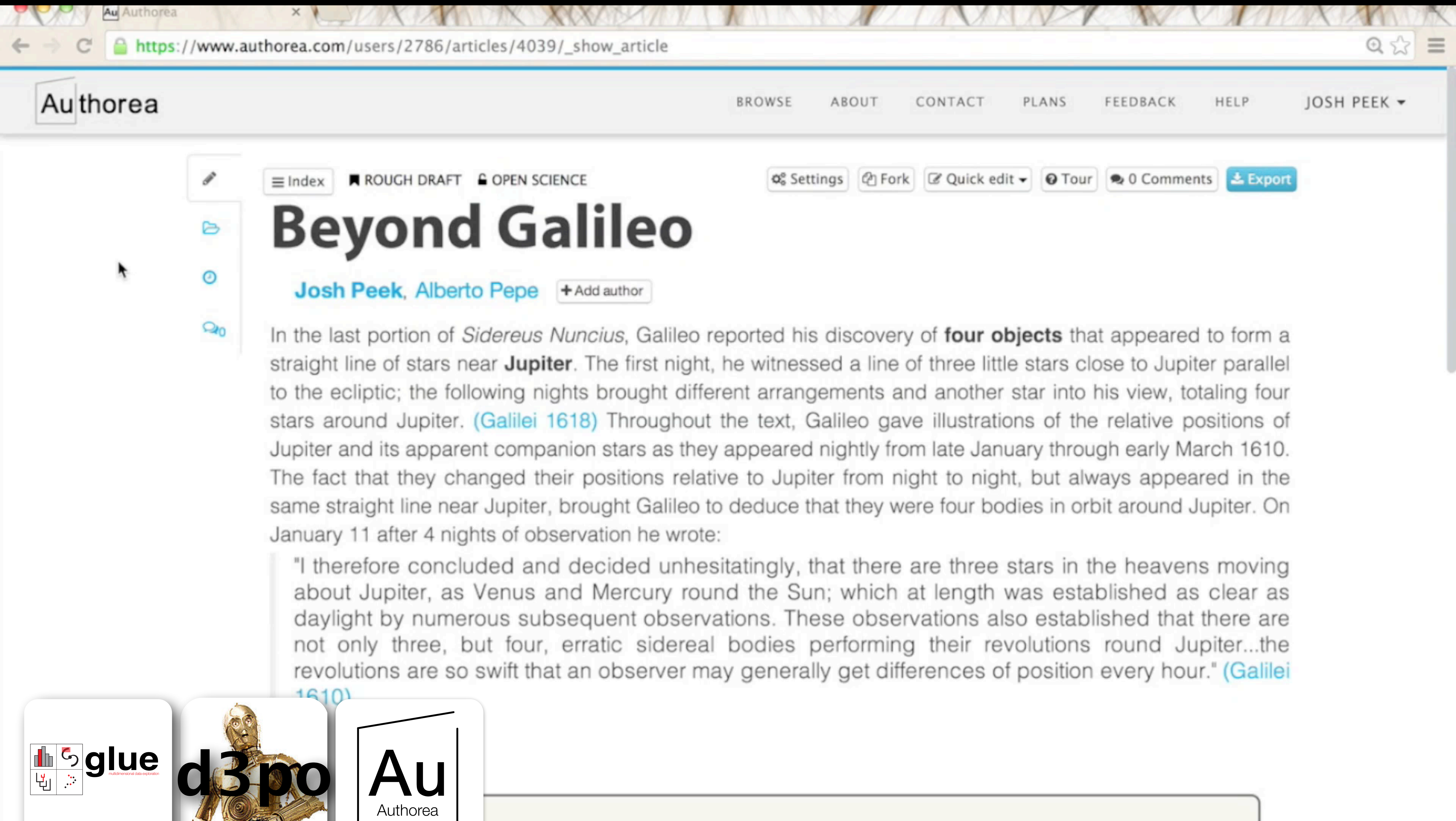


“The Story & the Sandbox” (Glue:D3PO:Authorea)







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)

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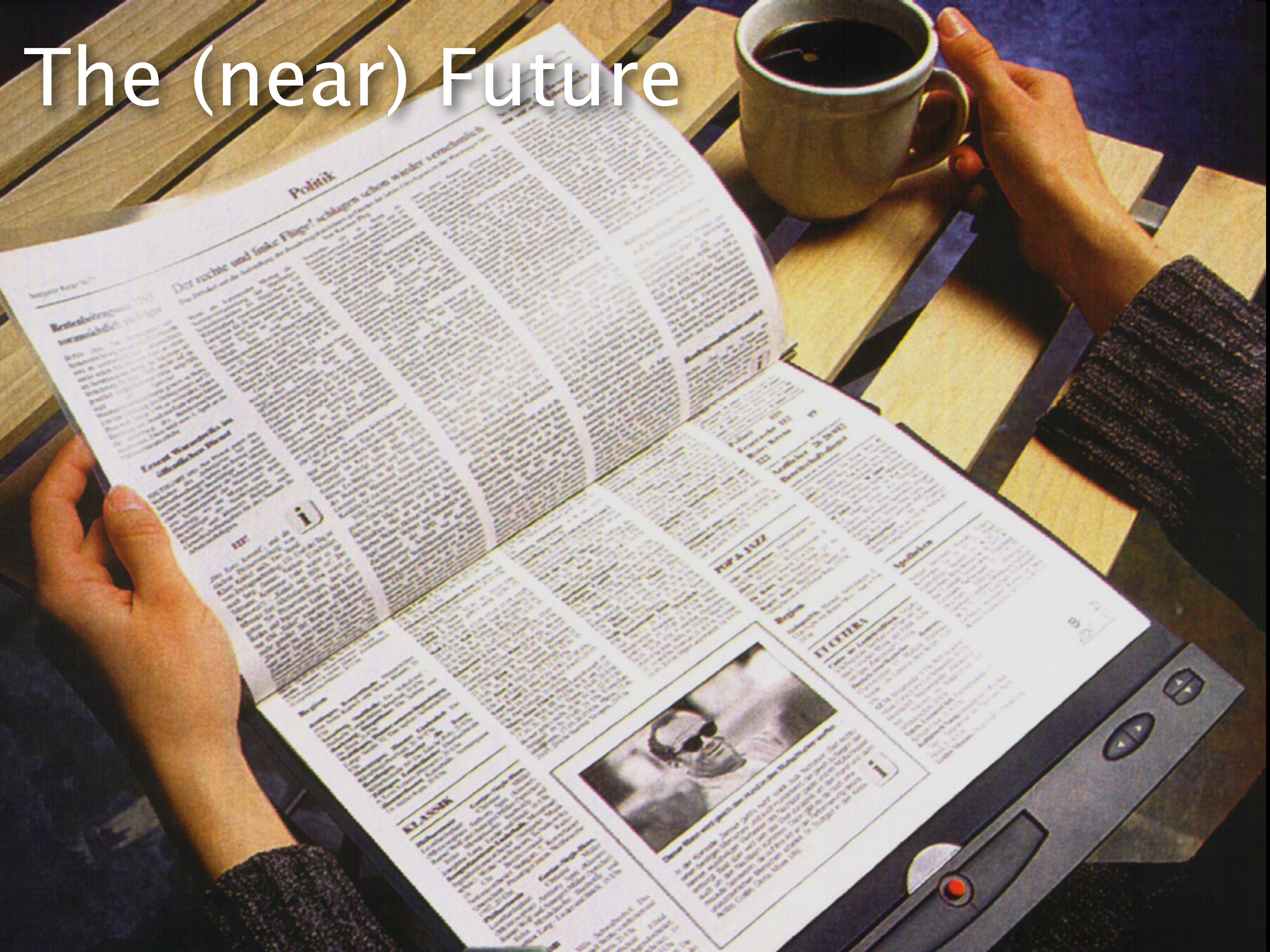
The (near) Future



2002 Patent Application for e-Scroll

Patents | Application | Grant

Rewritable display sheet, image forming apparatus for displaying image on rewritable display sheet, and image displaying method

US 6618188 B2

ABSTRACT

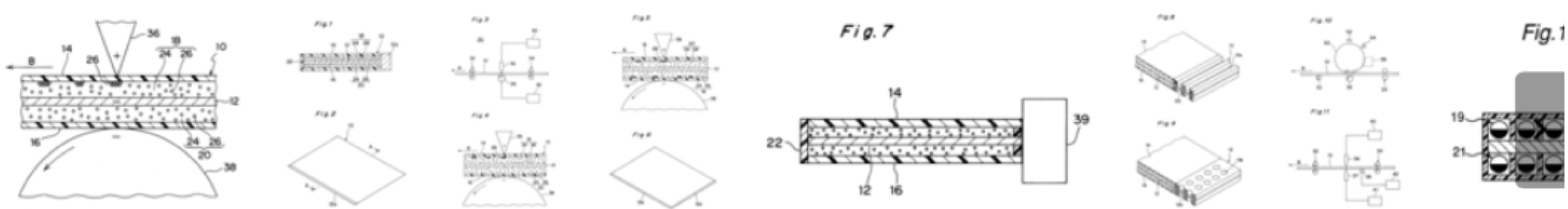
Provided is a rewritable display sheet capable of displaying different images on both surfaces. The rewritable display sheet **10** of the present invention is provided with a conductive substrate **12** that has a voltage applying section **12** *a* at an end portion, transparent sheets **14** and **16** provided on both sides of the conductive substrate **12**, and display layers **18** and **20** which are provided between the conductive substrate **12** and the transparent sheets **14** and **16** and in which an image is written with an electric field applied.

Publication number	US6618188 B2
Publication type	Grant
Application number	US 10/097,273
Publication date	Sep 9, 2003
Filing date	Mar 15, 2002
Priority date	Mar 23, 2001
Fee status	Paid
Also published as	US20020135859
Inventors	Masayasu Haga
Original Assignee	Minolta Co., Ltd.
Export Citation	BiBTeX, EndNote, RefMan

Patent Citations (12), Classifications (8), Legal Events (3)

External Links: USPTO, USPTO Assignment, Espacenet

IMAGES (8)



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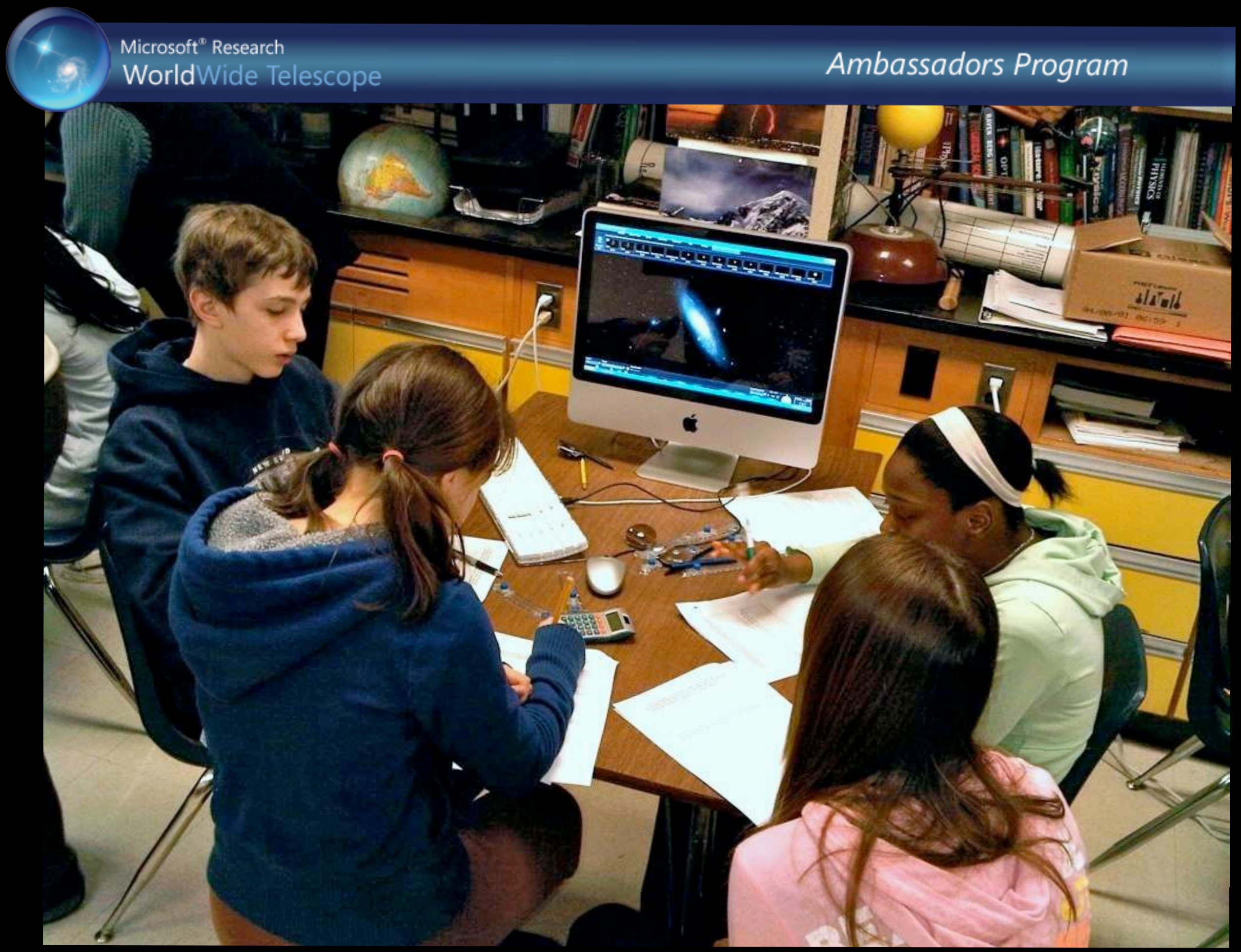

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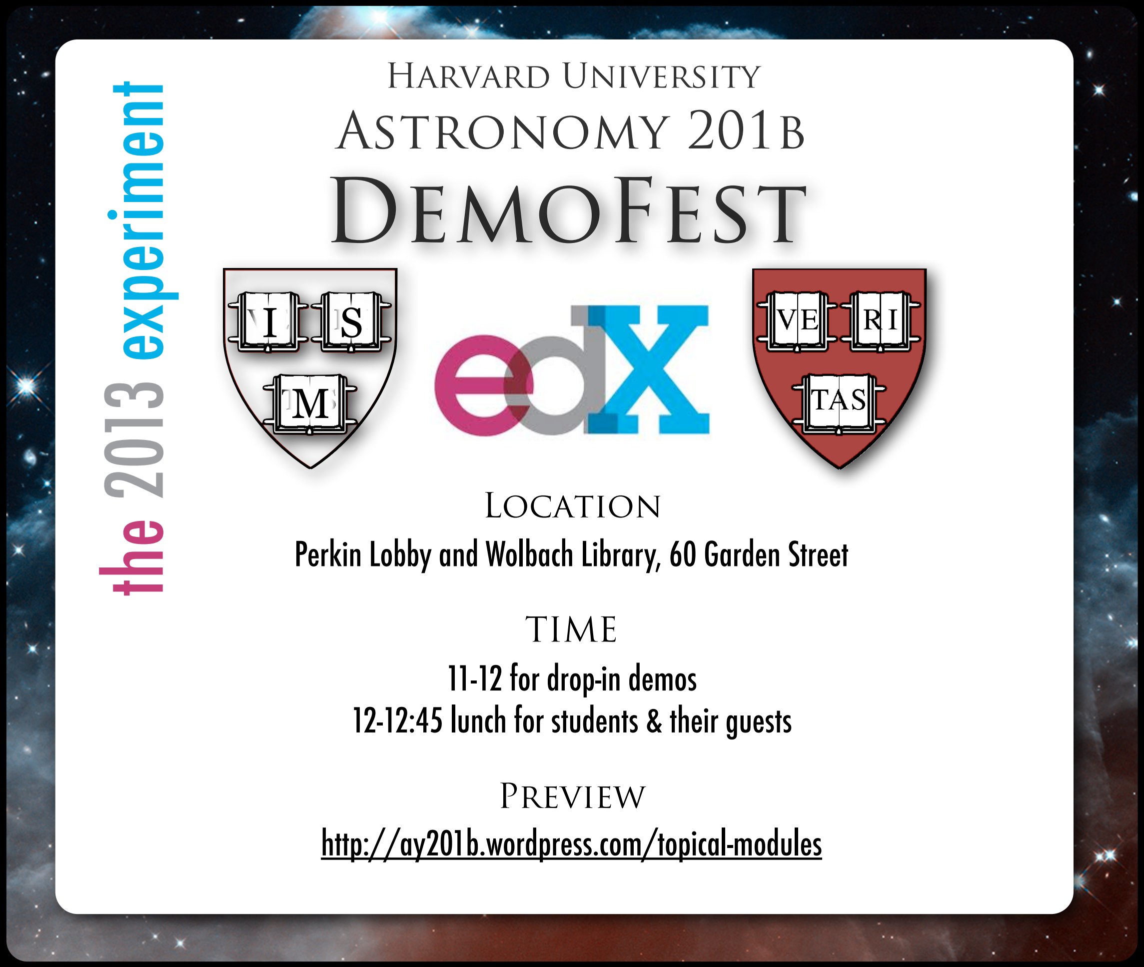

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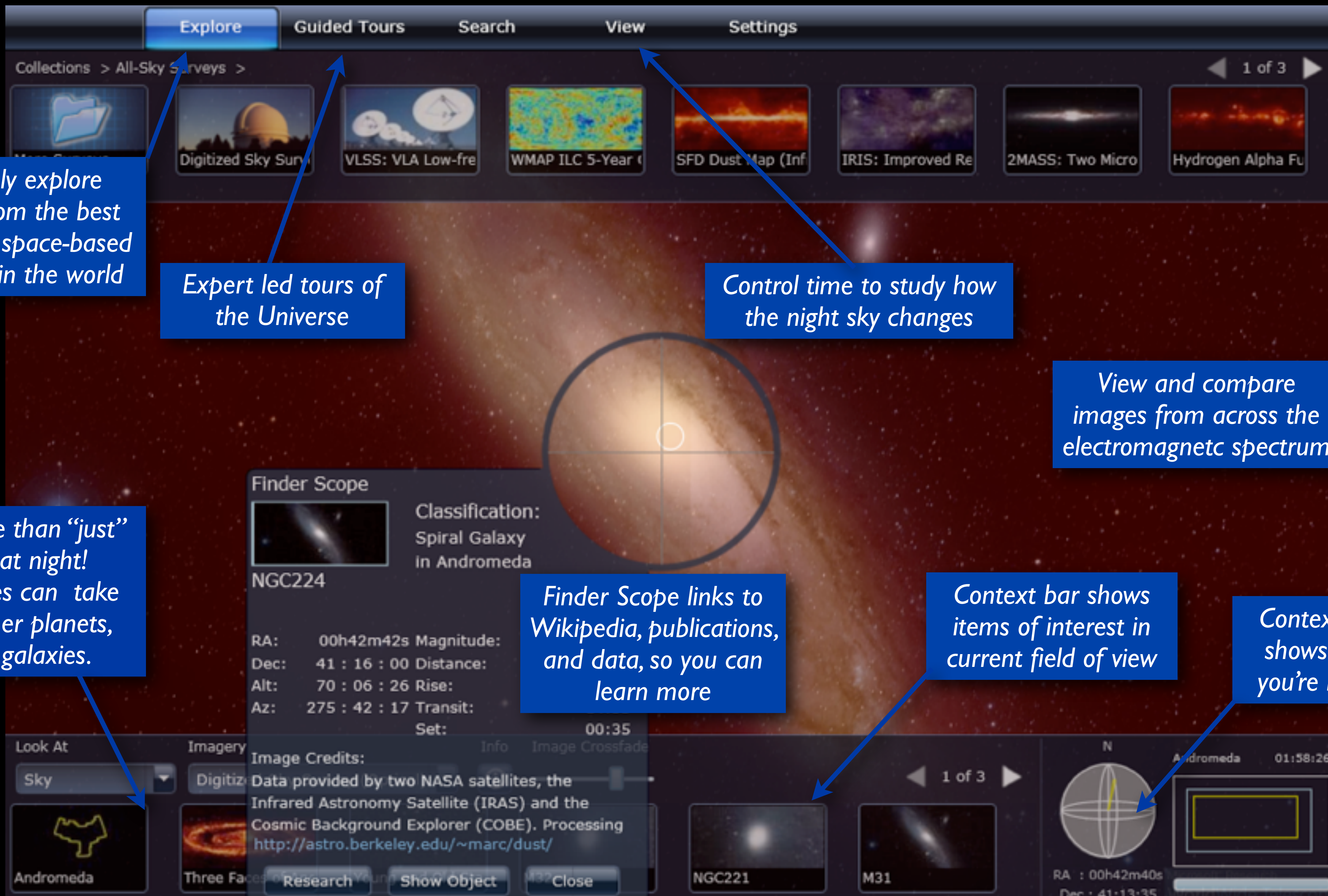

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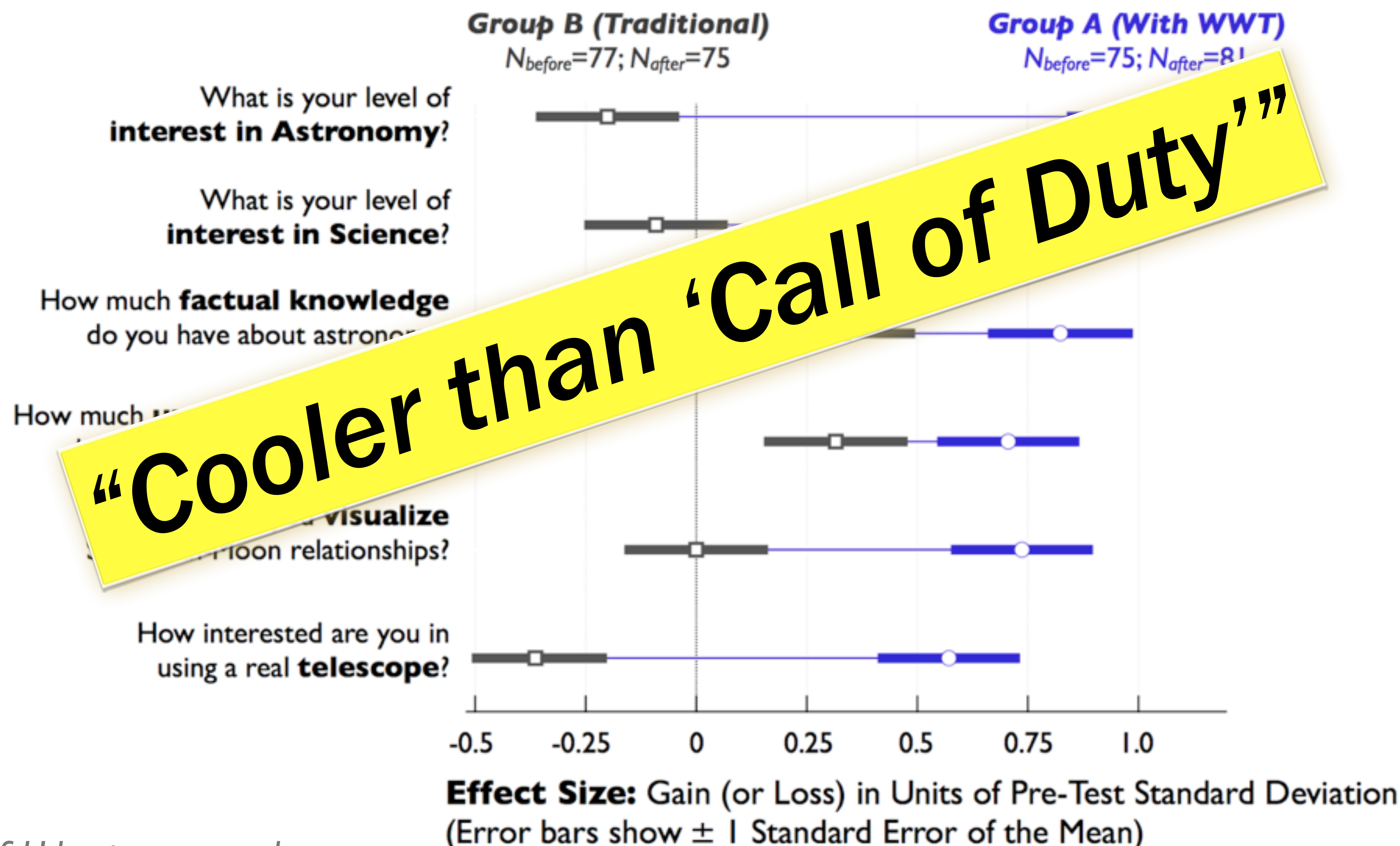
Gains in Student Interest and Understanding



cf. Udomprasert et al.

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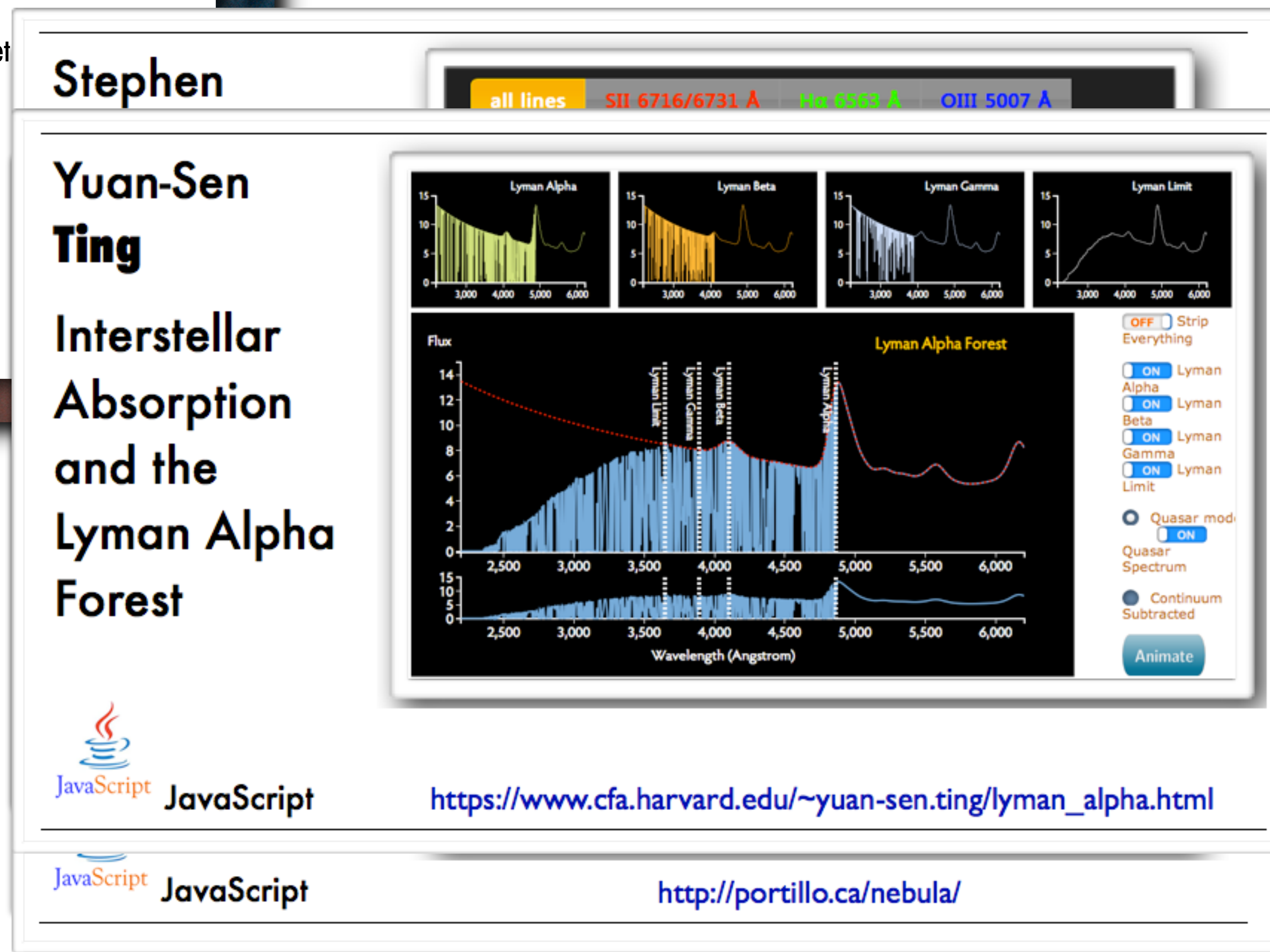

see: A New Approach to Developing Interactive Software Modules through Graduate Education, Sanders, Faesi & Goodman 2013

The Future

bendable paper
everything is a screen
data are everywhere
everyone’s data are shared
new data are community efforts, and community property
software is modular, seamless, and largely invisible