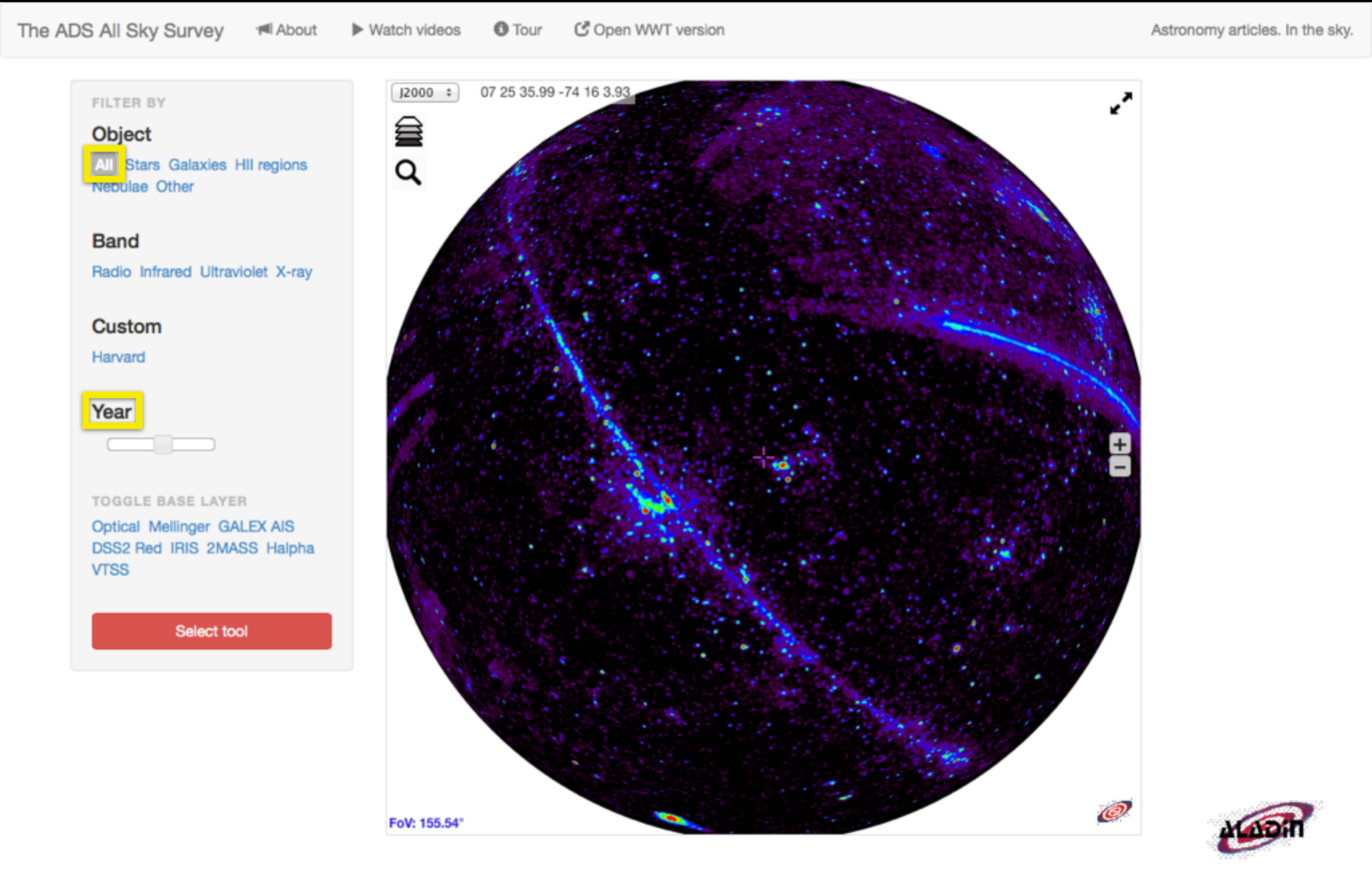
ADS ALL SKY SURVEY

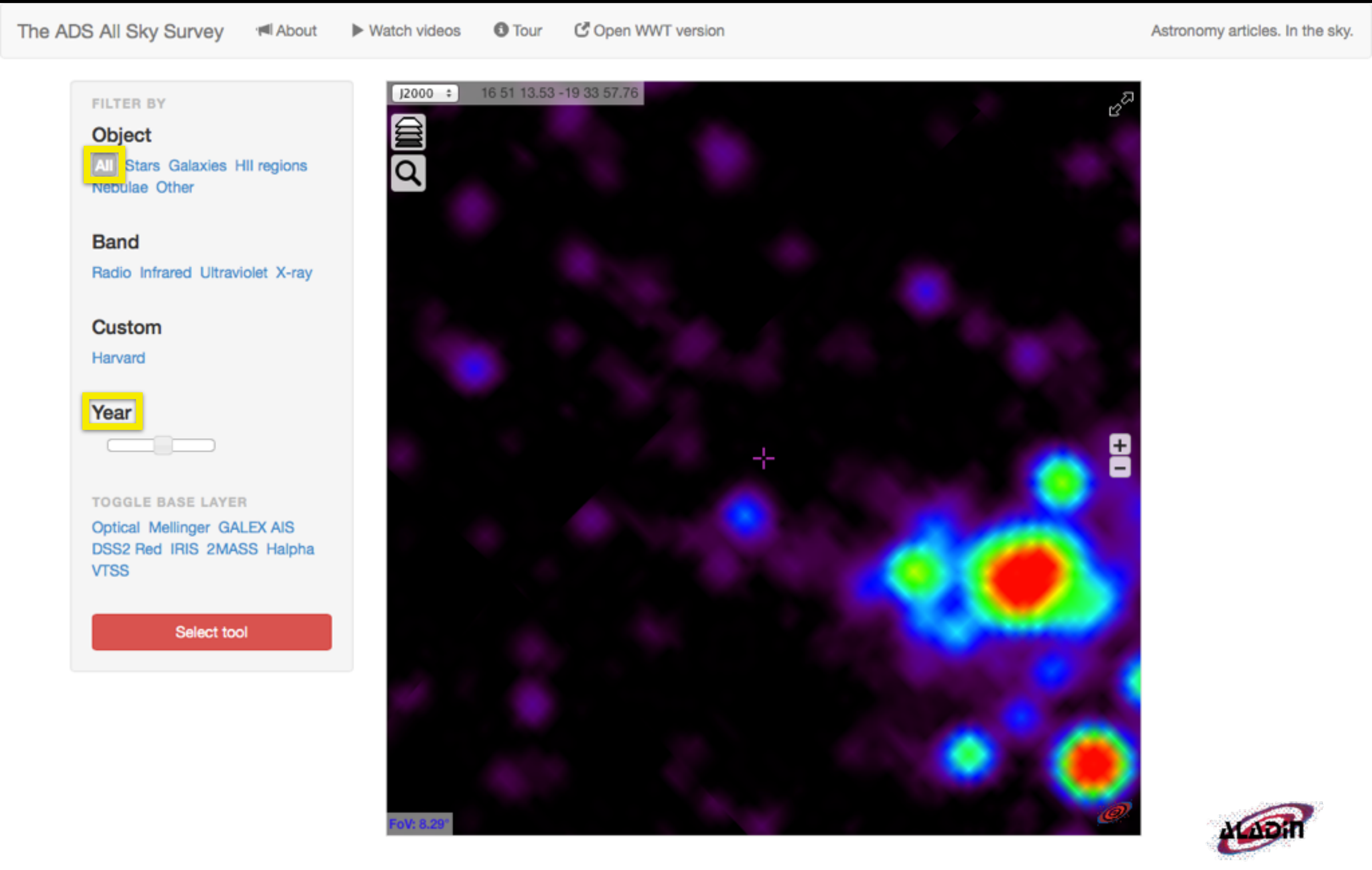
View in Aladin • View in WorldWide Telescope

adsass.org

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

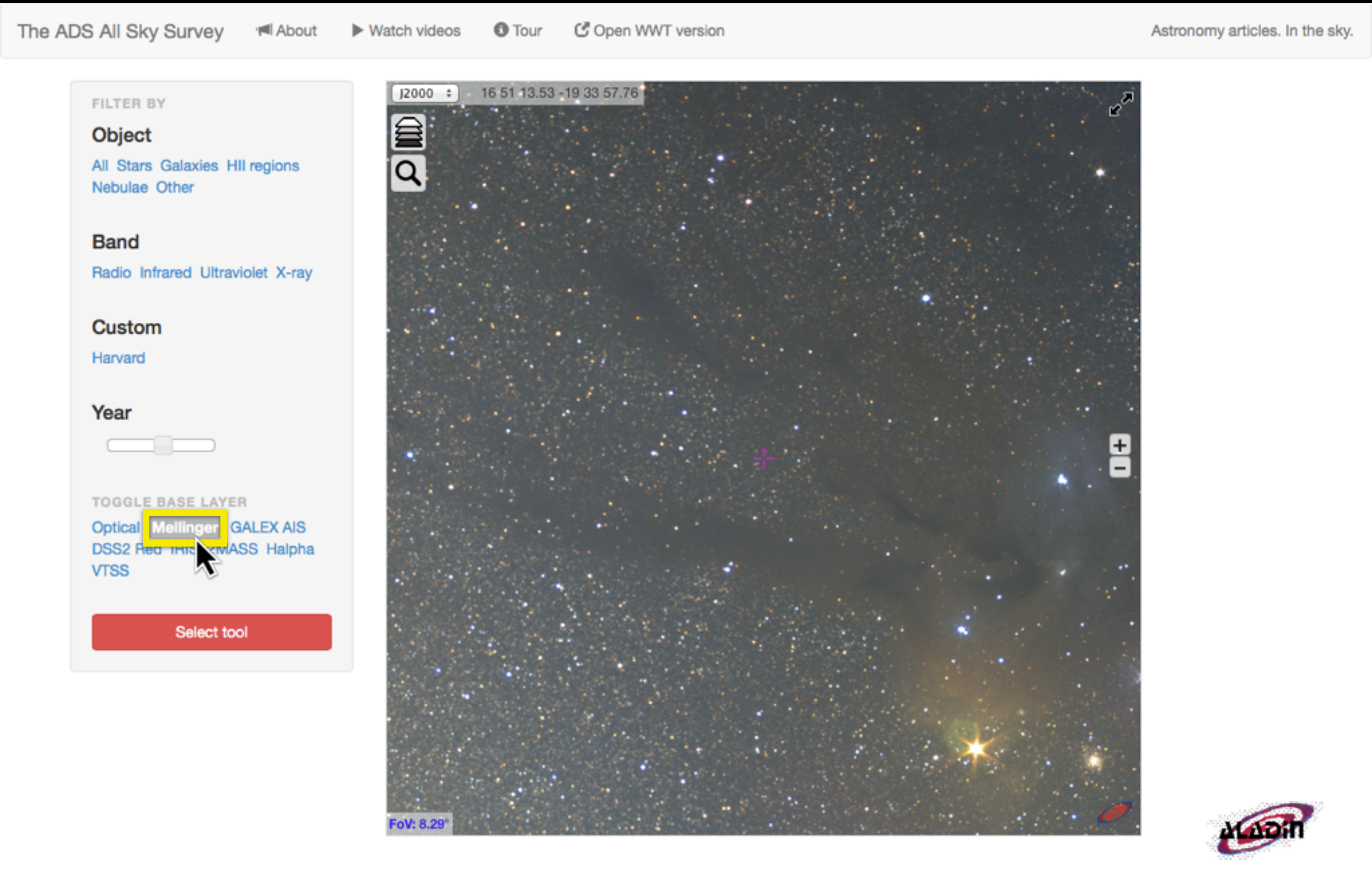


let's zoom in (on Ophiuchus)

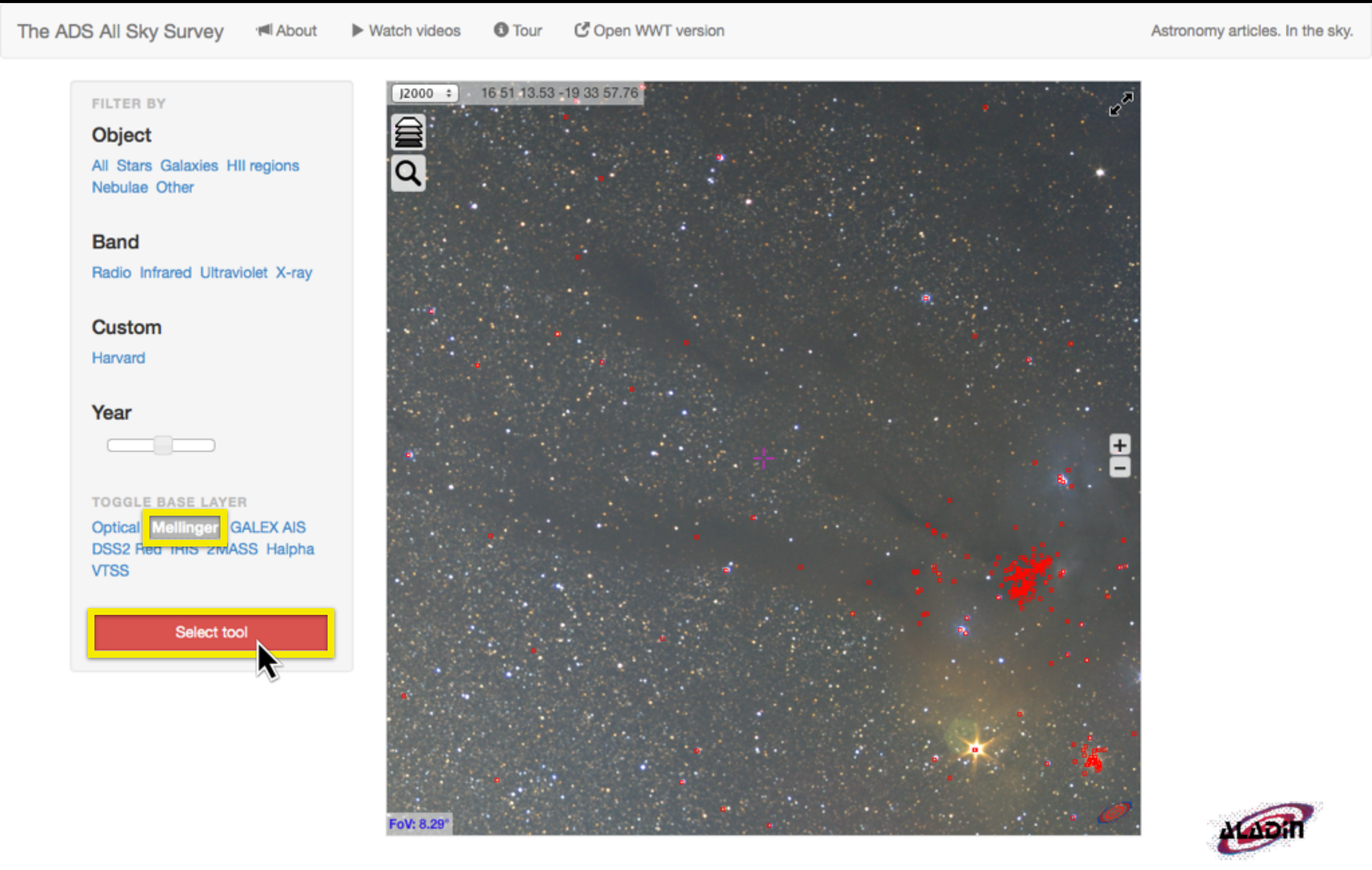


now, let's toggle on the "Mellinger" view of the Sky

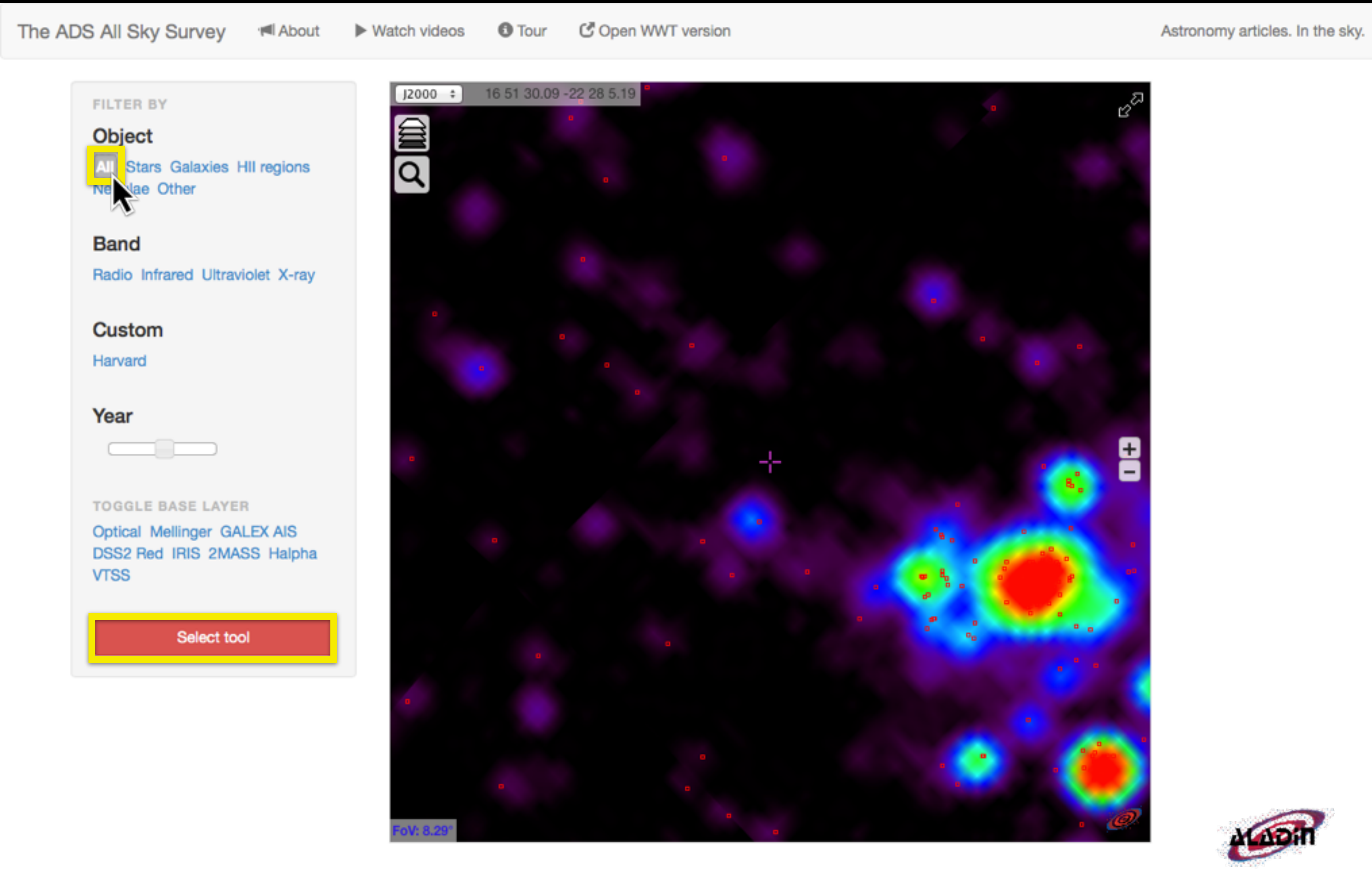
...to see a nice optical image of Ophiuchus



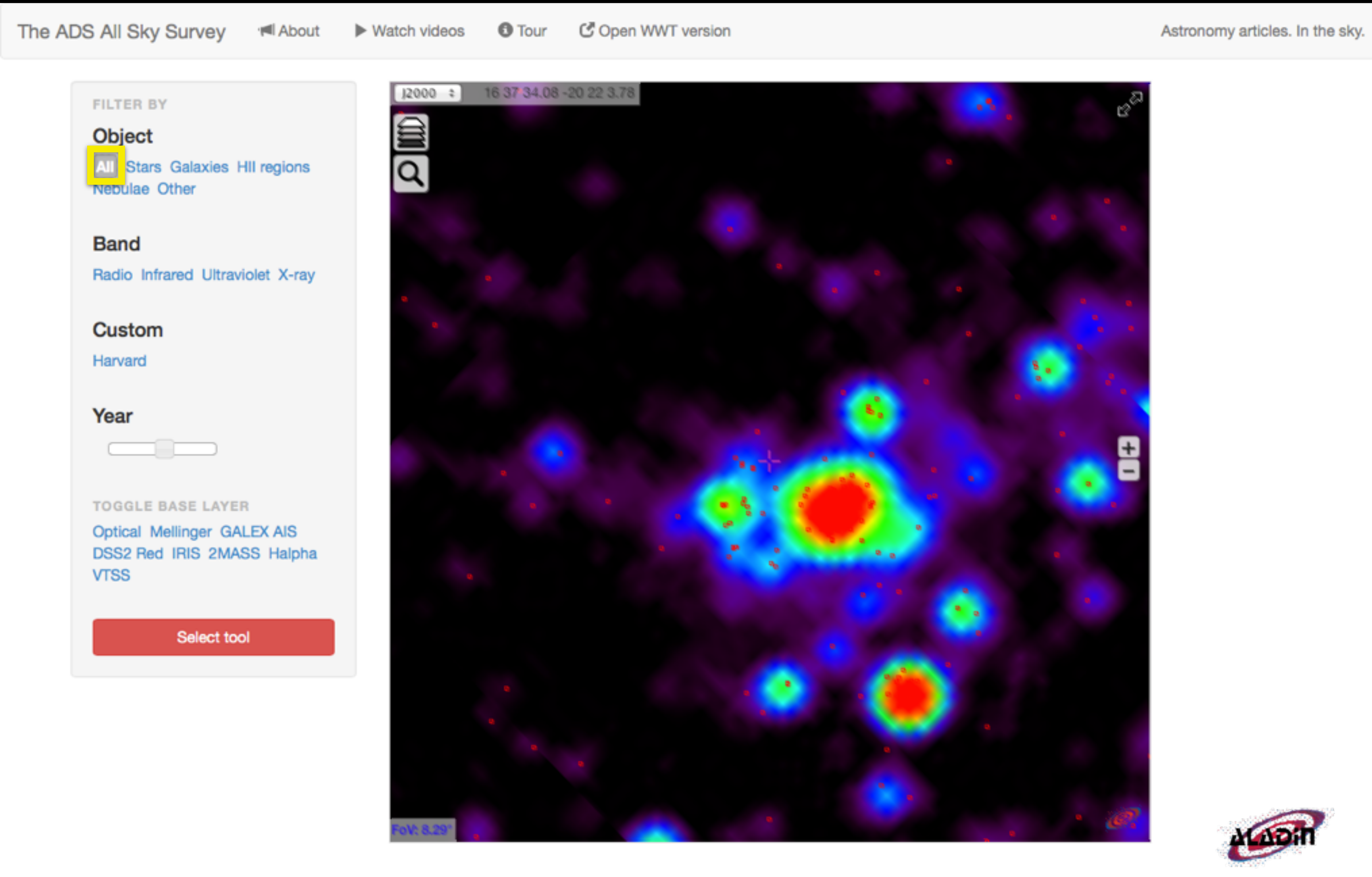
to add markers for SIMBAD sources, we can click the Select Tool



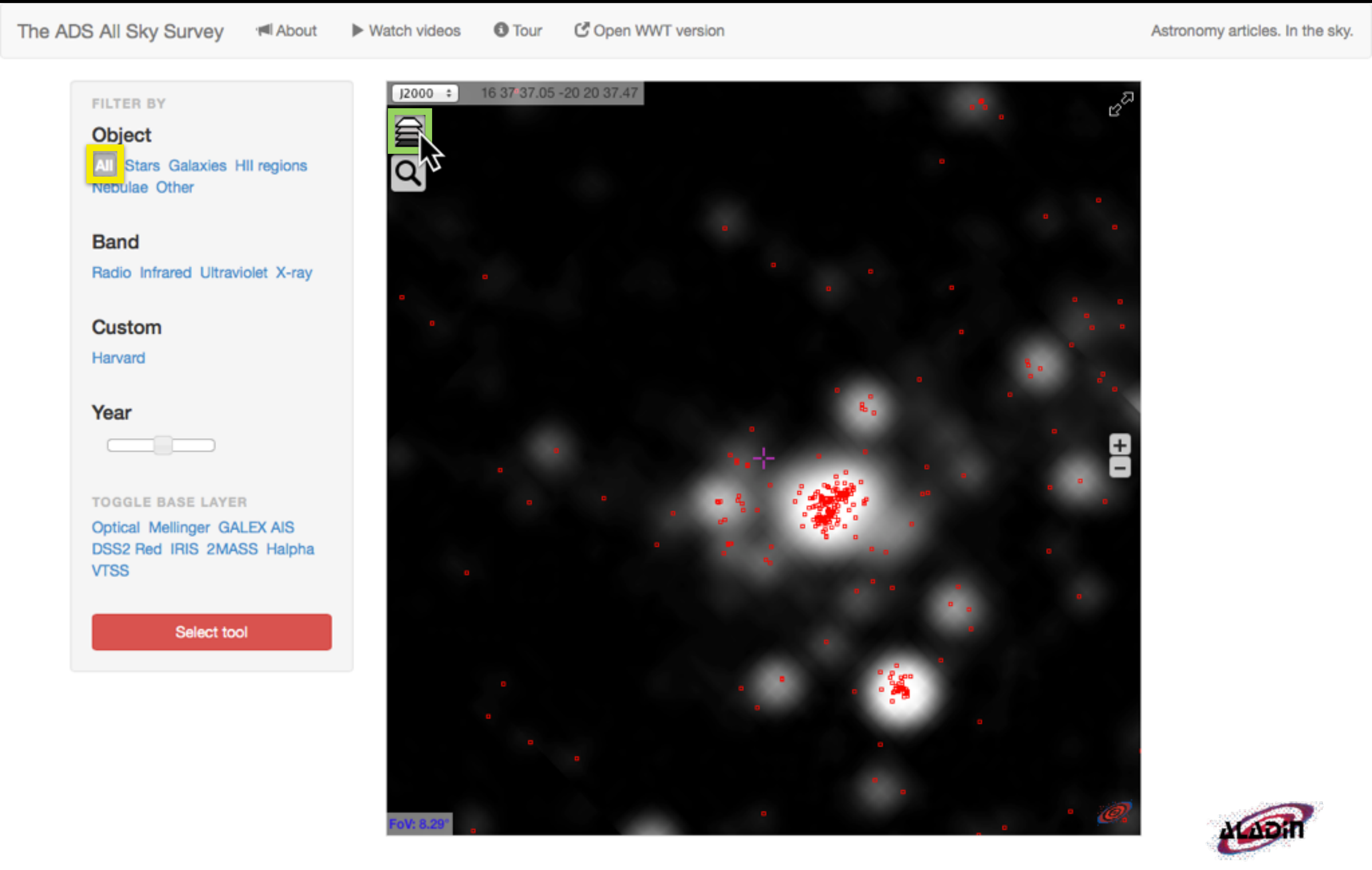
now, if we re-select "All," we see sources on article distribution



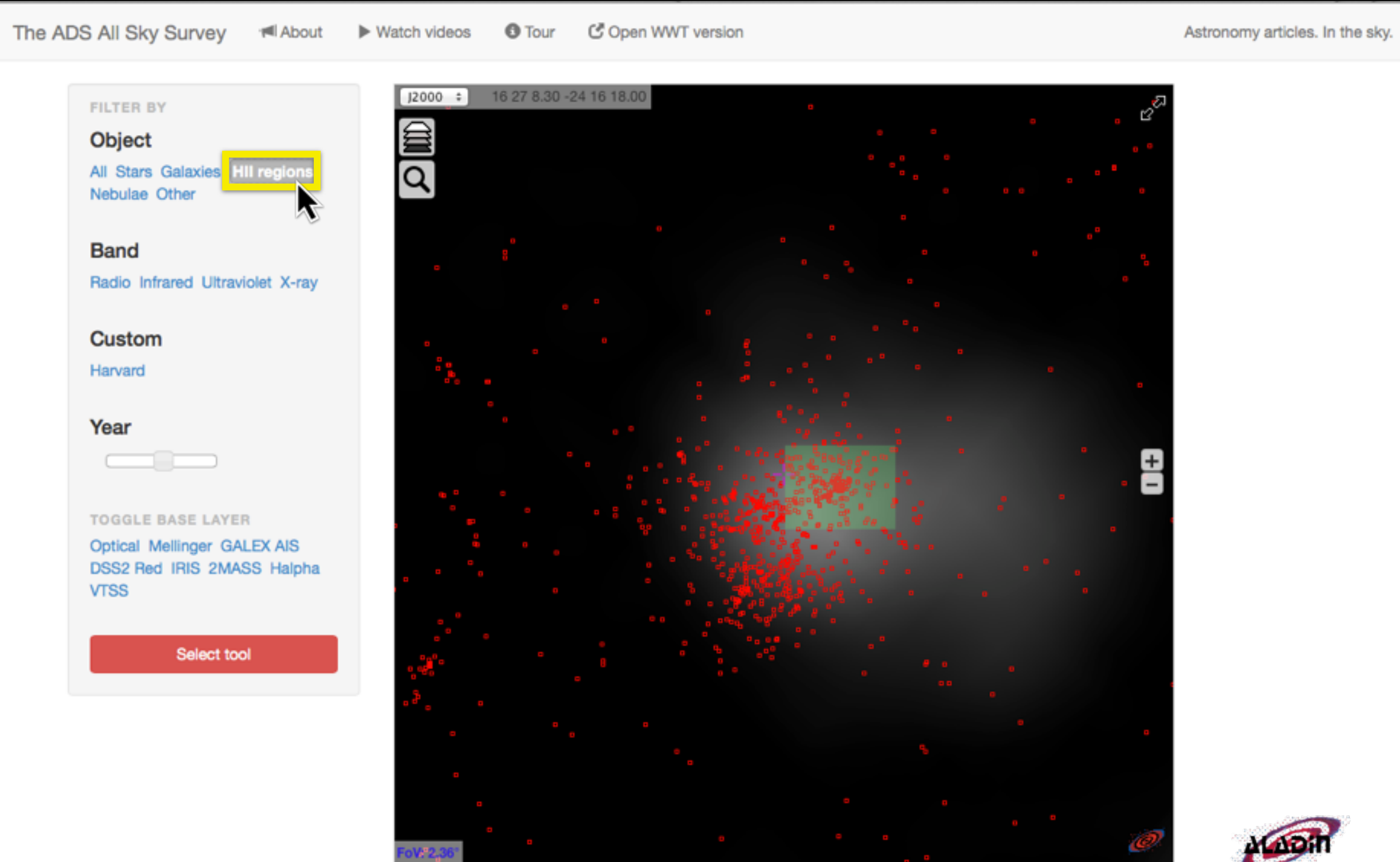
panning over a bit, we can center our region of interest



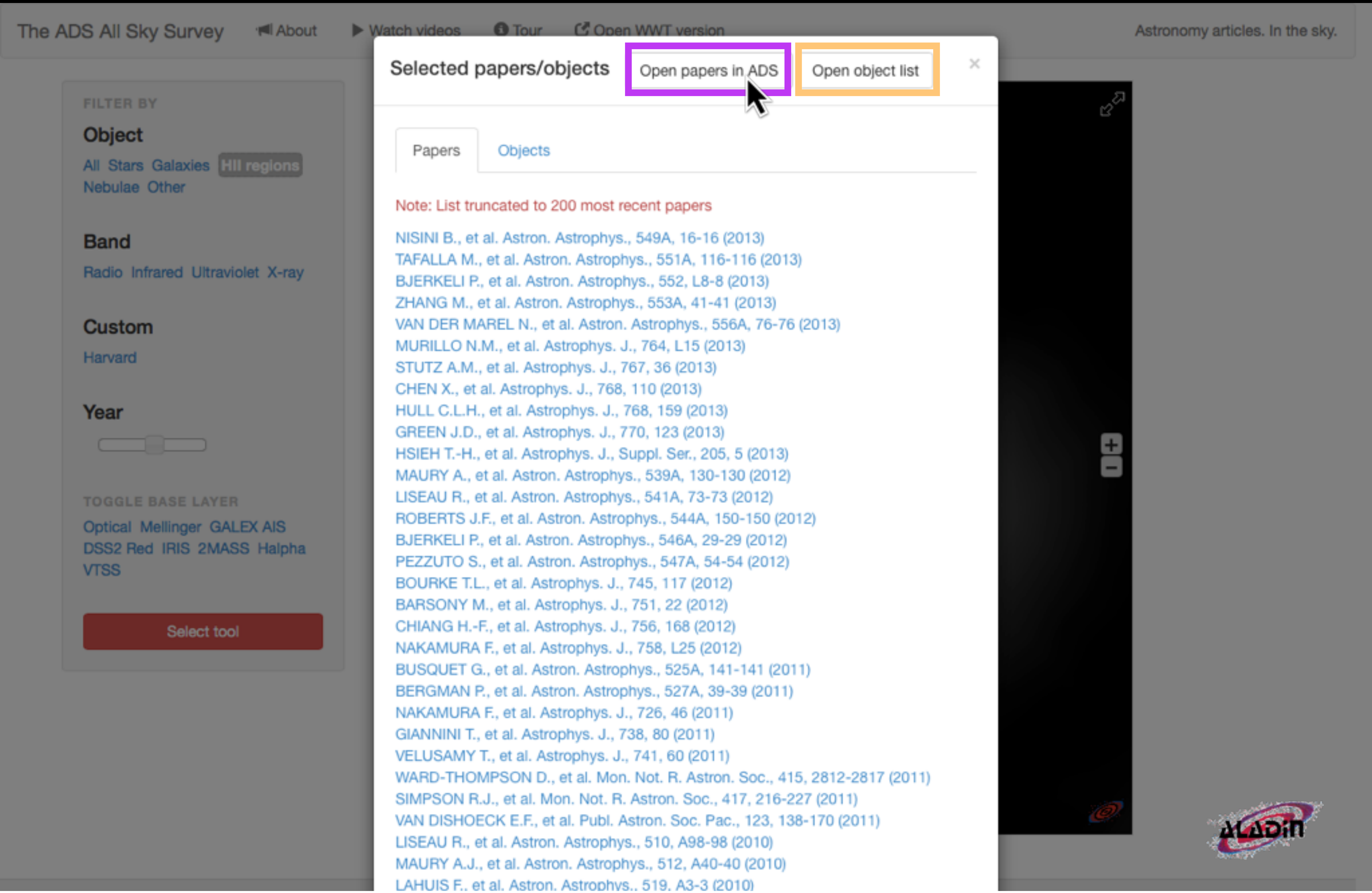
let's change the color table from rainbow to greyscale to make sources more apparent



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.)

ads labs

ADS Labs
Streamlined Search

NASA

Home | Labs Home | ADS Classic | Help | agoodman@cfa.harvard.edu - Sign off

Advanced query - *Advanced Search* *200 results* More

NO FILTERS APPLIED

FILTER BY:

Authors
- Andre, P (20)
- van Dishoeck, E (17)
- Smith, M (14)
- Ward-Thompson, D (14)
- Jorgensen, J (12)

Keywords

Data

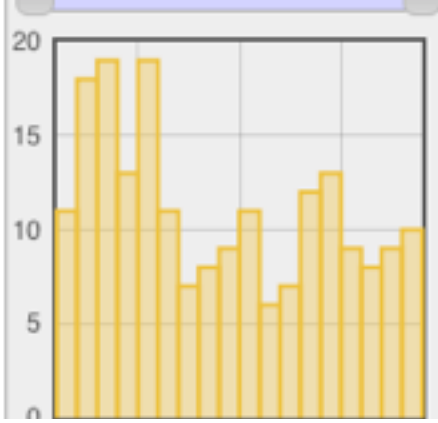
SIMBAD Objects

Vizier Tables

Refereed status

Dates

from 1996 to 2013



1. 2013A&A...556A..76V [E F L X D R S U]
Outflow forces of low-mass embedded objects in Ophiuchus: a quantitative comparison of analysis methods
van der Marel, N.; Kristensen, L. E.; Visser, R.; Mottram, J. C.; *and 2 coauthors*

2. 2013ApJ...770..123G Cited by 12 [E F L X R C S U]
Embedded Protostars in the Dust, Ice, and Gas In Time (DIGIT) Herschel Key Program: Continuum SEDs, and an Inventory of Characteristic Far-infrared Lines from PACS Spectroscopy
Green, Joel D.; Evans, Neal J., II; Jørgensen, Jes K.; Herczeg, Gregory J.; *and 17 coauthors*

3. 2013ApJ...768..159H Cited by 21 [E F L X R C S U]
Misalignment of Magnetic Fields and Outflows in Protostellar Cores
Hull, Charles L. H.; Plambeck, Richard L.; Bolatto, Alberto D.; Bower, Geoffrey C.; *and 21 coauthors*

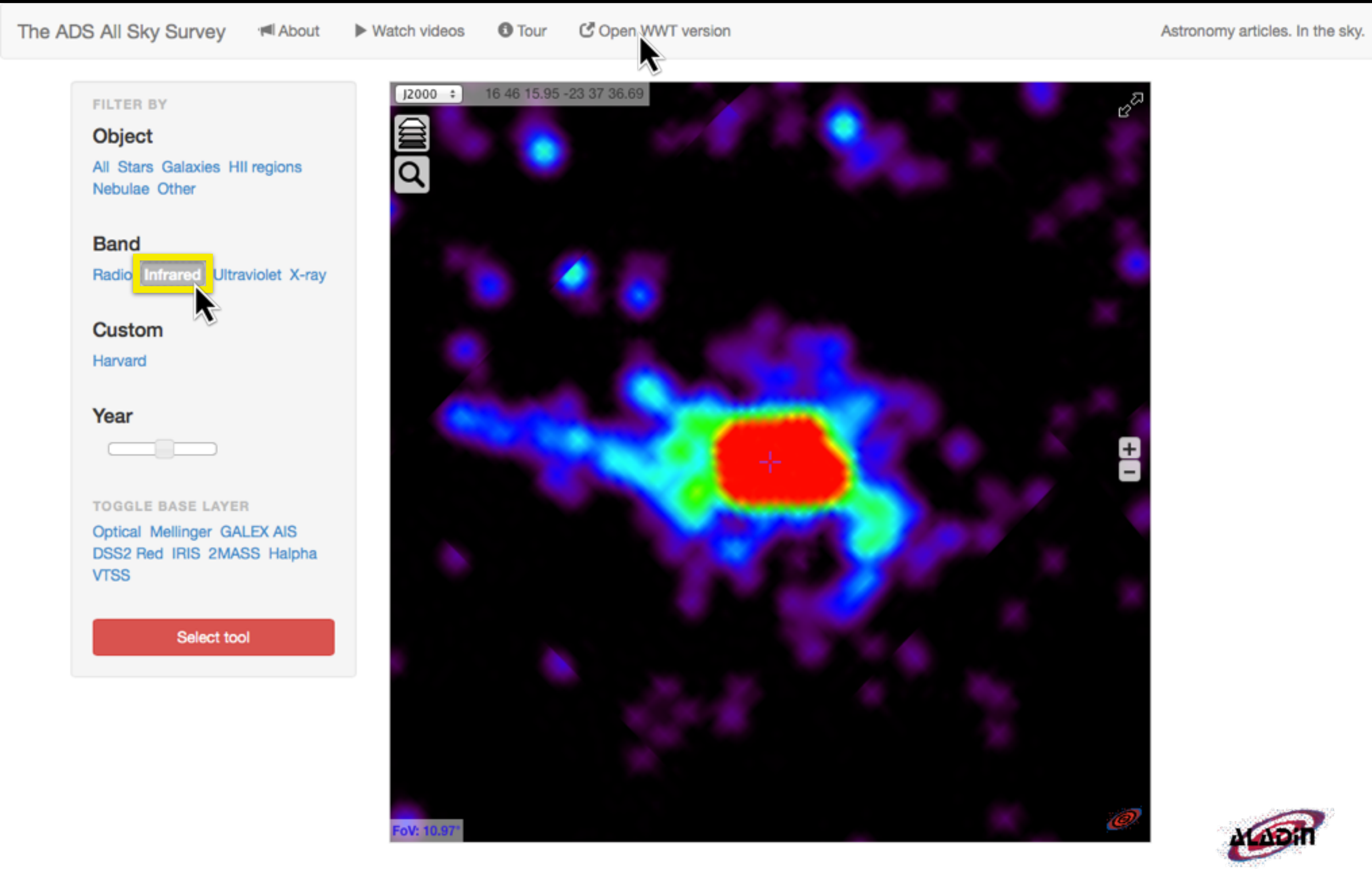
4. 2013ApJ...768..110C Cited by 6 [E F L X R C S U]
SMA Observations of Class 0 Protostars: A High Angular Resolution Survey of Protostellar Binary Systems
Chen, Xuepeng; Arce, Héctor G.; Zhang, Qizhou; Bourke, Tyler L.; *and 7 coauthors*

5. 2013A&A...553A..41Z [E F L X D R S U]
Proper motions of molecular hydrogen outflows in the ρ Ophiuchi molecular cloud
Zhang, M.; Brandner, W.; Wang, H.; Gennaro, M.; *and 5 coauthors*

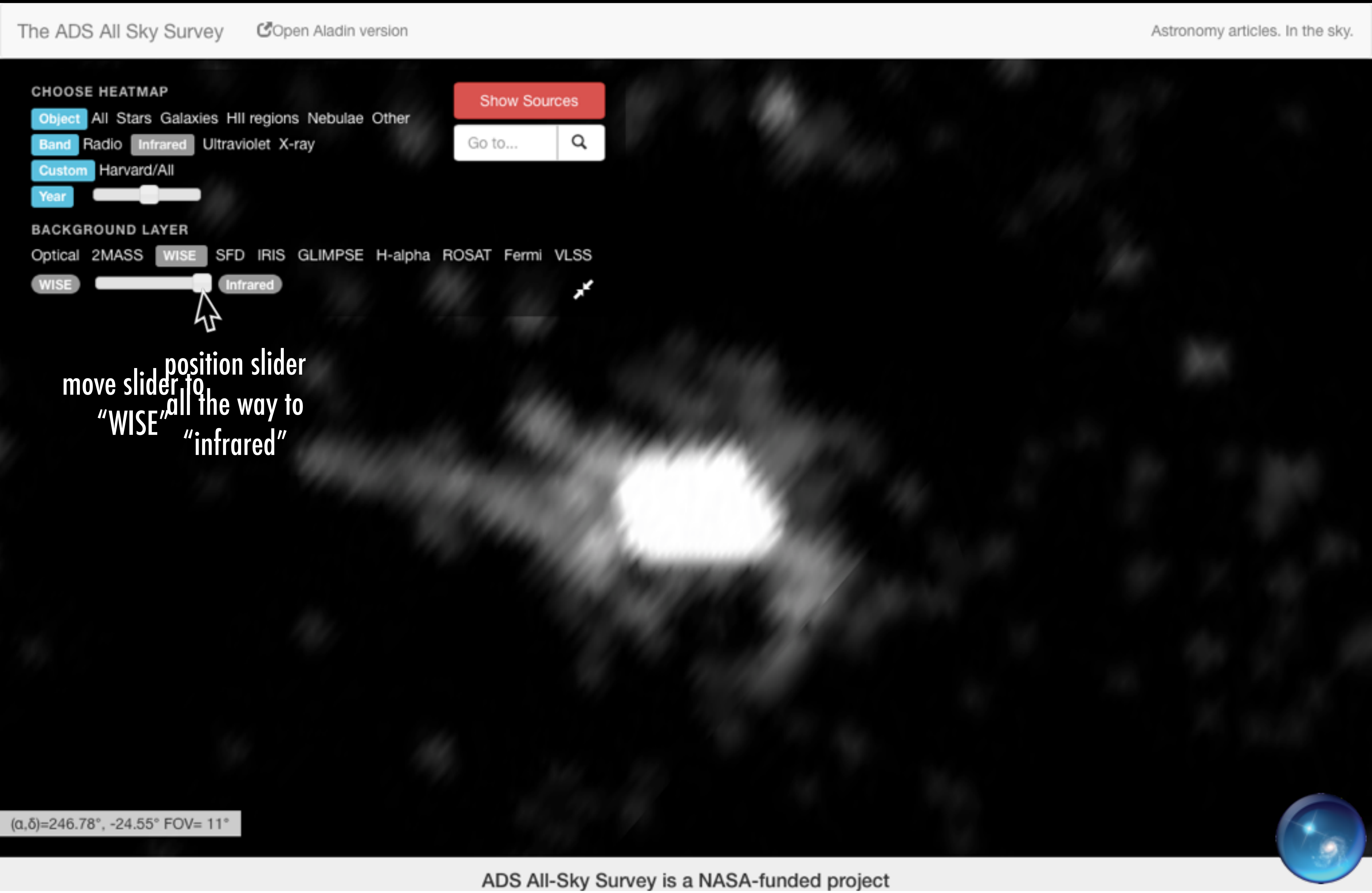
6. 2013ApJ...767...36S Cited by 6 [E F L X D R C S U]
A Herschel and APEX Census of the Reddest Sources in Orion: Searching for the Youngest Protostars
Stutz, Amelia M.; Tobin, John J.; Stanke, Thomas; Megeath, S. Thomas; *and 12 coauthors*

7. 2013A&A...552L...8B Cited by 2 [E F X R C S U]
Physical properties of outflows. Comparing CO- and H2O-based parameters

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

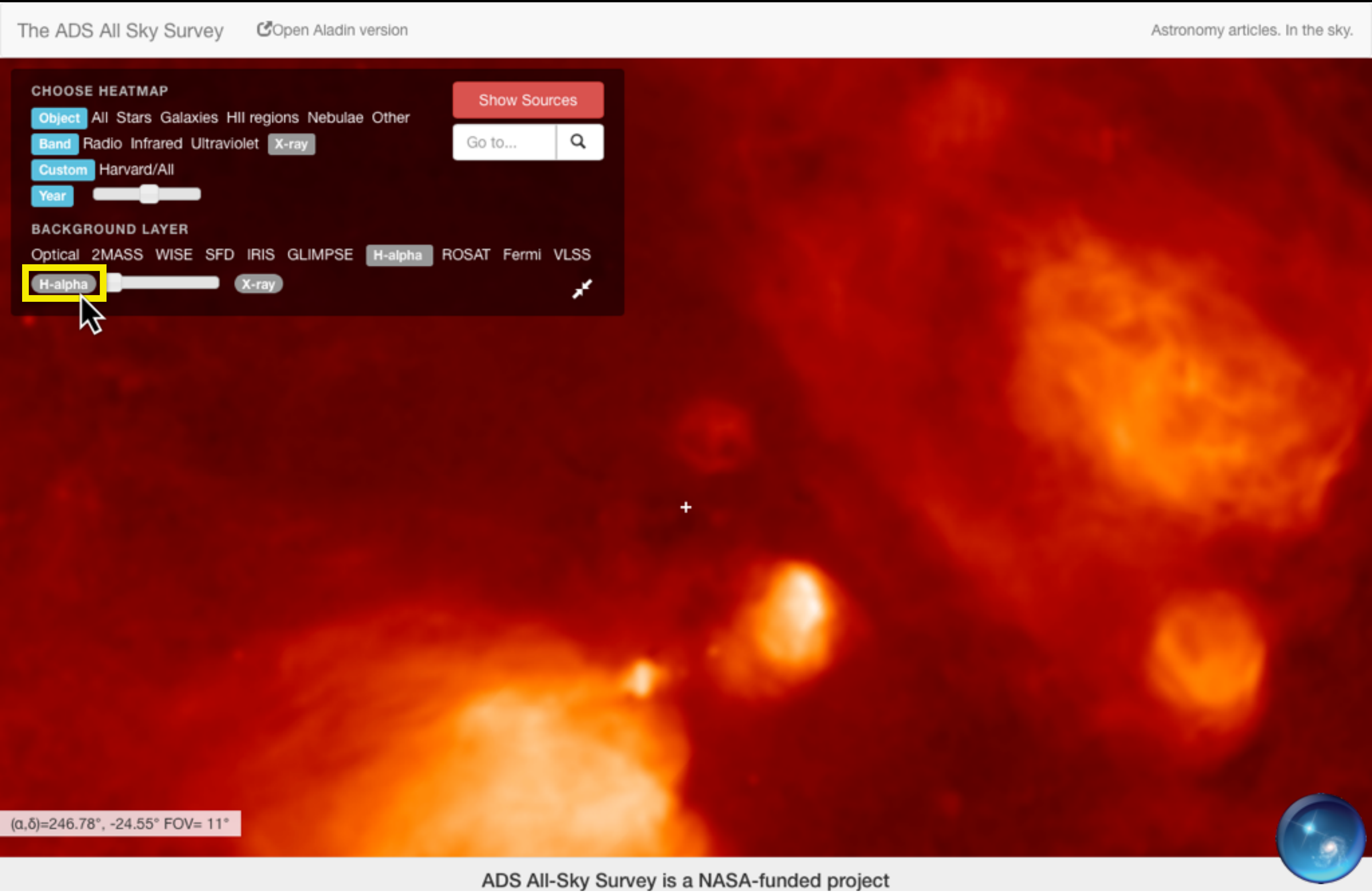


let's try the transparency (layer) slider in WorldWide Telescope

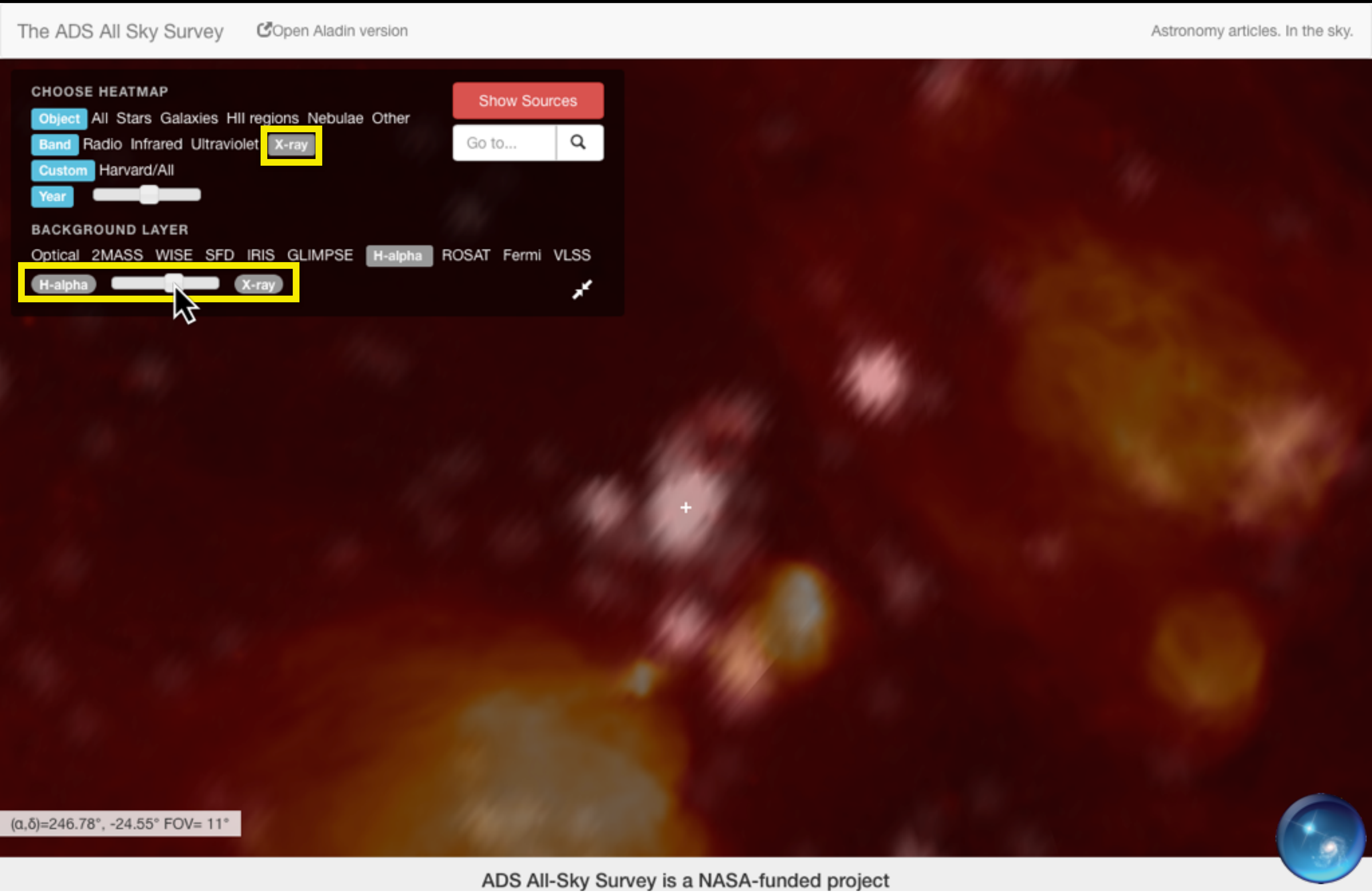


Thursday, May 1, 2014

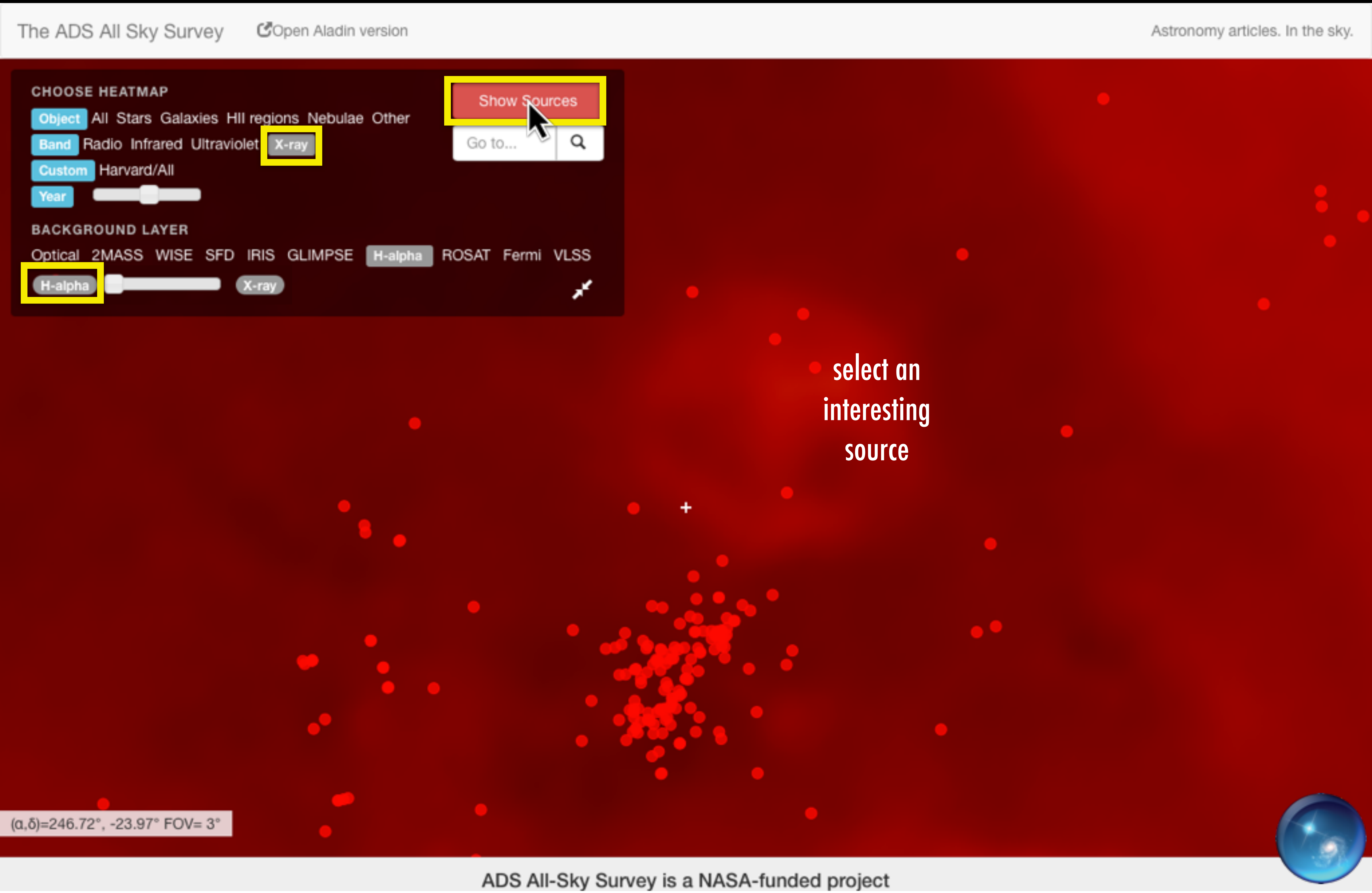
dust is nice, but we're curious about HII regions, let's change view to H-alpha



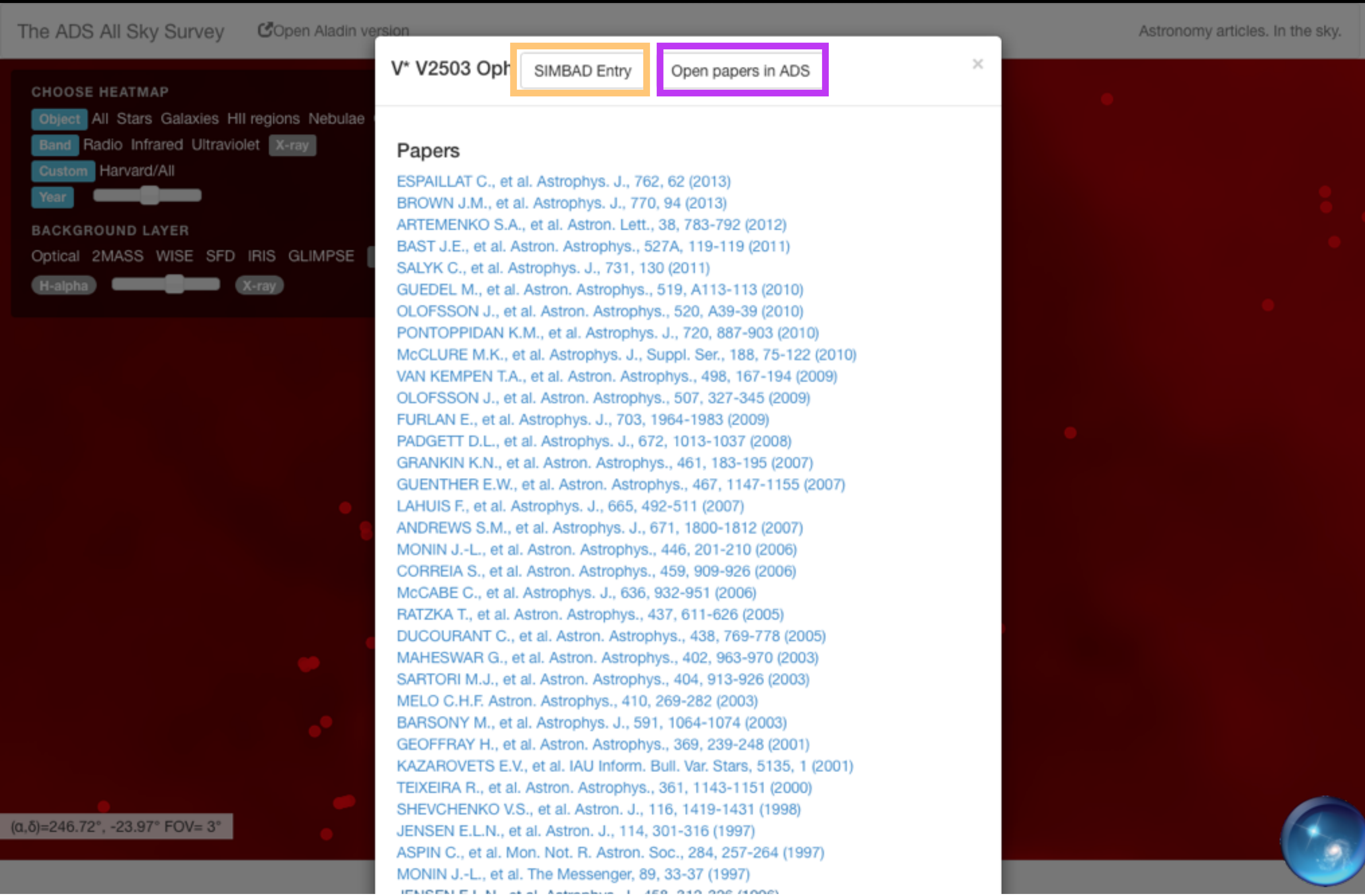
now we want to find X-ray observations and see if any are near the HII regions, so we can slide between H-alpha and X-ray



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

SEAMLESS ASTRONOMY

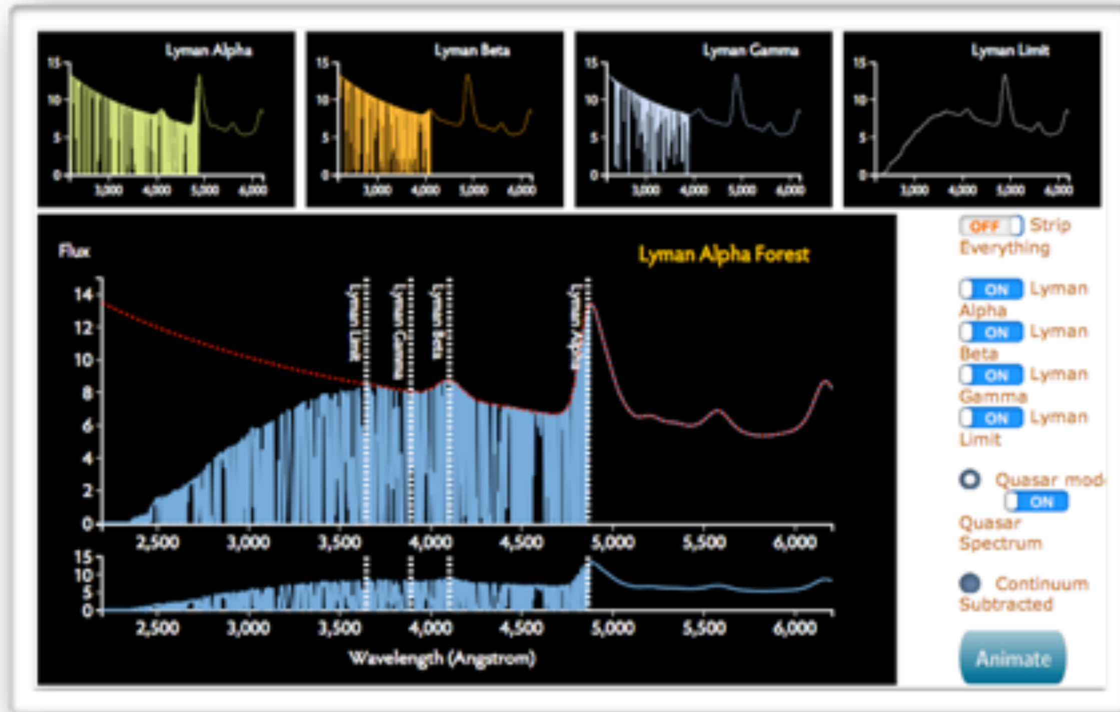
Linking scientific data, publications, and communities

Stephen

all lines SII 6716/6731 Å Hα 6563 Å OIII 5007 Å

Yuan-Sen **Ting**

Interstellar Absorption and the Lyman Alpha Forest



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

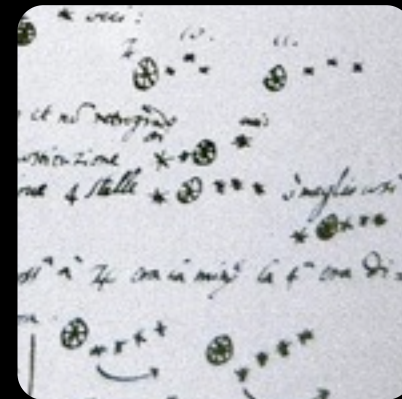
JavaScript JavaScript http://portillo.ca/nebula/

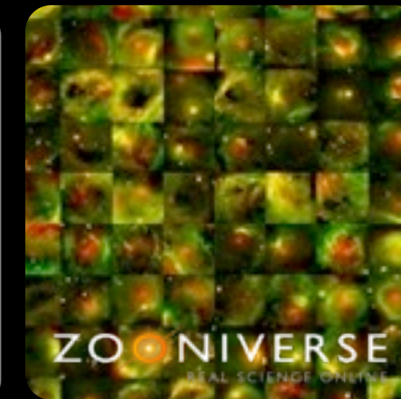
see: A New Approach to Developing Interactive Software Modules through Graduate Education, Sanders, Faesi & Goodman 2013

Experience WorldWide Telescope, free from Microsoft Research at **worldwidetelescope.org**

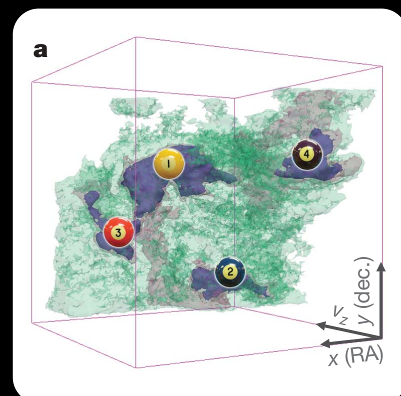
VISUALIZATION IN ASTRONOMY: FROM GALILEO TO THE ZOONIVERSE

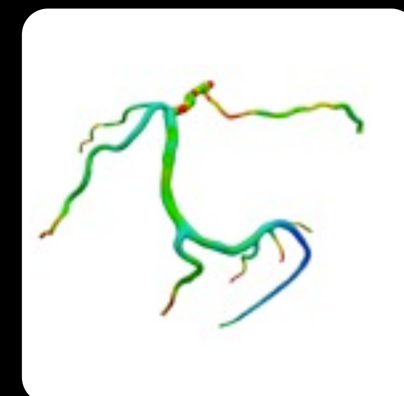
ALYSSA A. GOODMAN
HARVARD-SMITHSONIAN
CENTER FOR ASTROPHYSICS
@AAGIE

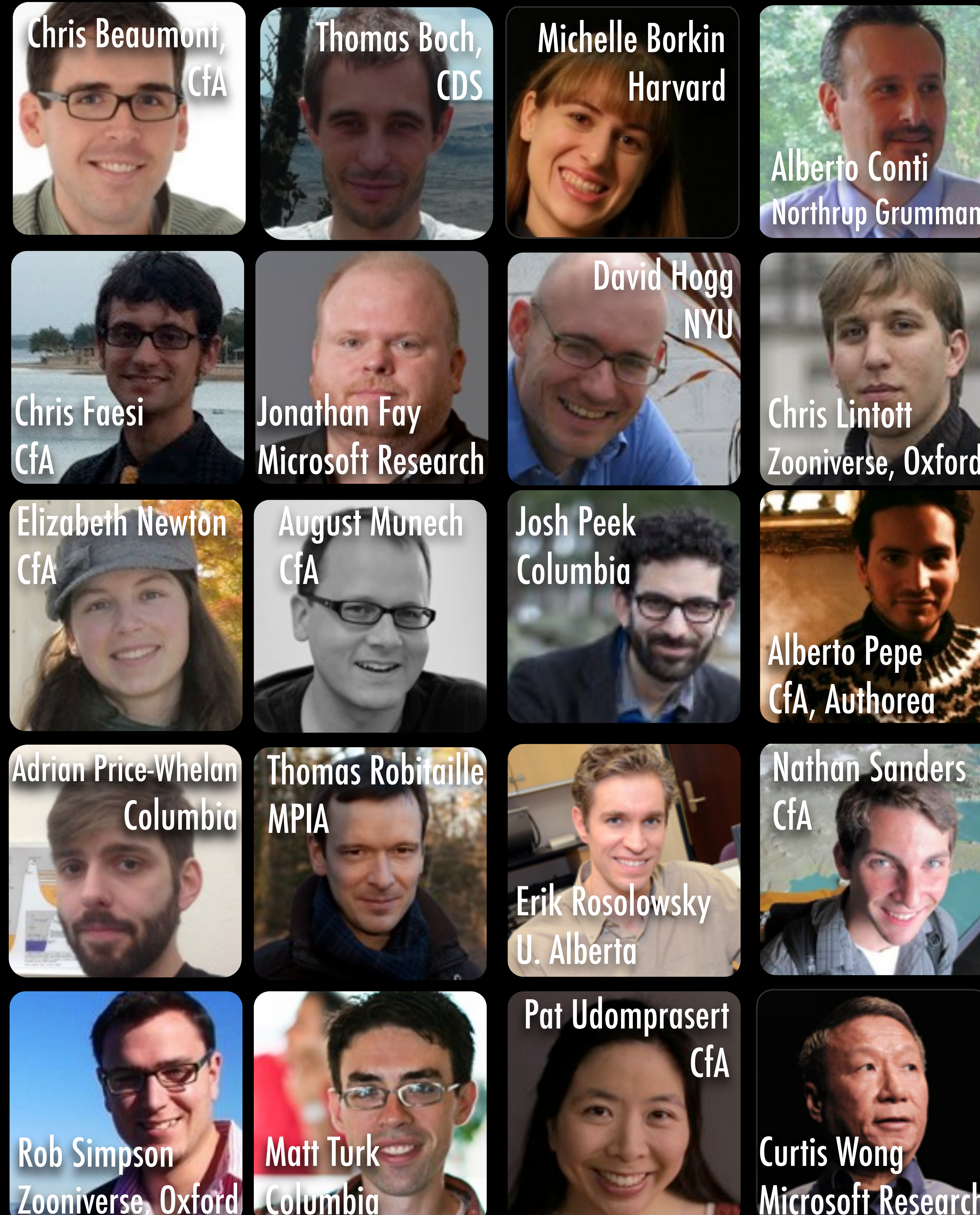








COLLABORATORS



SEAMLESS ASTRONOMY
Linking scientific data, publications, and communities
projects.iq.harvard.edu/seamlessastronomy

...including ADS team (Alberto Accomazzi, Michael Kurtz, Edwin Henneken, et al.) and Wolbach Library staff (Christopher Erdmann et al.)

RELATIVE STRENGTHS

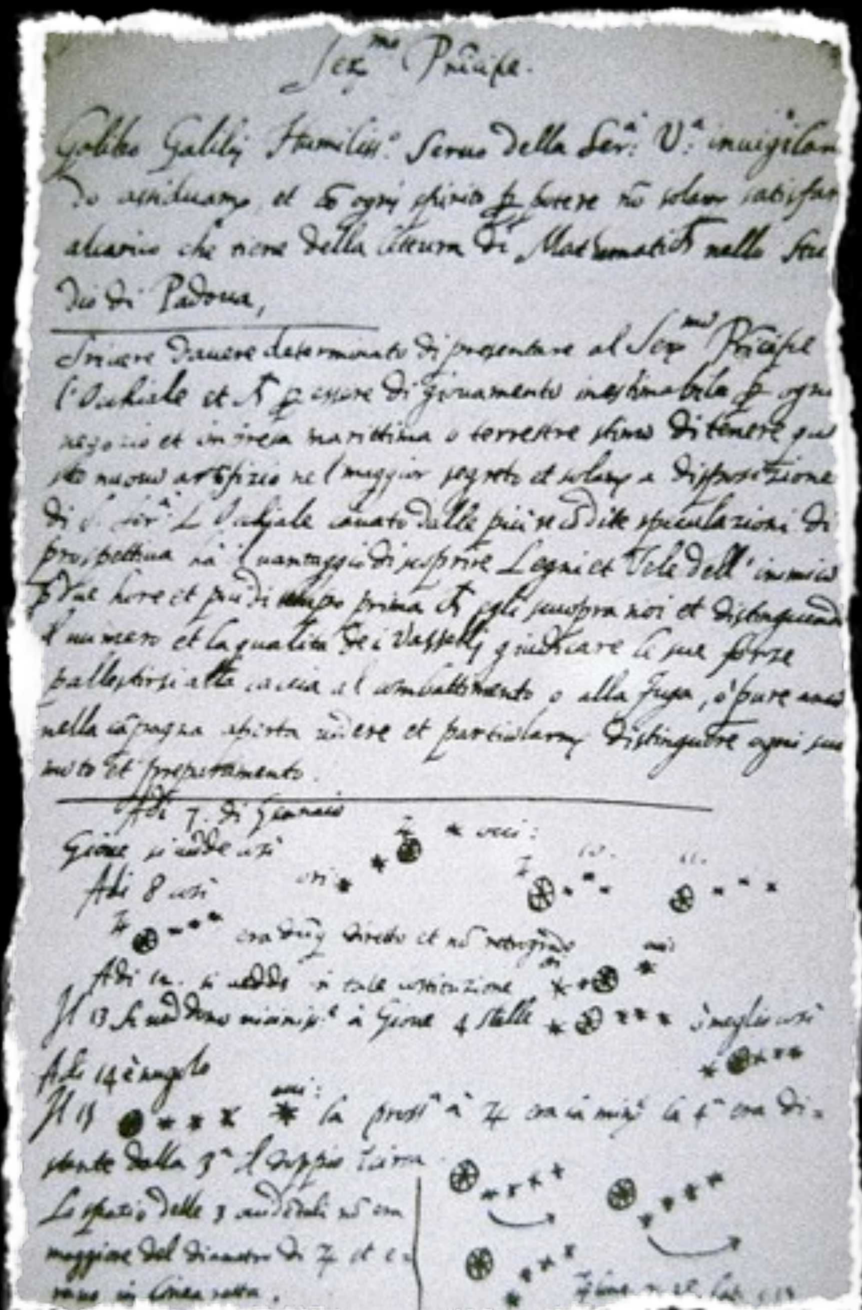
Pattern Recognition
Creativity

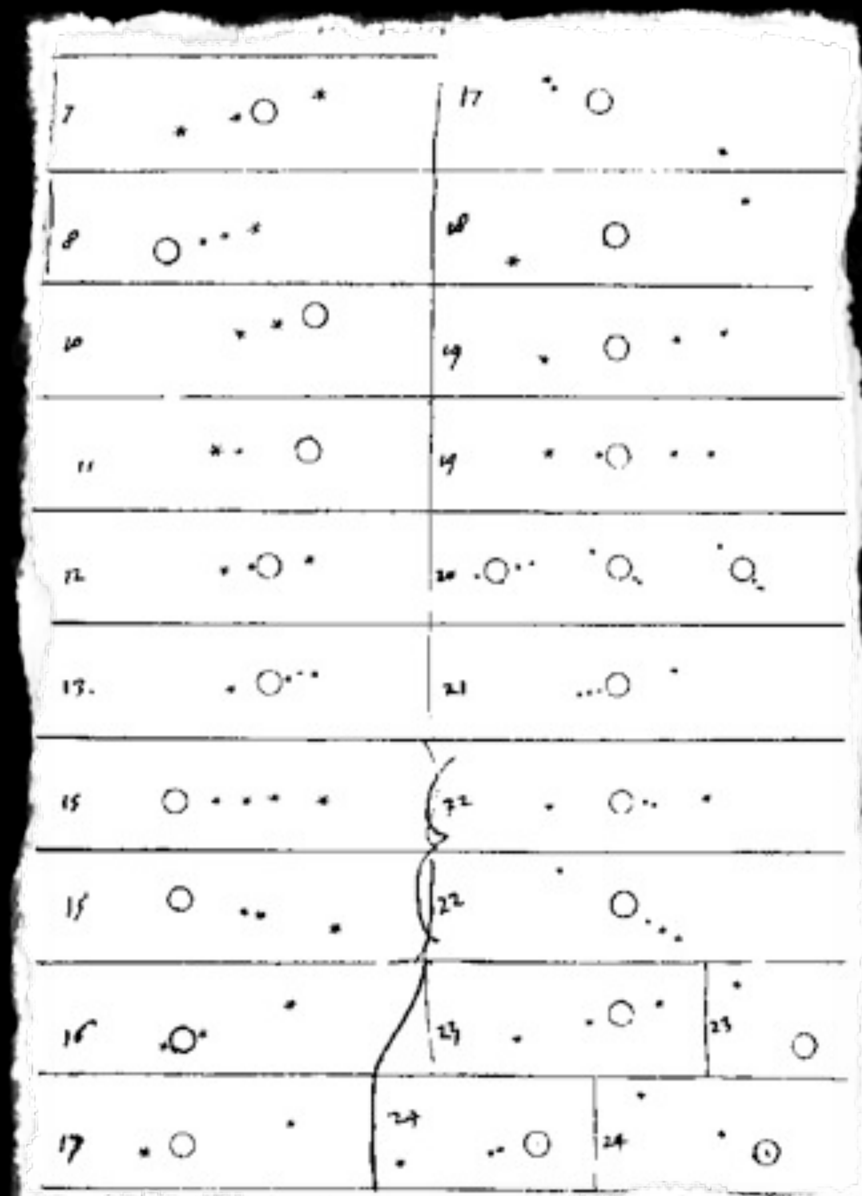
Calculations

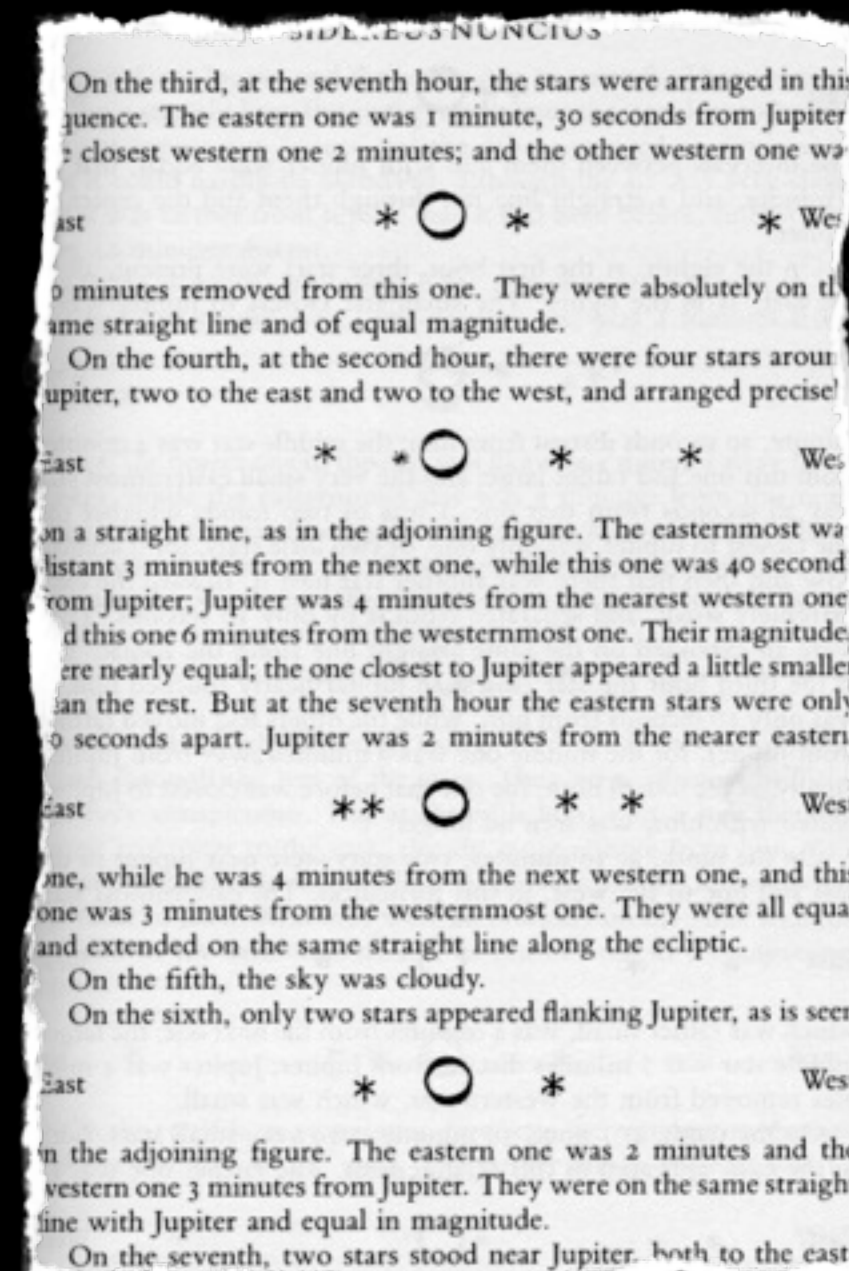
LINKING VISUALIZATION & UNDERSTANDING IN ASTRONOMY

GALILEO GALILEI

(1564-1642)







SIDEREUS NUNCIUS

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

East * O * * West

0 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 * * O * * 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 stars were only 30 seconds apart. Jupiter was 2 minutes from the nearer eastern

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

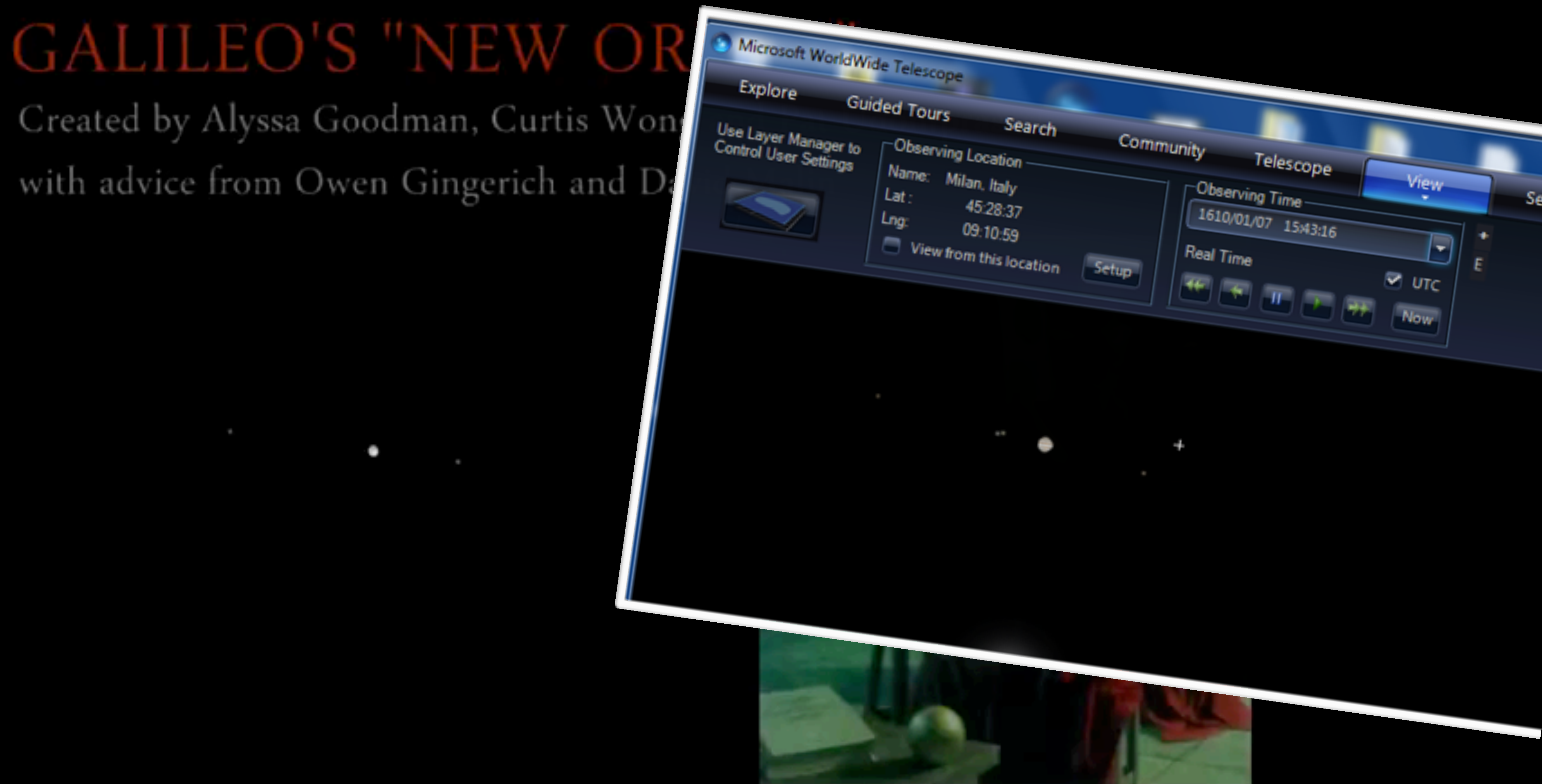
East * O * West

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

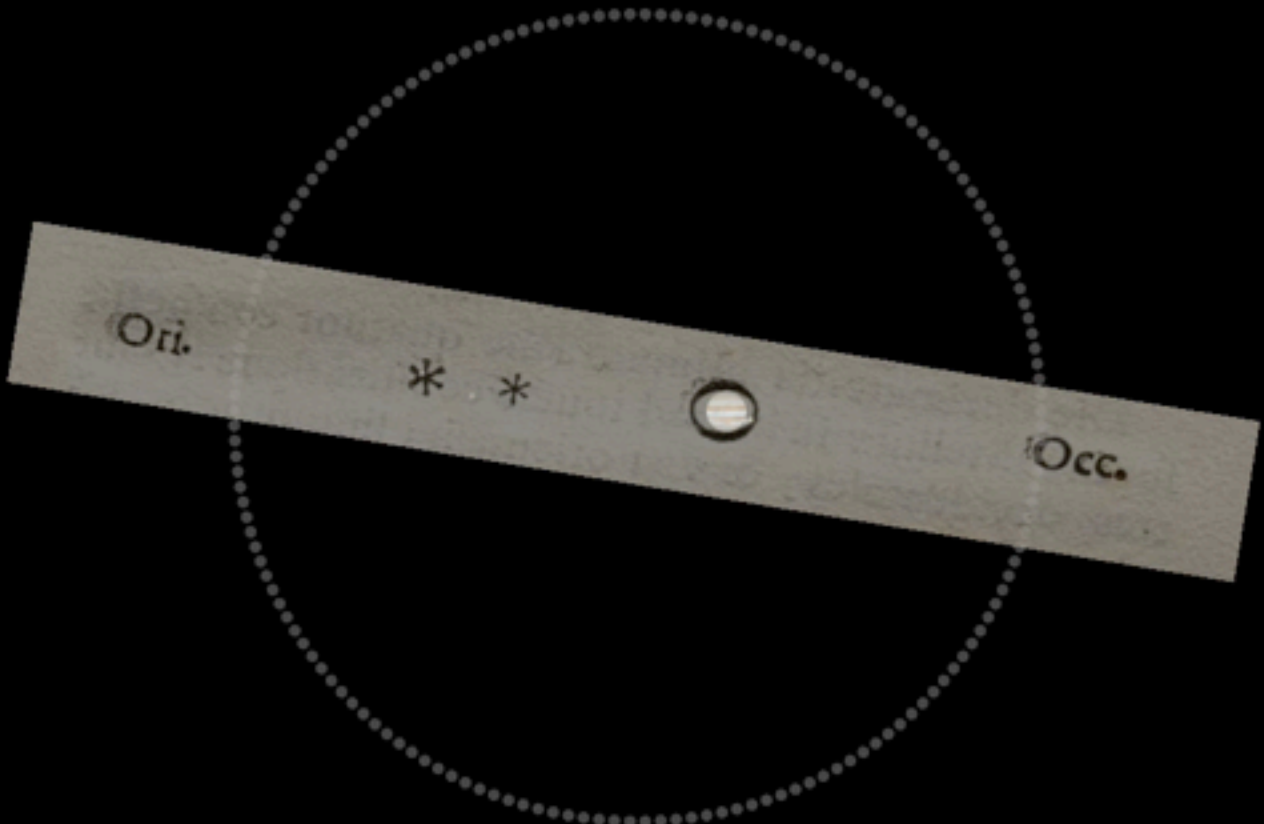
GALILEO GALILEI



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

GALILEO GALILEI

January 11, 1610

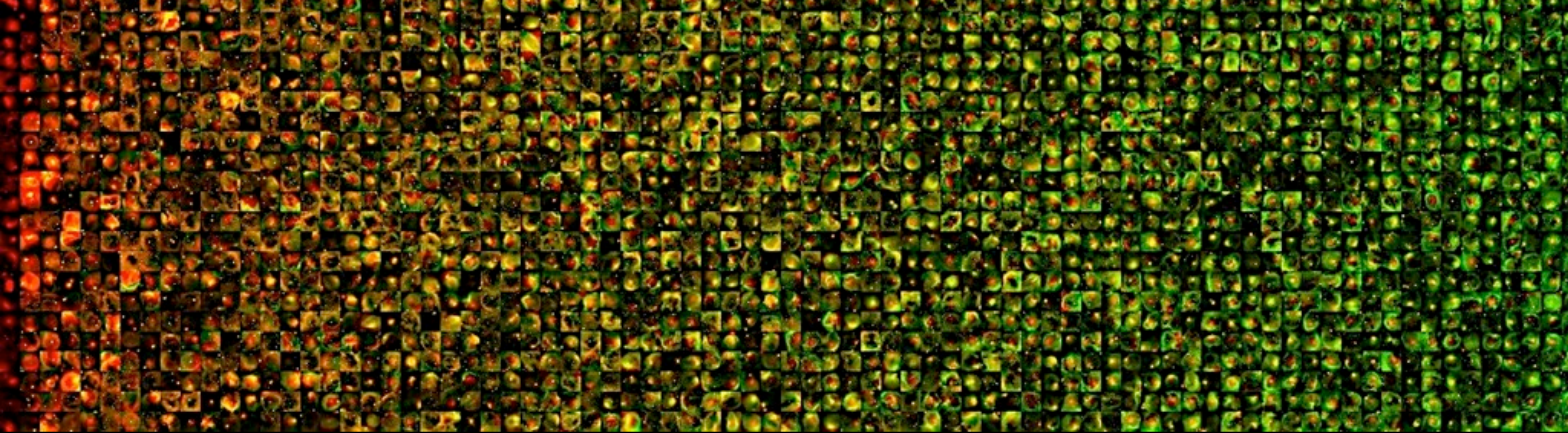


Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010

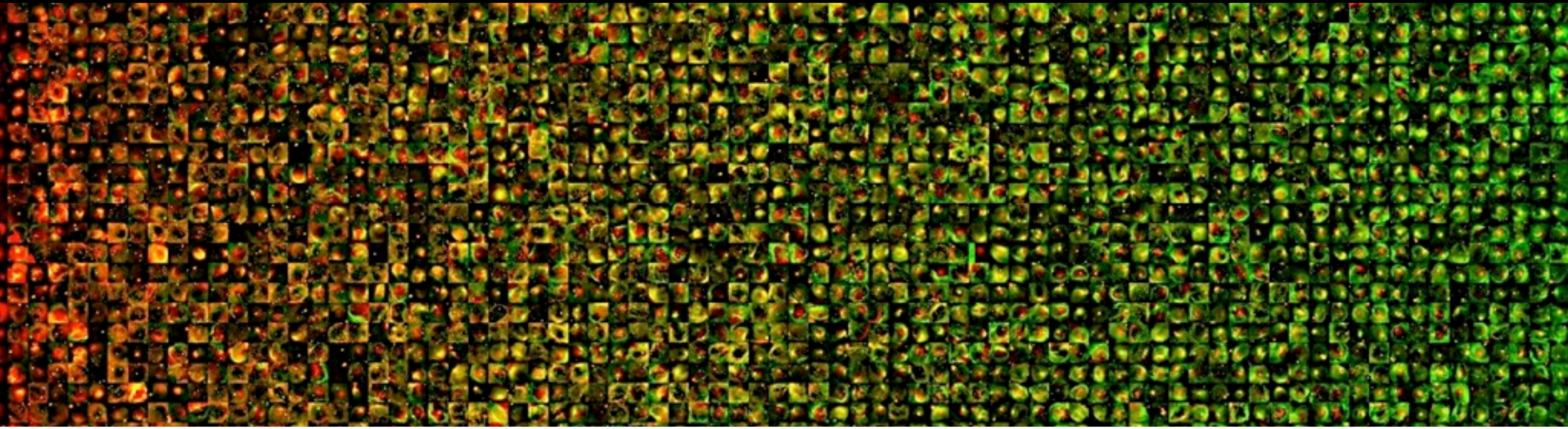
FROM GALILEO

TO THE ZOONIVERSE

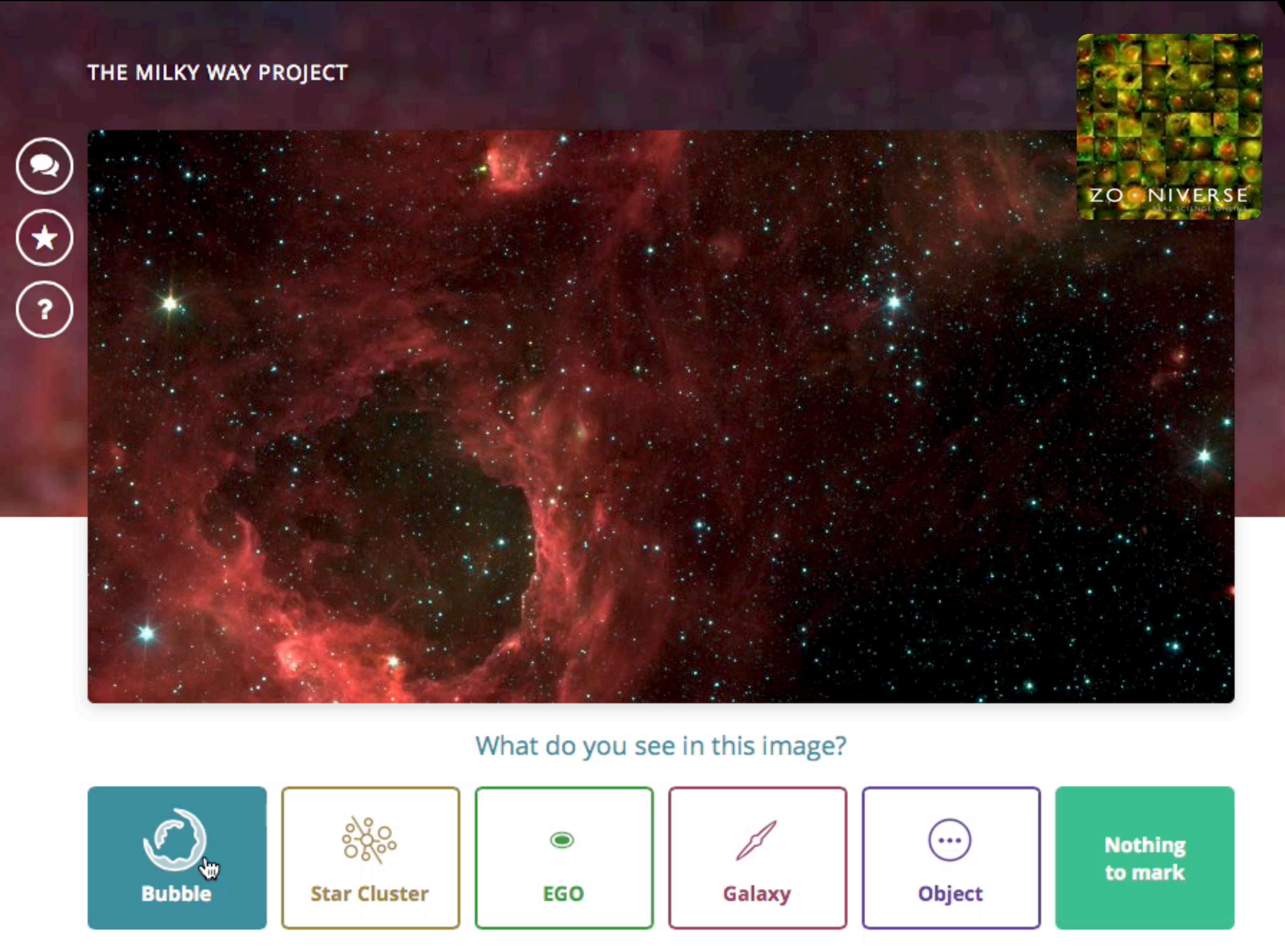

"We can connect visualization, data mining, and statistical tools to each other in order to discover and understand new phenomena."



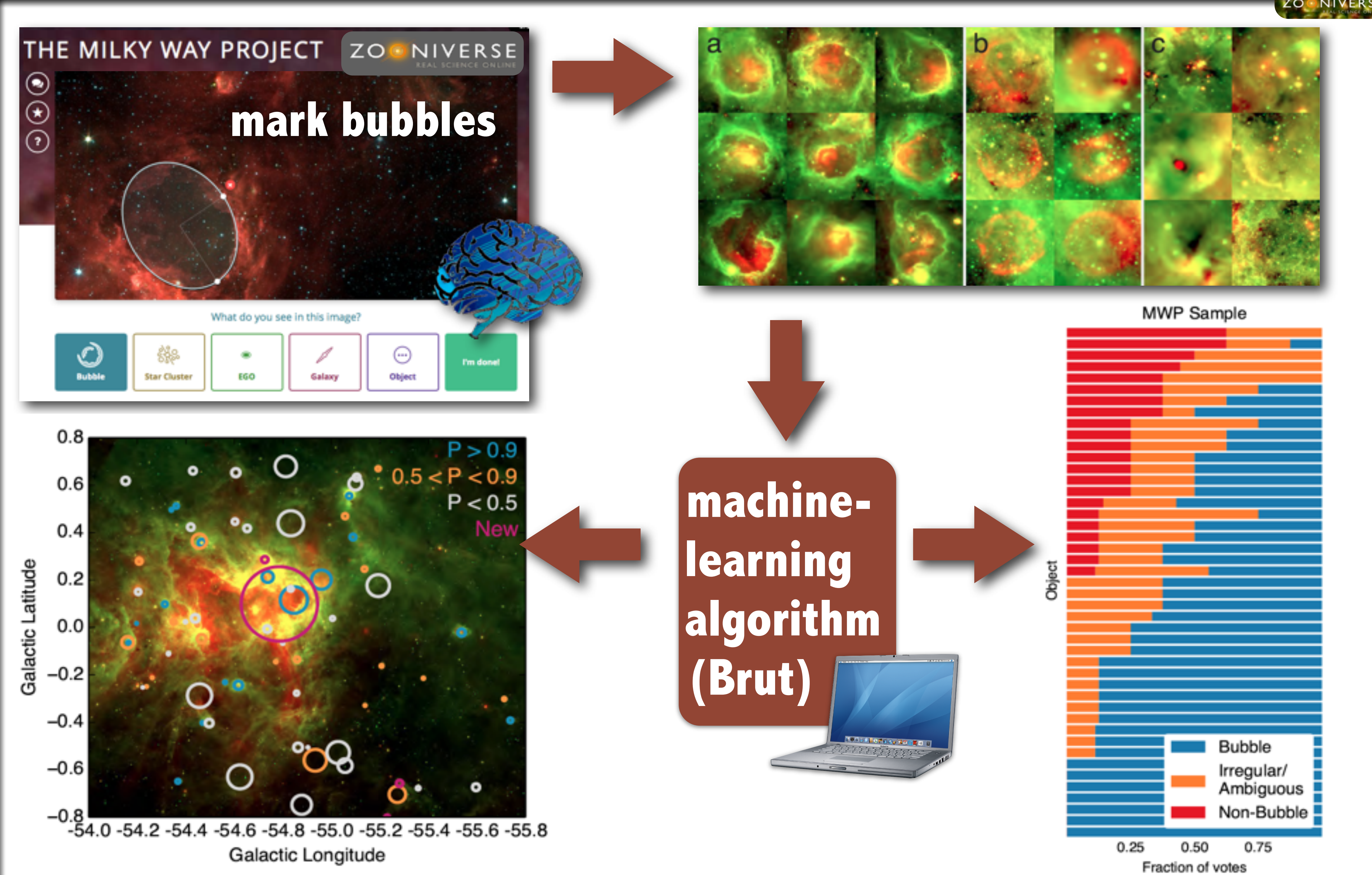
BIG DATA, WIDE DATA



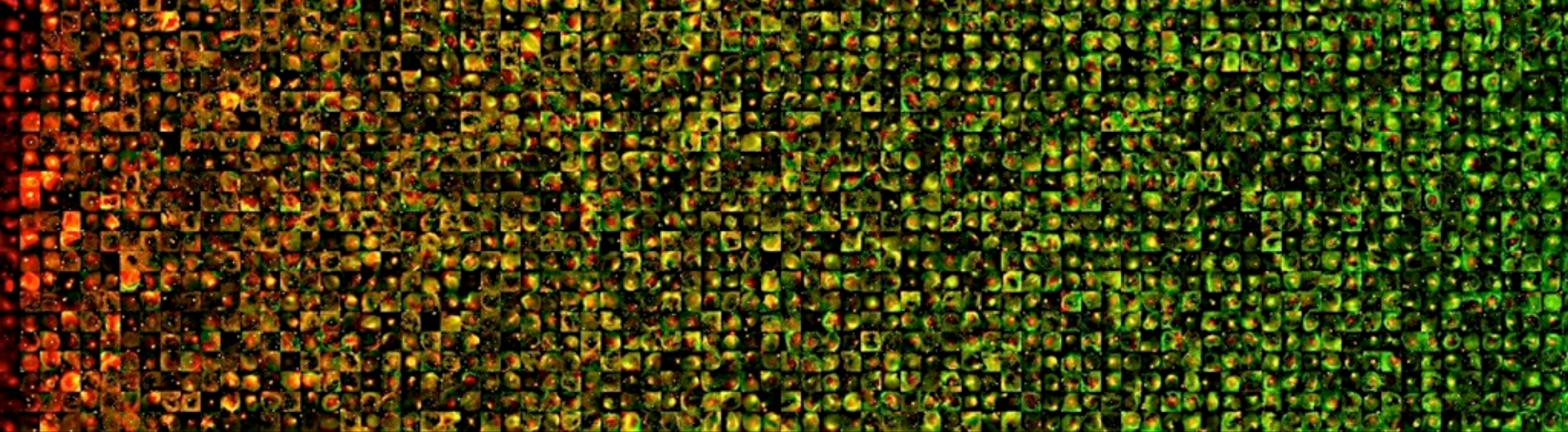
BIG DATA AND "HUMAN-AIDED COMPUTING"


THE MILKY WAY PROJECT
ZOONIVERSE
What do you see in this image?
Bubble
Star Cluster
EGO
Galaxy
Object
Nothing to mark

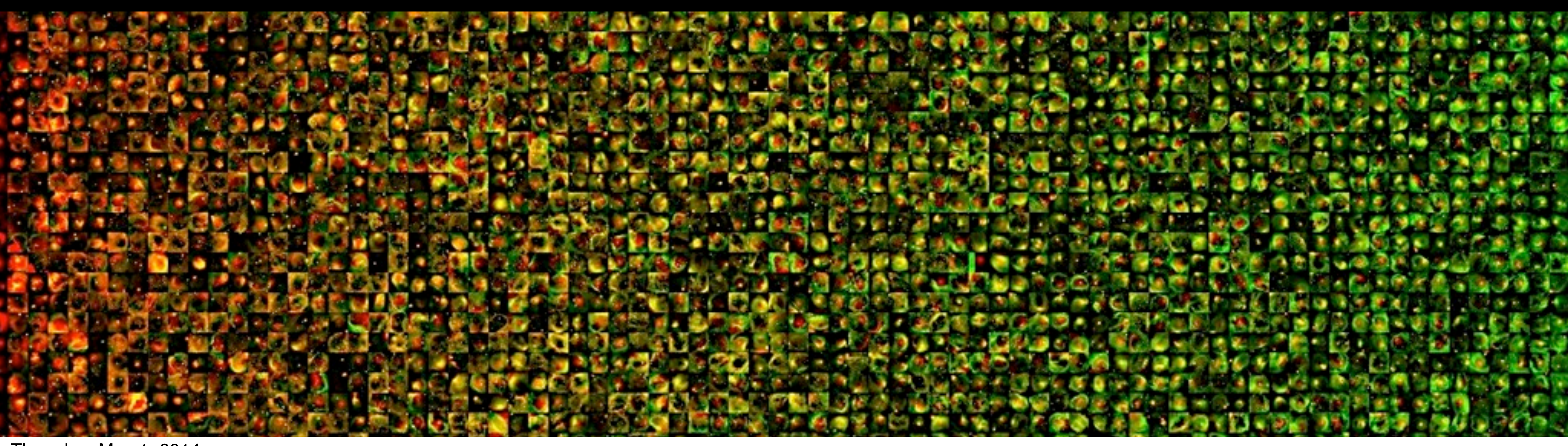
BIG DATA AND "HUMAN-AIDED COMPUTING"



example here from: ***Beaumont****, Goodman, Kendrew, Williams & Simpson 2014; based on* ***Milky Way Project*** *catalog (Simpson et al. 2013), which came from* ***Spitzer/GLIMPSE*** *(Churchwell et al. 2009, Benjamin et al. 2003), cf. Shenoy & Tan 2008 for discussion of HAC;* ***astroml.org*** *for machine learning advice/tools*



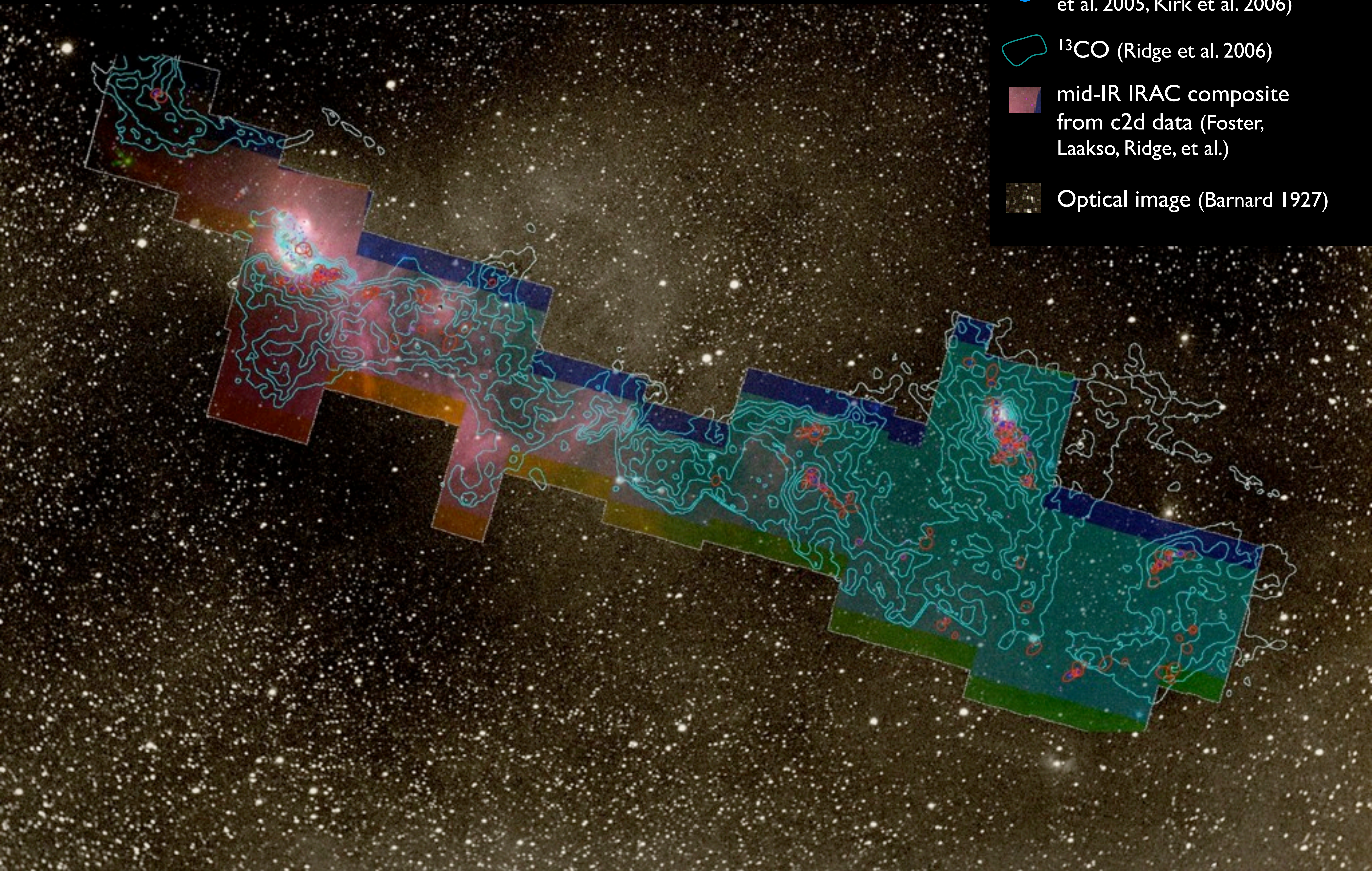
BIG DATA, WIDE DATA

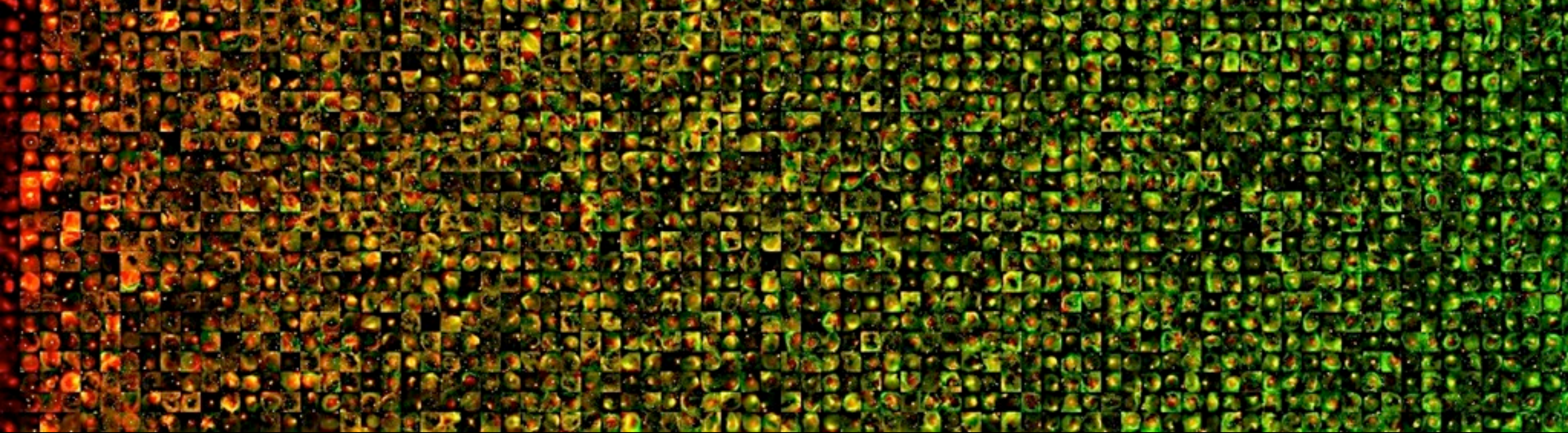


WIDE DATA

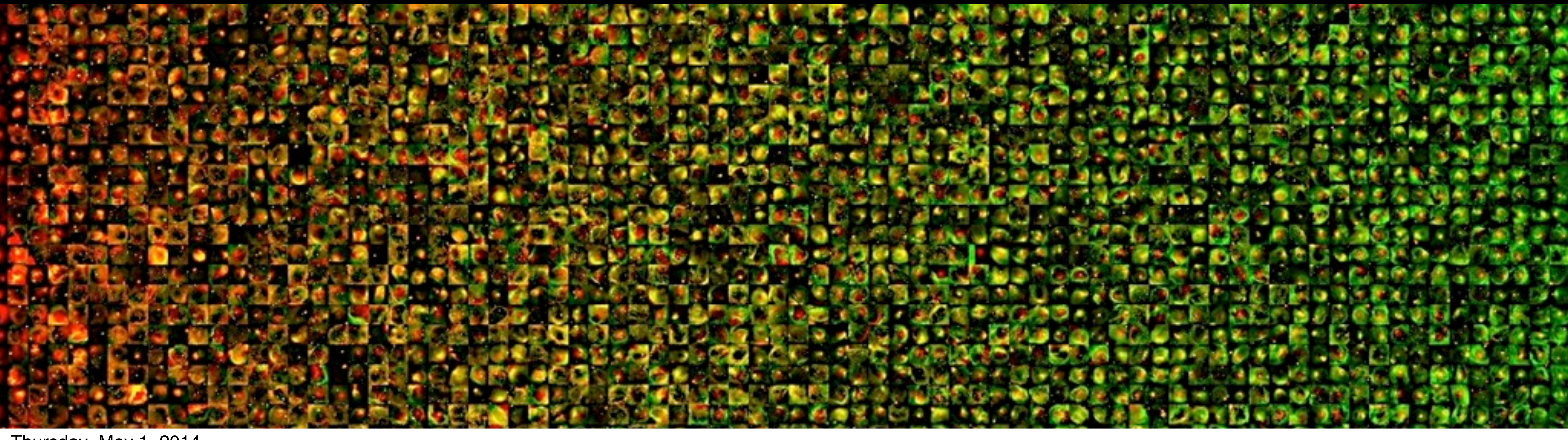
COMPLETE

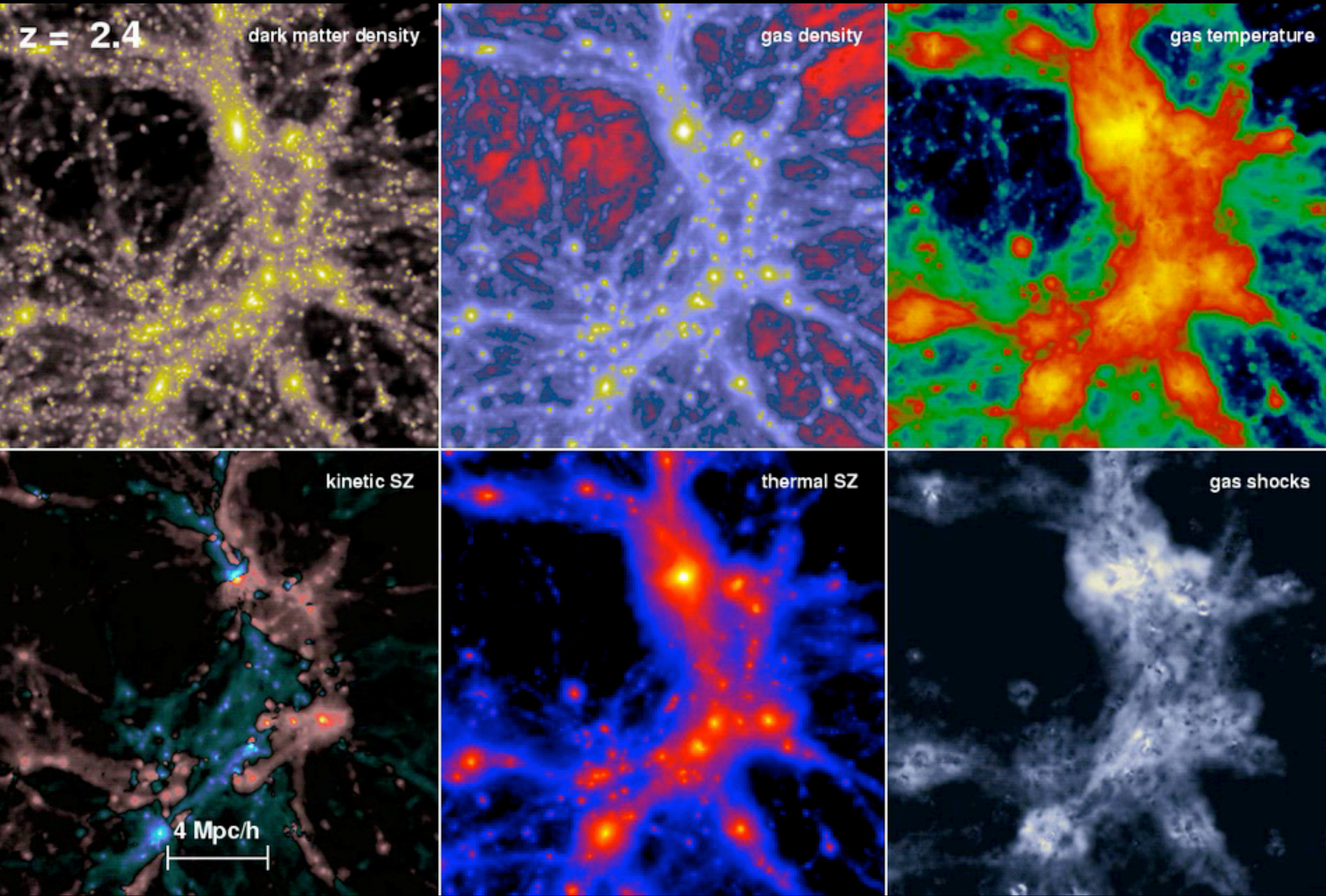
- mm peak (Enoch et al. 2006)
- sub-mm peak (Hatchell et al. 2005, Kirk et al. 2006)
- ^{13}CO (Ridge et al. 2006)
- mid-IR IRAC composite from c2d data (Foster, Laakso, Ridge, et al.)
- Optical image (Barnard 1927)



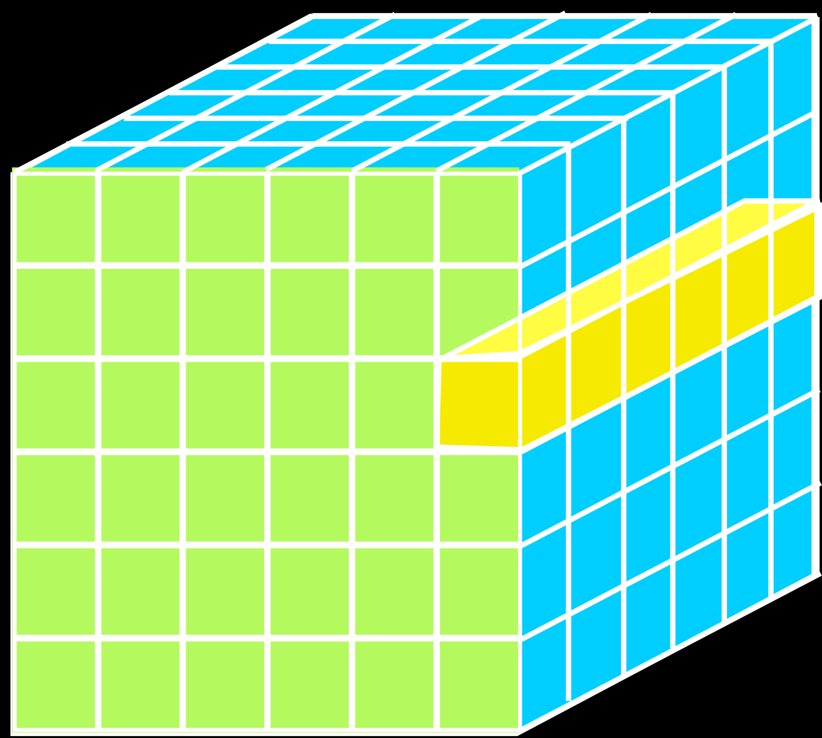


BIG AND WIDE DATA





Movie: Volker Springel, formation of a cluster of galaxies



"DATA, DIMENSIONS, DISPLAY"

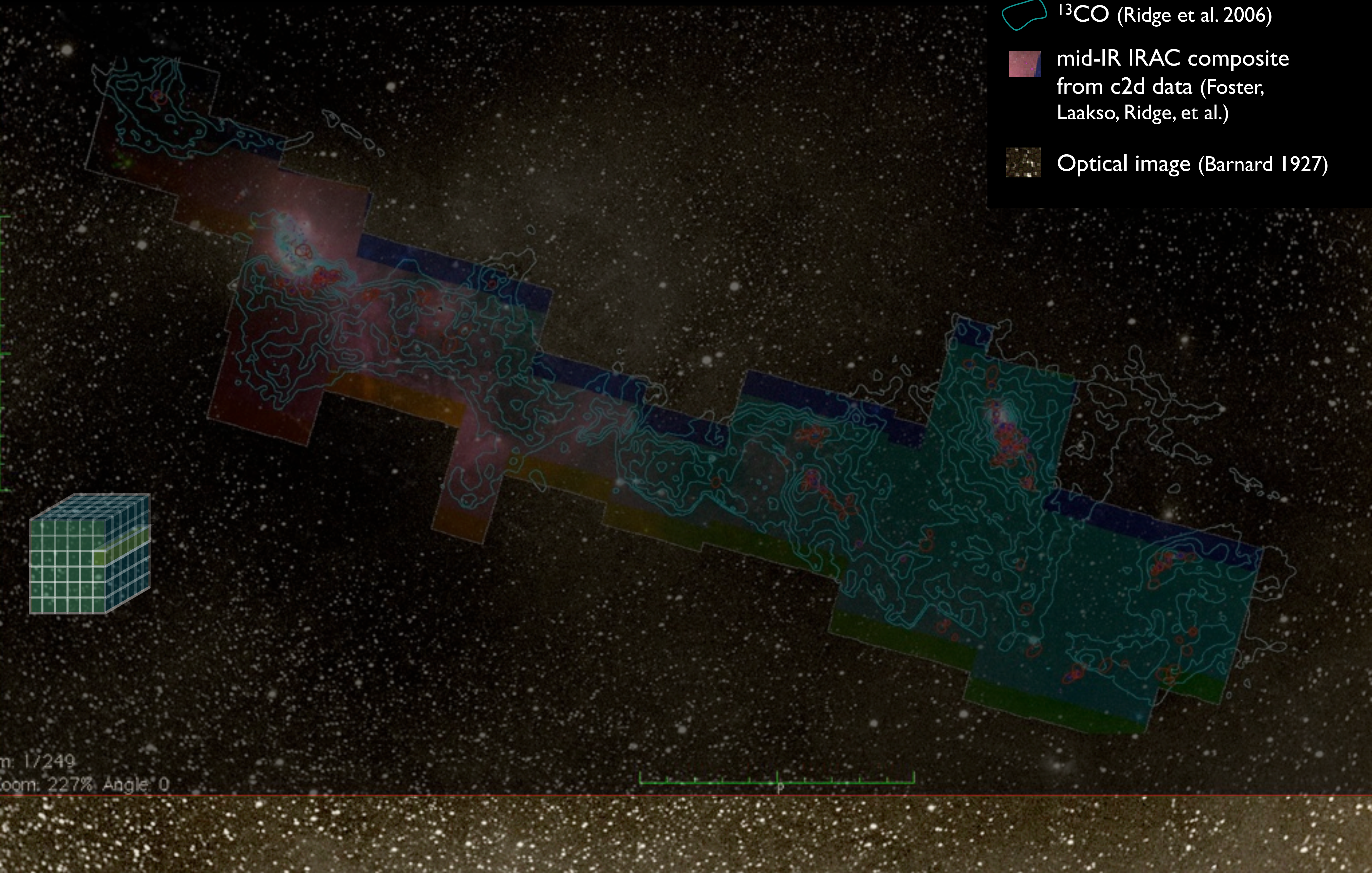
1D: Columns = "Spectra", "SEDs" or "Time Series"

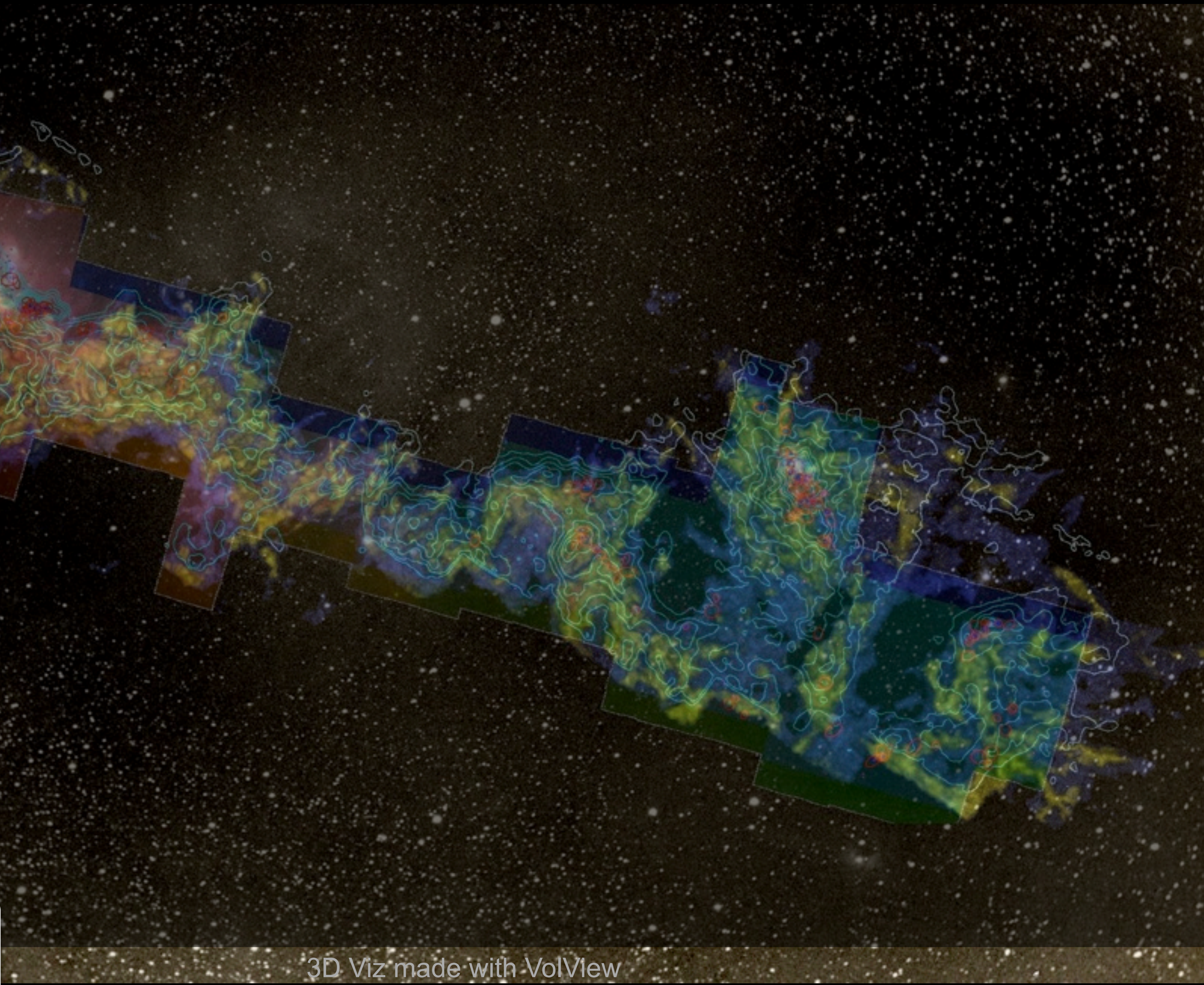
2D: Faces or Slices = "Images"

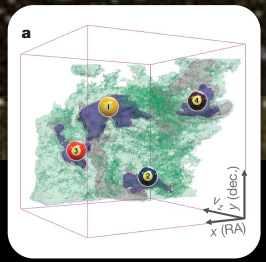
3D: Volumes = "3D Renderings", "2D Movies"

4D: Time Series of Volumes = "3D Movies"

WIDE DATA, "IN 3D"







AstronomicalMedicine@IIC

COMPLETE

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 t

East * O * * 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 * *O * * 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
than the rest. But at the seventh hour the eastern s
30 seconds apart. Jupiter was 2 minutes from the

East ** O * *

one, while he was 4 minutes from the next wester
one was 3 minutes from the westernmost one. They
and extended on the same straight line along the ec
On the fifth, the sky was cloudy.
On the sixth, only two stars appeared flanking Ju

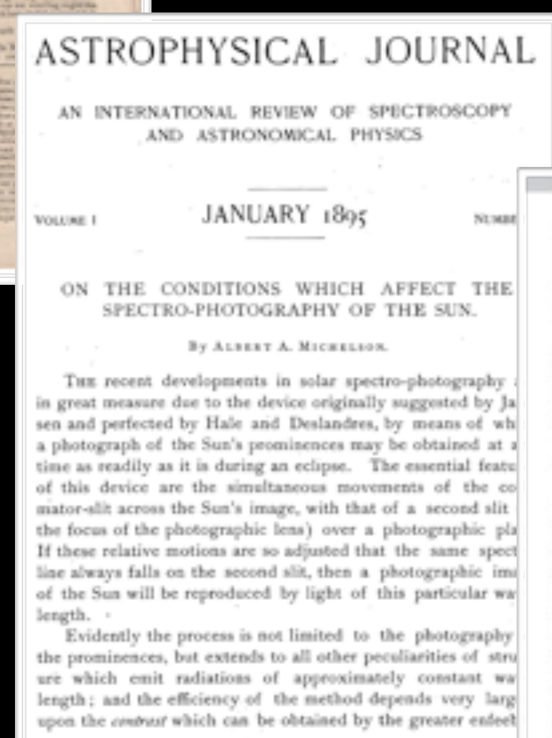
East * O *

in the adjoining figure. The eastern one was 2 m
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
arranged in this manner.

1665


PHILOSOPHICAL
TRANSACTIONS

1895


ASTROPHYSICAL JOURNAL

AN INTERNATIONAL REVIEW OF SPECTROSCOPY
AND ASTRONOMICAL PHYSICS

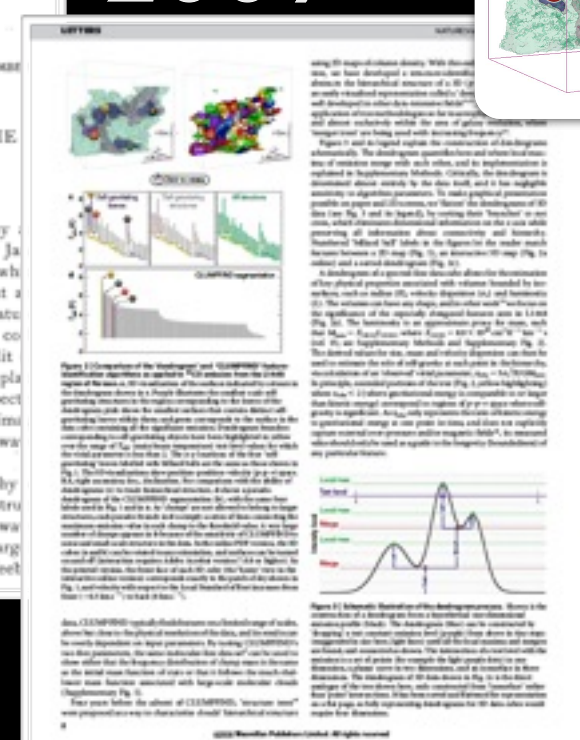
VOLUME I JANUARY 1895 NUMBE

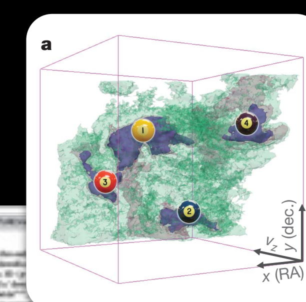
ON THE CONDITIONS WHICH AFFECT THE
SPECTRO-PHOTOGRAPHY OF THE SUN.

By ALBERT A. MICHELSON.

THE recent developments in solar spectro-photography
in great measure due to the device originally suggested by Ja
sen and perfected by Hale and Deslandres, by means of wh
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 co
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 im
of the Sun will be reproduced by light of this particular wa
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 wa
length; and the efficiency of the method depends very larg
upon the *contrast* which can be obtained by the greater enfeeb

2009

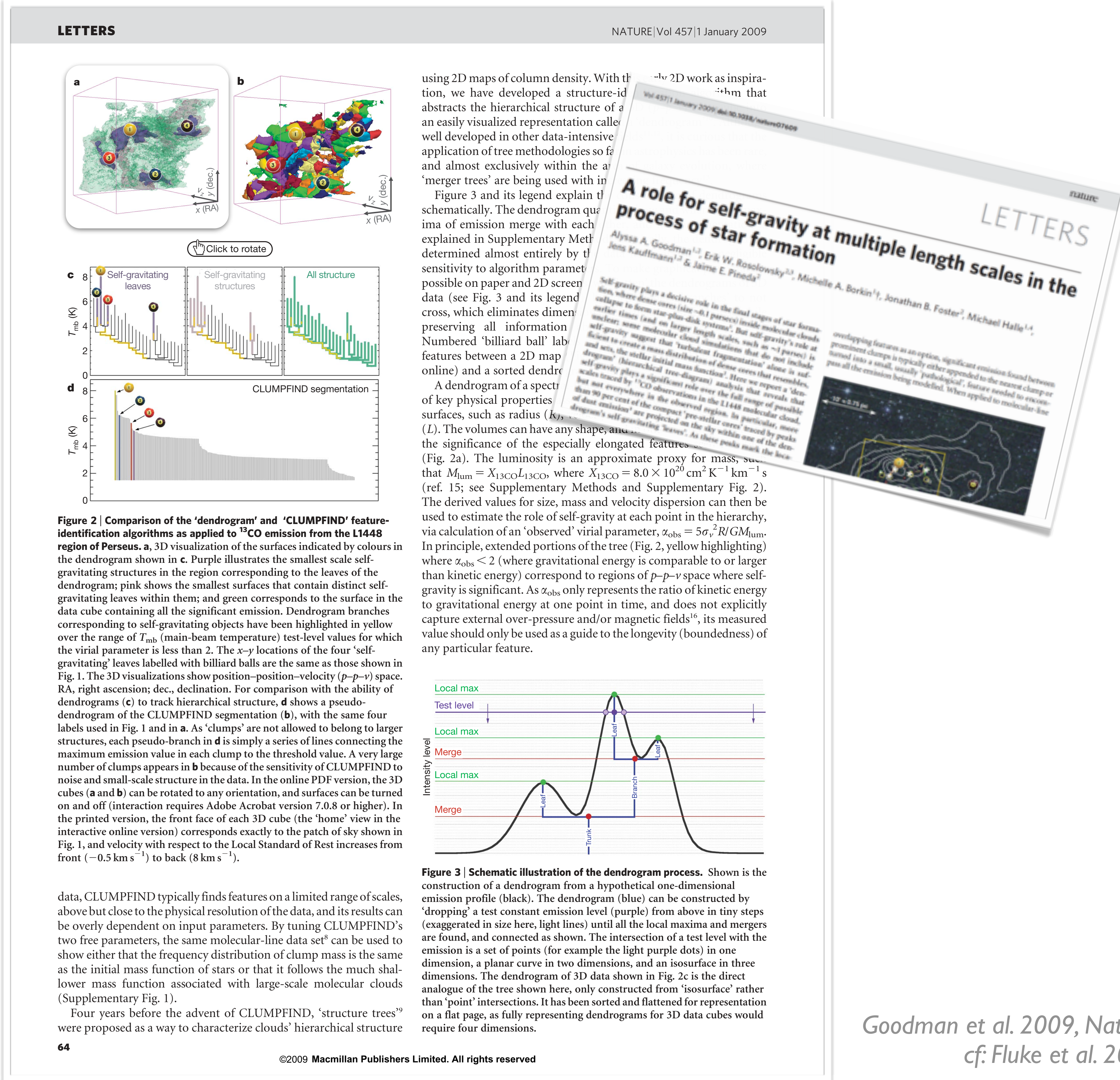

LETTERS



2009

3D PDF

INTERACTIVITY IN A "PAPER"


LETTERS NATURE|Vol 457|1 January 2009

Click to rotate

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… 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 t… 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, such that $M_{lum} = X_{13CO}L_{13CO}$, where $X_{13CO} = 8.0\times10^{20}\,cm^2\,K^{-1}\,km^{-1}\,s$ (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.

64

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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]

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

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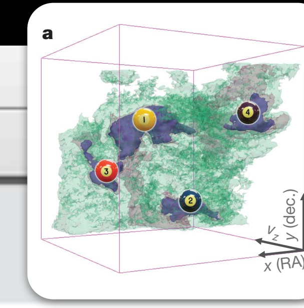


Vol 457|1 January 2009|**doi:10.1038/nature07609**

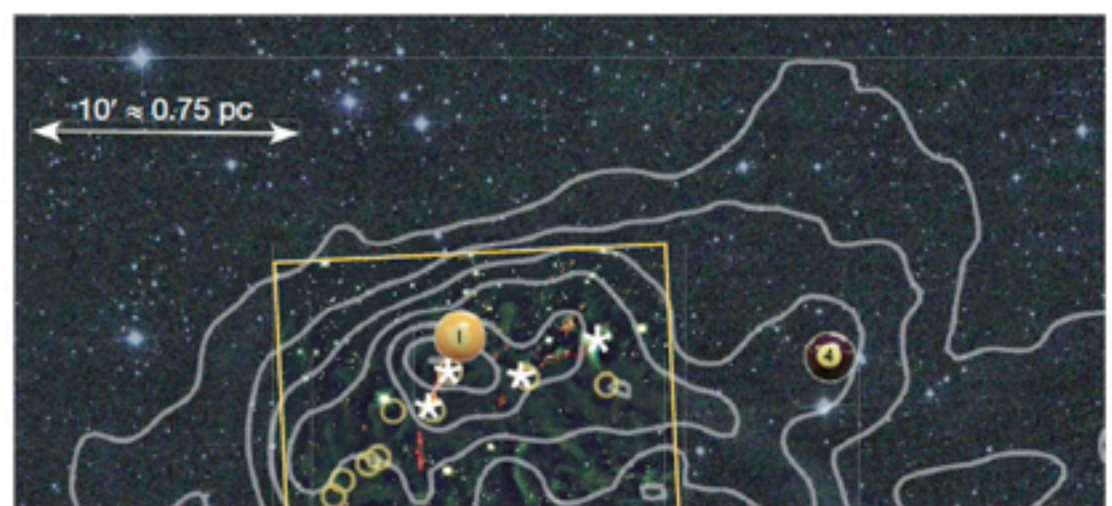
LETTERS

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



Thursday, May 1, 2014

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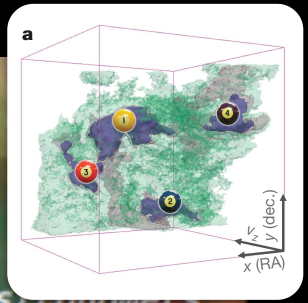
Tips and Tricks for Professional Astronomers



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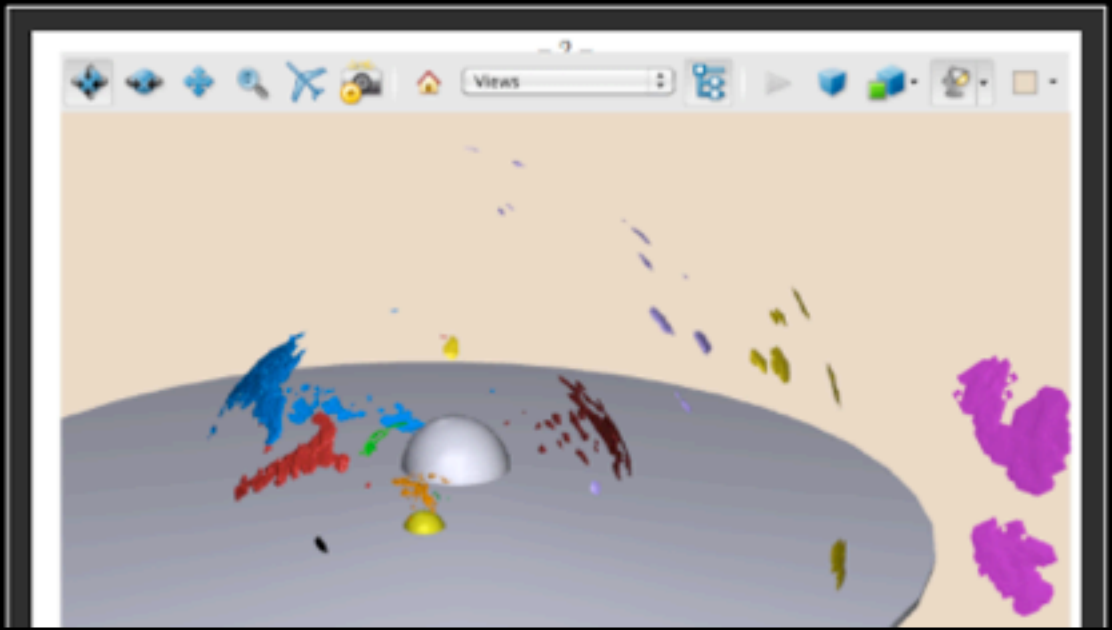
Tutorial for embedding 3D interactive graphics into PDF

by ***Guest*** *on* March 7, 2012

Josh Peek (@joshuaegpeek) is a Hubble Fellow at Columbia University, specializing in the ISM in and around disk galaxies. He has a fascination with data presentation and design.

As an astronomer studying the complex three-dimensional structures of the interstellar medium, I've been taken with the idea of presenting that information in a compelling and interactive way to readers. The major mode of communication for astronomers is the refereed journal article, as distributed through PDF, so I got interested in how one can package interactive 3D scenes with the papers we write. Interactive graphics can be embedded in PDFs that can be rotated, panned, and zoomed.



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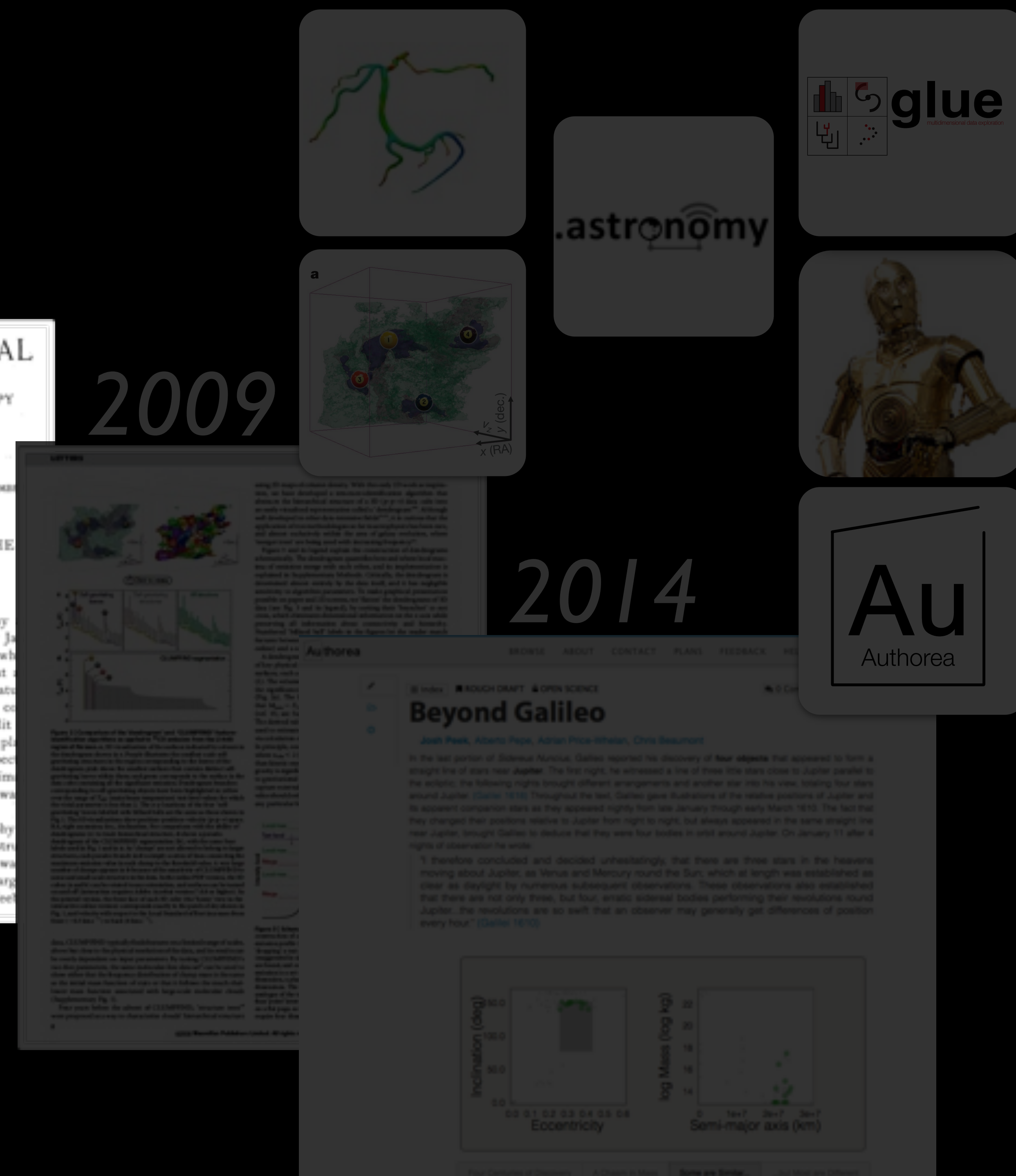
- contentmgr (2)
- Jess K (1)

RIVETING SEQUEL TO COME, BUT, FIRST...



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Astrometry.net

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

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NASA
TOGRAPHS OF THE MILKY WAY.
By E. E. Barnard.
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 singu-
larly beautiful as simple pictures of the stars. I have selected
two of these for illustration in The Astrophysical Journal.
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
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Bar-ptl-pl003_sm
Barnard's Image of Perseus, from www.librarygatech.edu/bpdl/bpdl.php
December 17, 2003
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AND, SOON...HUMANS WILL SEE THE INVISIBLE!

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CITIZEN SCIENCE ALLIANCE

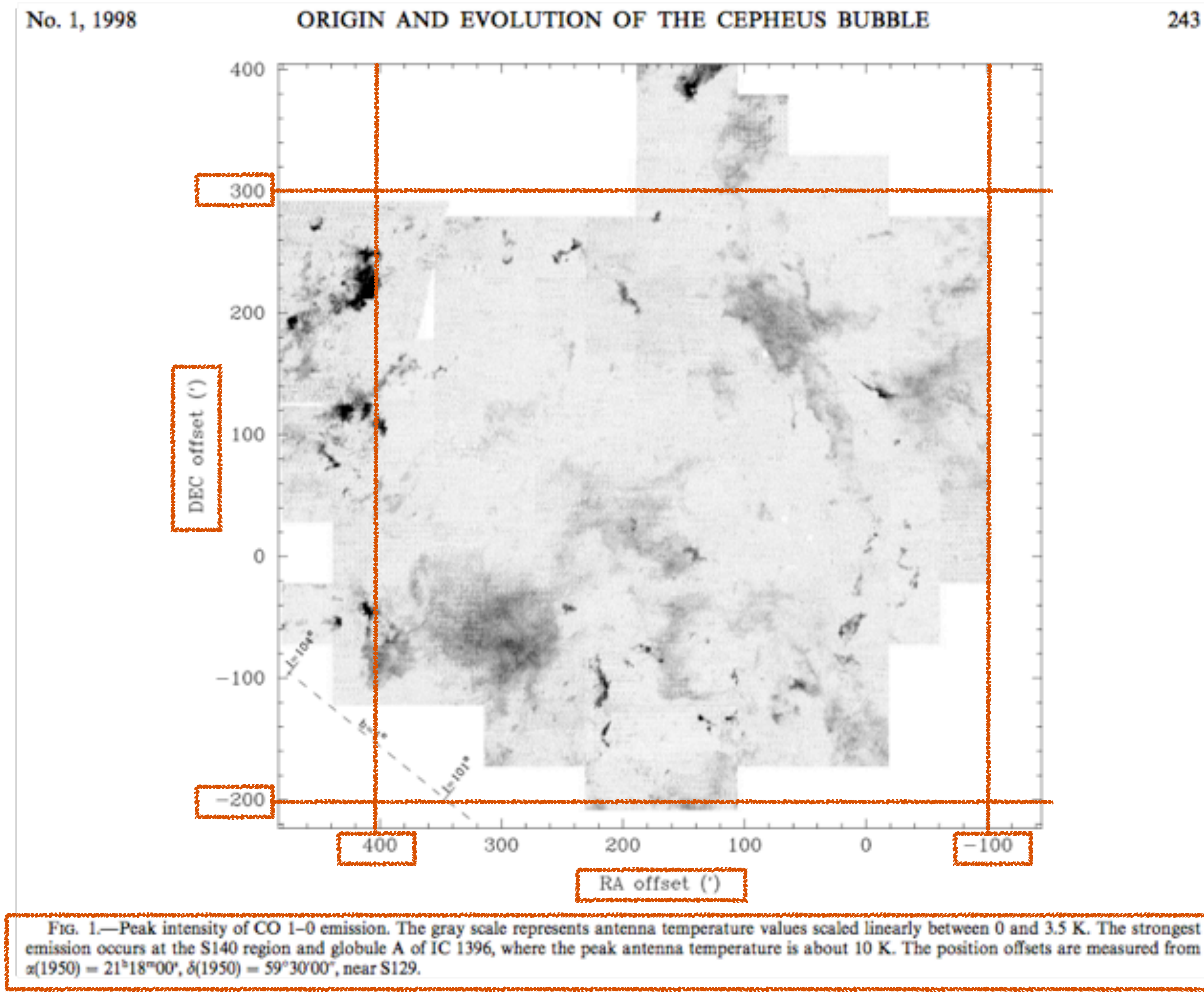
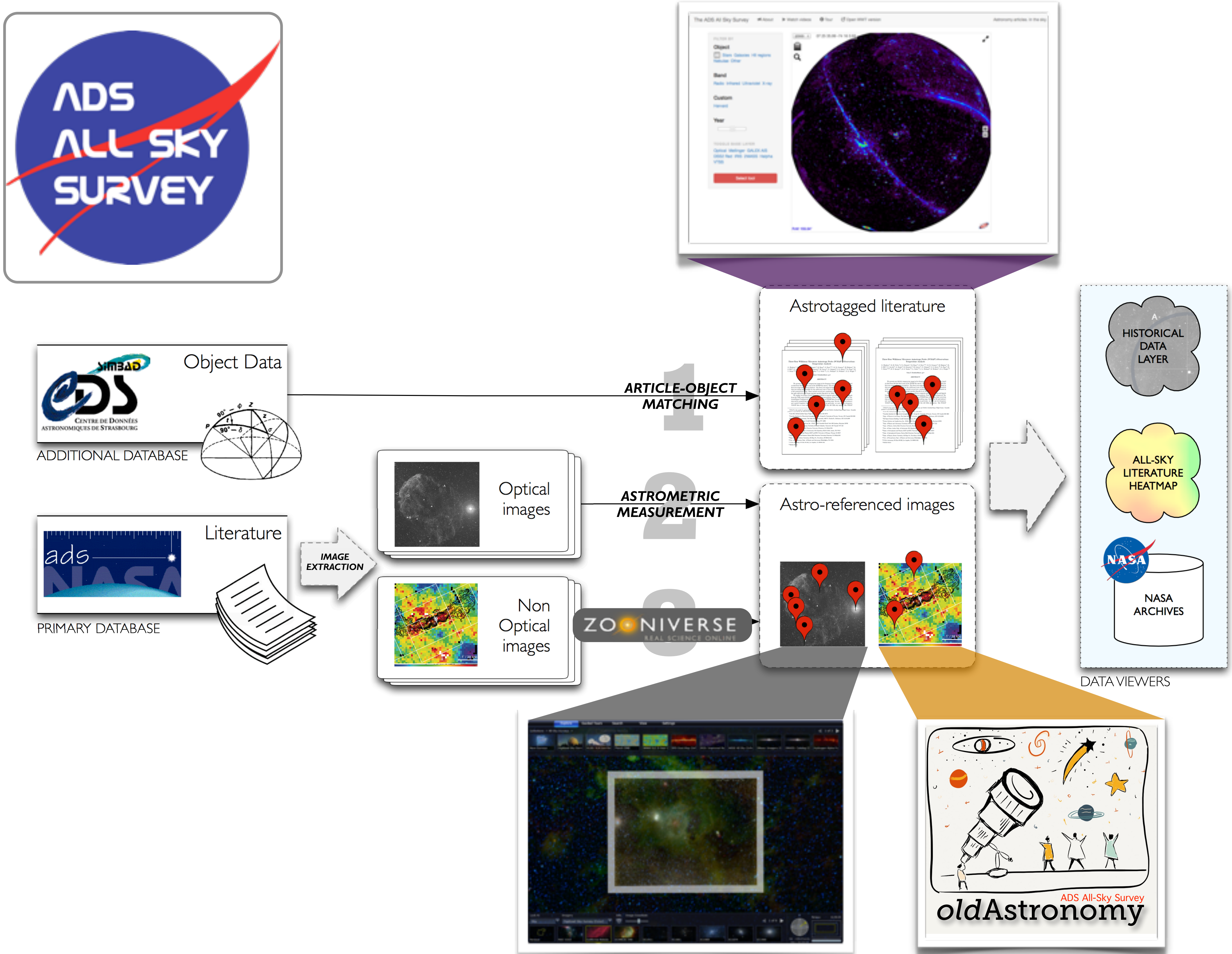

No. 1, 1998 ORIGIN AND EVOLUTION OF THE CEPHEUS BUBBLE 243

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

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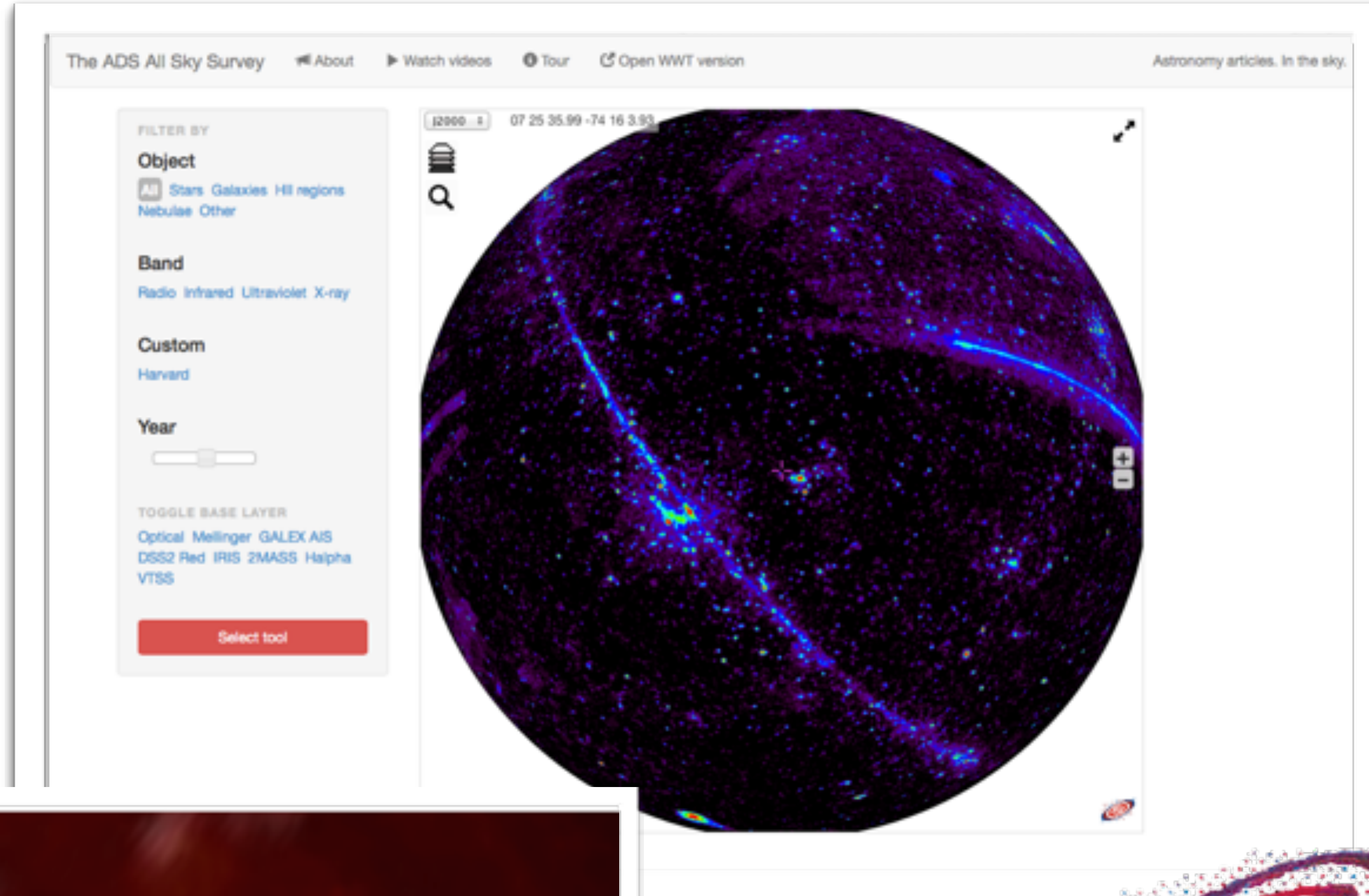
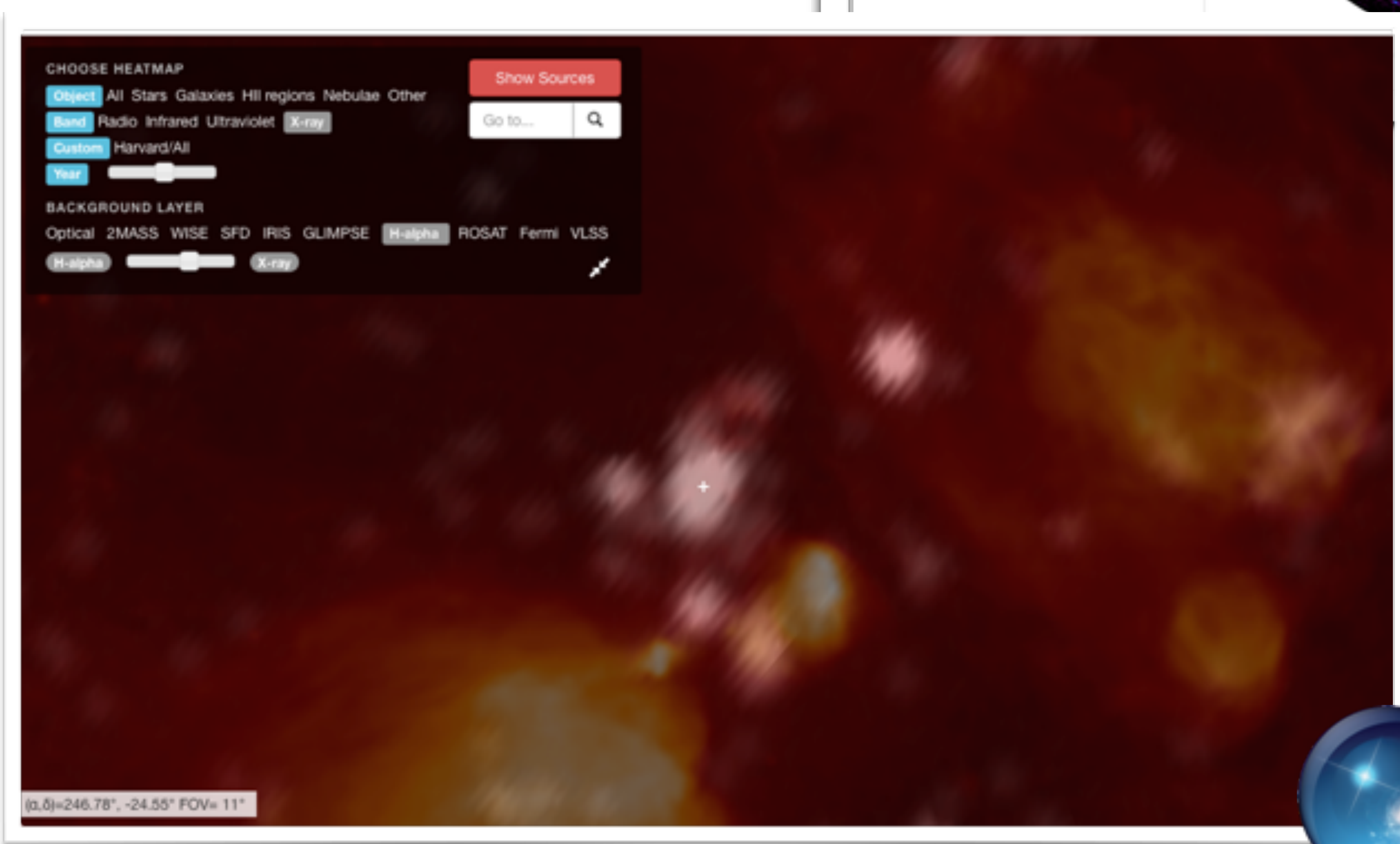
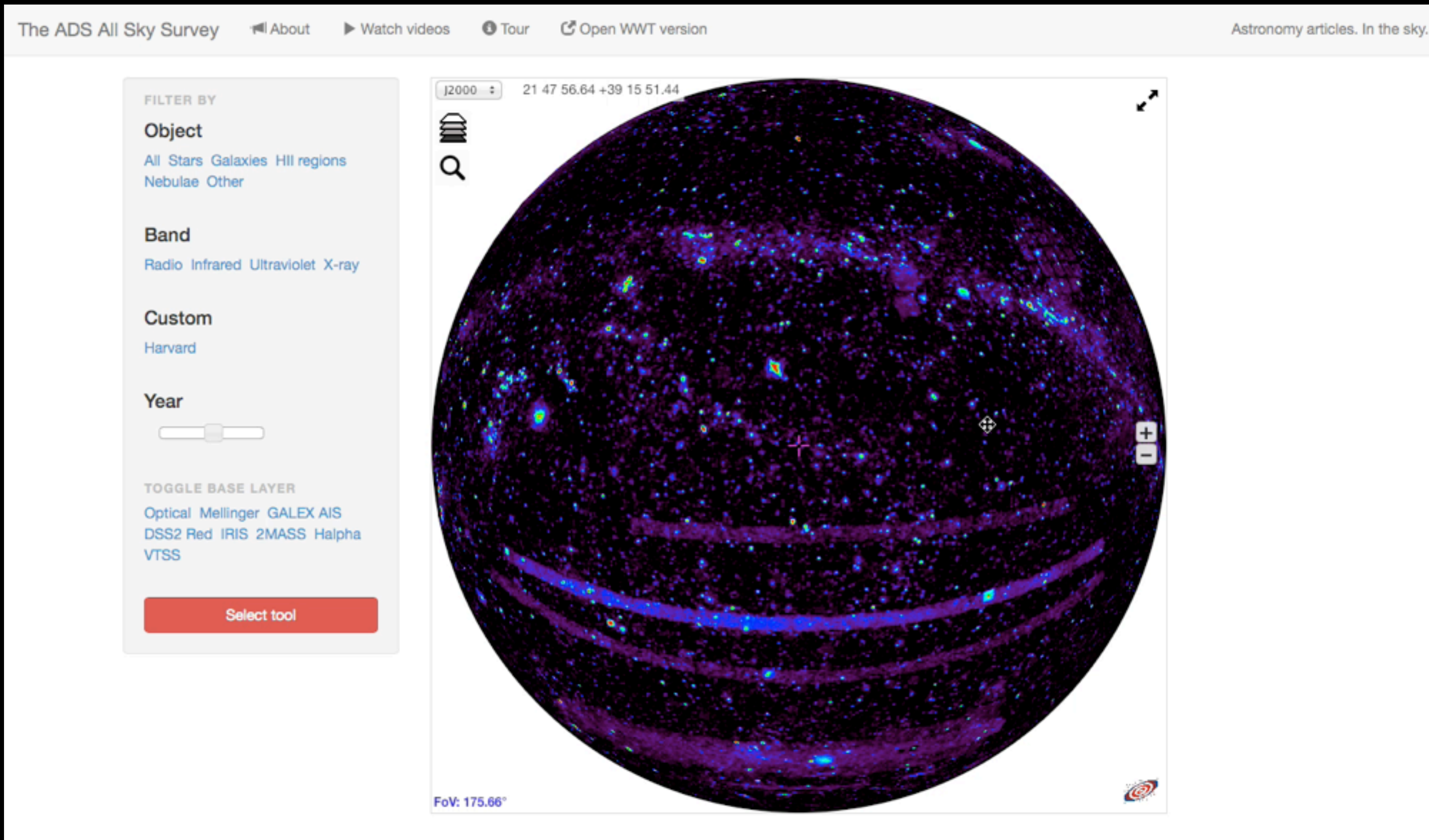




ALADIN

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



Thursday, May 1, 2014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SIDEREUS NUNC
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PHILOSOPHICAL TRANSACTIONS
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ASTROPHYSICAL JOURNAL
AN INTERNATIONAL REVIEW OF SPECTROSCOP
AND ASTRONOMICAL PHYSICS
JANUARY 1895
ON THE CONDITIONS WHICH AFFECT TH
SPECTRO-PHOTOGRAPHY OF THE SUN.
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.
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The ADS All Sky Survey
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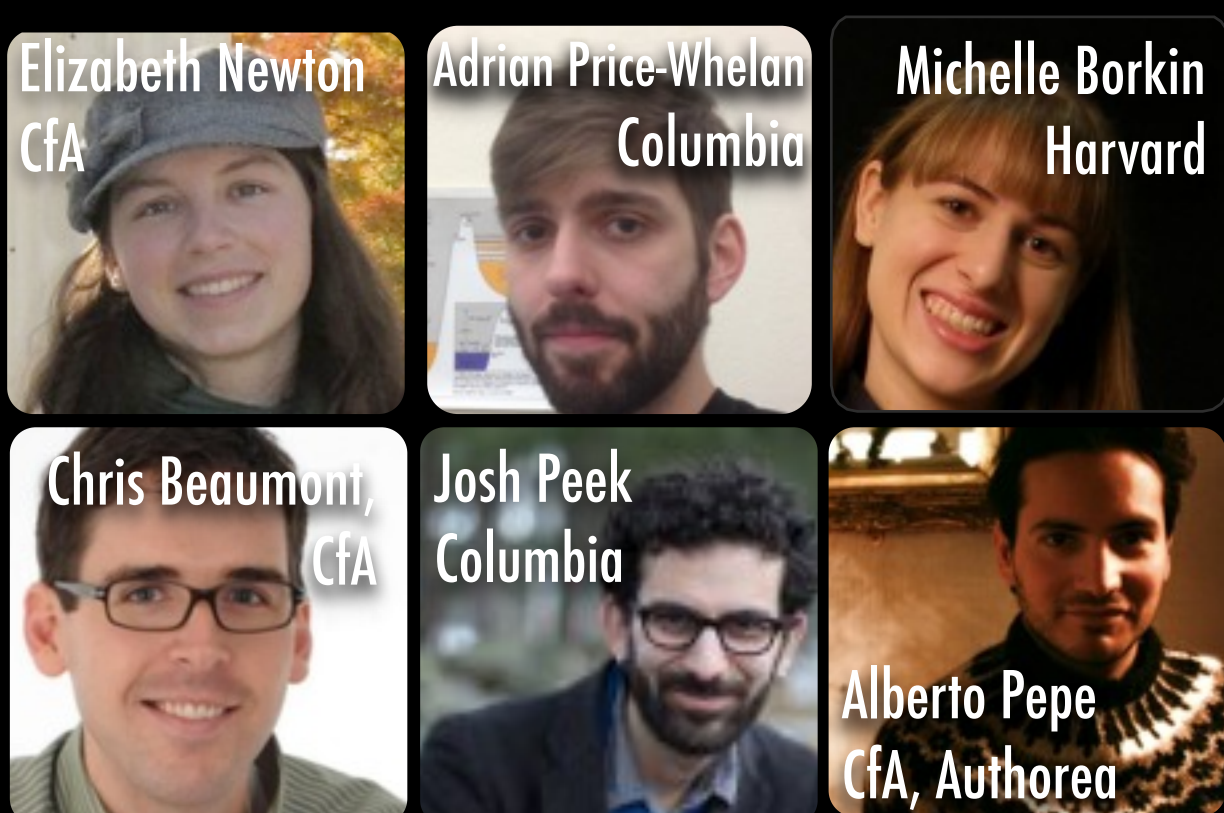
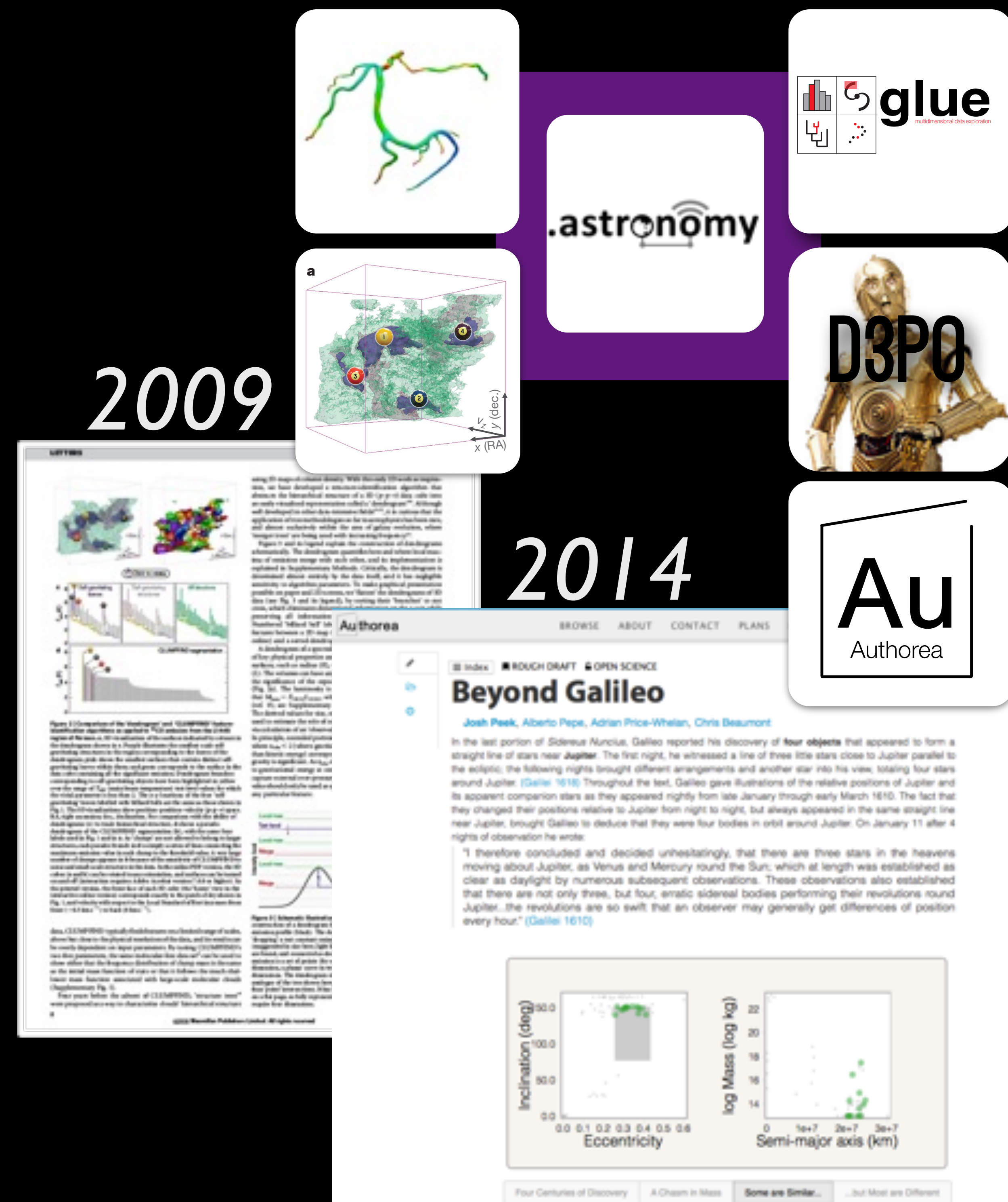
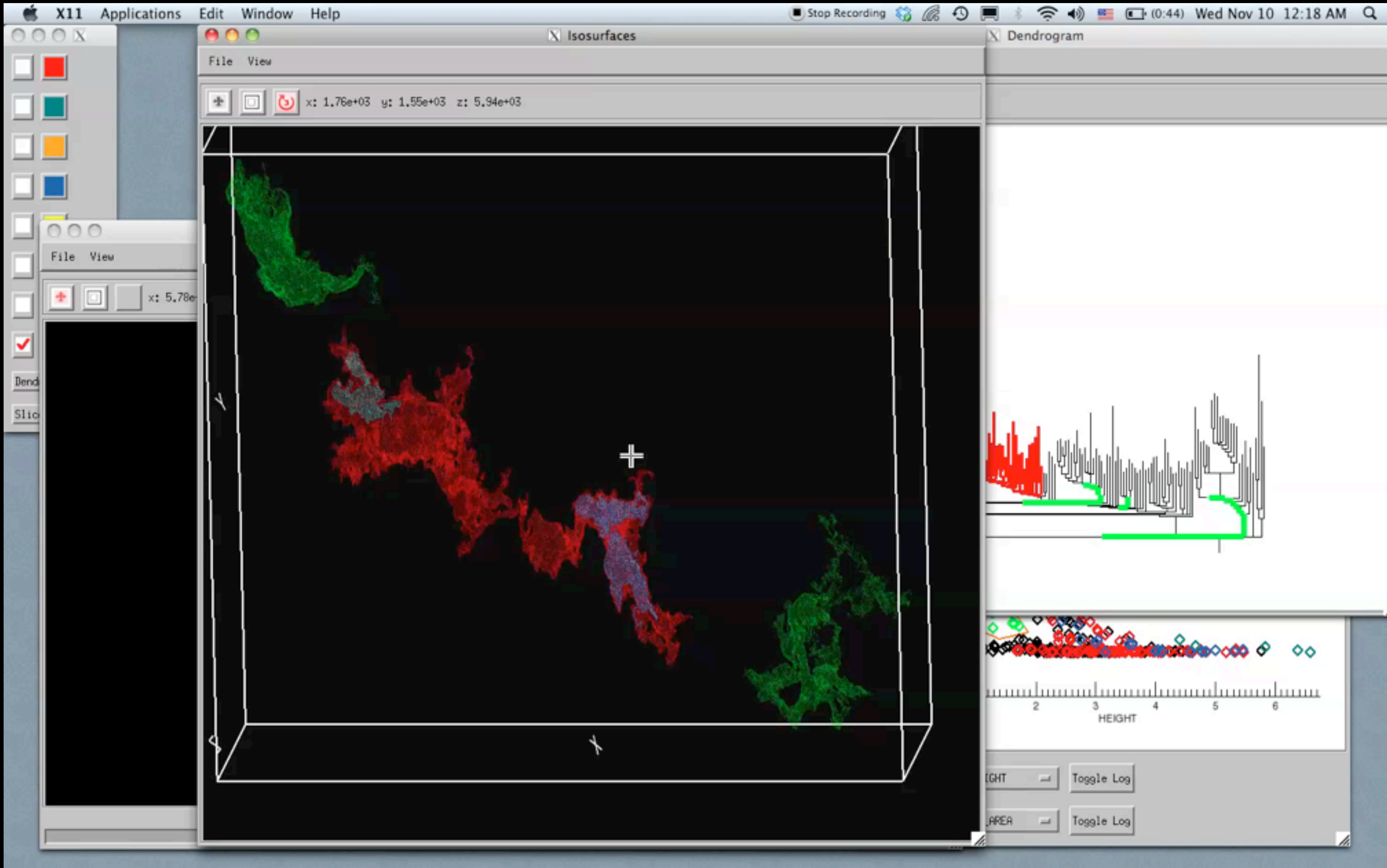
THE RIVETING SEQUEL





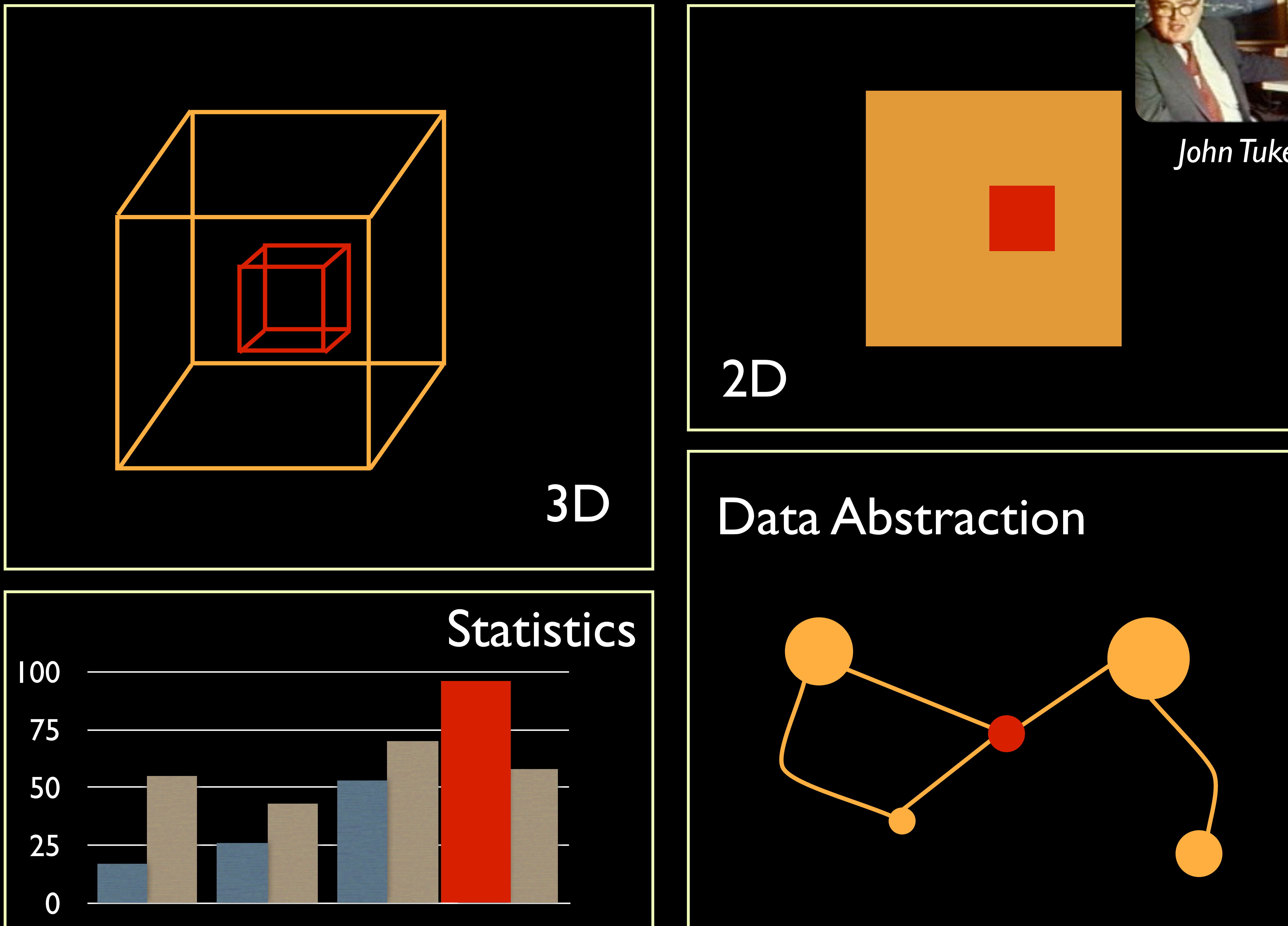
LINKED VIEWS OF HIGH-DIMENSIONAL DATA



*Video & implementation: Christopher **Beaumont**, CfA;*
inspired by AstroMed work of Douglas Alan, Michelle Borkin, AG, Michael Halle, Erik Rosolowsky

LINKED VIEWS OF HIGH-DIMENSIONAL DATA

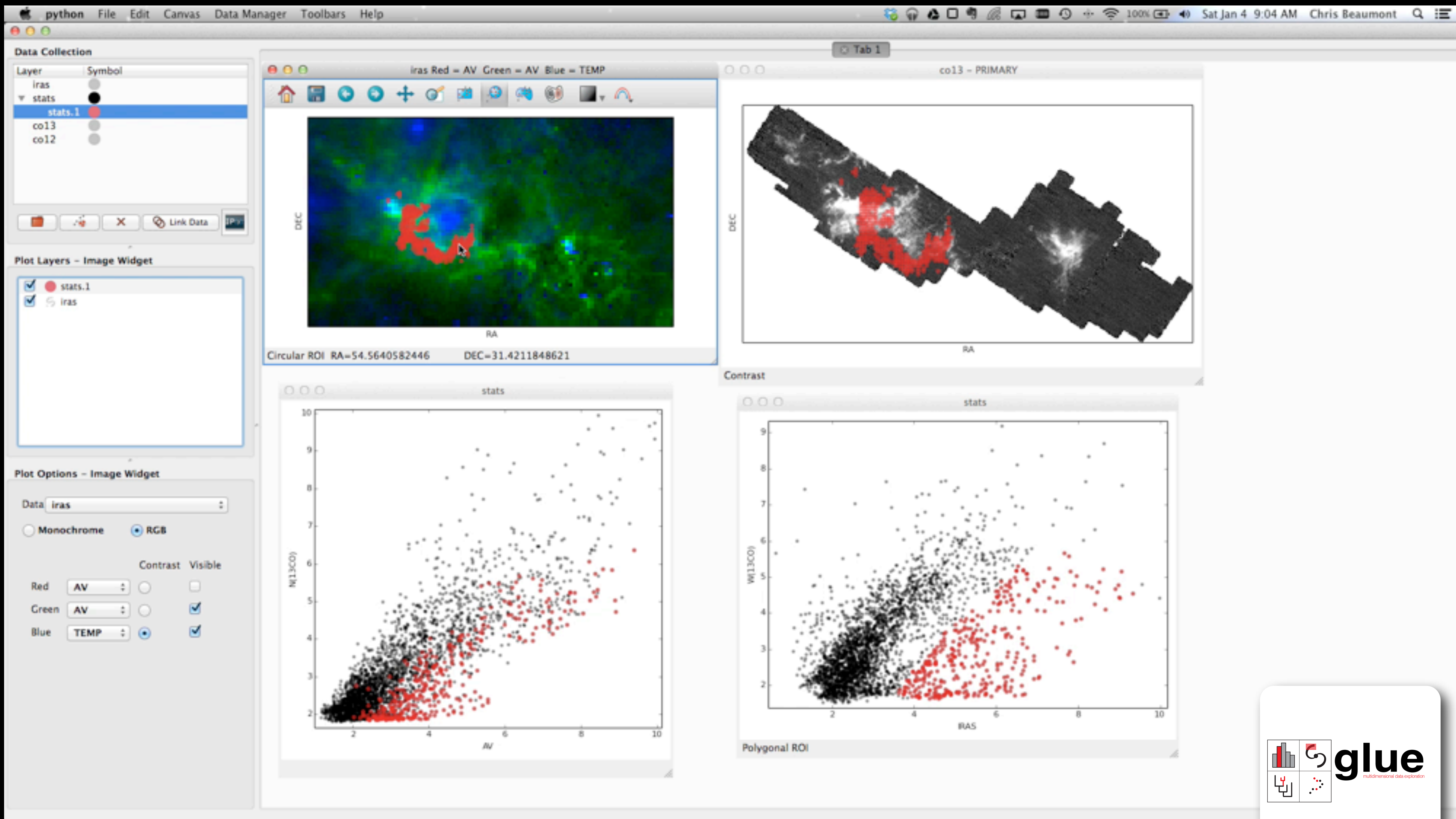
John Tukey



figure, by M. Borkin, reproduced from Goodman 2012, "Principles of High-Dimensional Data Visualization in Astronomy"

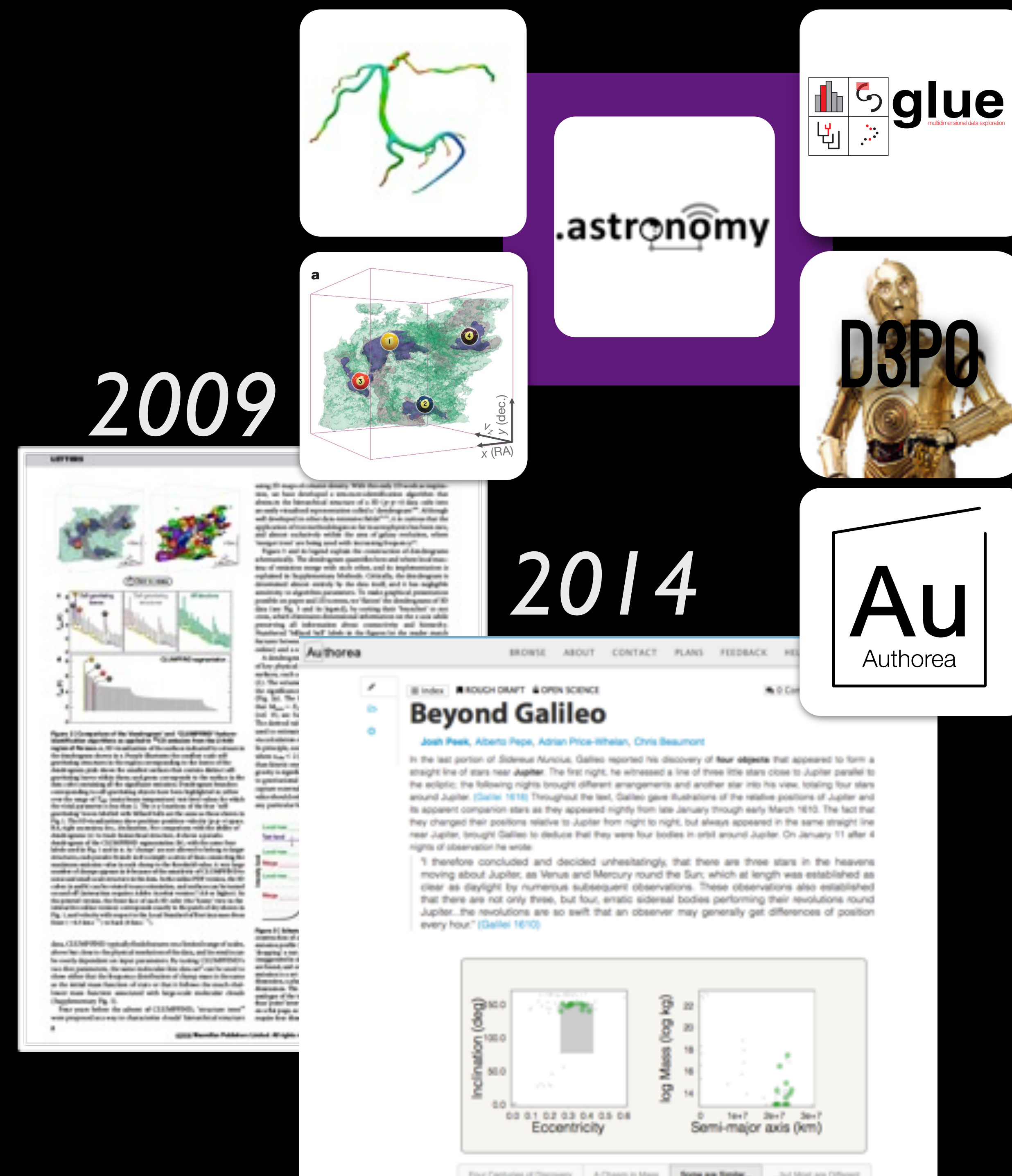
LINKED VIEWS OF HIGH-DIMENSIONAL DATA

GLUE



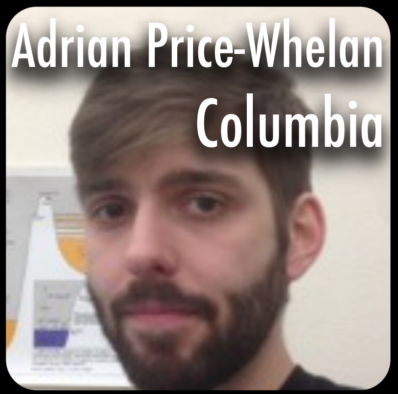
Beaumont, w/Goodman, Robitaille & Borkin

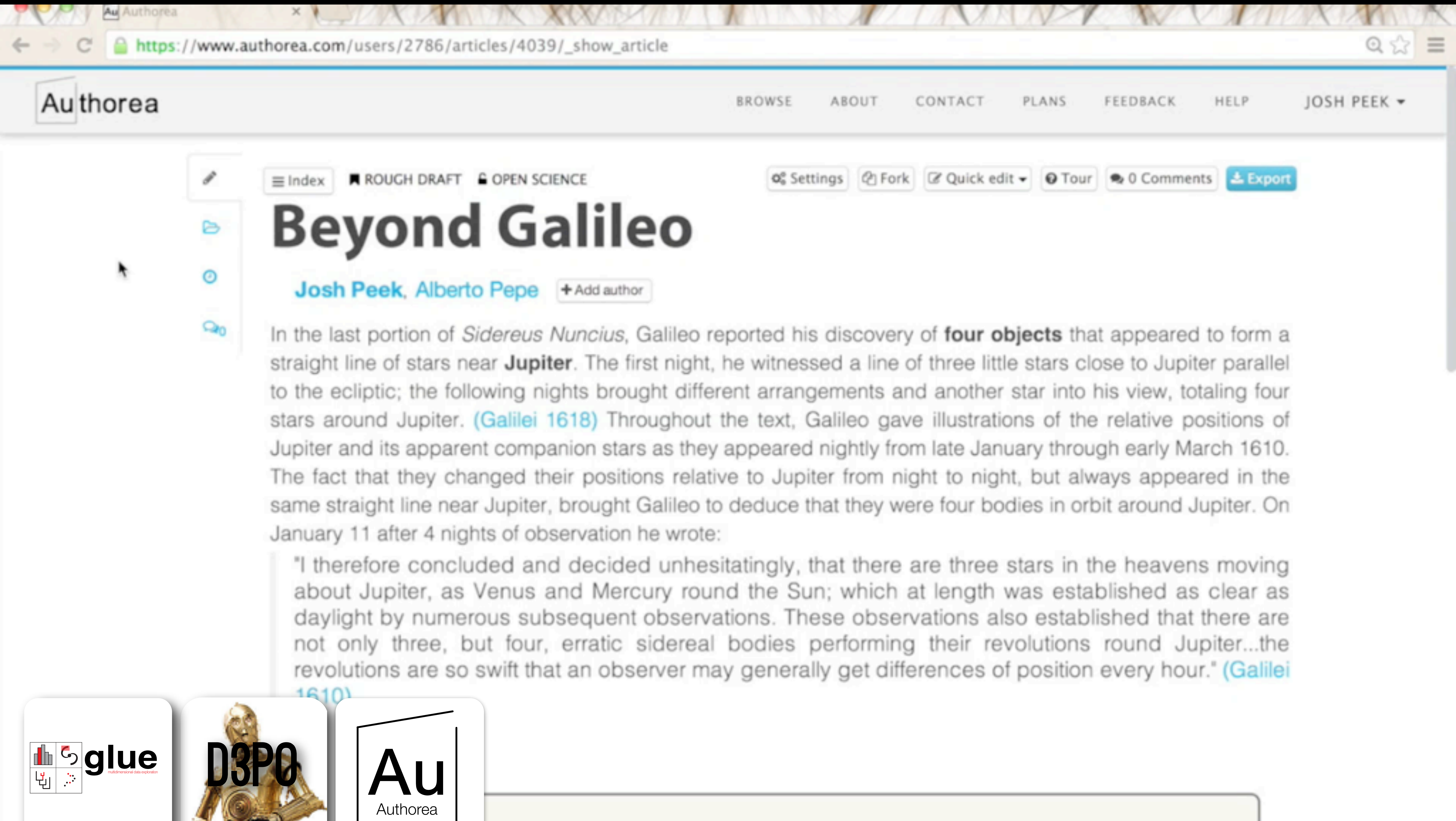
THE RIVETING SEQUEL



"THE STORY & THE SANDBOX"

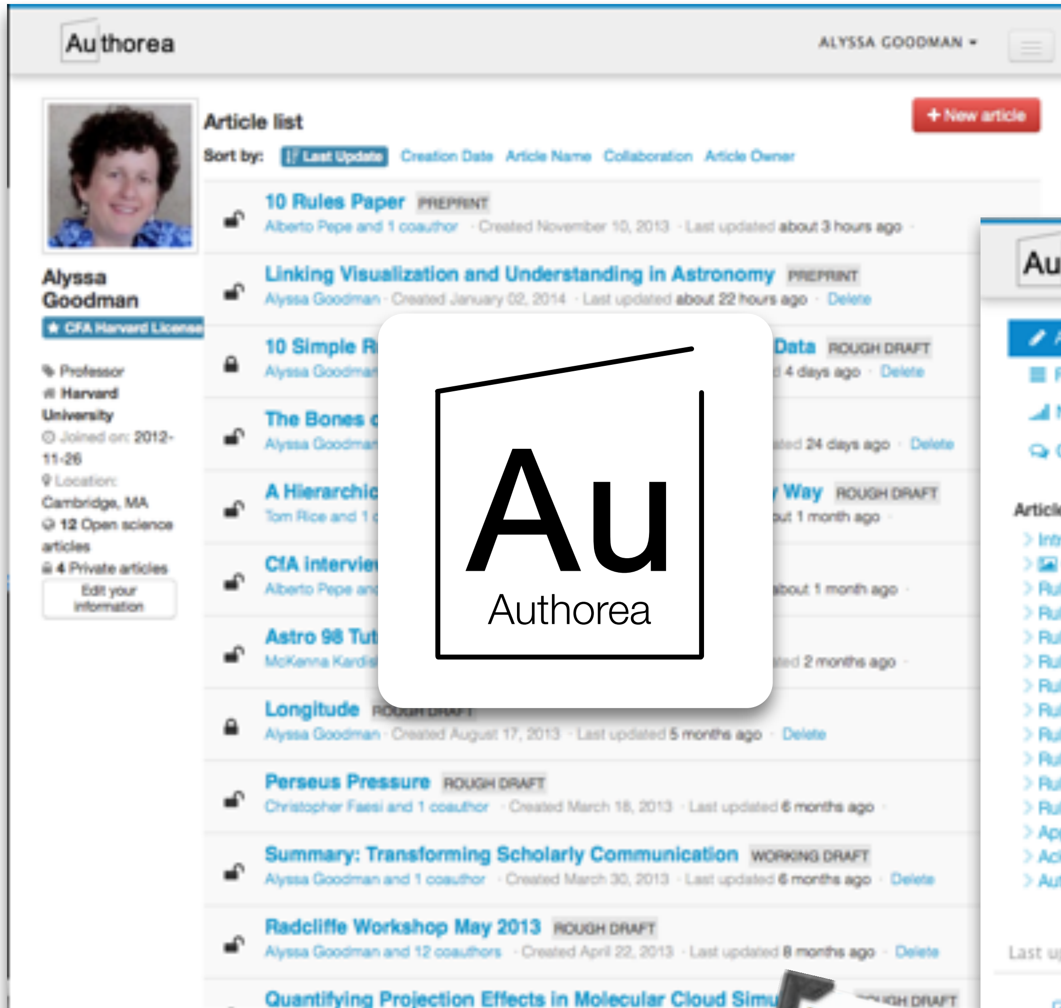
(GLUE:D3PO:AUTHOREA)

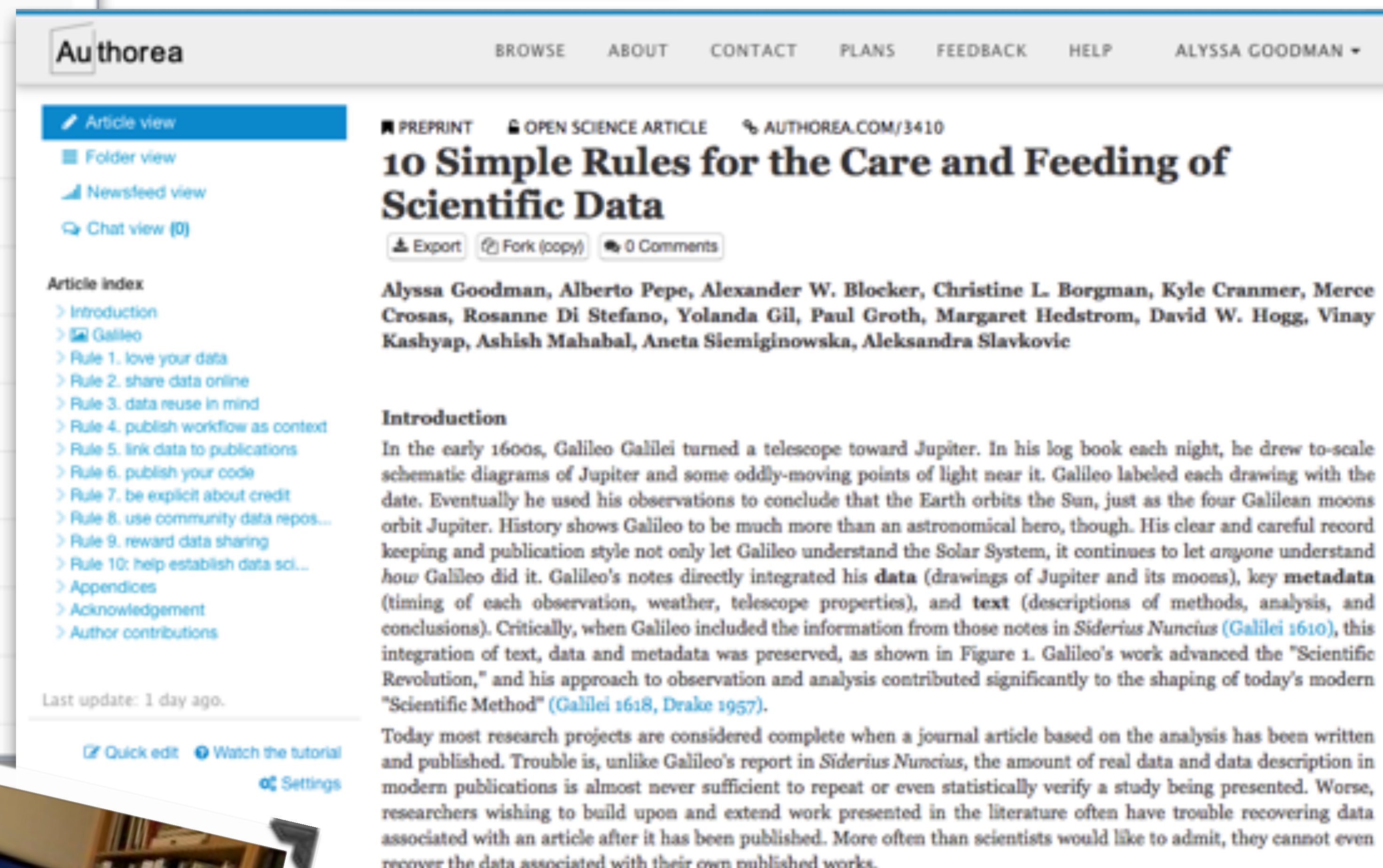




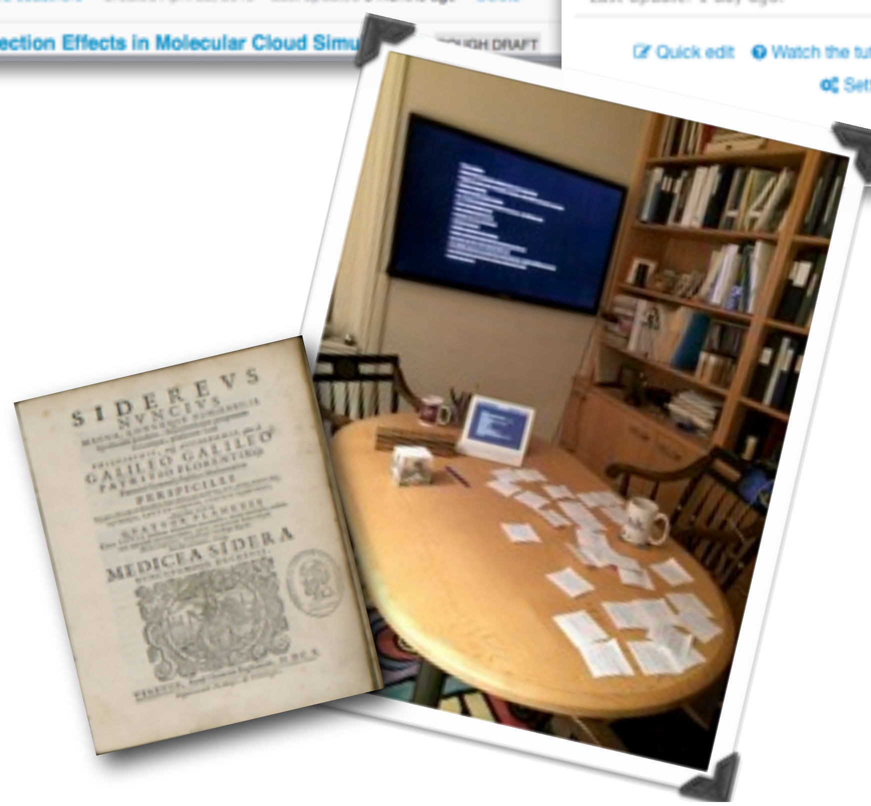
glue D3PO Au Authorea

THE FUTURE IS IN ONLINE





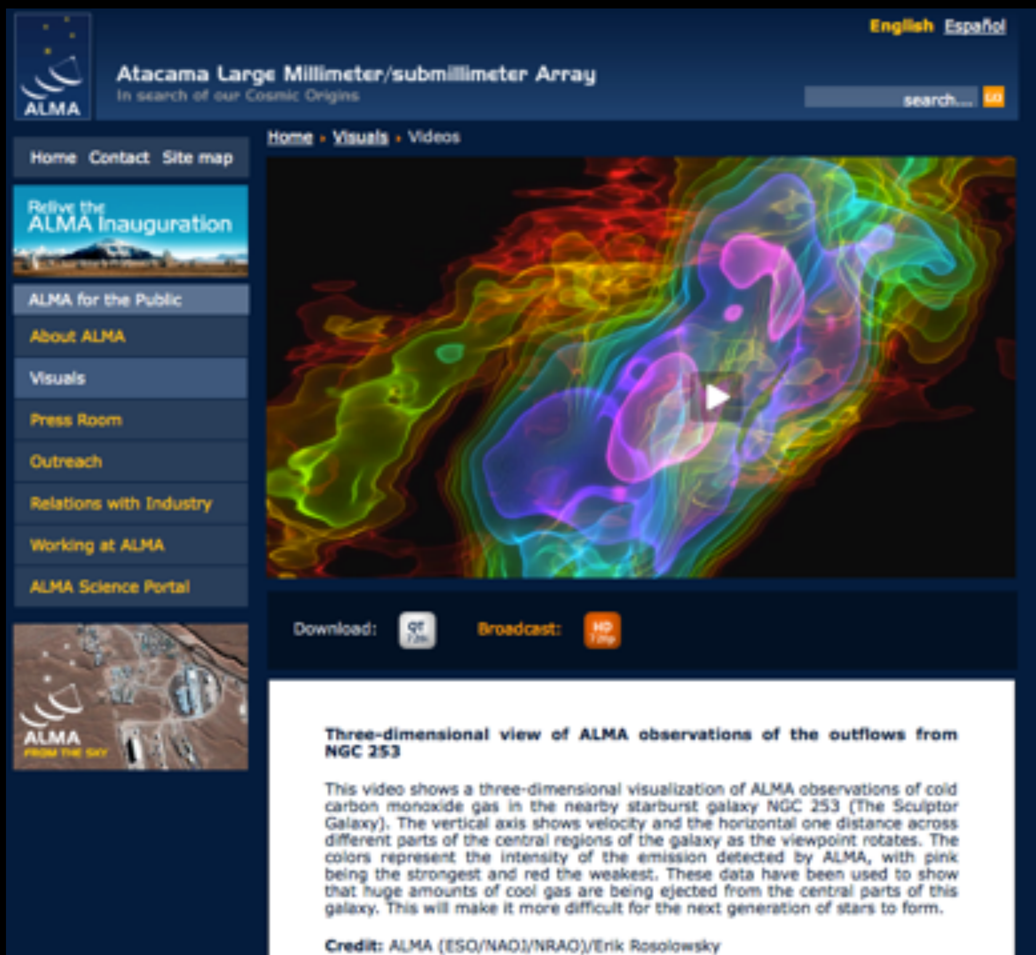
BUT WE DO NEED TO FIGURE OUT HOW NOT TO LOSE IT.

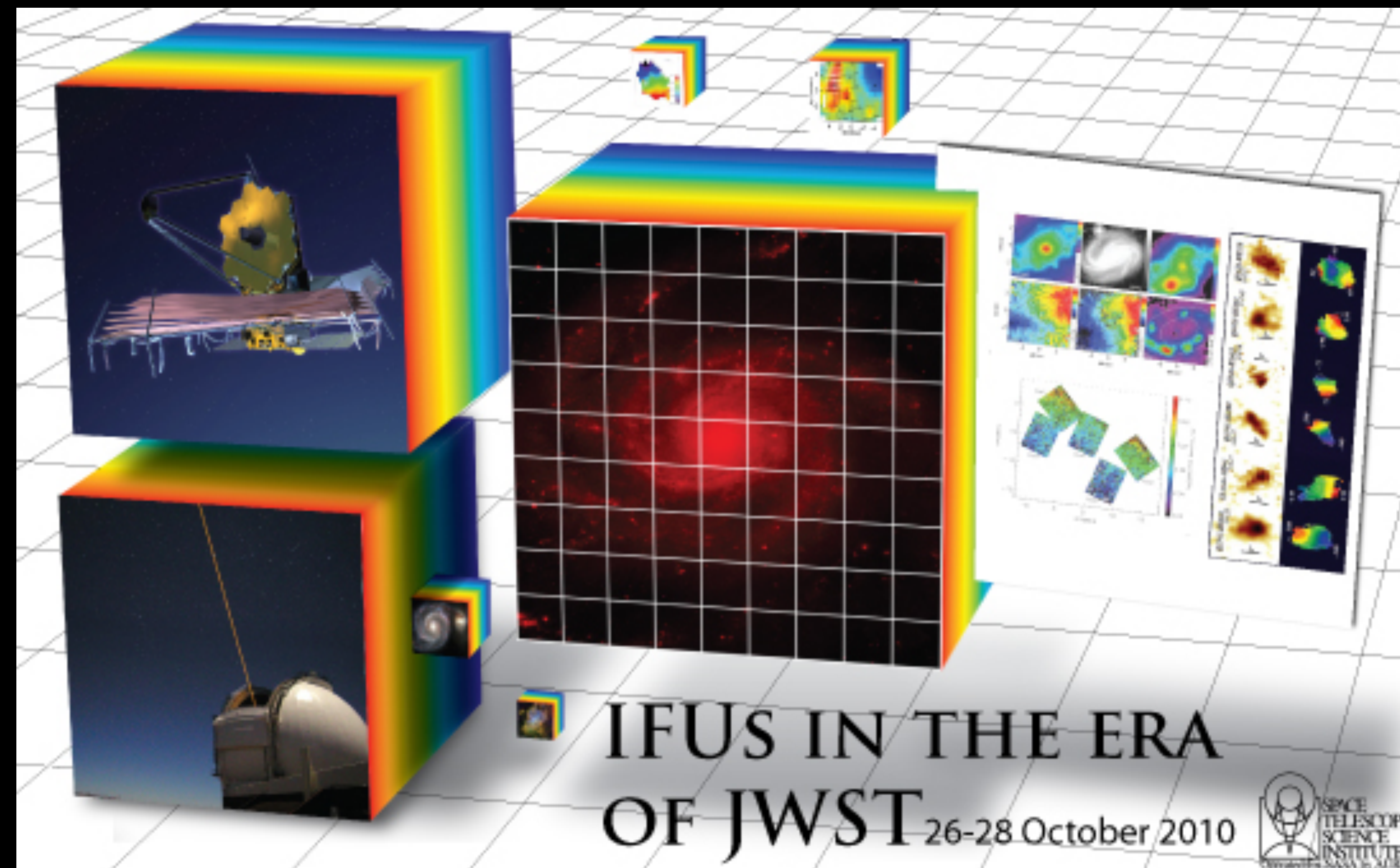


tinyurl.com/acidfreedigital

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

THE FUTURE IS IN 3D

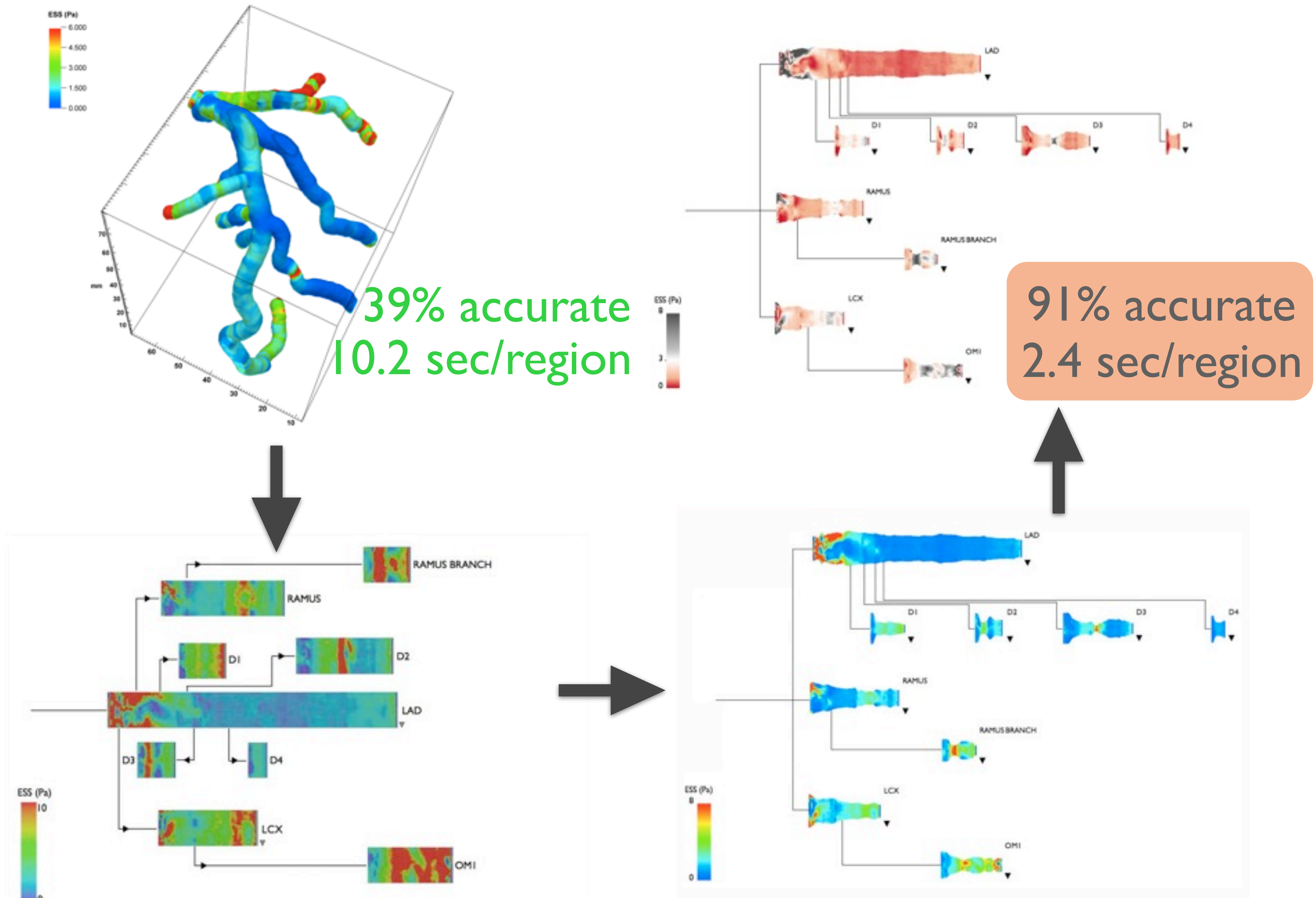




yt viz from ALMA data
(Turk, Rosolowsky)

Glue “for” JWST
(Beaumont et al., NASA)

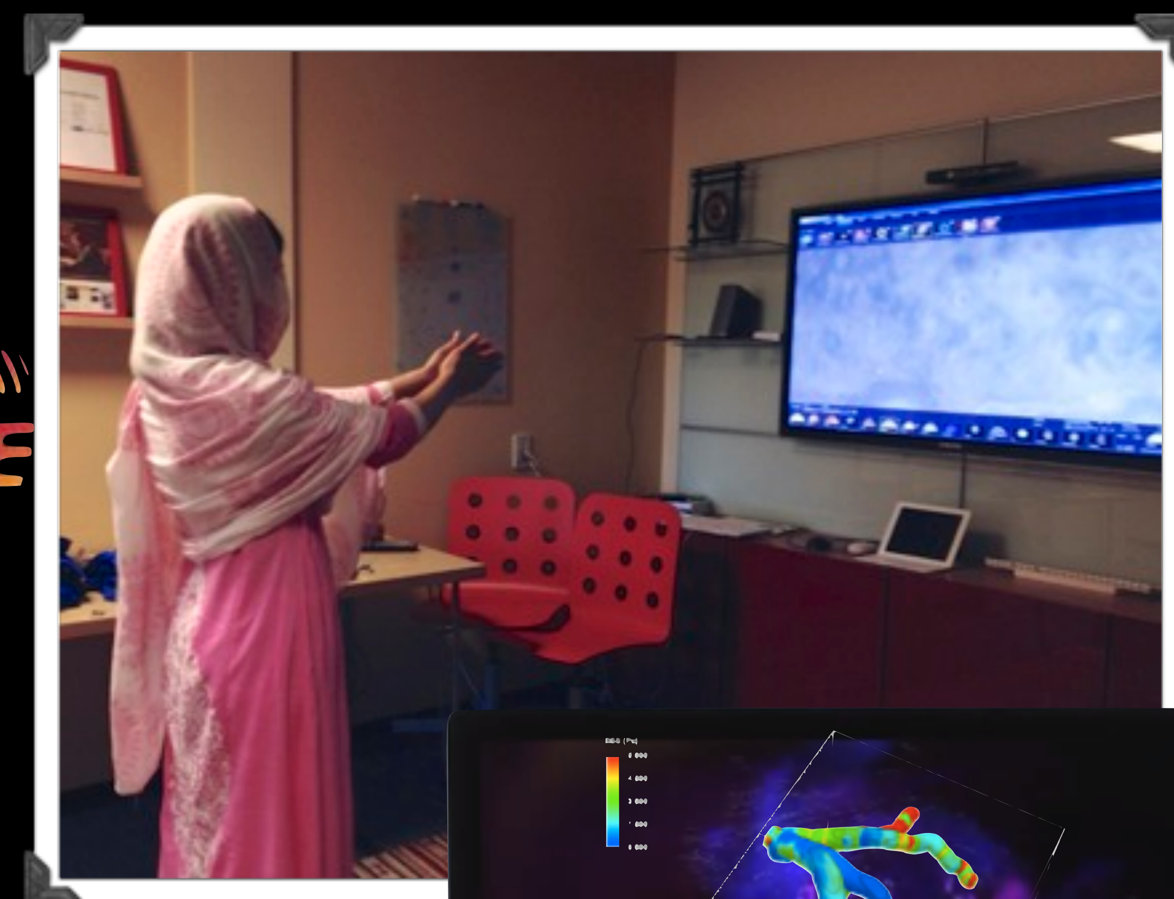
DIMENSIONALITY & COLOR + "ASTRONOMICAL MEDICINE"

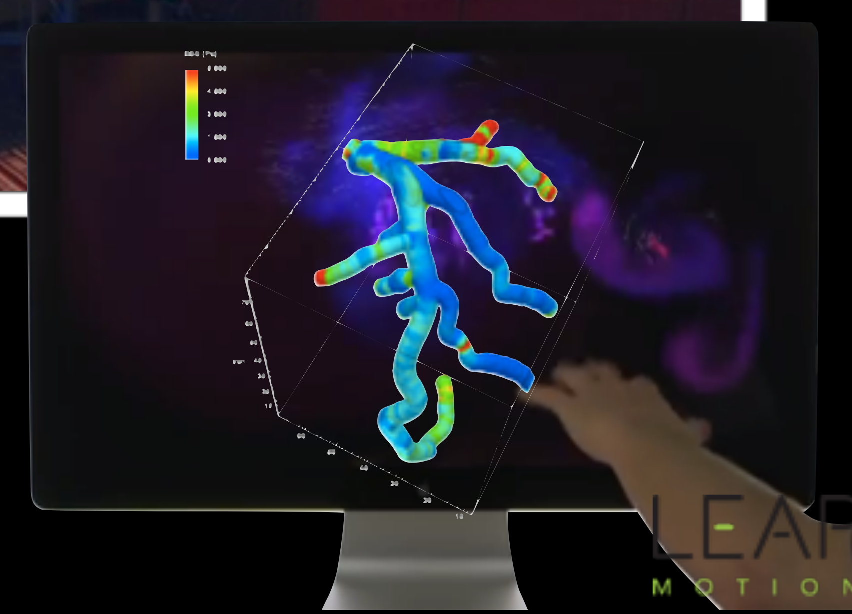


Borkin et al. 2011
cf. colorbrewer2.org

THE FUTURE IS MODULAR, OPEN-SOURCE, AND NOT (JUST) ON THE DESKTOP

HACK TO THE FUTURE





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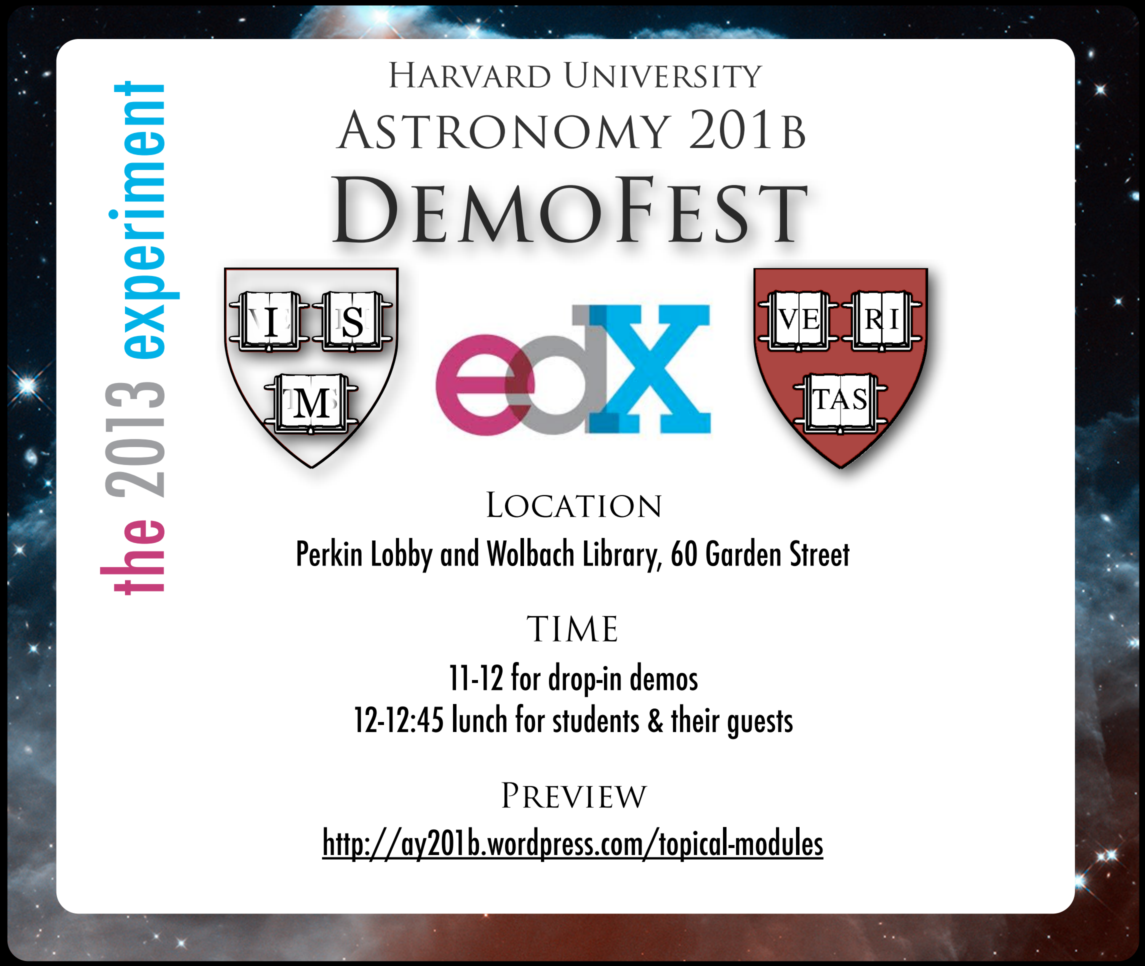
Higher Ed



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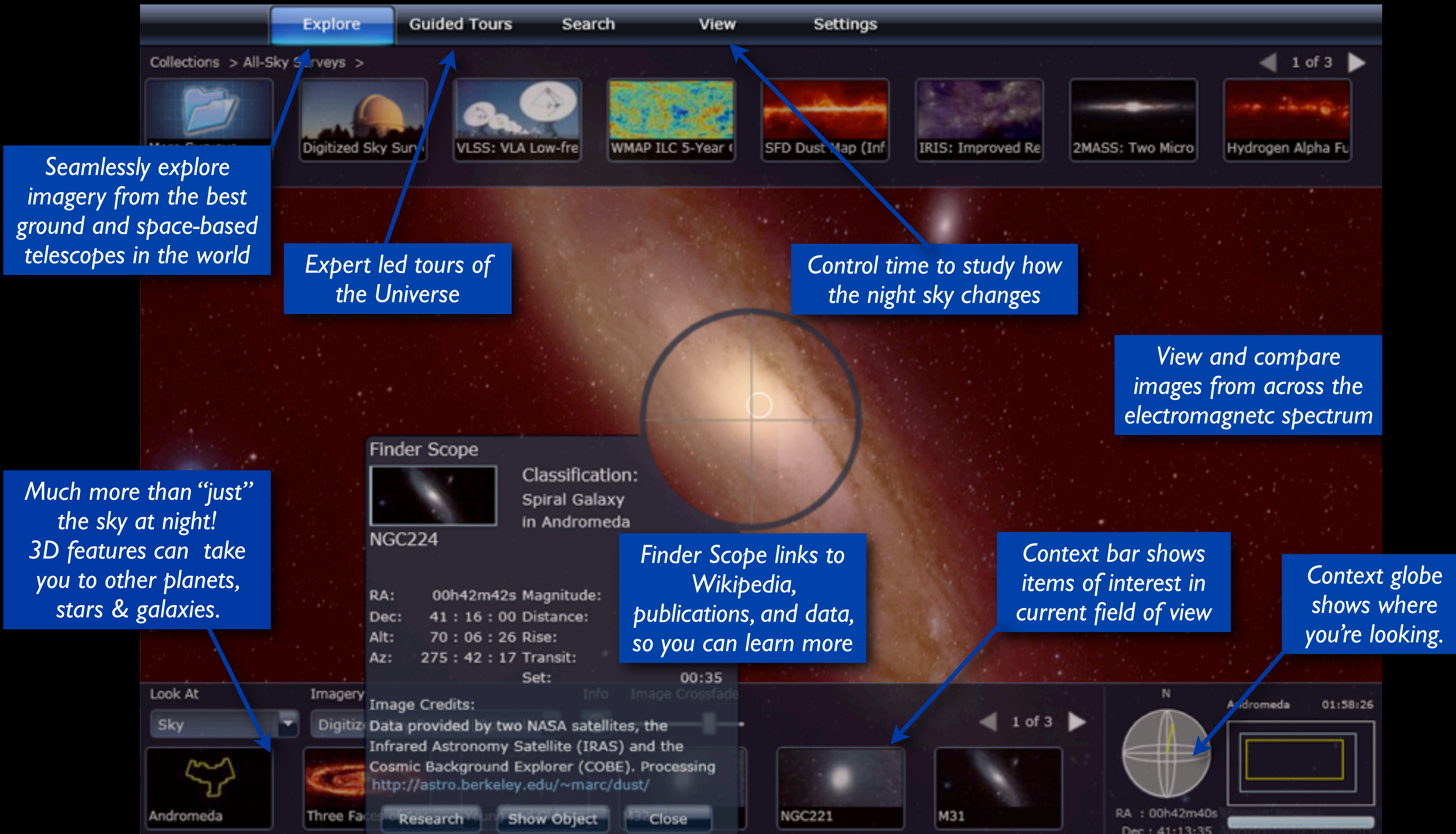
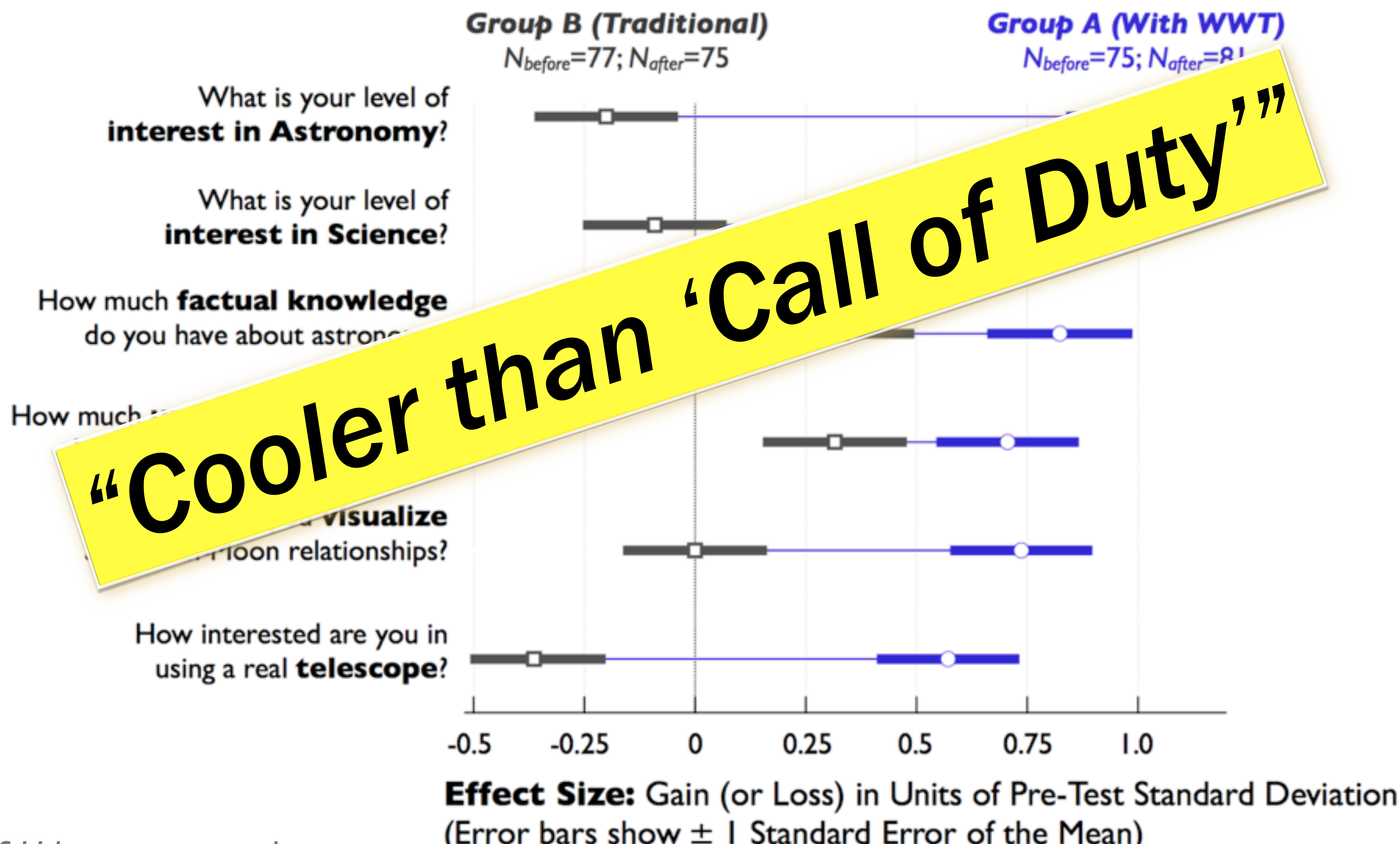


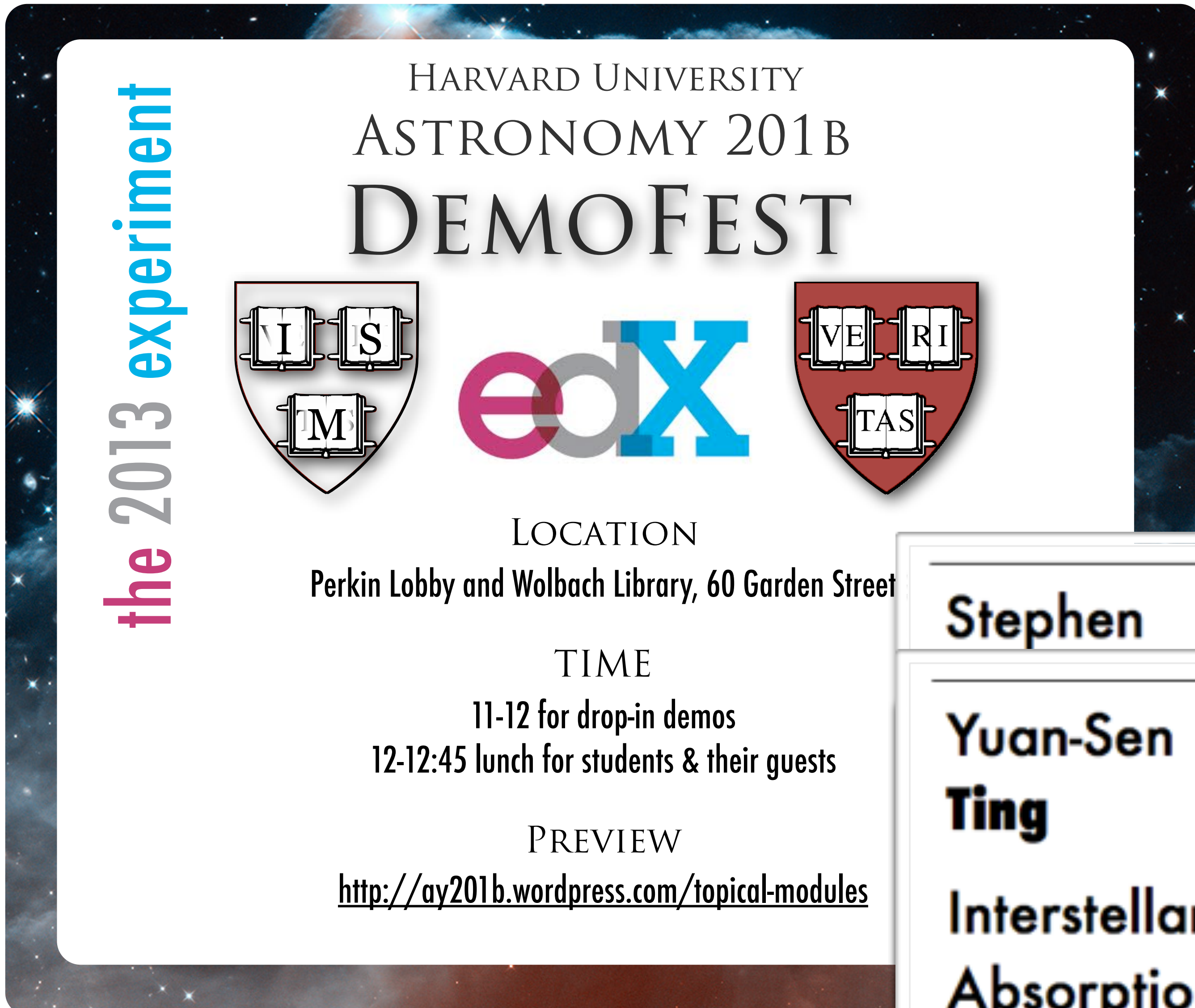
WWT created by Curtis Wong & Jonathan Fay

GAINS IN STUDENT INTEREST AND UNDERSTANDING

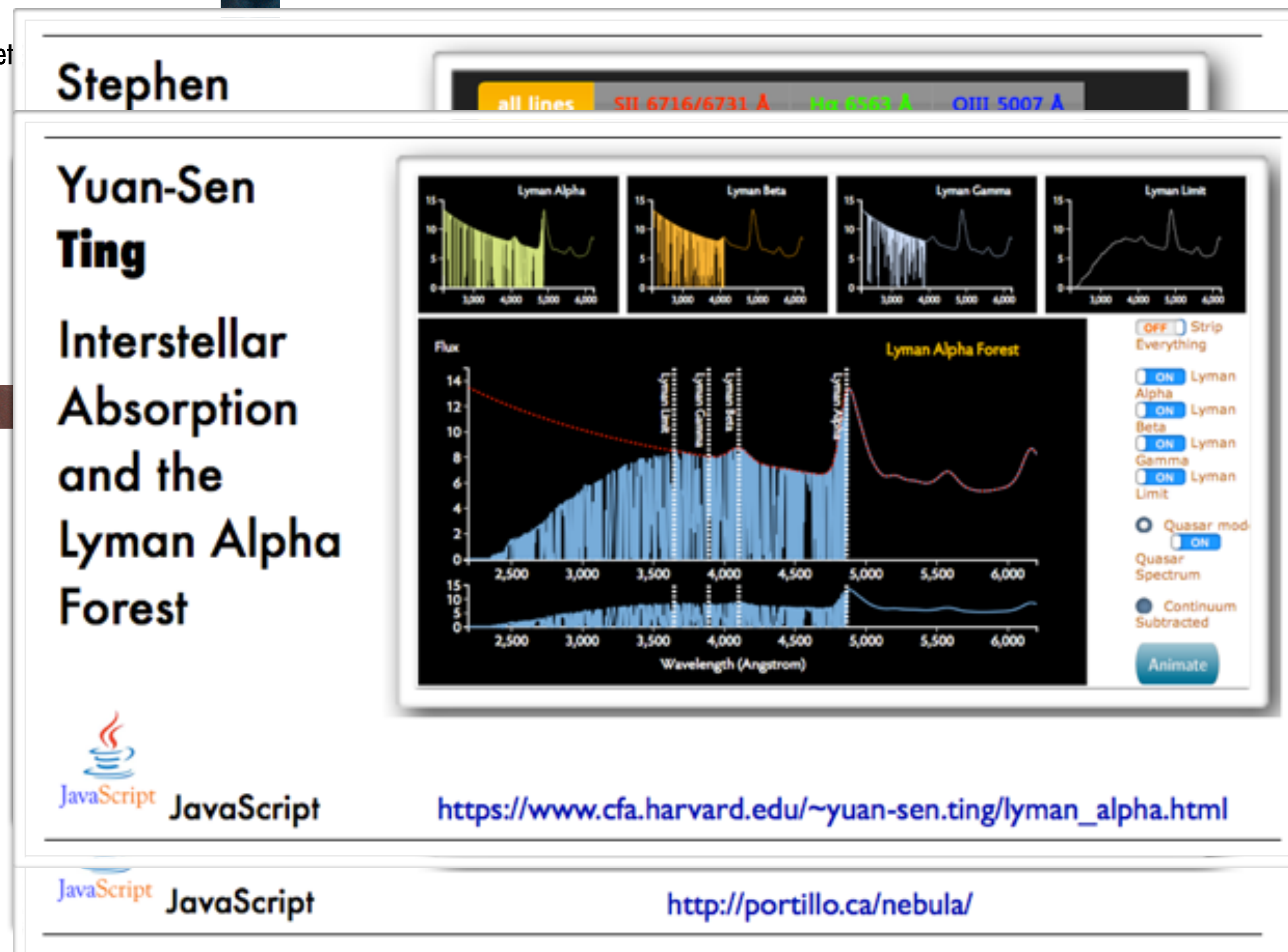
("Traditional Way" vs "WWT Way")



cf. Udomprasert et al.

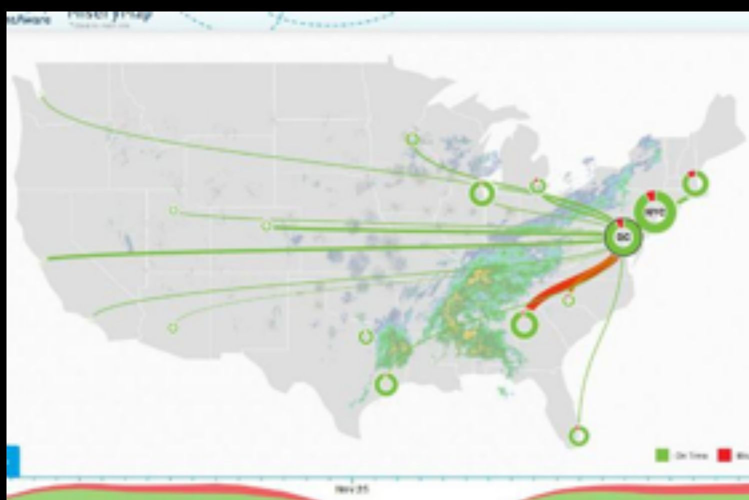


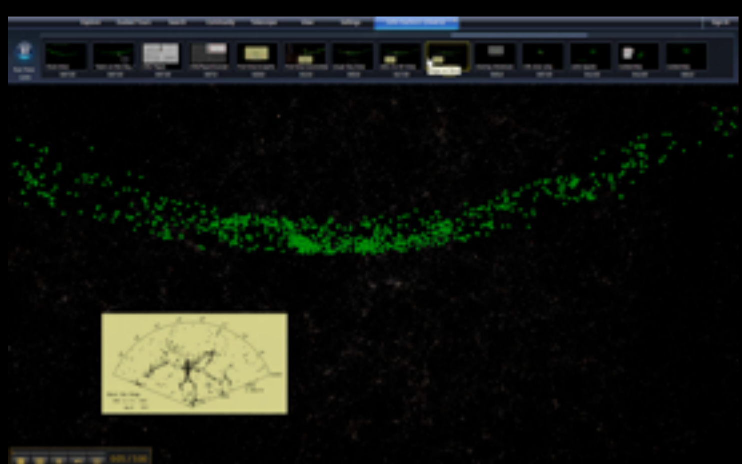
VIZ IN HIGHER-ED



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

CHALLENGES





What can we afford?

What do we teach?

Is visualization, and computation more generally, the new “instrumentation”?

How do we value visualization specialists?

How much customization?

Will tools be preserved?

How much organization (orchestration) is too much?

VISUALIZATION IN ASTRONOMY: FROM GALILEO TO THE ZOONIVERSE

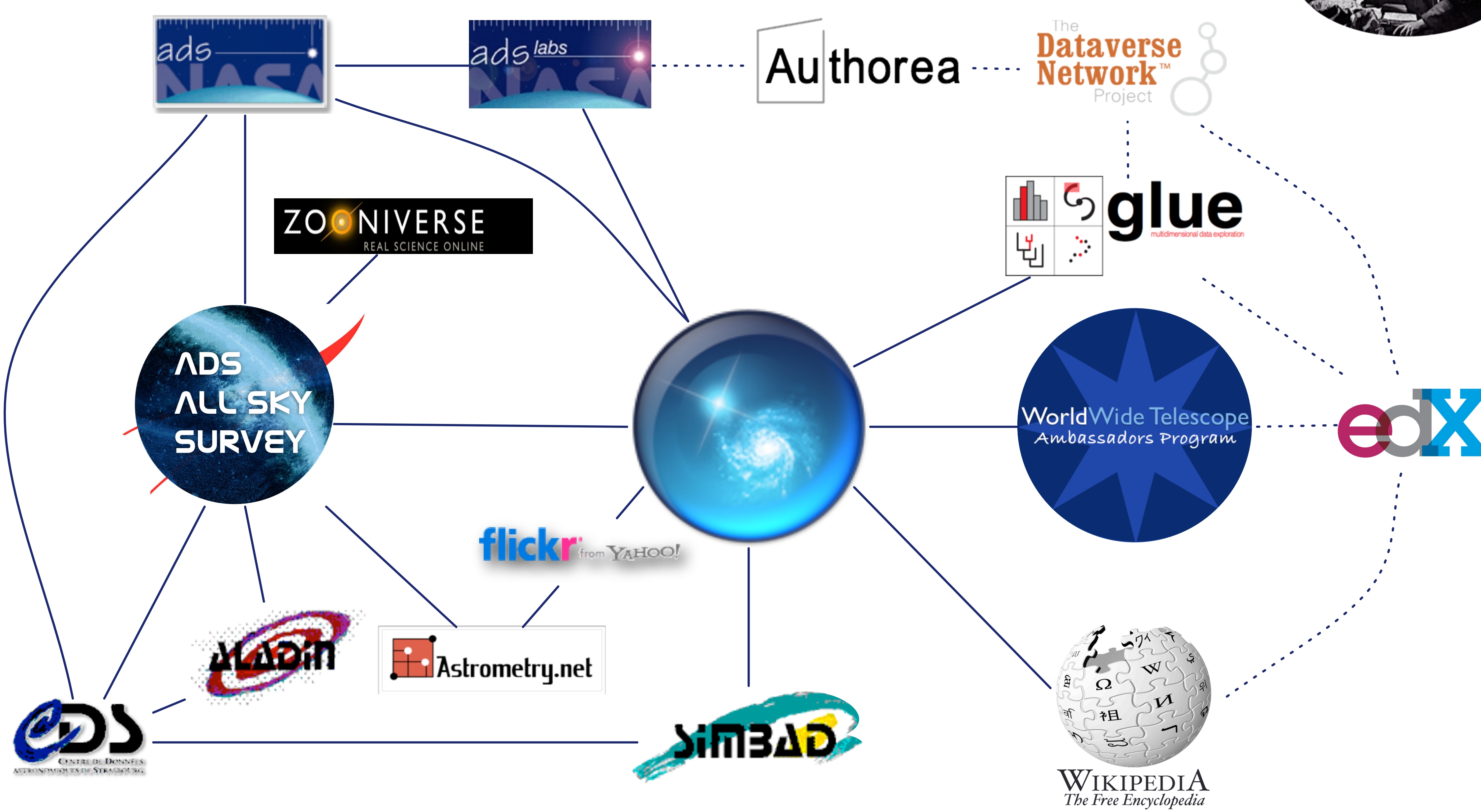
extra slides (not shown)

LINKING VISUALIZATION & UNDERSTANDING IN ASTRONOMY

ALYSSA A. GOODMAN
HARVARD-SMITHSONIAN
CENTER FOR ASTROPHYSICS

SEAMLESS ASTRONOMY

Linking scientific data, publications, and communities



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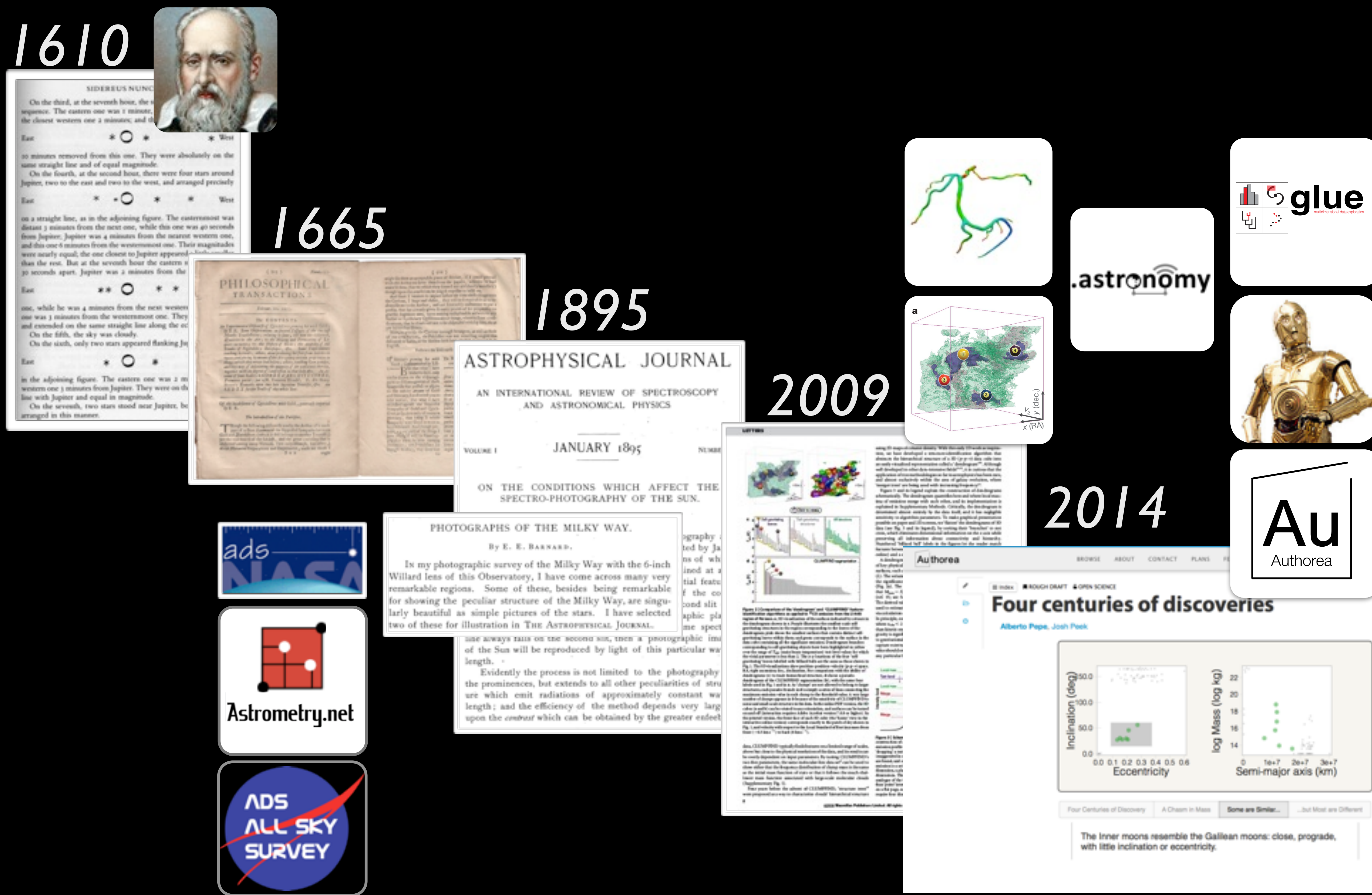
Made possible by MANY collaborators, listed at projects.iq.harvard.edu/seamlessastronomy


1610
SIDEREUS NUNCIUS
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PHILOSOPHICAL TRANSACTIONS
1895
ASTROPHYSICAL JOURNAL
AN INTERNATIONAL REVIEW OF SPECTROSCOPY AND ASTRONOMICAL PHYSICS
JANUARY 1895
ON THE CONDITIONS WHICH AFFECT THE SPECTRO-PHOTOGRAPHY OF THE SUN.
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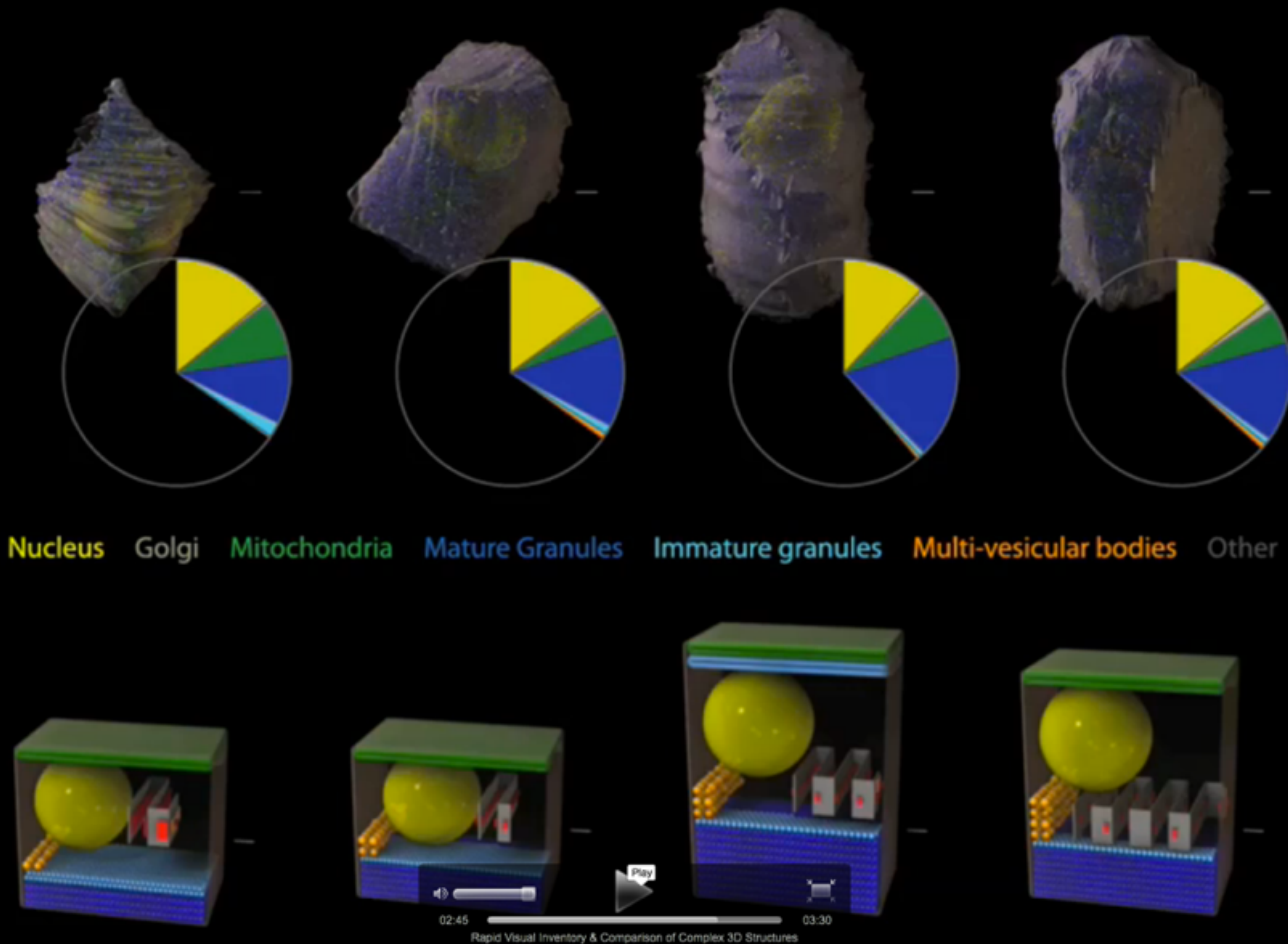
ADS ALL SKY SURVEY
2009
.astronomy
glue
2014
Au Authorea
Authorea
Four centuries of discoveries
Alberto Pepe, Josh Peek
Inclination (deg)
Eccentricity
log Mass (log kg)
Semi-major axis (km)
The Inner moons resemble the Galilean moons: close, prograde, with little inclination or eccentricity.

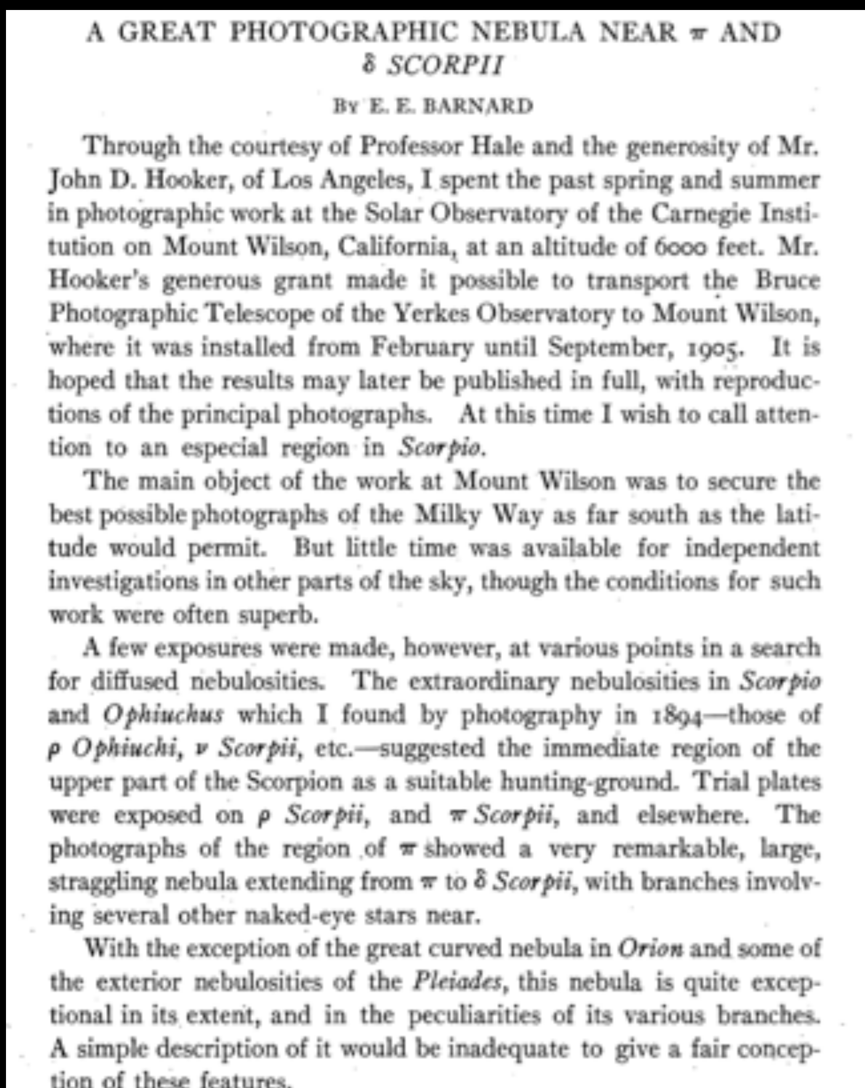
MEANINGFUL ABSTRACTION IS OFTEN BETTER THAN REALISM.



G. Johnson et al. 2011: http://video.sciencemag.org/VideoLab/1423692130001/1

A great photographic nebula near pi and delta Scorpii.

Barnard, E. E.
Astrophysical Journal, 23, 144-147 (1906)
Published in Mar 1906
DOI: 10.1086/141311



A GREAT PHOTOGRAPHIC NEBULA NEAR π AND δ *SCORPII*

By E. E. BARNARD

Through the courtesy of Professor Hale and the generosity of Mr. John D. Hooker, of Los Angeles, I spent the past spring and summer in photographic work at the Solar Observatory of the Carnegie Institution on Mount Wilson, California, at an altitude of 6000 feet. Mr. Hooker's generous grant made it possible to transport the Bruce Photographic Telescope of the Yerkes Observatory to Mount Wilson, where it was installed from February until September, 1905. It is hoped that the results may later be published in full, with reproductions of the principal photographs. At this time I wish to call attention to an especial region in *Scorpio*.

The main object of the work at Mount Wilson was to secure the best possible photographs of the Milky Way as far south as the latitude would permit. But little time was available for independent investigations in other parts of the sky, though the conditions for such work were often superb.

A few exposures were made, however, at various points in a search for diffused nebulosities. The extraordinary nebulosities in *Scorpio* and *Ophiuchus* which I found by photography in 1894—those of ρ *Ophiuchi*, ν *Scorpii*, etc.—suggested the immediate region of the upper part of the Scorpion as a suitable hunting-ground. Trial plates were exposed on ρ *Scorpii*, and π *Scorpii*, and elsewhere. The photographs of the region of π showed a very remarkable, large, straggling nebula extending from π to δ *Scorpii*, with branches involving several other naked-eye stars near.

With the exception of the great curved nebula in *Orion* and some of the exterior nebulosities of the *Pleiades*, this nebula is quite exceptional in its extent, and in the peculiarities of its various branches. A simple description of it would be inadequate to give a fair conception of these features.

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