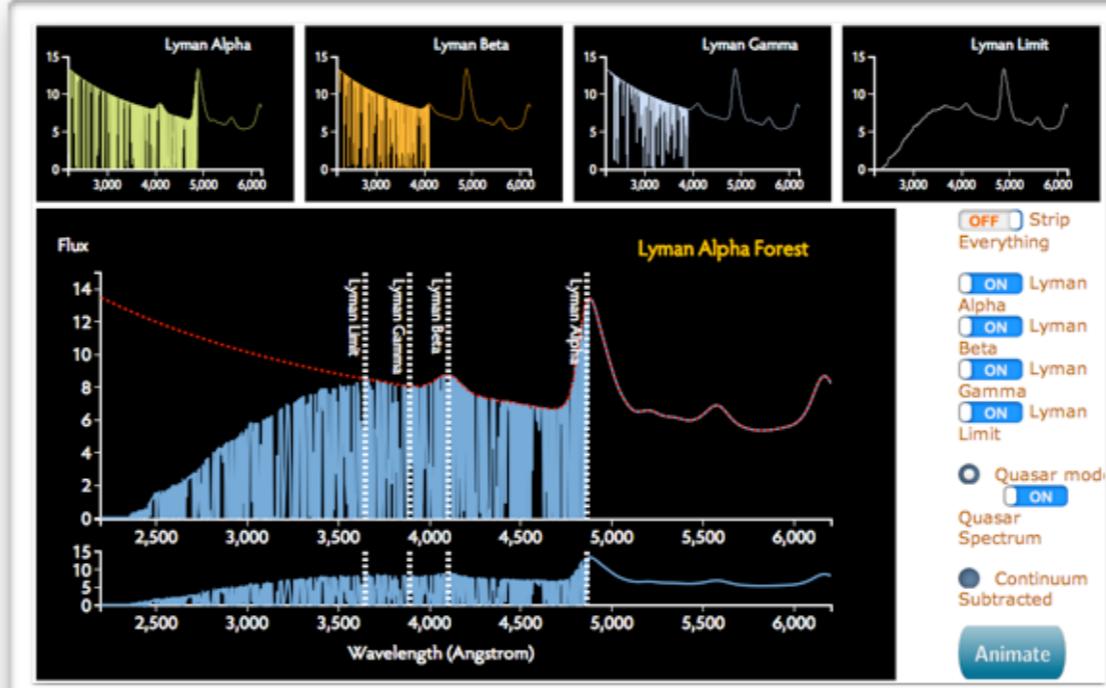


Stephen

all lines SII 6716/6731 Å H α 6563 Å OIII 5007 Å

Yuan-Sen Ting

Interstellar Absorption and the Lyman Alpha Forest



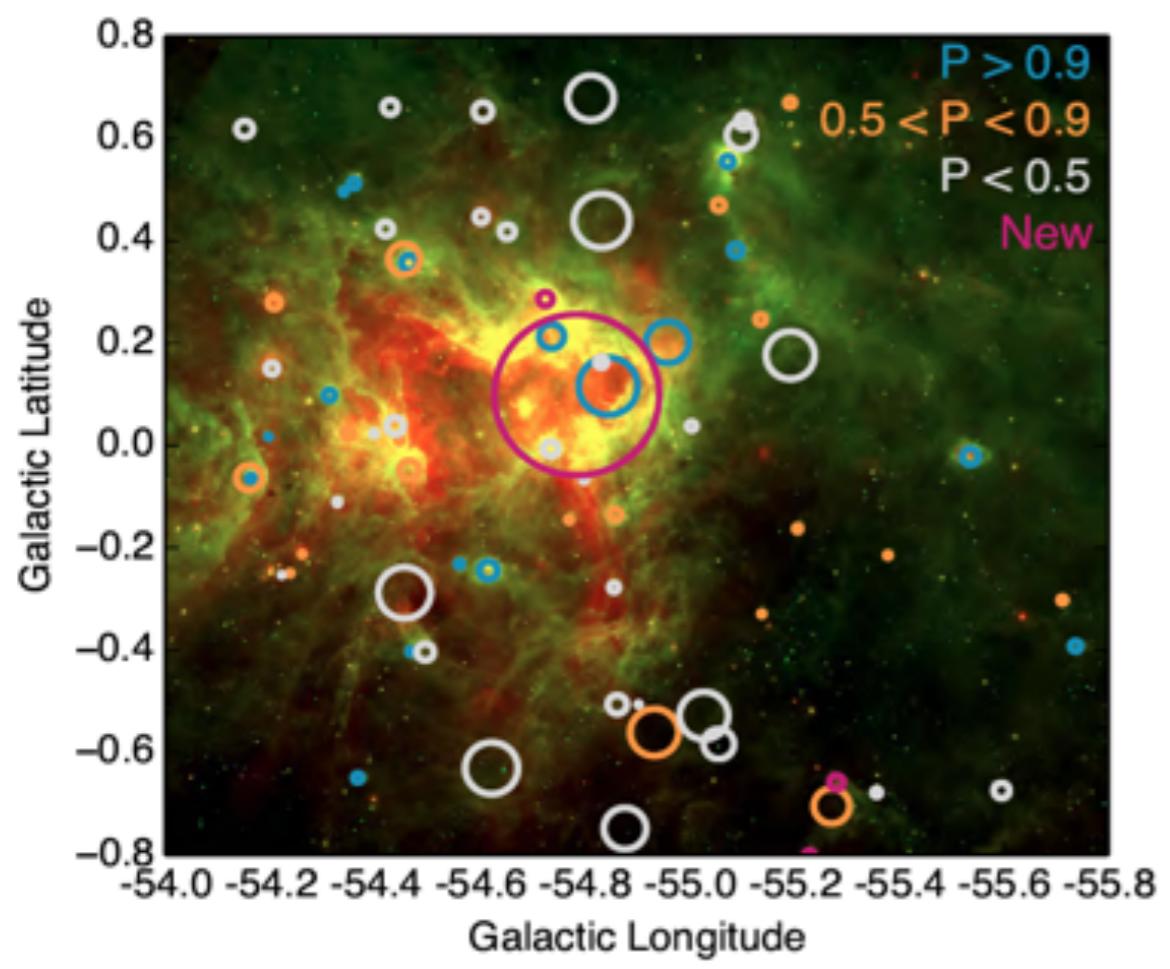
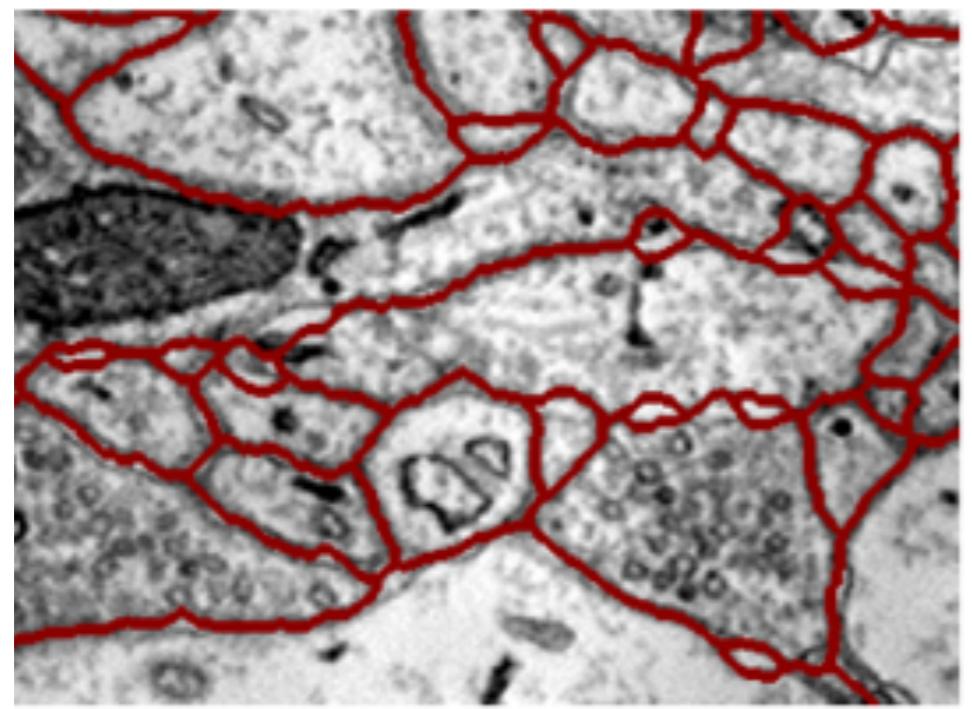
JavaScript

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

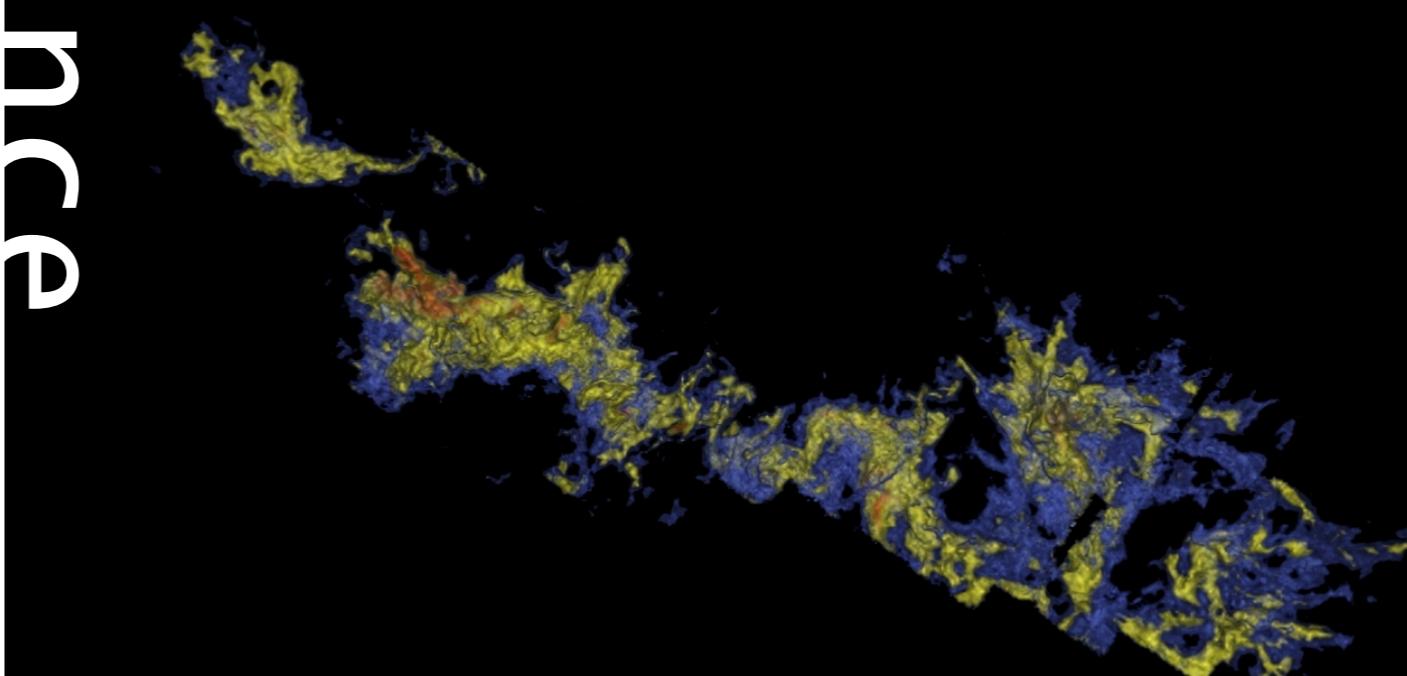
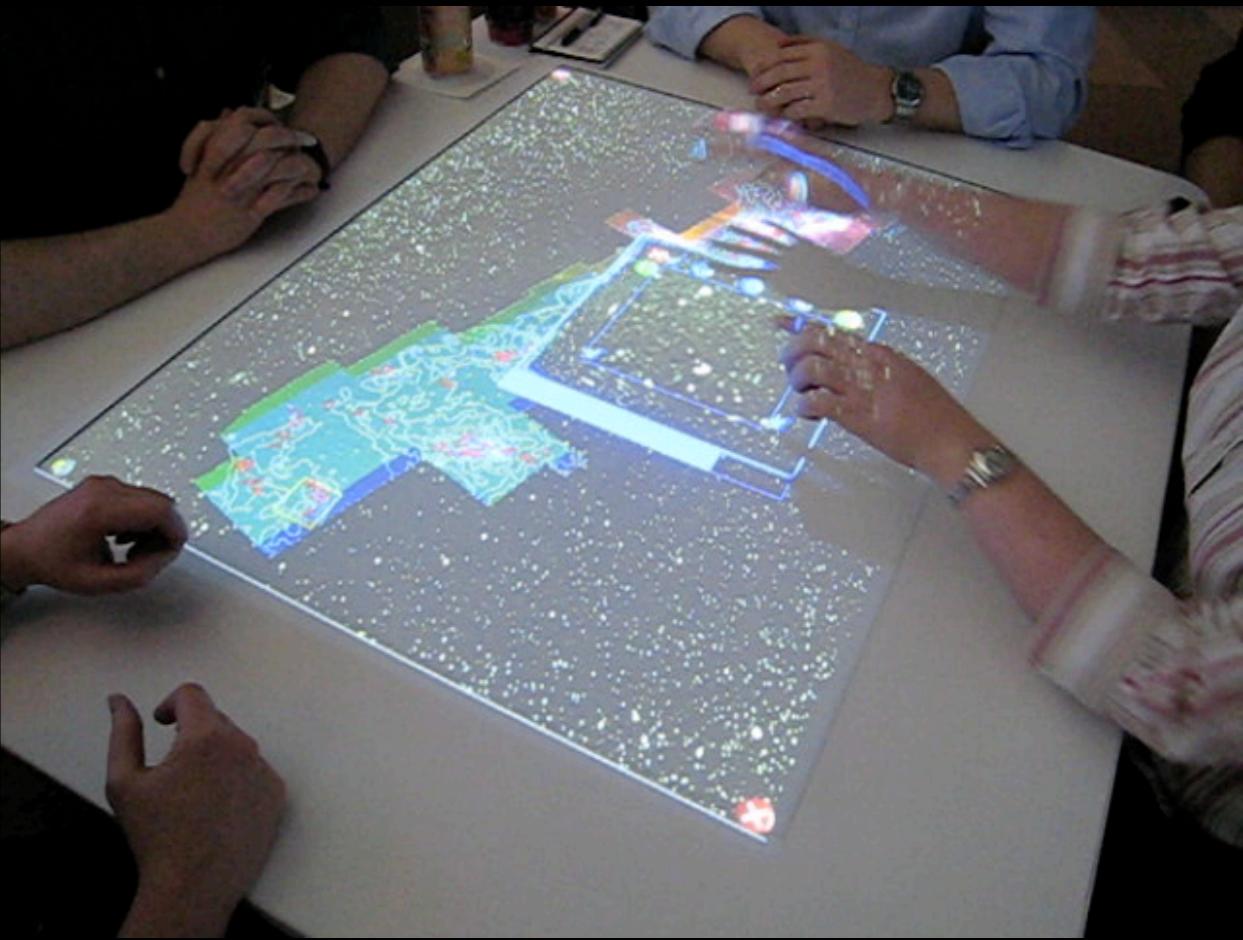


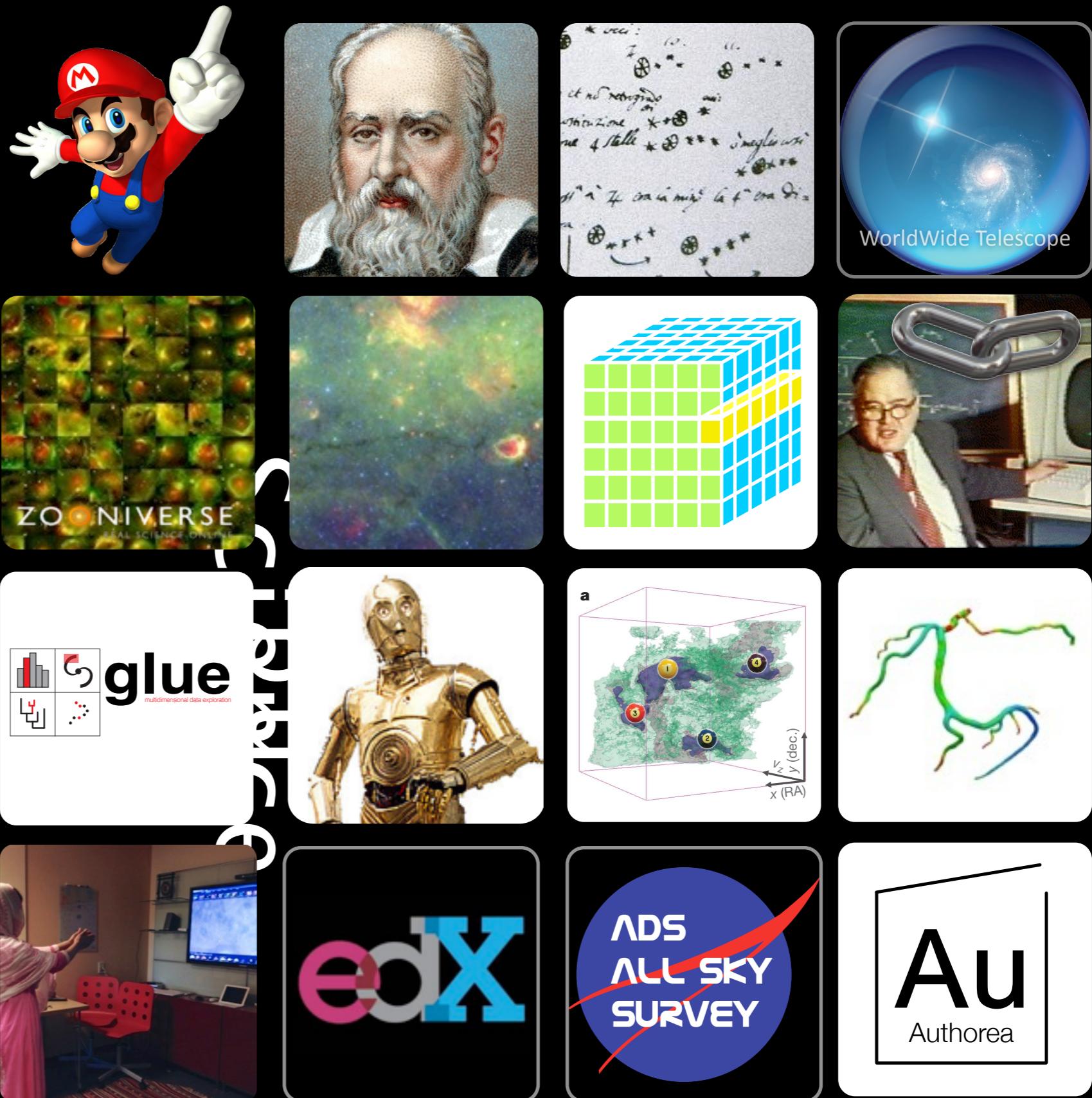
JavaScript

<http://portillo.ca/nebula/>



Science





Prof. Alyssa A. Goodman-Harvard-Smithsonian Center for Astrophysics-@aagie
+Herricks High School, Class of 1980

Relative Strengths

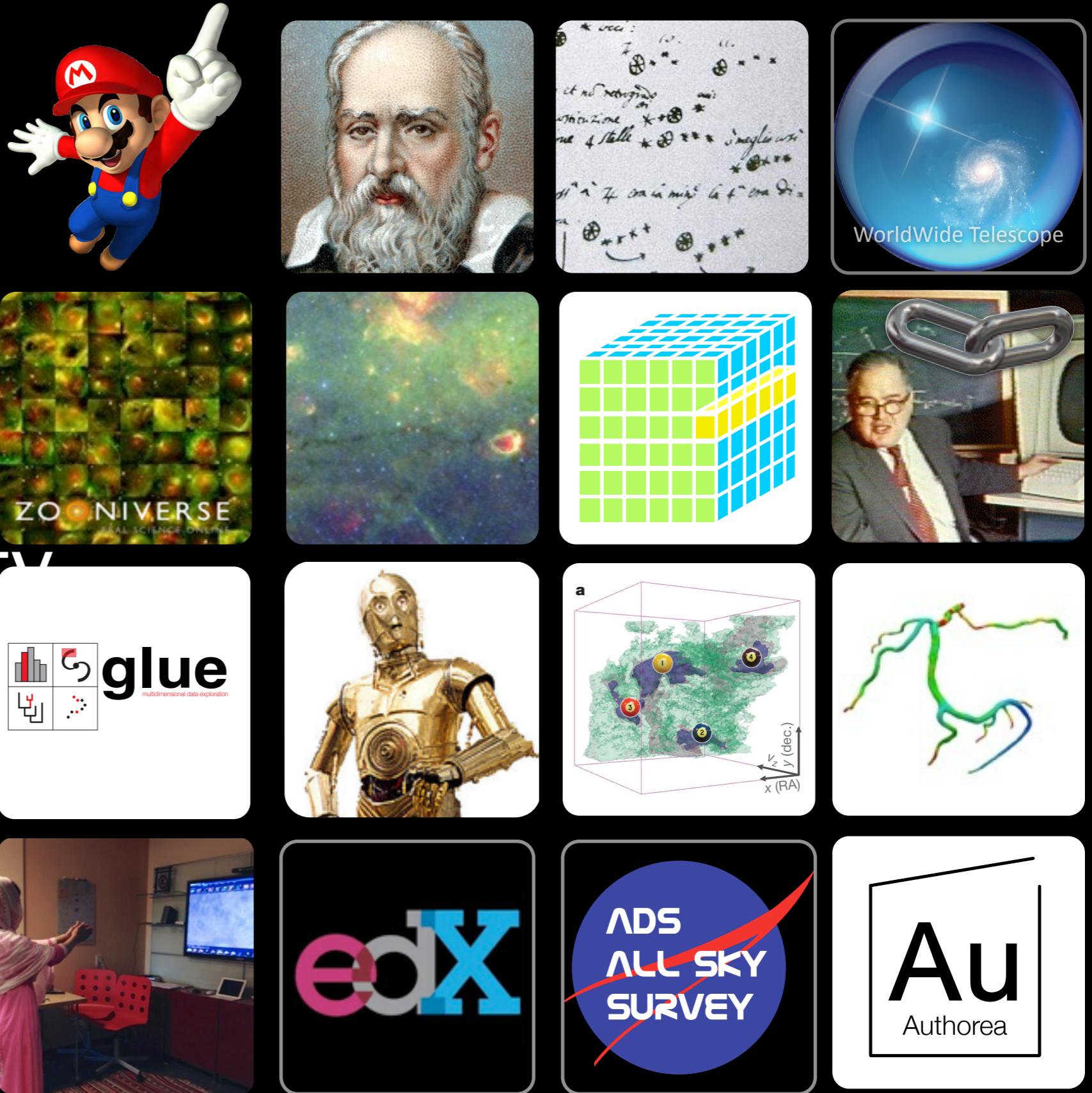


Pattern Recognition
Creativity



Calculations

Resolution
Context
Big Data
Wide Data
Dimensionality
Linked views
Interaction
Communication
education



1992



Super Mario Kart: Rainbow Road (1992)

2014

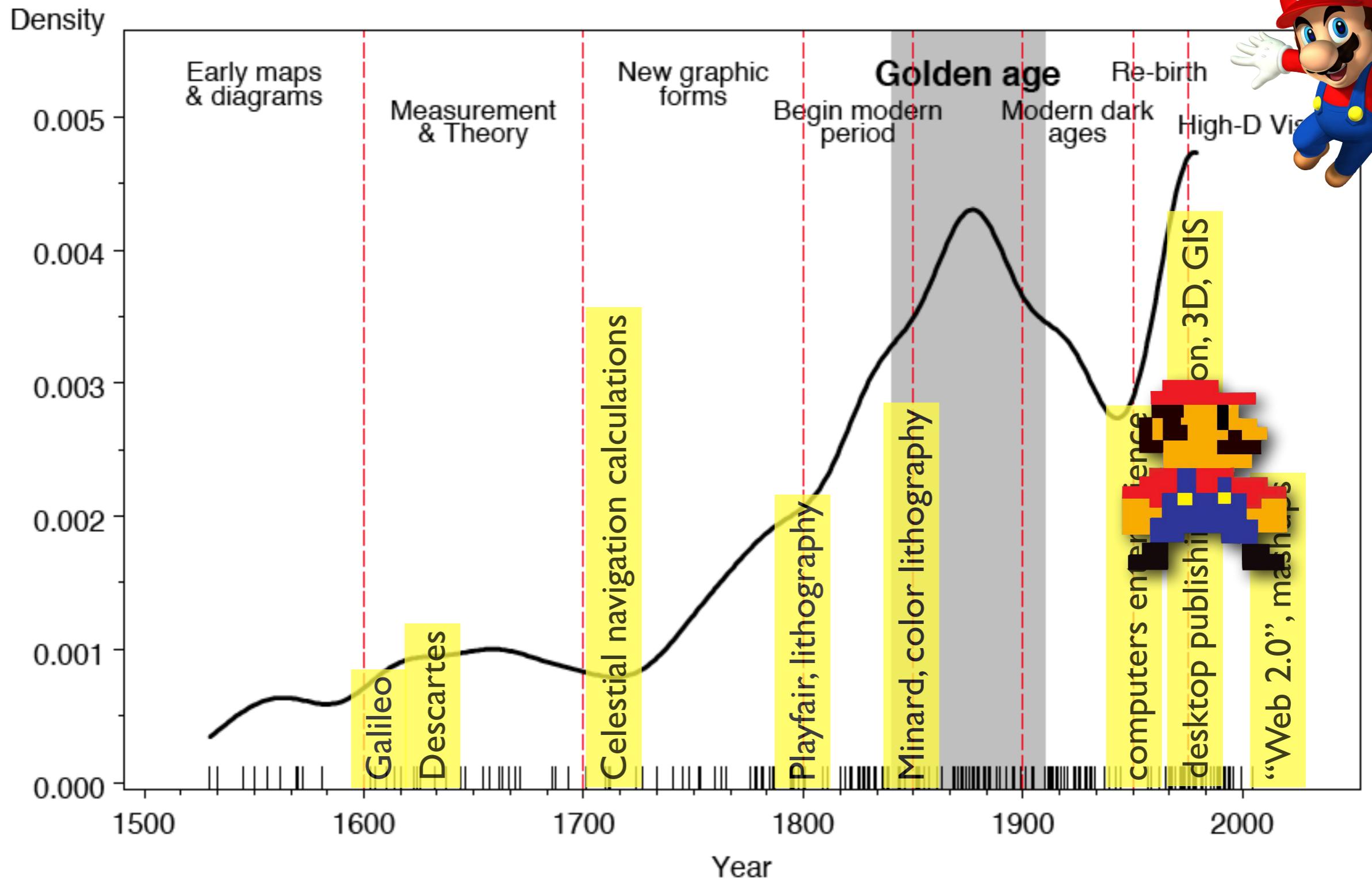


Mario Kart 8: Rainbow Road (2014)



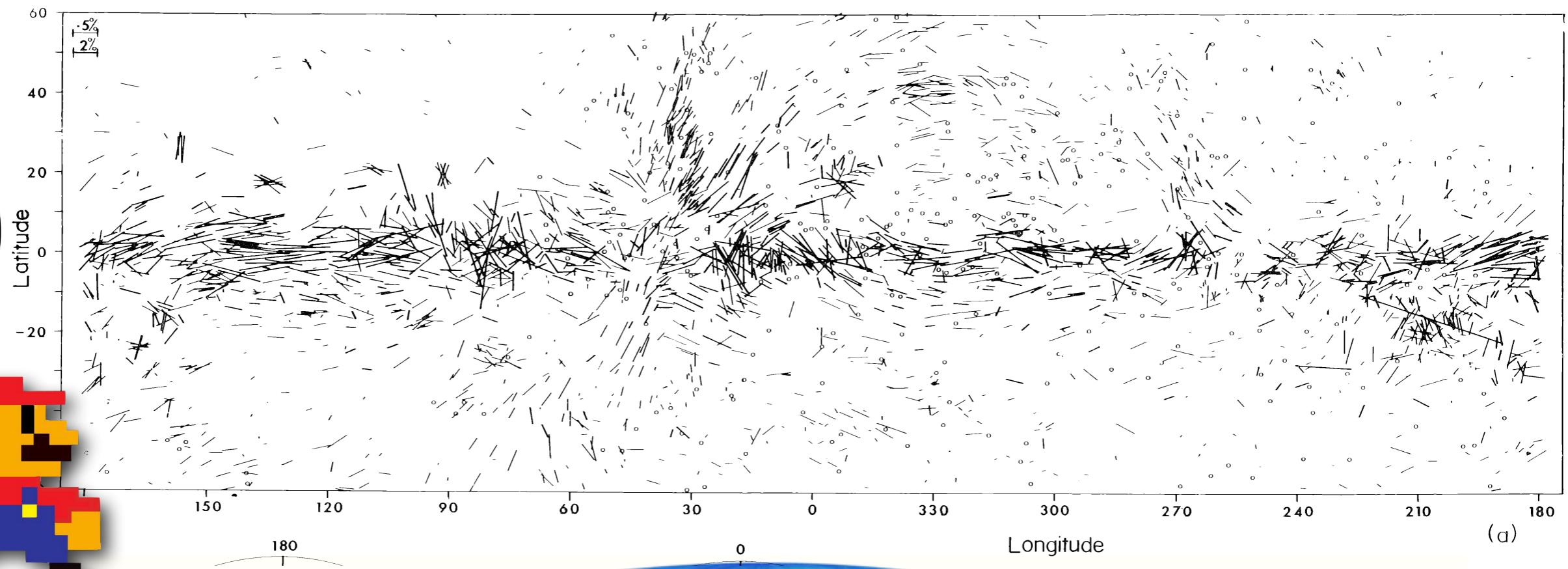
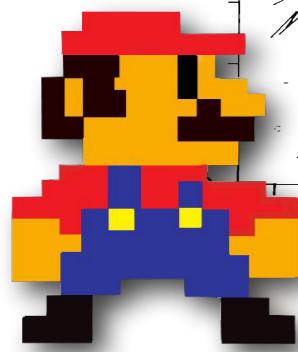
Mario franchise, copyright Nintendo

Milestones: Time course of developments

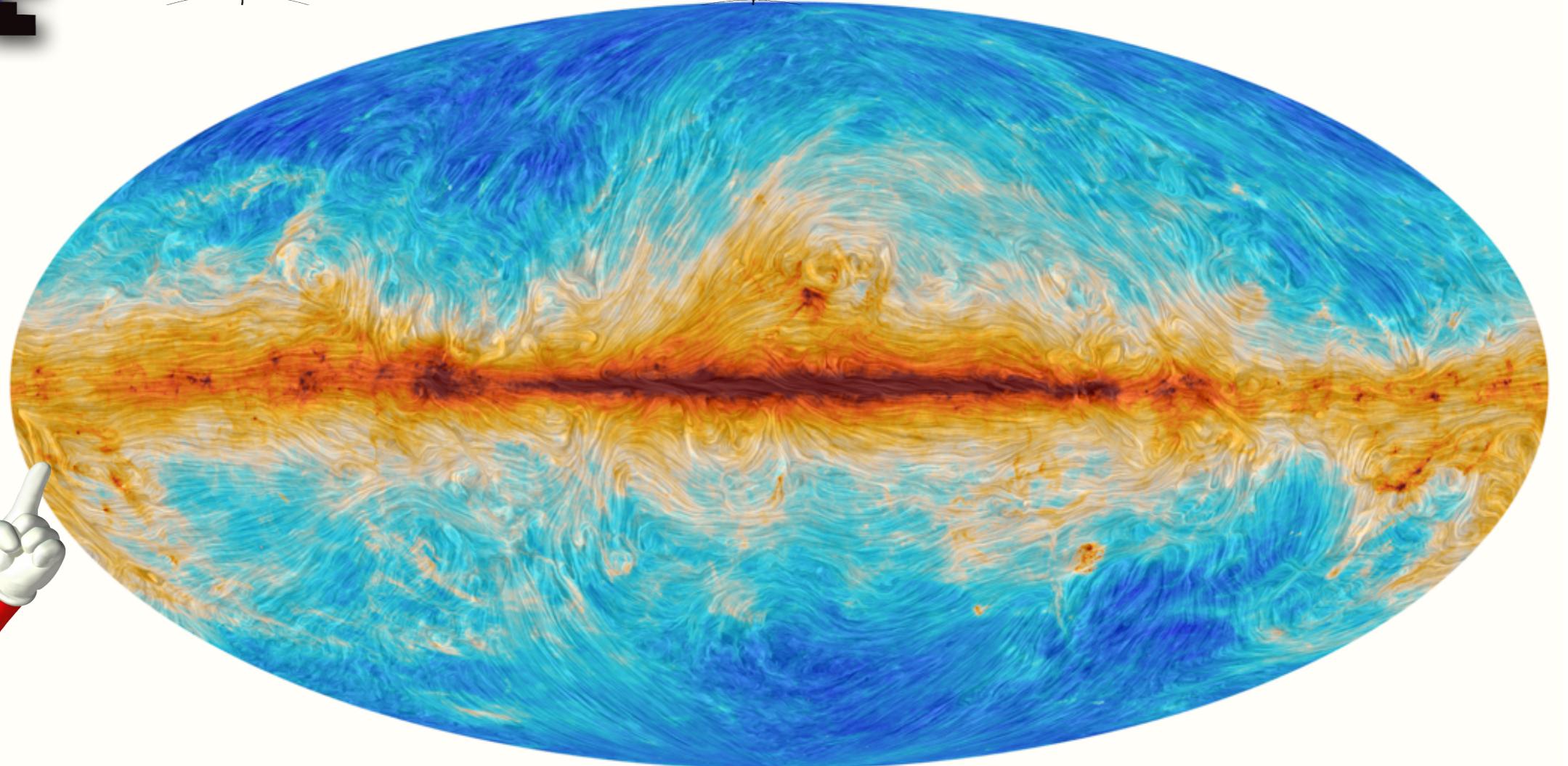


adapted from Friendly, "The Golden Age of Statistical Graphics," *Statistical Science*, 2009

1970

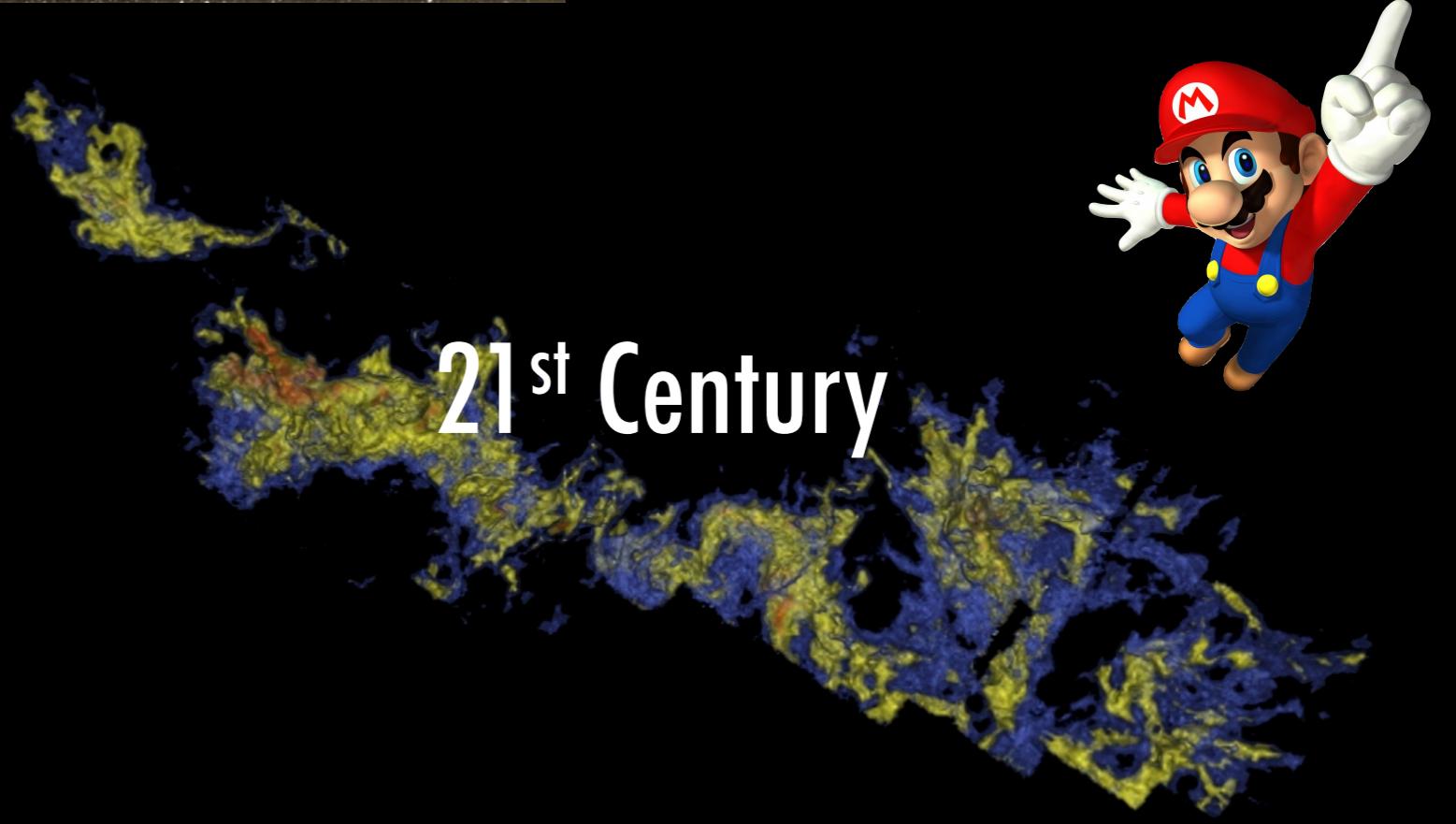


2014



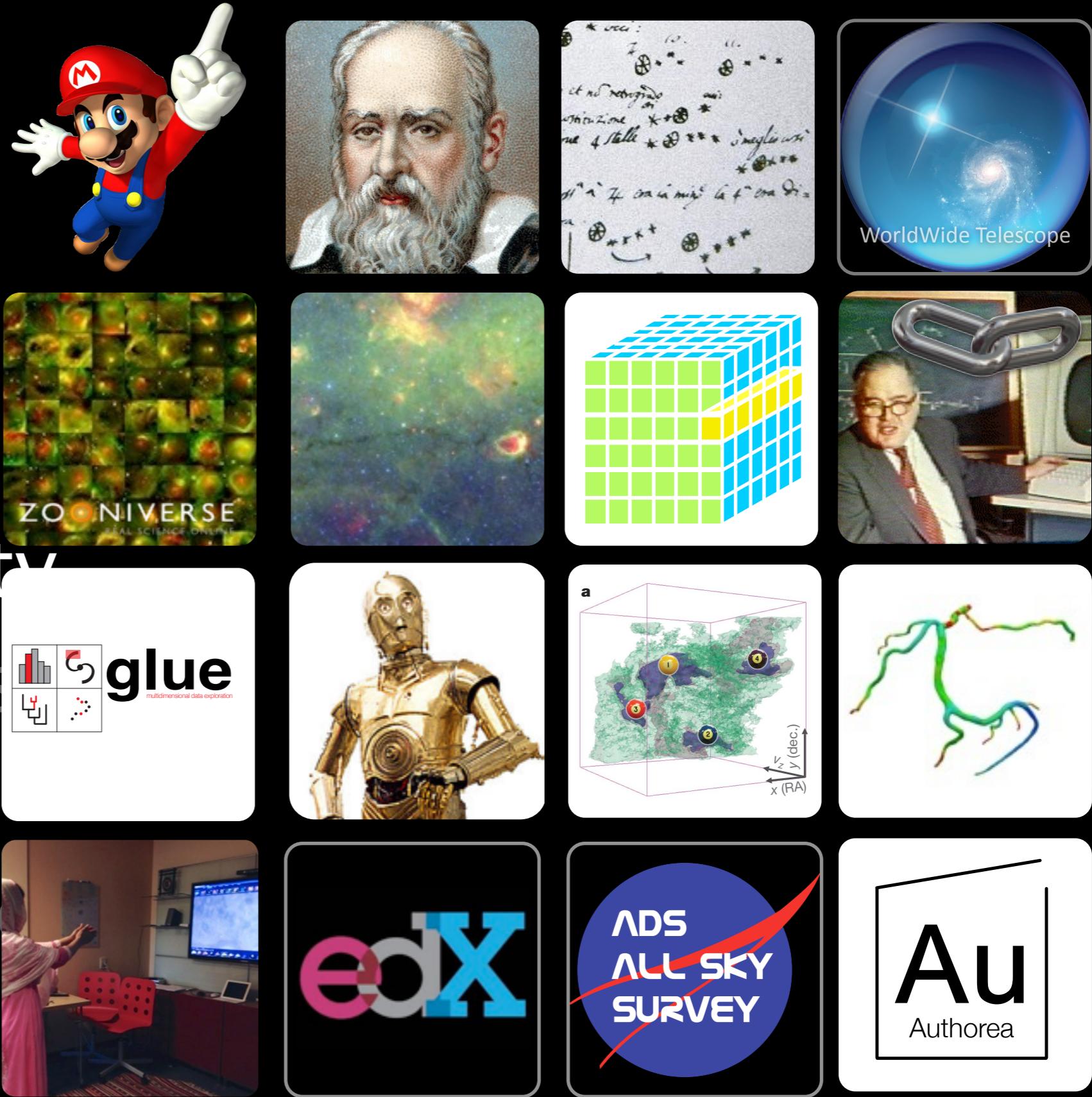


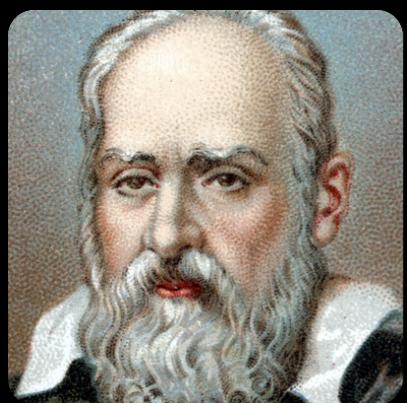
20th Century



21st Century

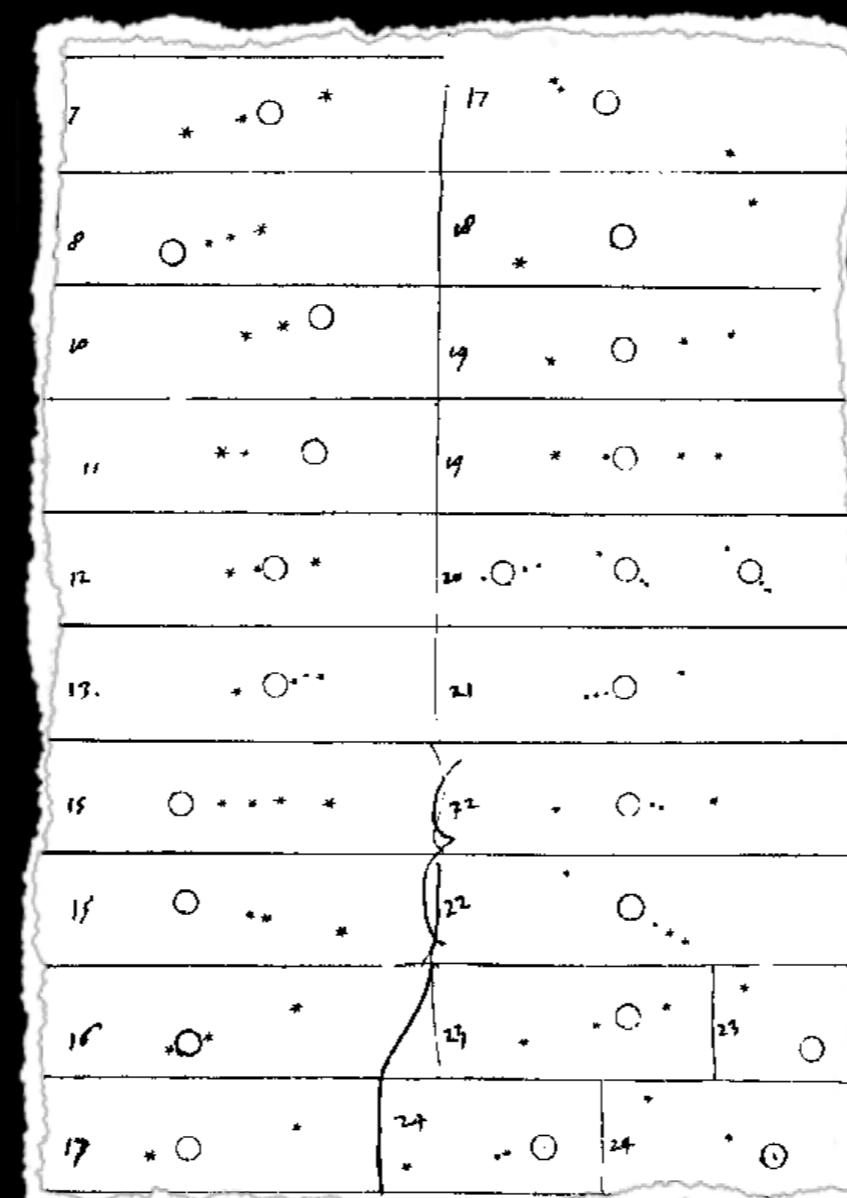
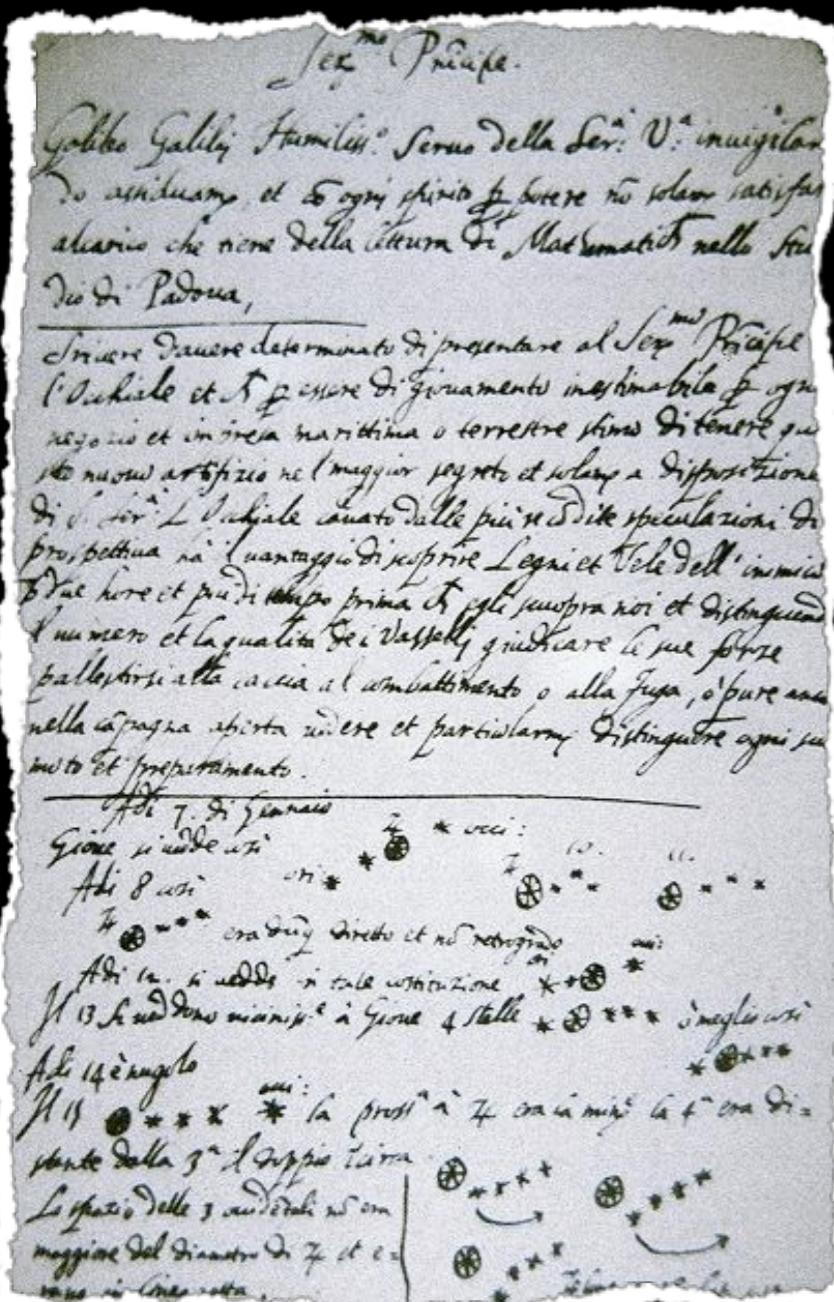
Resolution
Context
Big Data
Wide Data
Dimensionality
Linked views
Interaction
Communication
education





Galileo Galilei

(1564-1642)



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

1st * O * * We

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

last * * O * * * We

in a straight line, as in the adjoining figure. The easternmost was instant 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 magnitude 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 6 seconds apart. Jupiter was 2 minutes from the nearer eastern

last * * O * * We

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.

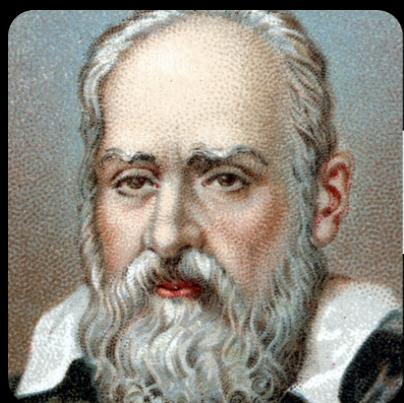
On the fifth, the sky was cloudy.

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

last * O * We

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

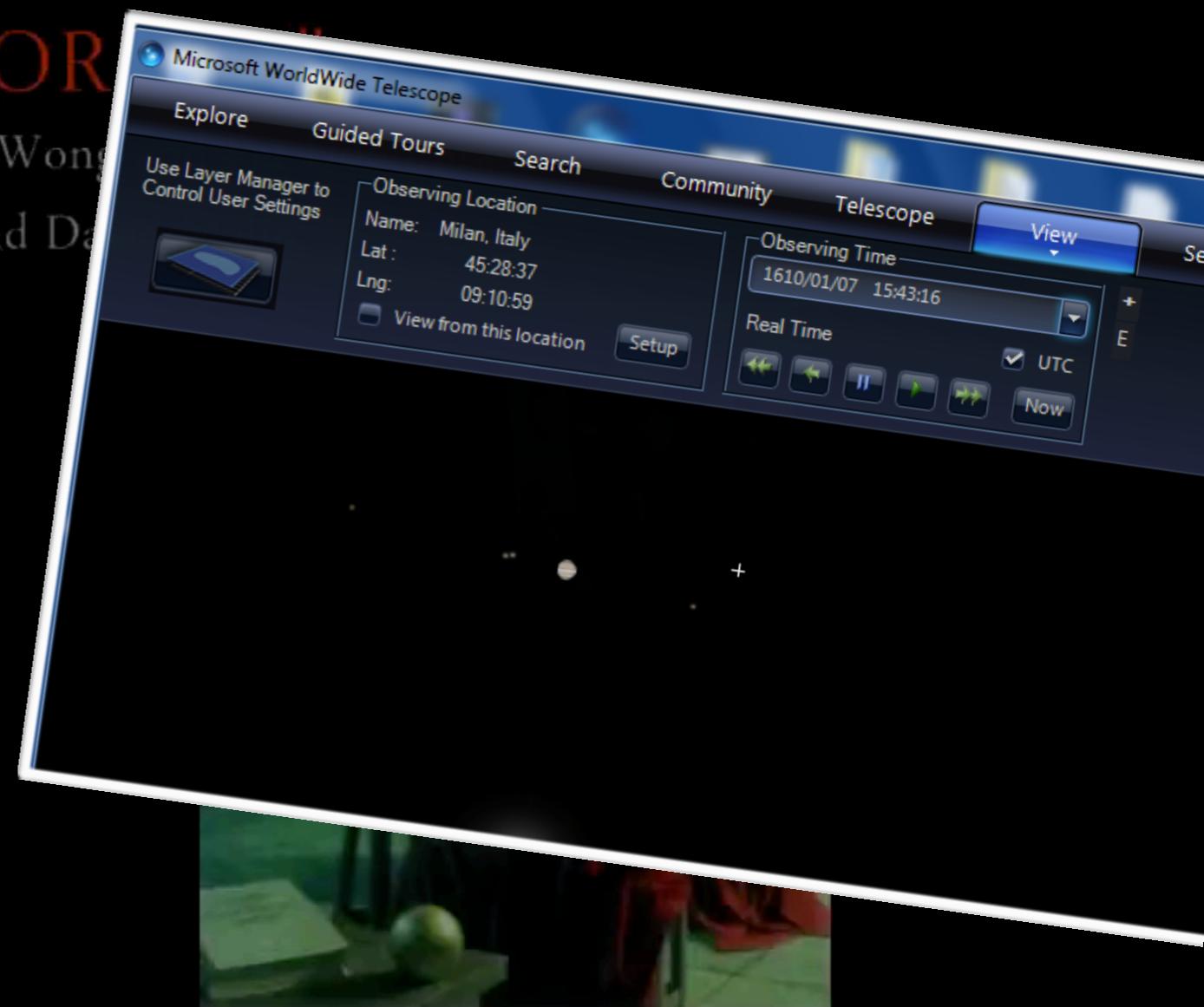


Resolution & Context



GALILEO'S "NEW ORDER"

Created by Alyssa Goodman, Curtis Wong
with advice from Owen Gingerich and David



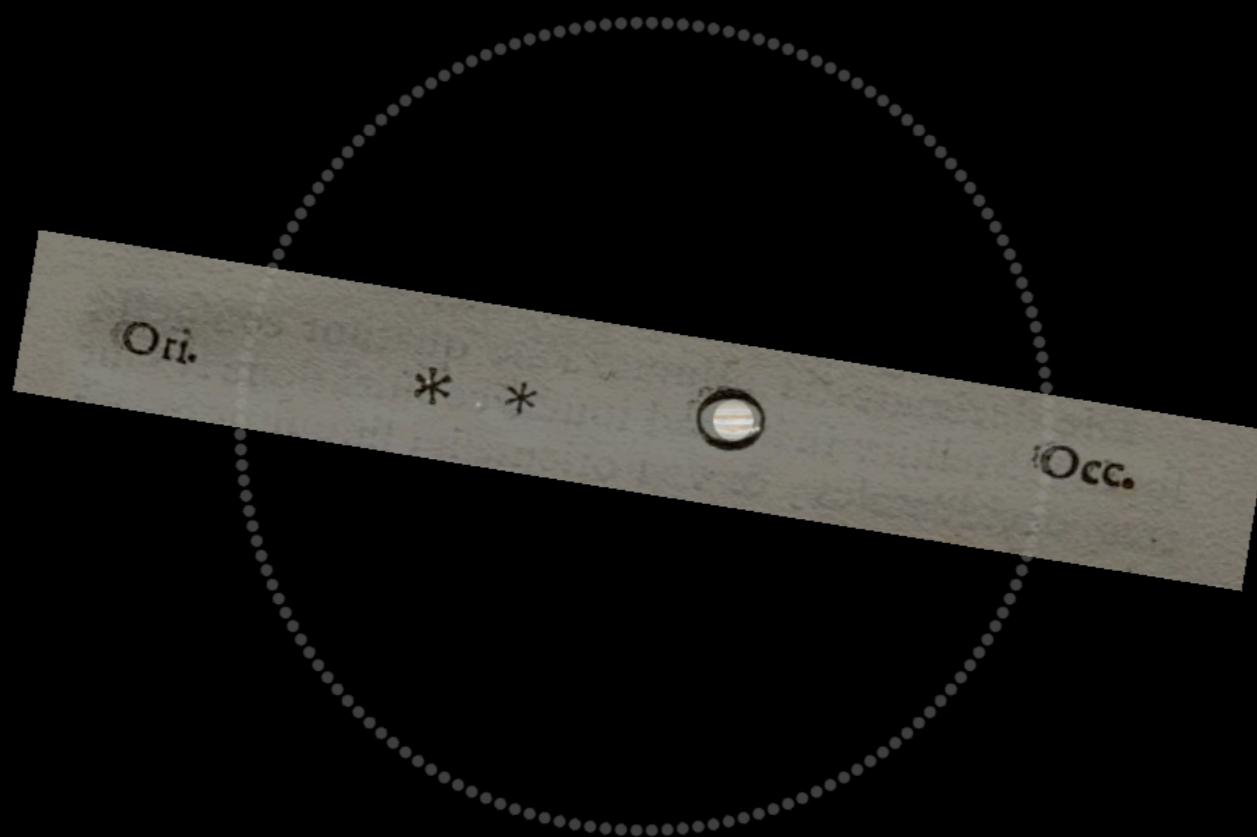
Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010
Microsoft Research WWT Software (~now "OpenWWT"): Wong (inventor), Fay (architect), et al.



Resolution & Context + Dimensionality

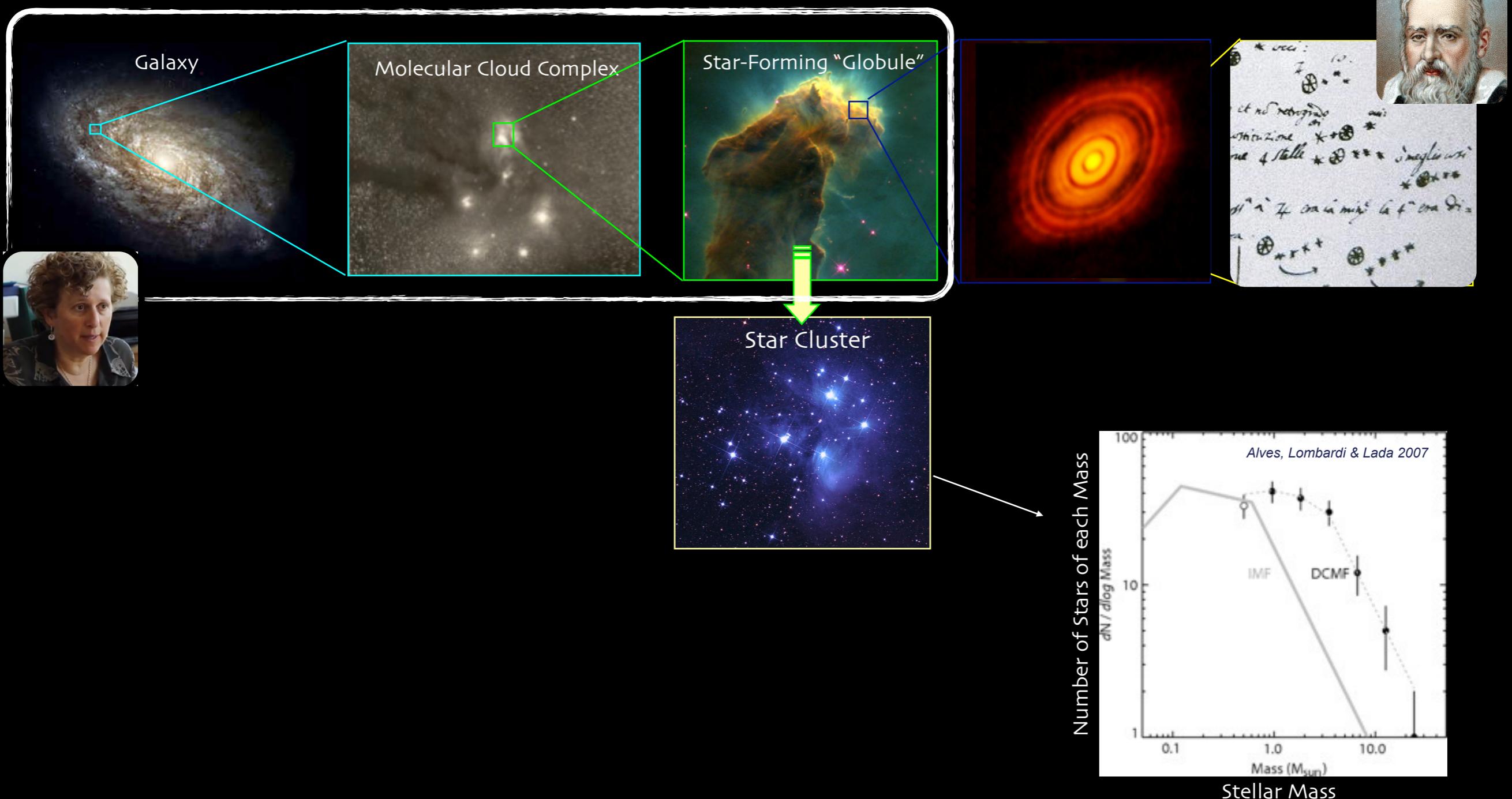


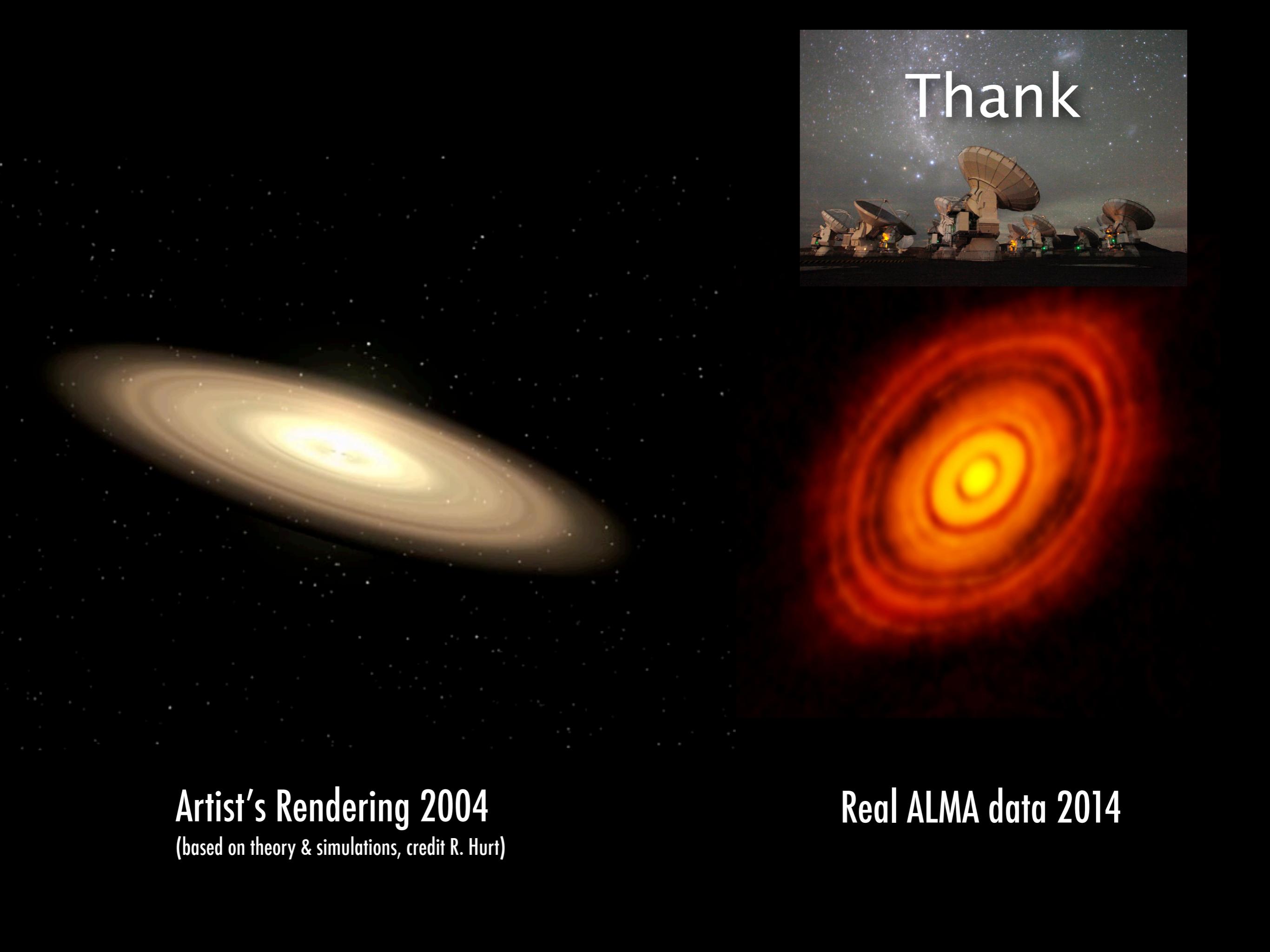
January 11, 1610



Galileo's New Order, A WorldWide Telescope Tour by Goodman, Wong & Udomprasert 2010
Microsoft Research WWT Software (~now "OpenWWT"): Wong (inventor), Fay (architect), et al.

Star & Planet formation in 1 slide



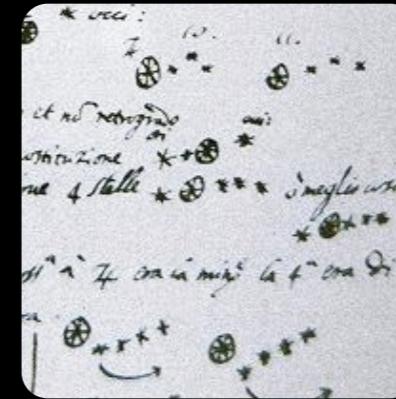
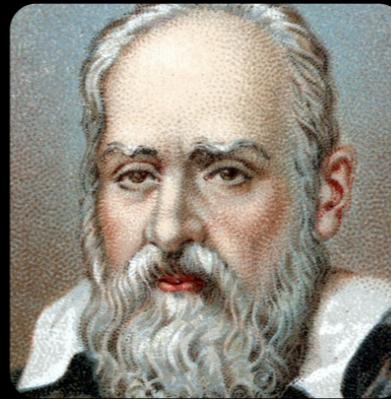


Thank

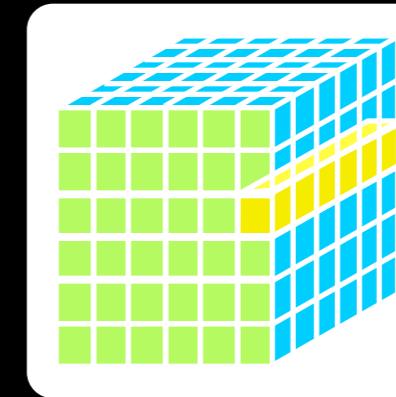
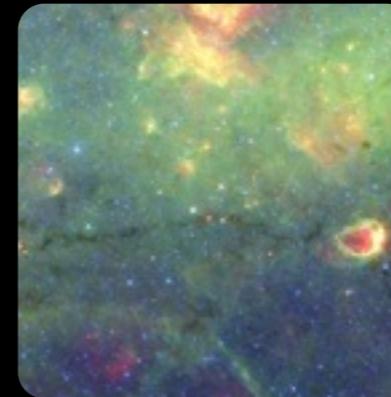
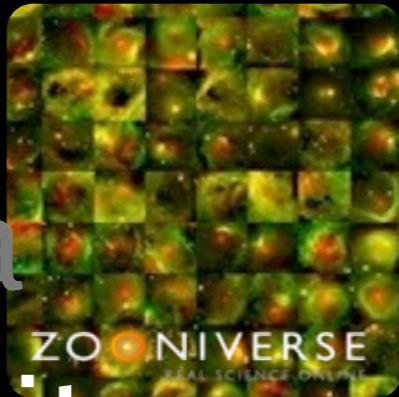
Artist's Rendering 2004
(based on theory & simulations, credit R. Hurt)

Real ALMA data 2014

Resolution
Context

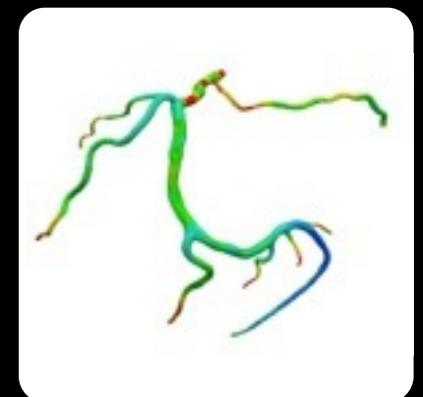
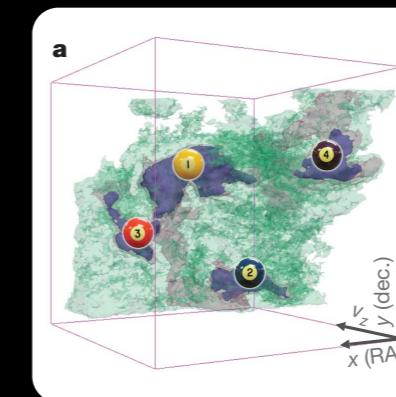
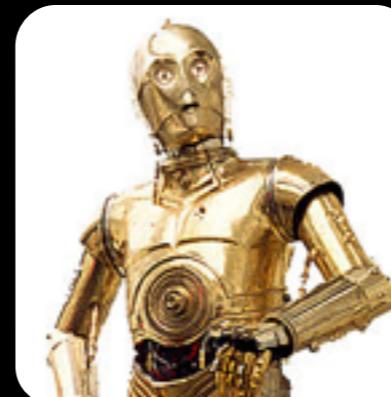
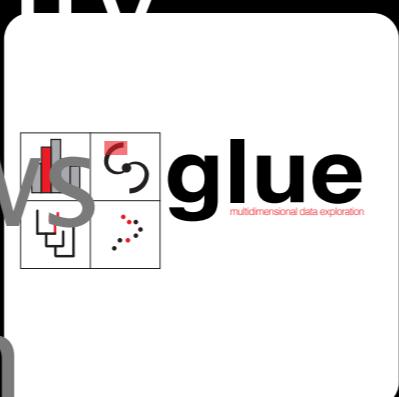


Big Data



Wide Data

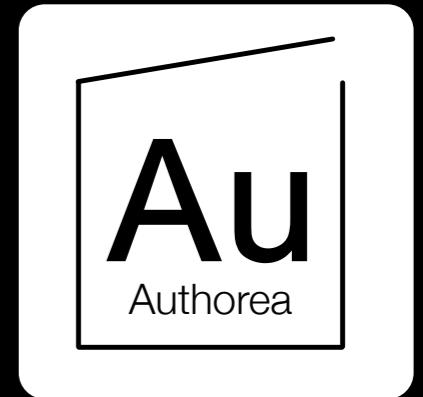
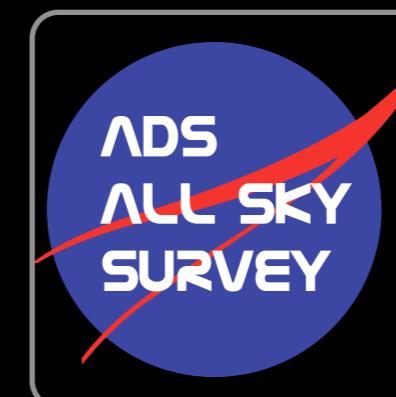
Dimensionality

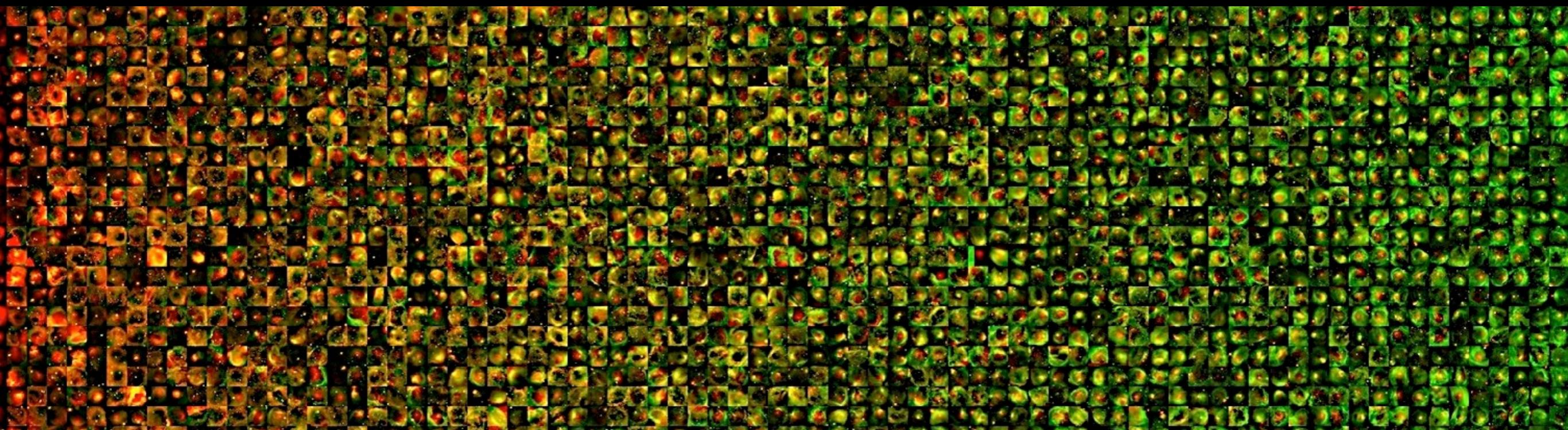
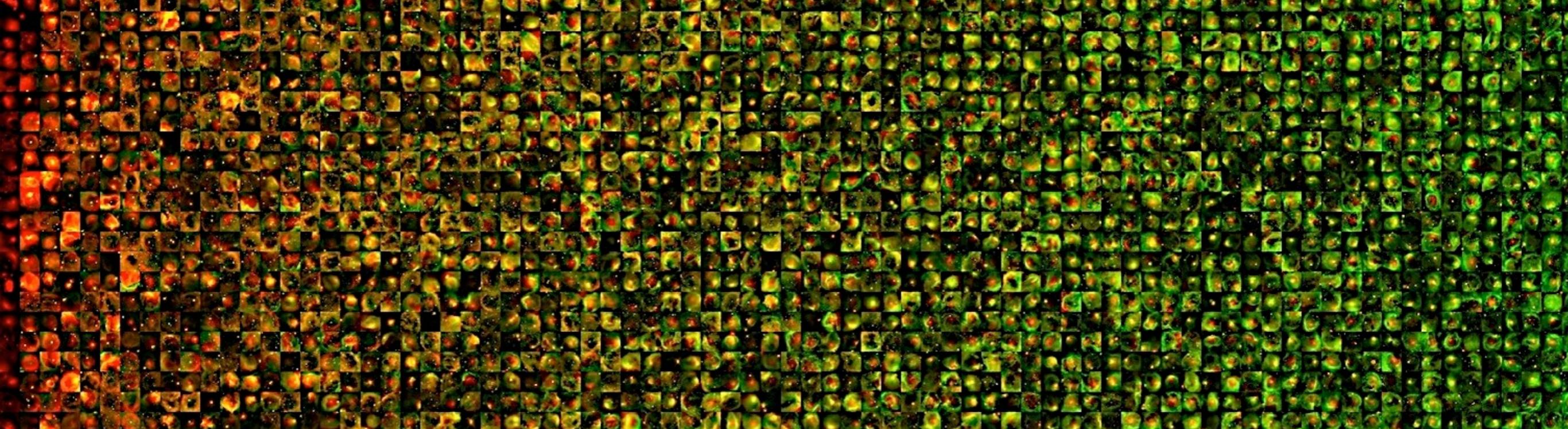


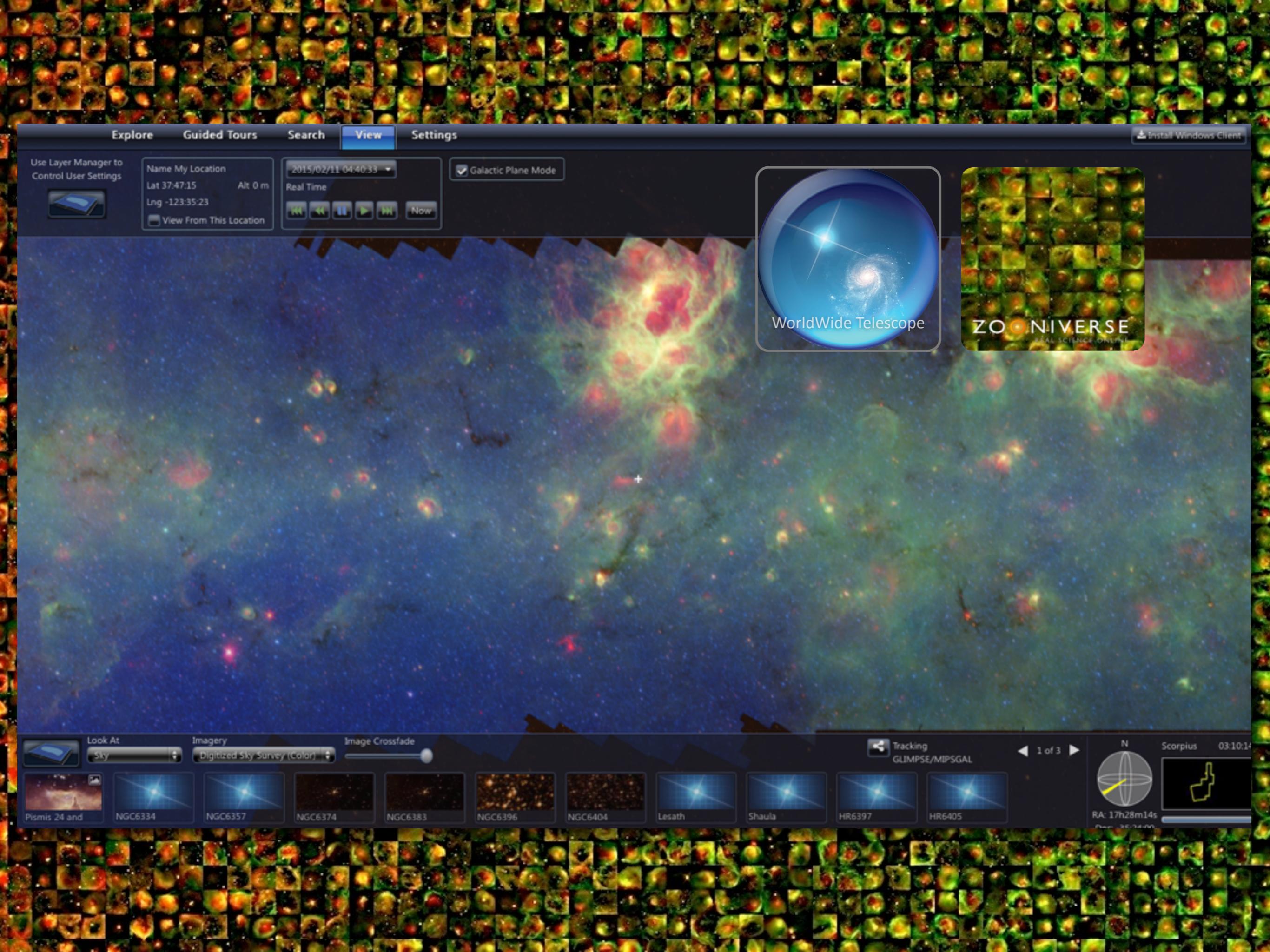
Linked views

Interaction

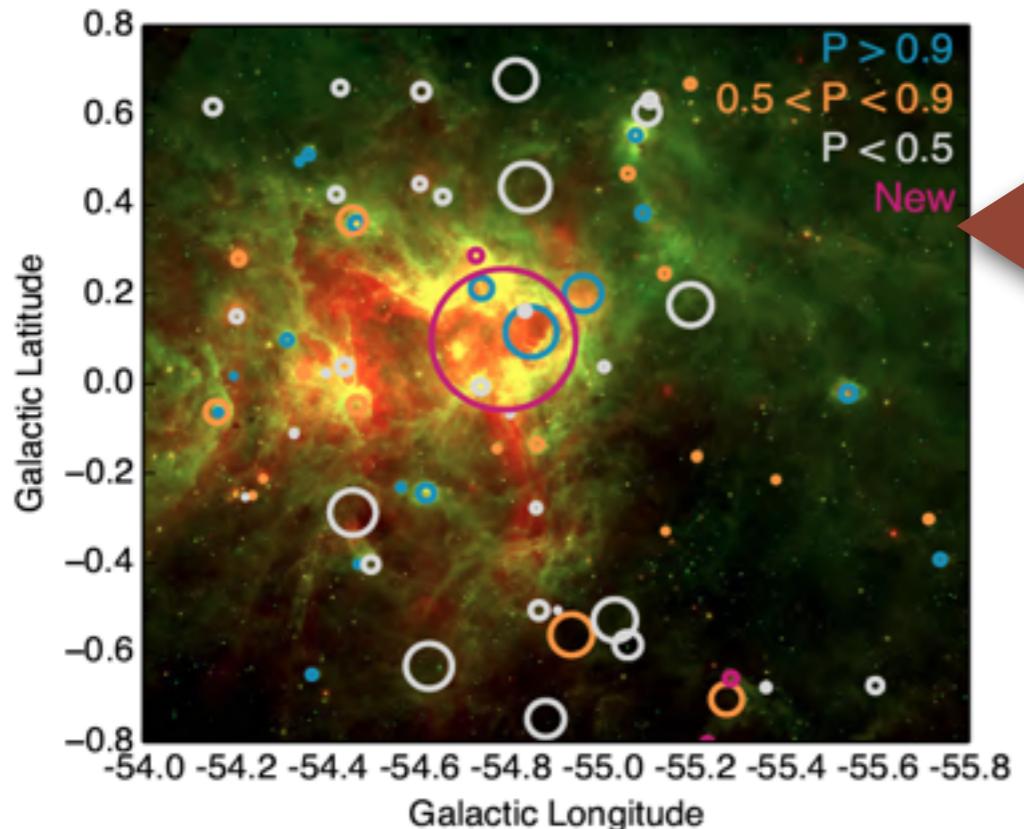
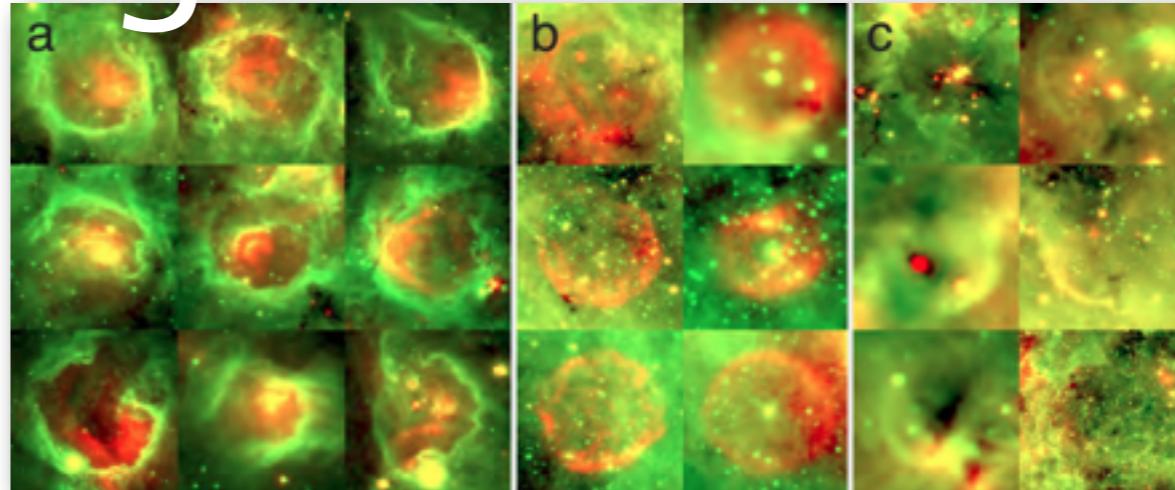
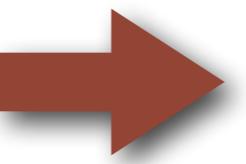
Communication
education



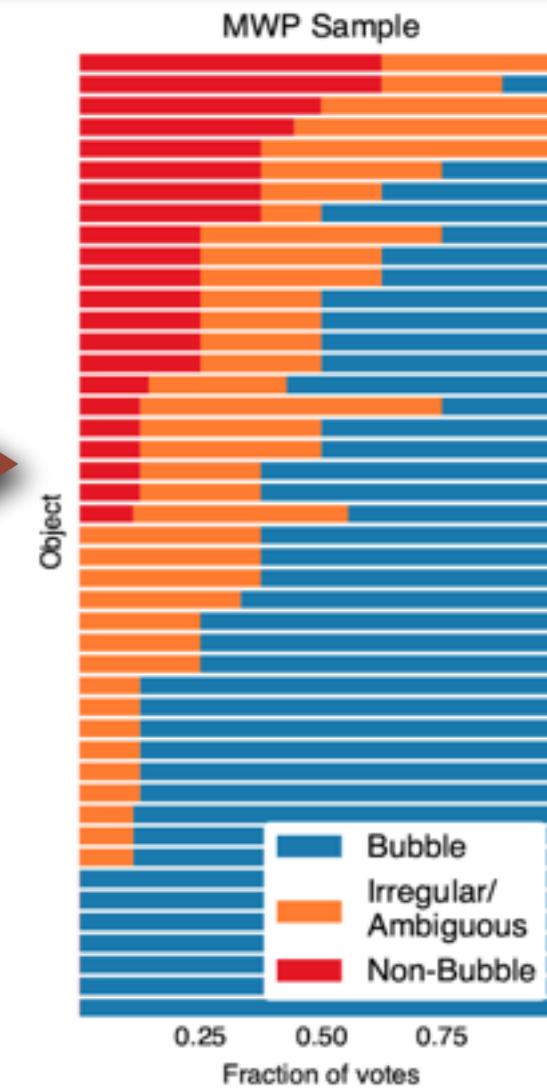
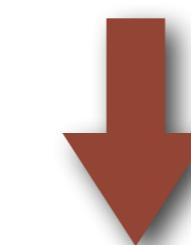




BIG DATA and Human-Aided Computing”

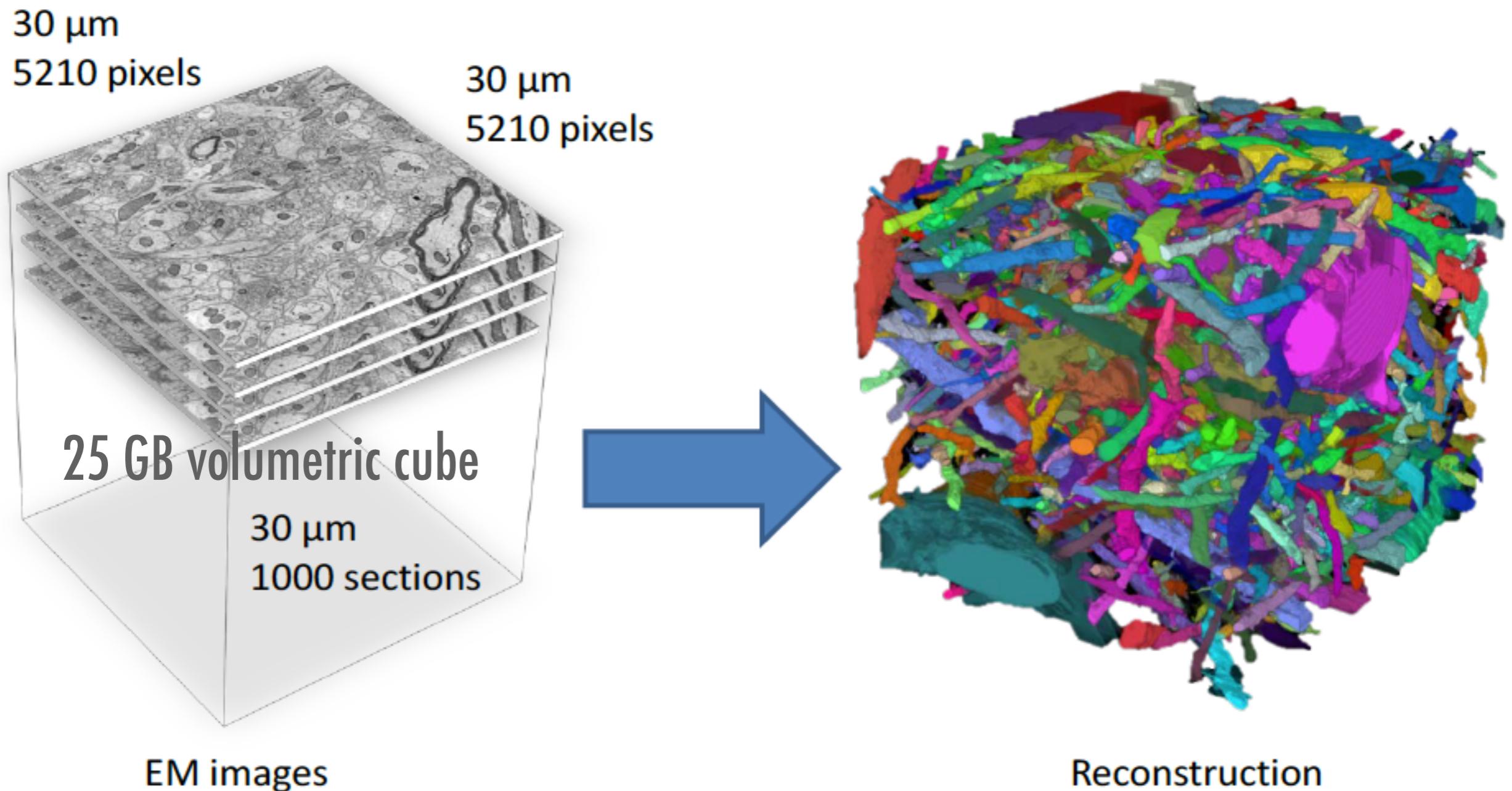


machine-learning algorithm (Brut)



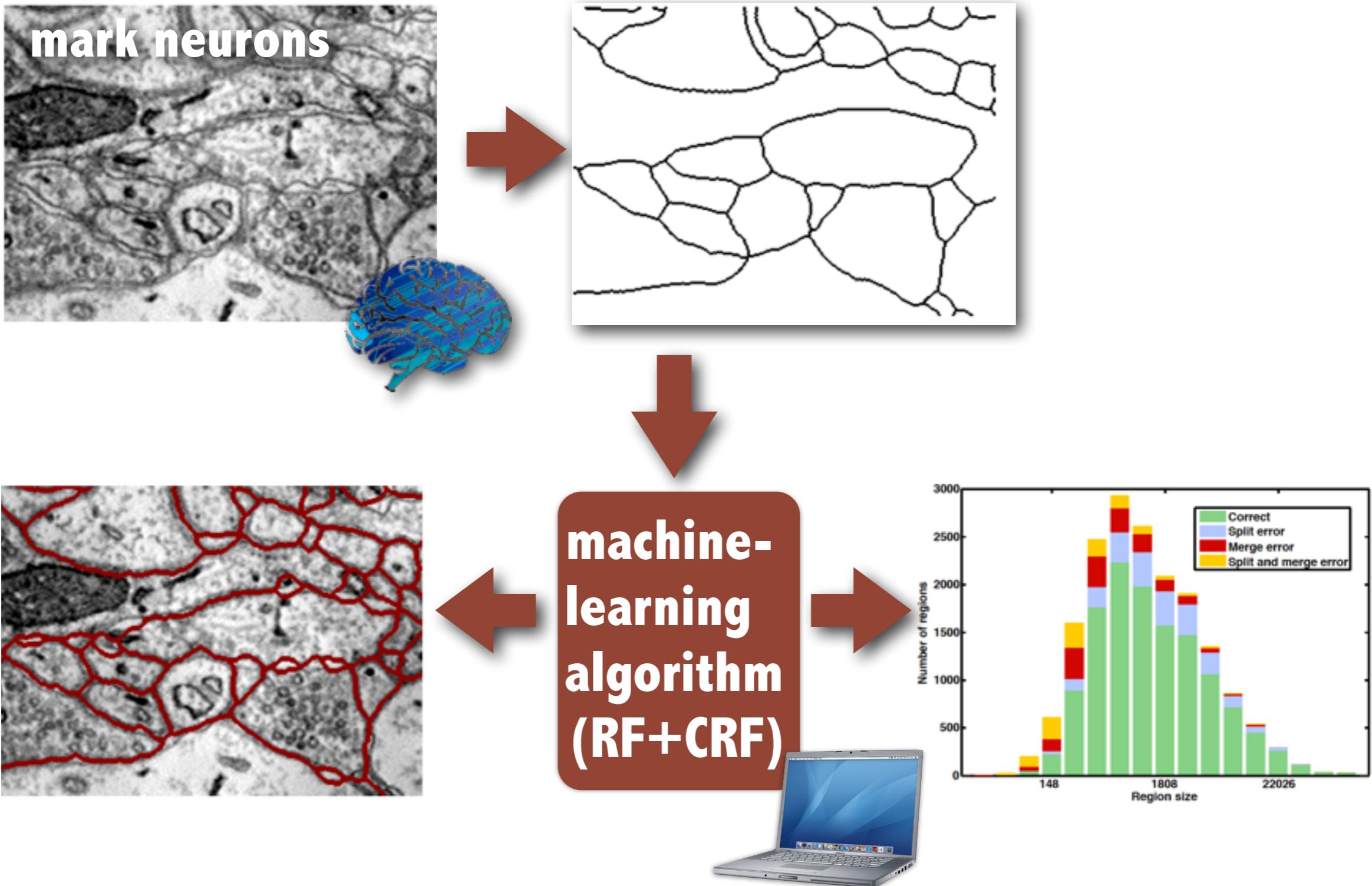
example here from: Beaumont, Goodman, Kendrew, Williams & Simpson 2014; based on Milky Way Project catalog (Simpson et al. 2013), which came from Spitzer/GLIMPSE (Churchwell et al. 2009, Benjamin et al. 2003), cf. Shenoy & Tan 2008 for discussion of HAC; astroml.org for machine learning advice/tools

BIG DATA and Human-Aided Computing”

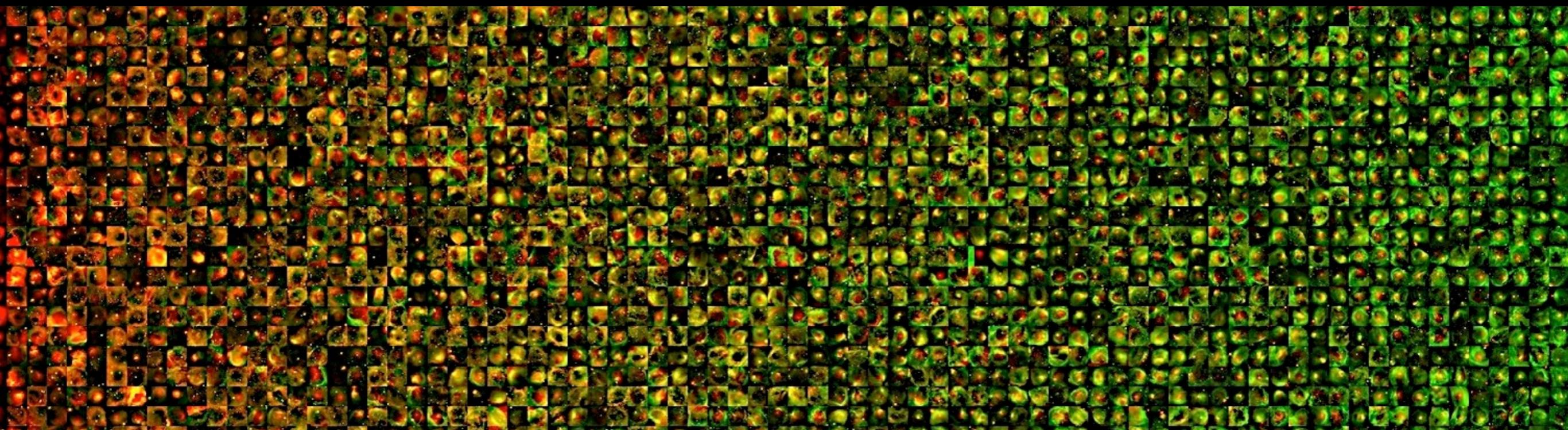
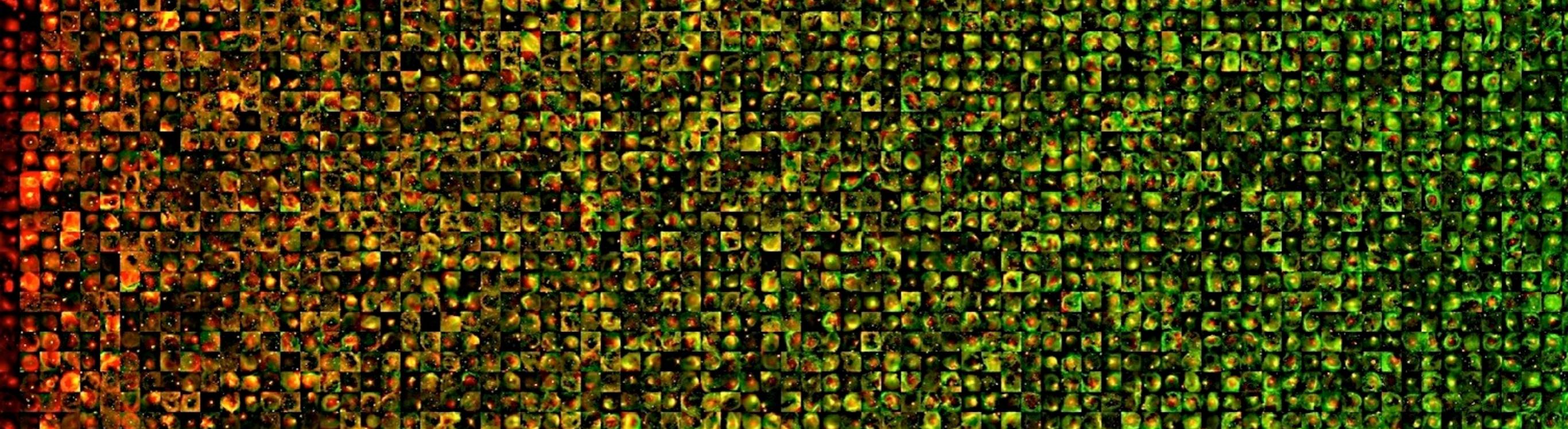


example here from: Kaynig...Lichtman...Pfister et al. 2013, “Large-Scale Automatic Reconstruction of Neuronal Processes from Electron Microscopy Images”; cf. Shenoy & Tan 2008 for discussion of HAC; astroml.org for machine learning advice/tools

BIG DATA and Human-Aided Computing”



example here from: Kaynig...Lichtman...Pfister et al. 2013, “Large-Scale Automatic Reconstruction of Neuronal Processes from Electron Microscopy Images”; cf. Shenoy & Tan 2008 for discussion of HAC; astroml.org for machine learning advice/tools (Note: RF=Random Forest; CRF=Conditional Random Fields.)

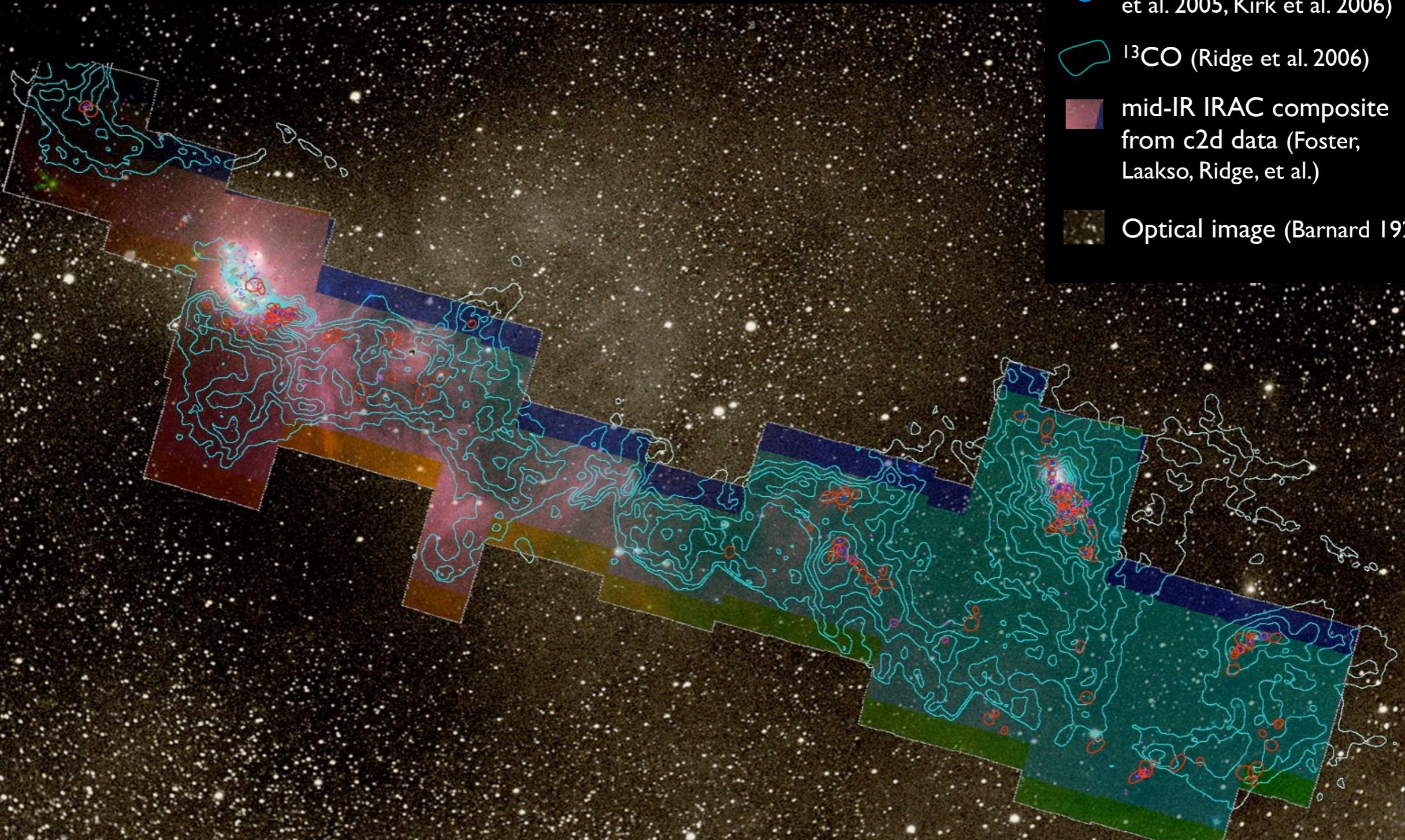


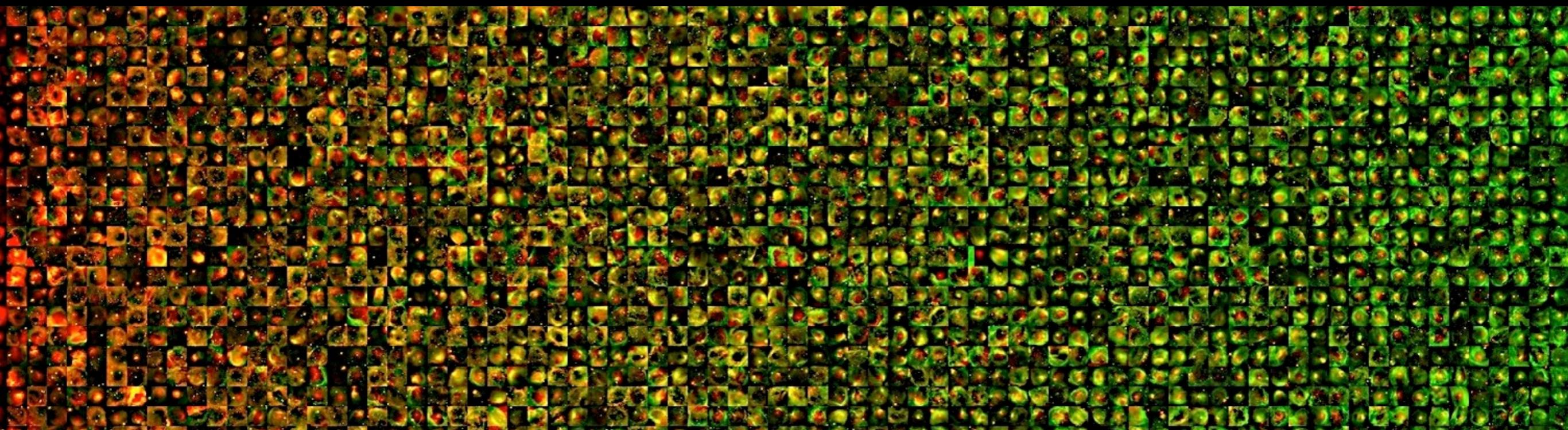
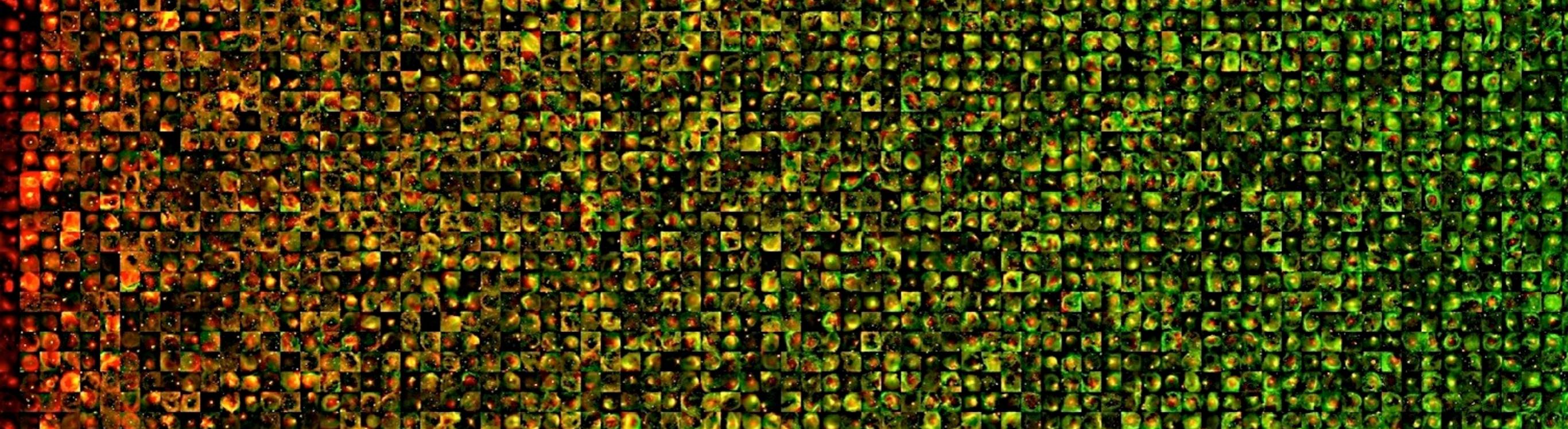
Vide Data

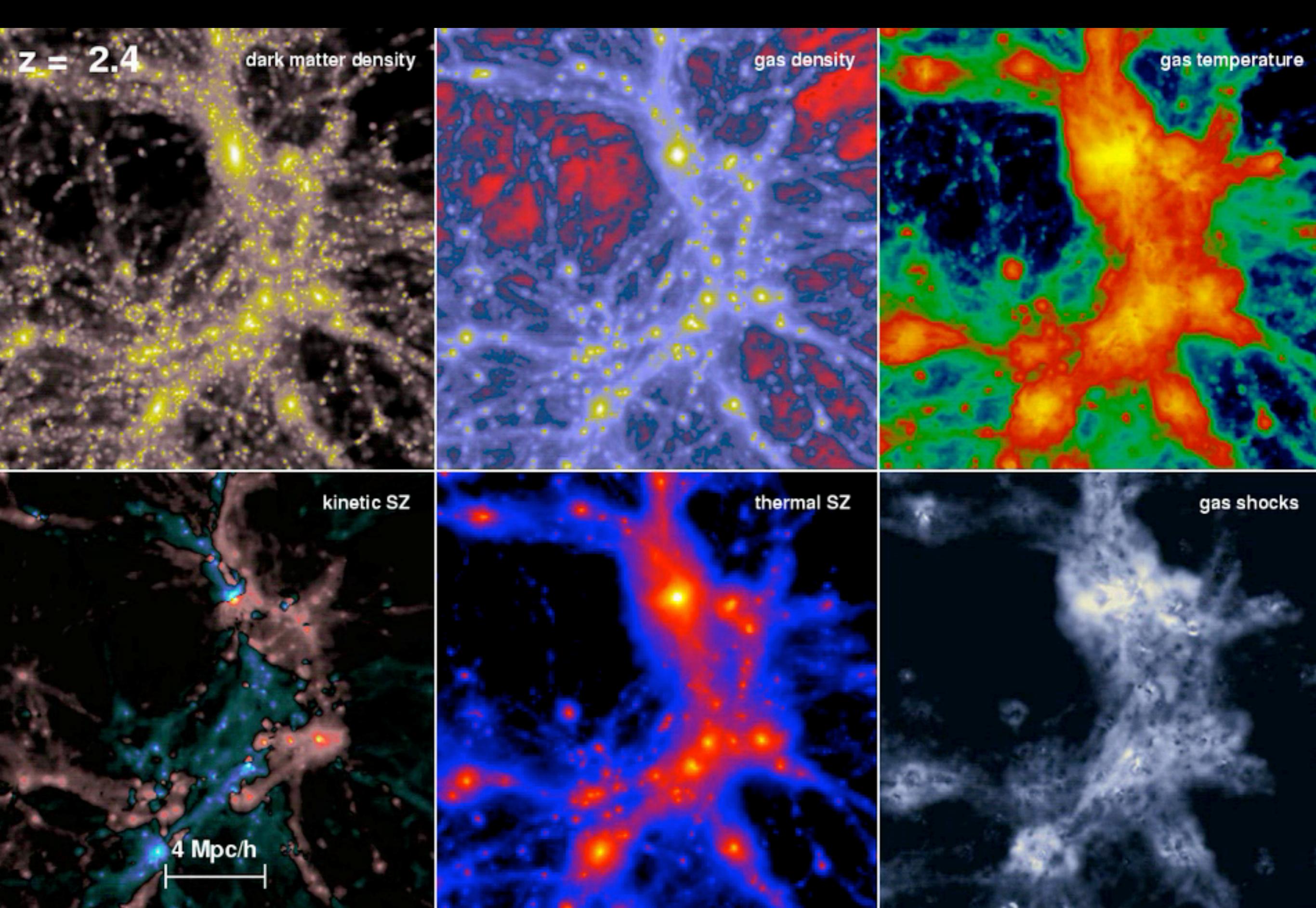
COMPLETE

- 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)

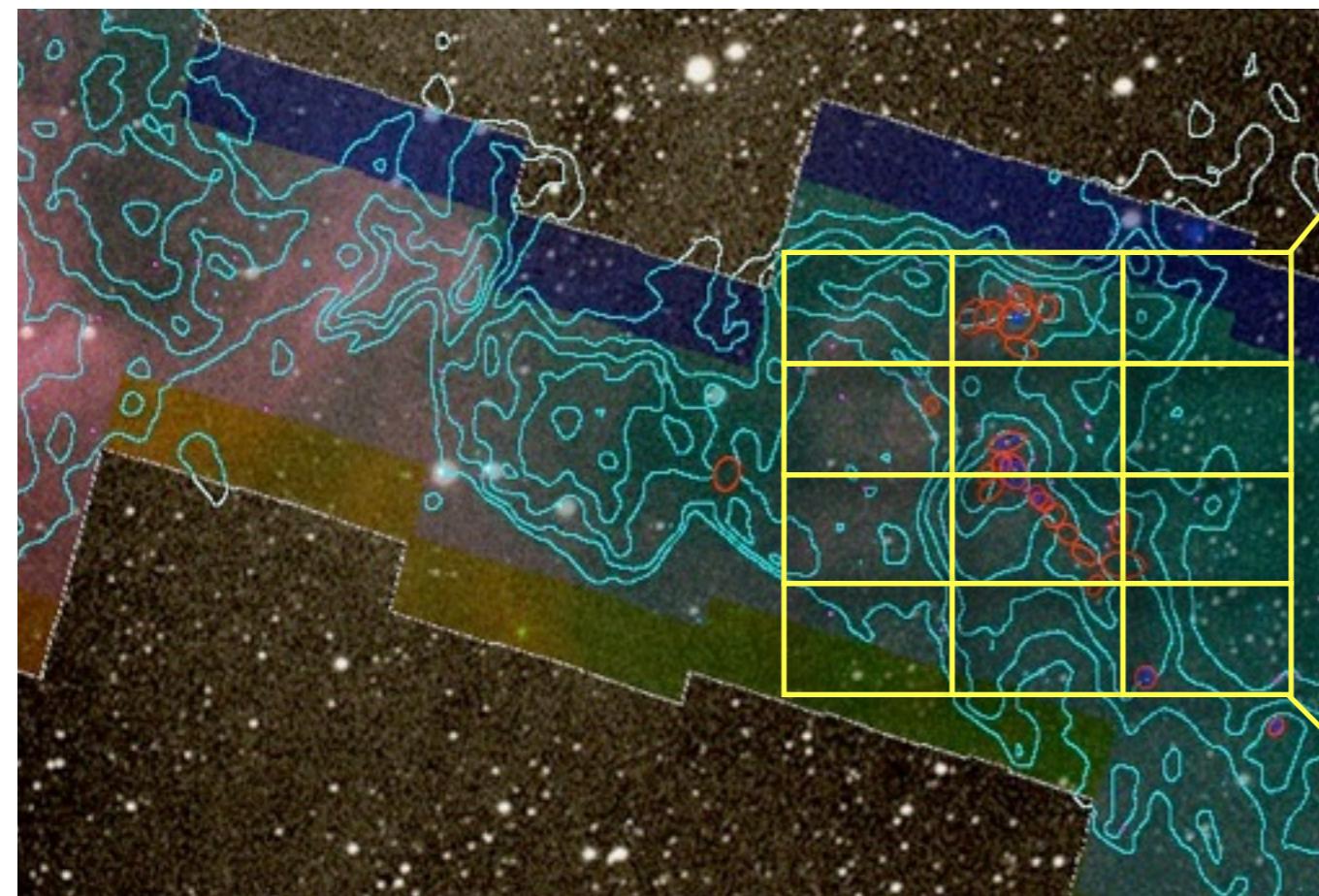
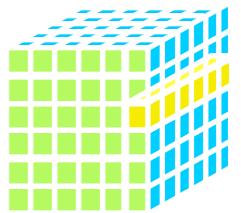




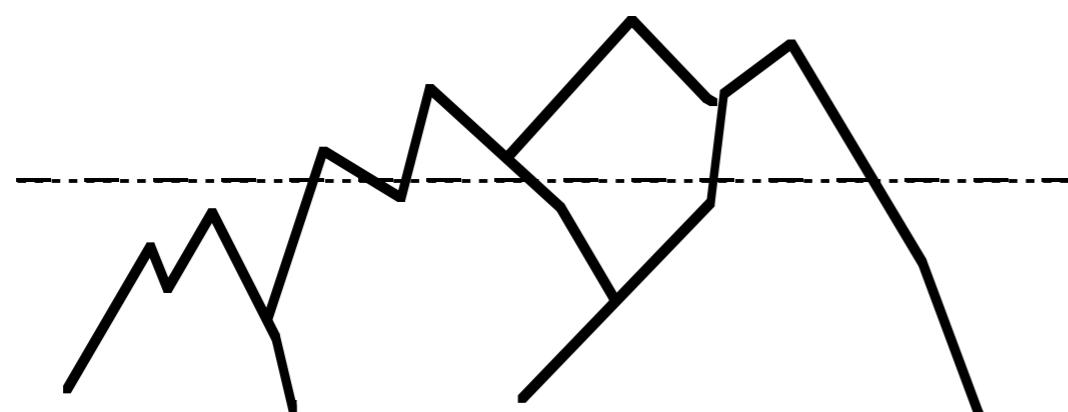
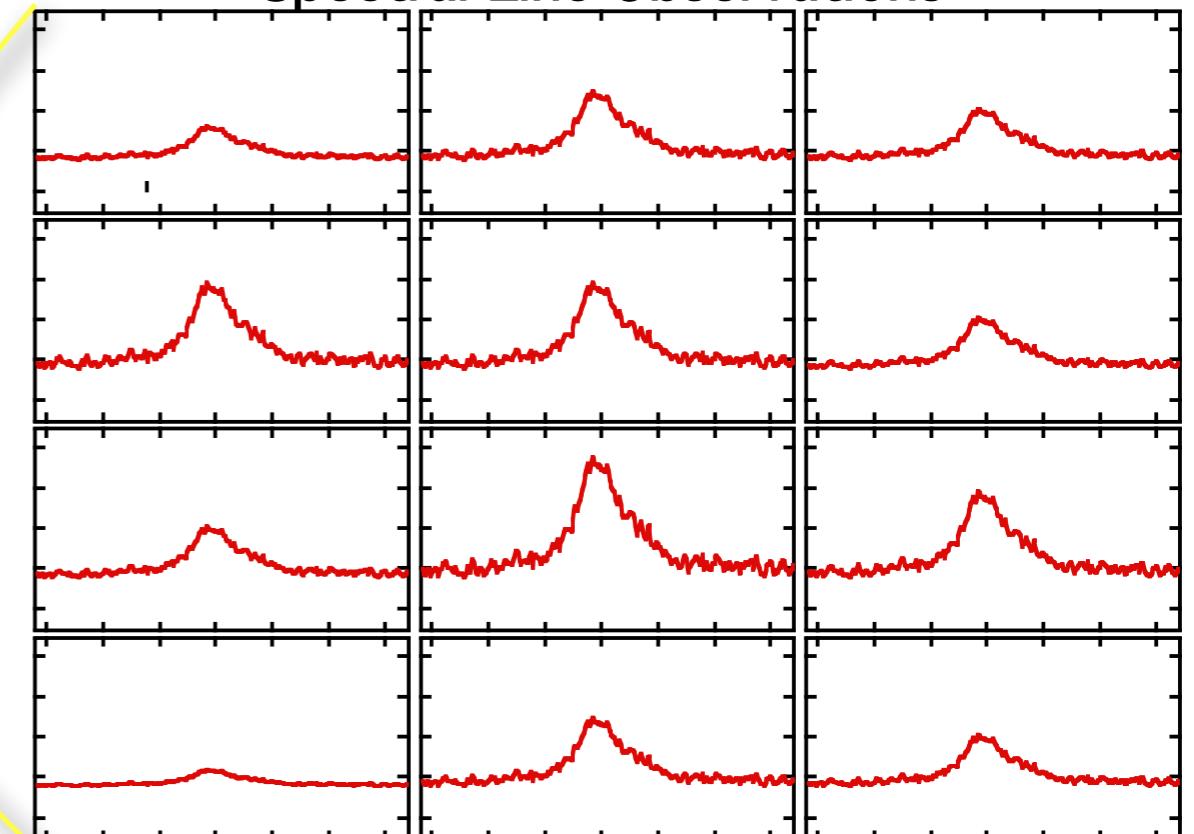


Movie: Volker Springel, formation of a cluster of galaxies. Millenium Simulation requires 25TB for output.

hidden “3D” in Astronom



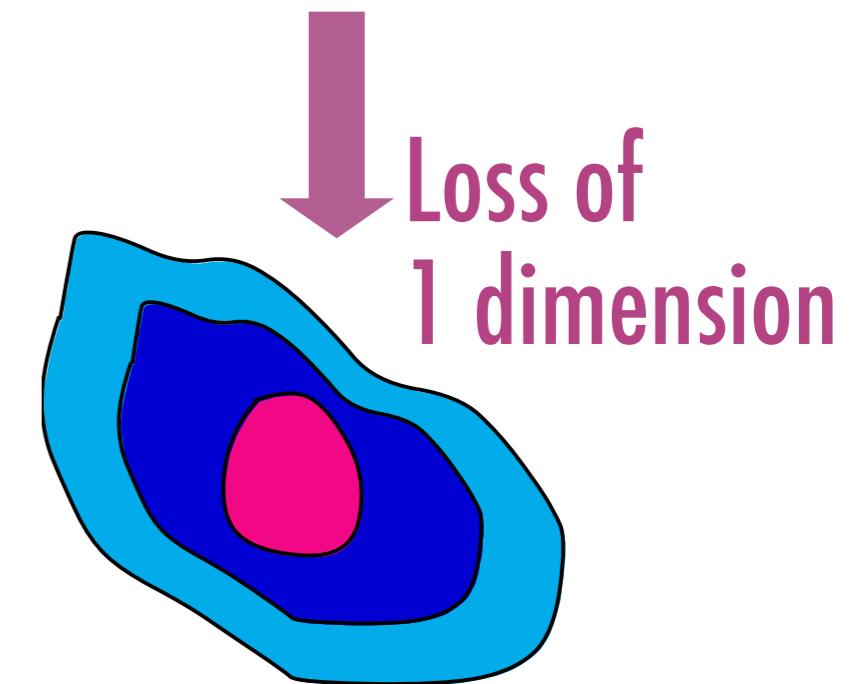
Spectral Line Observations



Mountain Range



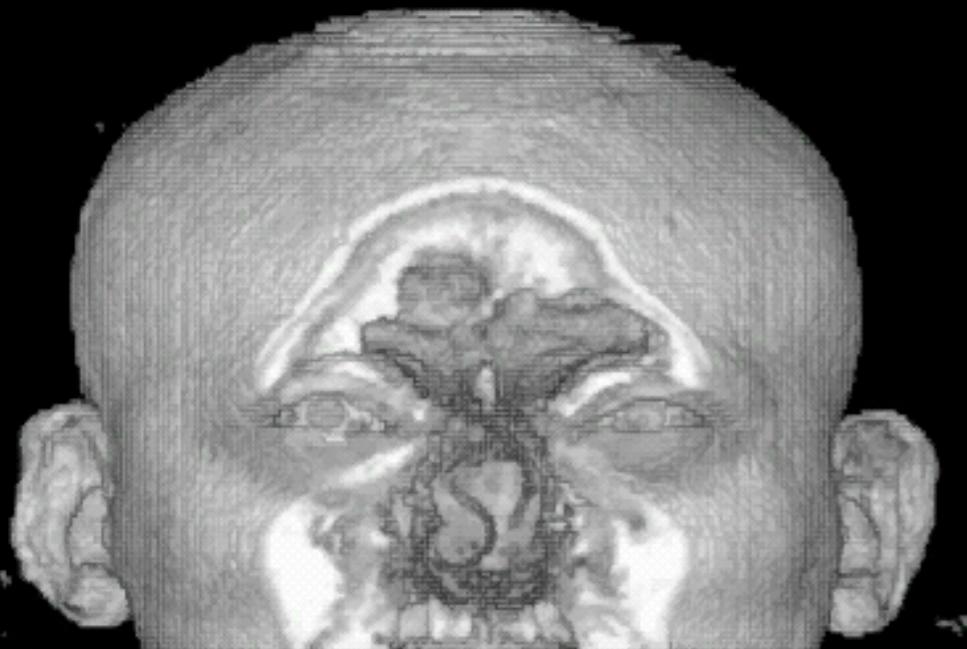
No loss of
information



Loss of
1 dimension

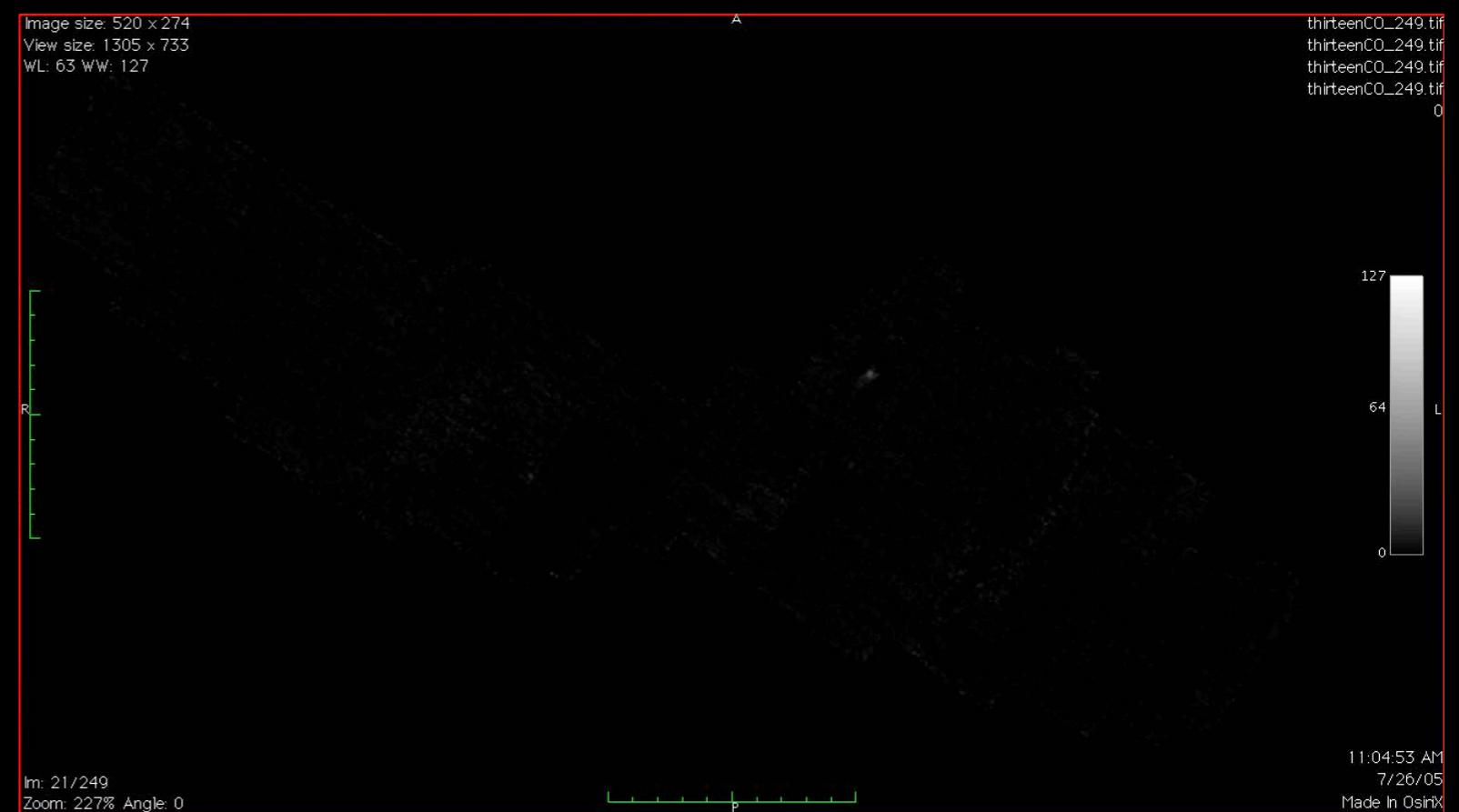
Astronomical Medicine @

“KEITH”



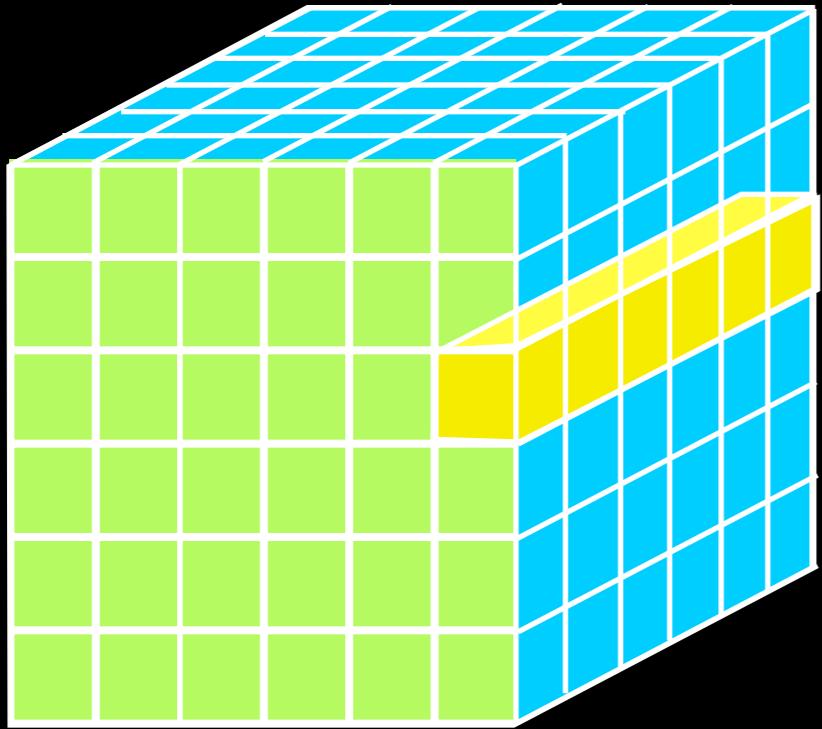
“z” is depth into head

“PERSEUS”



“z” is line-of-sight velocity

(This kind of “series of 2D slices view” is known in the Viz as “the grand tour”)

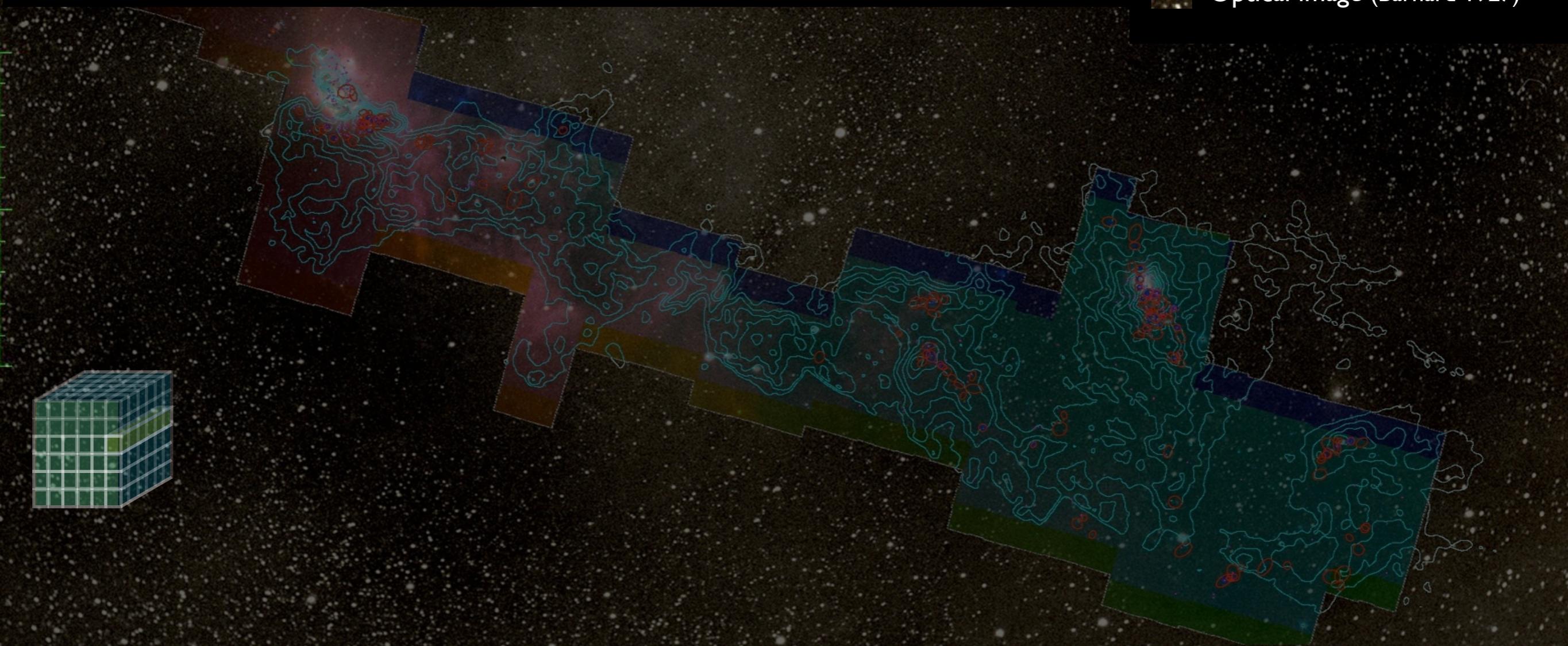


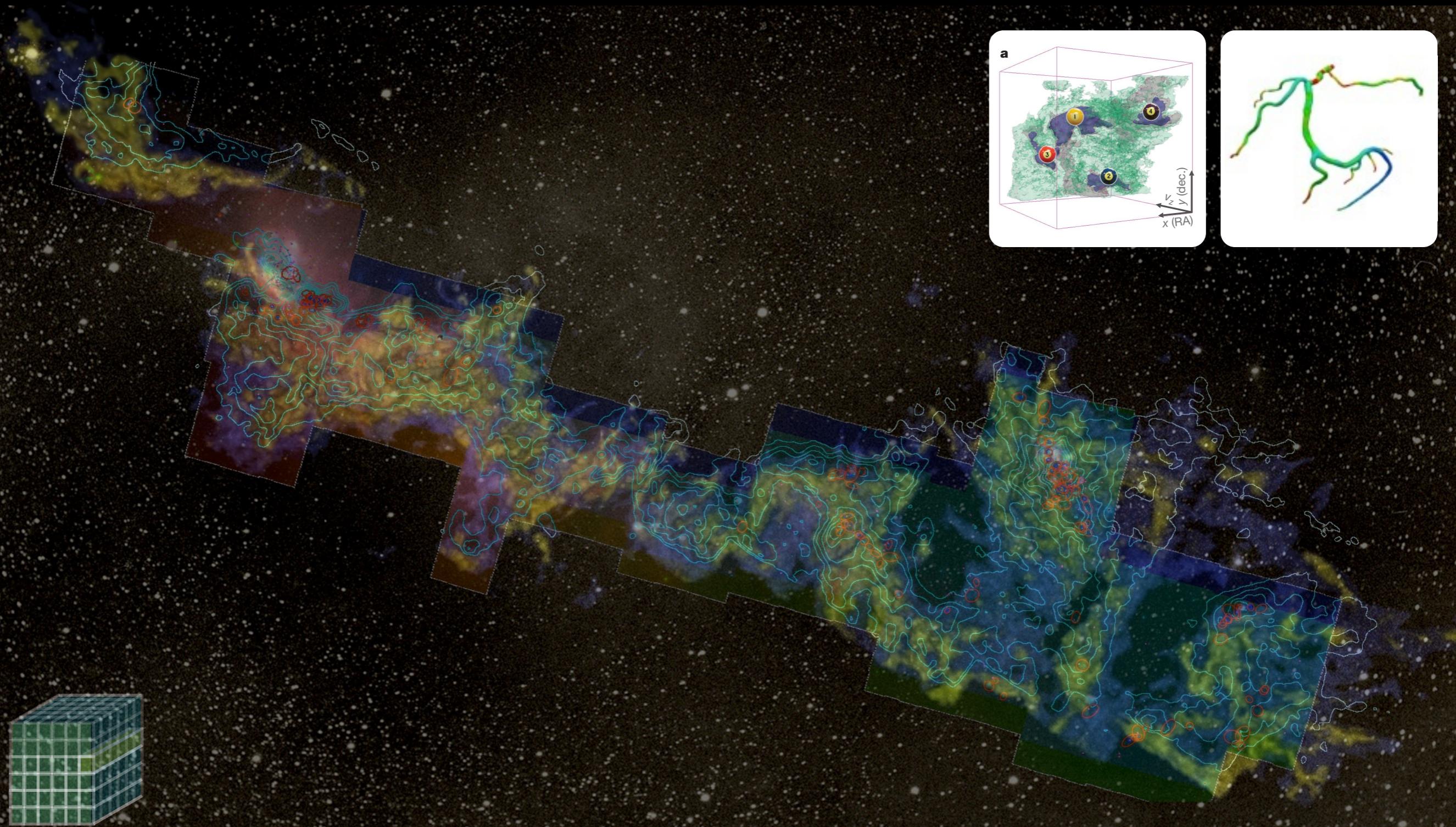
“Data, Dimensions, Display”

- 1D:** Columns = “Spectra”, “SEDs” or “Time Series” (x-y Graphs)
- 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)



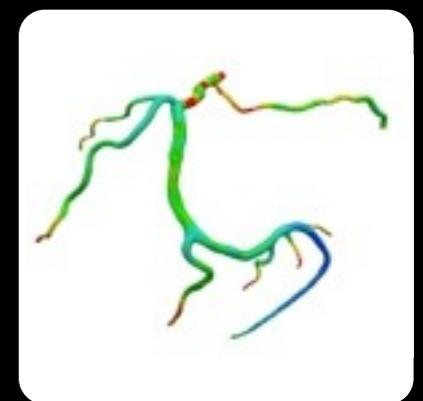
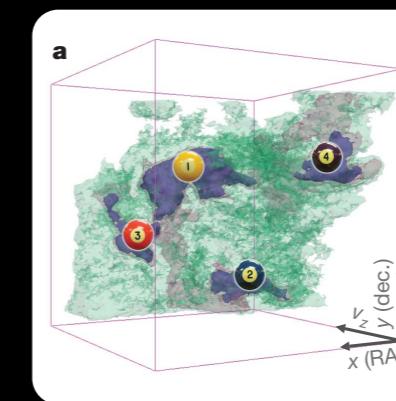
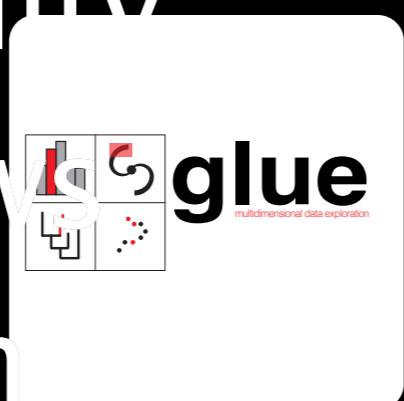
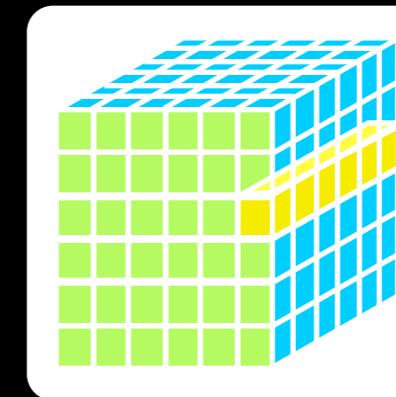
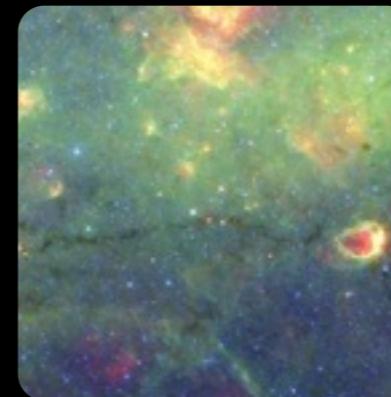
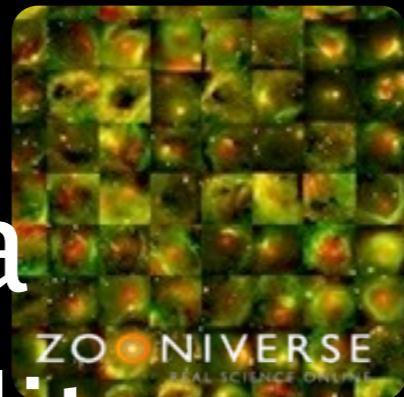
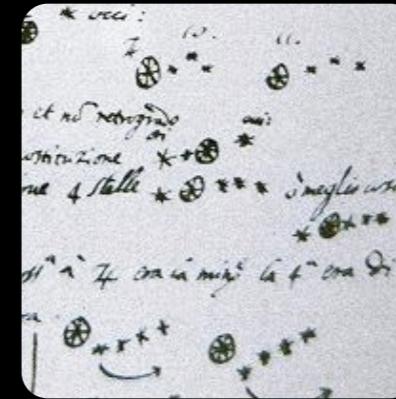
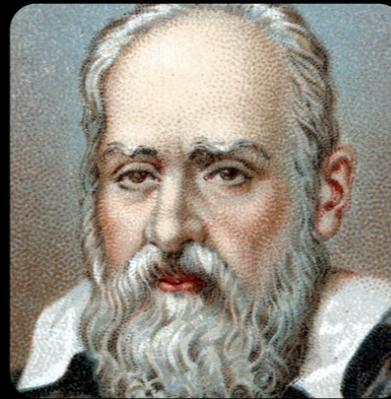


3D Viz made with VolView

Astronomical Medicine @ 

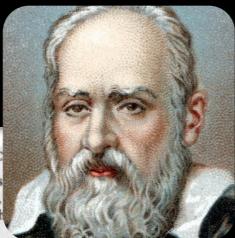
COMPLETE 

Resolution
Context
Big Data
Wide Data
Dimensionality
Linked views
Interaction
Communication
education



scholarly Communication

1610



SIDEREUS NUNC

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

East * ○ * West

10 minutes removed from this one. They were absolutely on the

same straight line and of equal magnitude.

East * * O * * West
on a straight line, as in the adjoining figure. The eastermost 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 star 30 seconds apart. Jupiter was 2 minutes from the

one, while he was 4 minutes from the next western one was 3 minutes from the westernmost one. They extended on the same straight line along the ecl. On the fifth, the sky was cloudy.

On the fifth, the sky was cloudy. On the sixth, only two stars appeared flanking Jupiter.

East * ○ *

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

On the seventh, two stars stood near Jupiter, both

1665



1895

ASTROPHYSICAL JOURNAL

AN INTERNATIONAL REVIEW OF SPECTROSCOPY
AND ASTRONOMICAL PHYSICS

VOLUME I JANUARY 1895

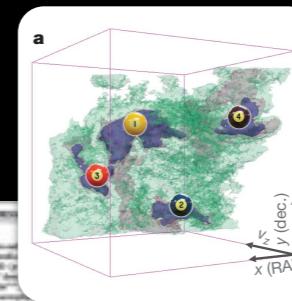
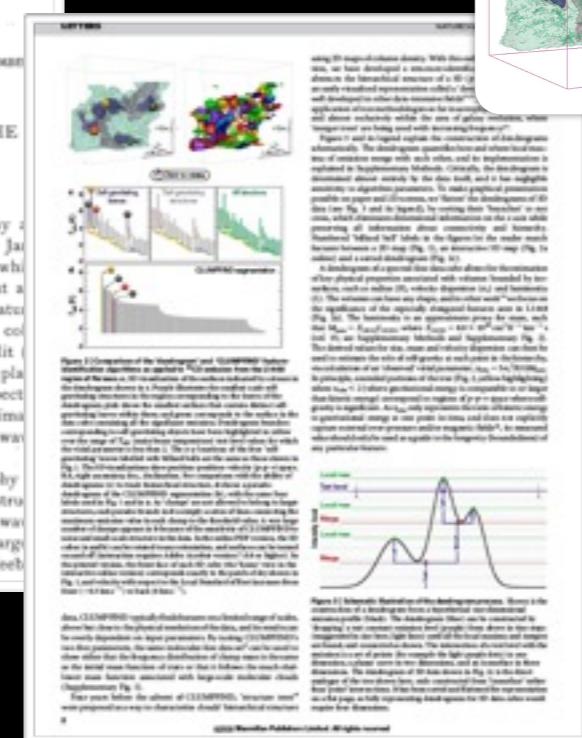
ON THE CONDITIONS WHICH AFFECT THE SPECTRO-PHOTOGRAPHY OF THE SUN.

By ALBERT A. MICHAELSON.

THE recent developments in solar spectro-photography are in great measure due to the device originally suggested by Jasen and perfected by Hale and Deslandres, by means of which a photograph of the Sun's prominences may be obtained at a time as readily as it is during an eclipse. The essential feature of this device are the simultaneous movements of the coronator-slit across the Sun's image, with that of a second slit (the focus of the photographic lens) over a photographic plate. If these relative motions are so adjusted that the same spectral line always falls on the second slit, then a photographic image of the Sun will be reproduced by light of this particular wavelength.

Evidently the process is not limited to the photography of the prominences, but extends to all other peculiarities of structure which emit radiations of approximately constant wavelength; and the efficiency of the method depends very largely upon the *contrast* which can be obtained by the greater sensitiveness

2009



2009 3D PDF interactiv- ity in a “Paper”

LETTERS

NATURE | Vol 457 | 1 January 2009

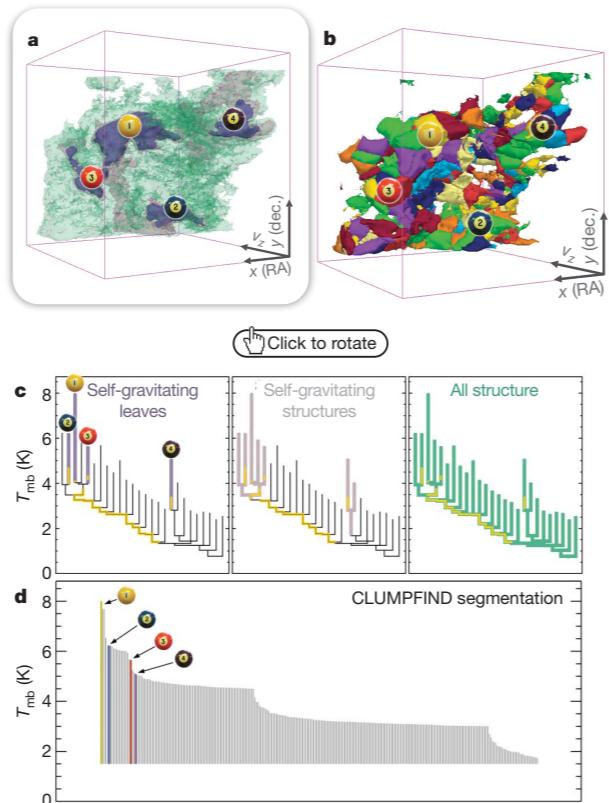


Figure 2 | Comparison of the ‘dendrogram’ and ‘CLUMPFIND’ feature-identification algorithms as applied to ^{13}CO emission from the L1448 region of Perseus. **a**, 3D visualization of the surfaces indicated by colours in the dendrogram shown in **c**. Purple illustrates the smallest scale self-gravitating 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 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 set⁸ 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 this 2D work as inspiration, we have developed a structure-identification algorithm that abstracts the hierarchical structure of a 3D data cube into an easily visualized representation called a dendrogram, well developed in other data-intensive fields. The application of tree methodologies so far has been almost exclusively within the area of ‘merger trees’ are being used with increasing frequency.

Figure 3 and its legend explain the dendrogram process schematically. The dendrogram quantifies the emission merge with each structure explained in Supplementary Methods. The emission is determined almost entirely by the sensitivity to algorithm parameters, possible on paper and 2D screen and data (see Fig. 3 and its legend) and cross, which eliminates dimensions preserving all information. Numbered ‘billiard ball’ labels features between a 2D map (online) and a sorted dendrogram.

A dendrogram of a spectrum of key physical properties of surfaces, such as radius (R), mass (M) and T_{mb} (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 $M_{\text{lum}} = X_{13\text{CO}}L_{13\text{CO}}$, where $X_{13\text{CO}} = 8.0 \times 10^{-20} \text{ cm}^2 \text{ K}^{-1} \text{ km}^{-1}$ (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, $\alpha_{\text{obs}} = 5\sigma_v^2 R/GM_{\text{lum}}$. In principle, extended portions of the tree (Fig. 2, yellow highlighting) where $\alpha_{\text{obs}} < 2$ (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 fields¹⁶, its measured value should only be used as a guide to the longevity (boundedness) of any particular feature.

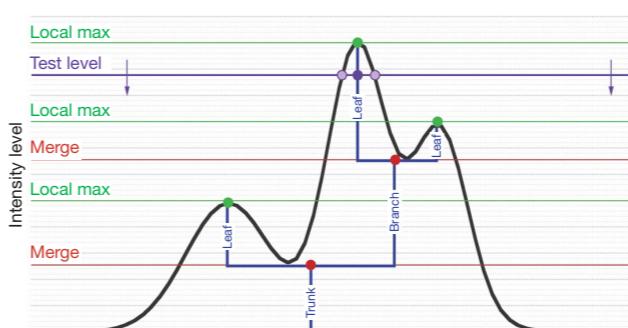


Figure 3 | Schematic illustration of the dendrogram process. Shown is the construction of a dendrogram from a hypothetical one-dimensional emission profile (black). The dendrogram (blue) can be constructed by ‘dropping’ a test constant emission level (purple) from above in tiny steps (exaggerated in 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 dendograms for 3D data cubes would require four dimensions.

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

LETTERS

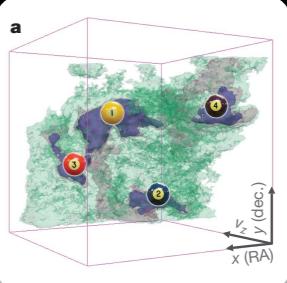
A role for self-gravity at multiple length scales in the process of star formation

Alyssa A. Goodman^{1,2}, Erik W. Rosolowsky^{1,3}, Michelle A. Borkin^{1,2}, Jonathan B. Foster², Michael Hahn^{1,4}, Jens Kauffmann^{1,2} & Jaime E. Pineda²

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 systems¹. 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 function². Here we report a ‘den-drogram’ (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 emission³ are projected on the sky within one of the dendrogram’s self-gravitating ‘leaves’. As these peaks mark the locations of the stellar initial mass function⁴.



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



LETTERS

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

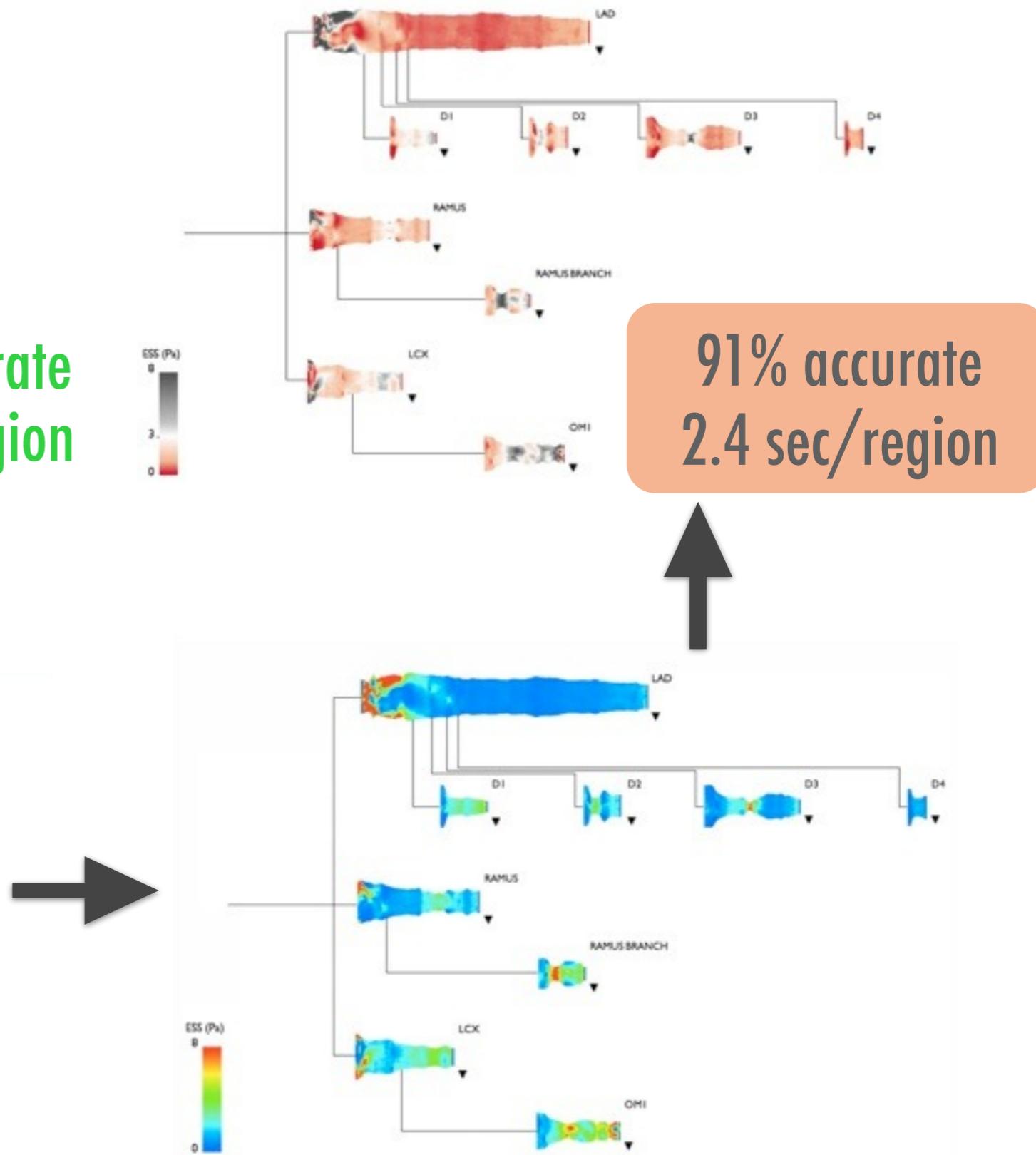
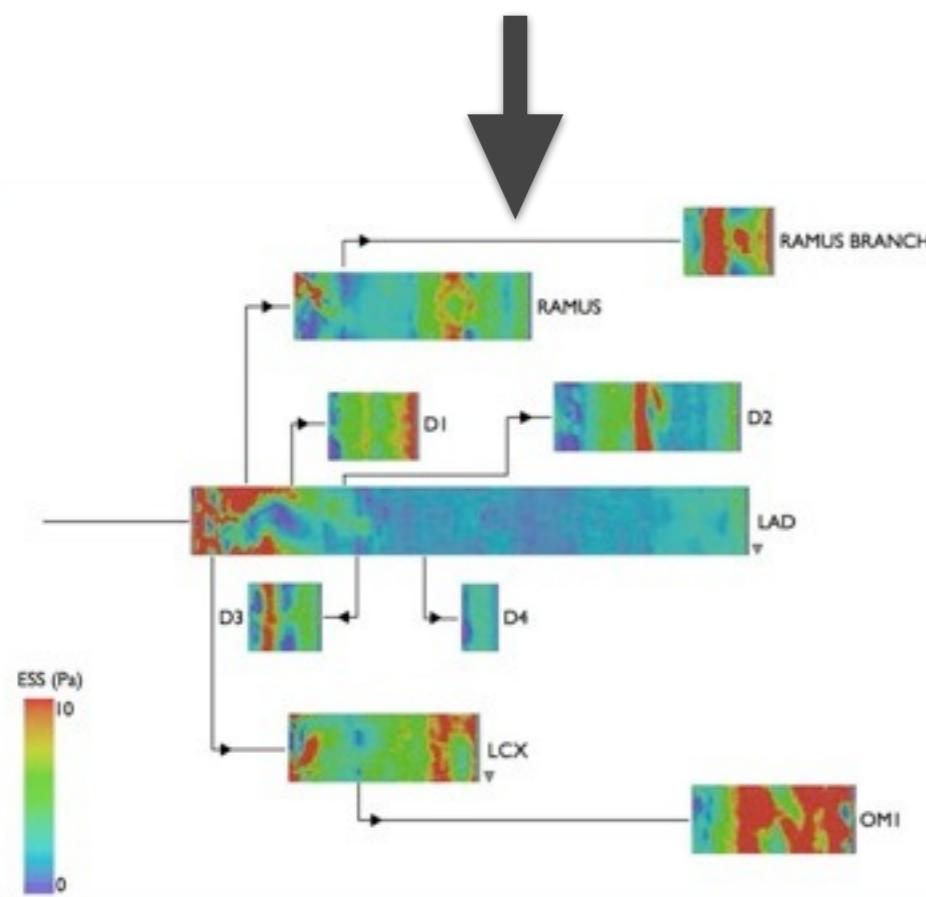
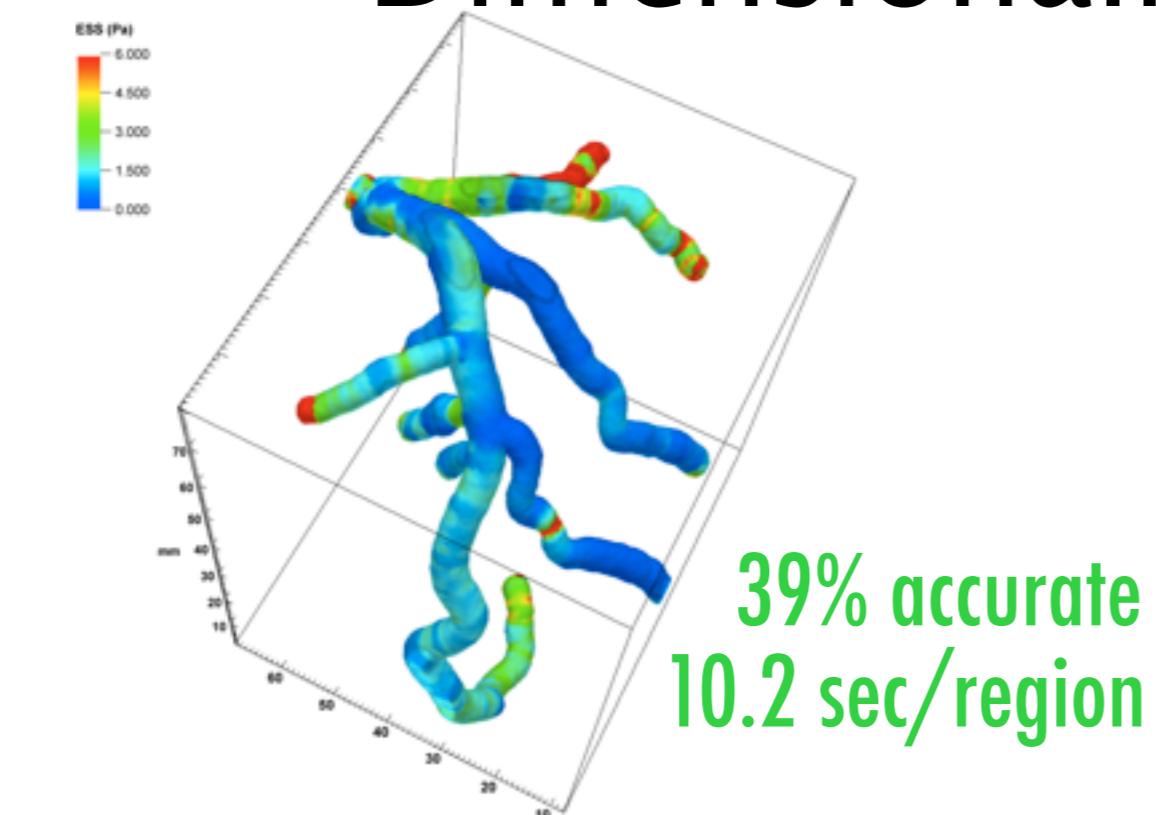
Alyssa A. Goodman^{1,2}, Erik W. Rosolowsky^{2,3}, Michelle A. Borkin¹†, Jonathan B. Foster², Michael Halle^{1,4}, Jens Kauffmann^{1,2} & Jaime E. Pineda²

Self-gravity plays a decisive role in the final stages of star formation, where dense cores (size \sim 0.1 parsecs) inside molecular clouds collapse to form star-plus-disk systems¹. But self-gravity's role at earlier times (and on larger length scales, such as \sim 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 function². 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 emission³ 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



Dimensionality (and Color)

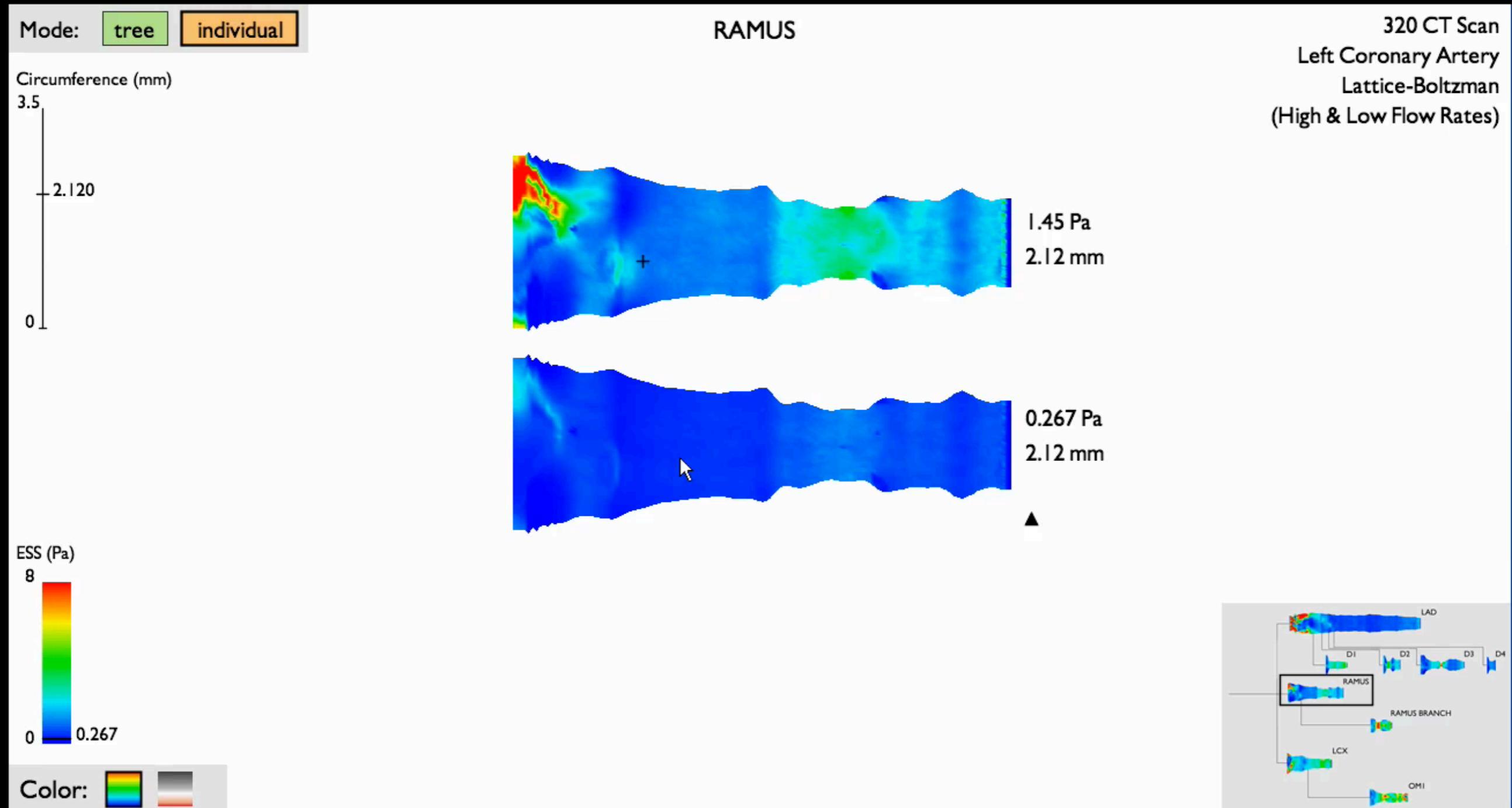


91% accurate
2.4 sec/region



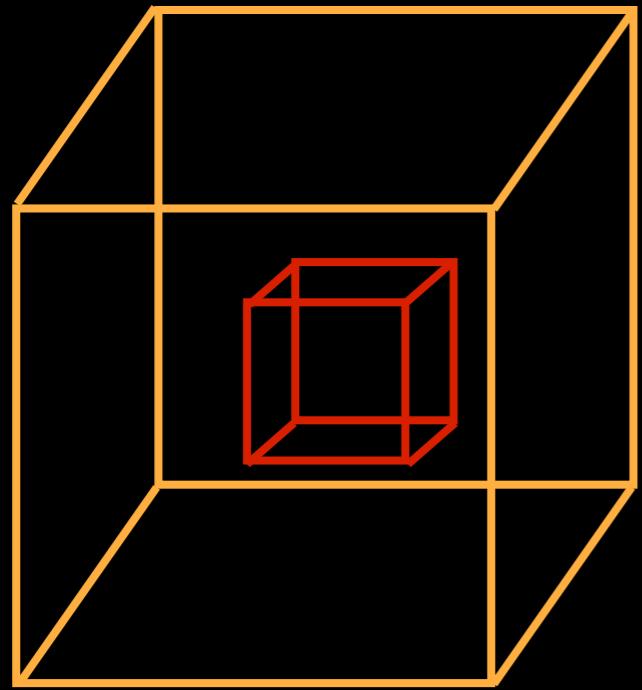
Borkin et al. 2011
cf. colorbrewer2.org

Dimensionality (and Color) + INTERACTION

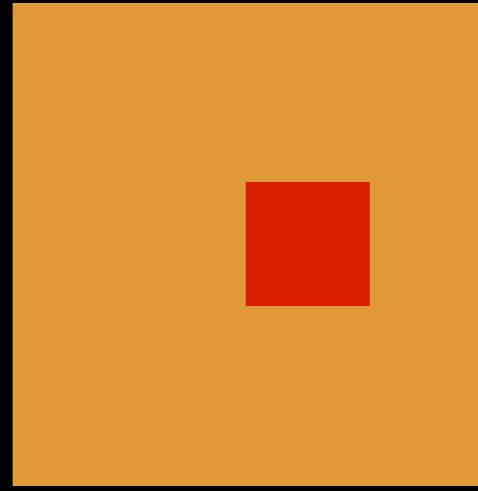


Borkin et al. 2011

Linked Views of High-dimensional Data

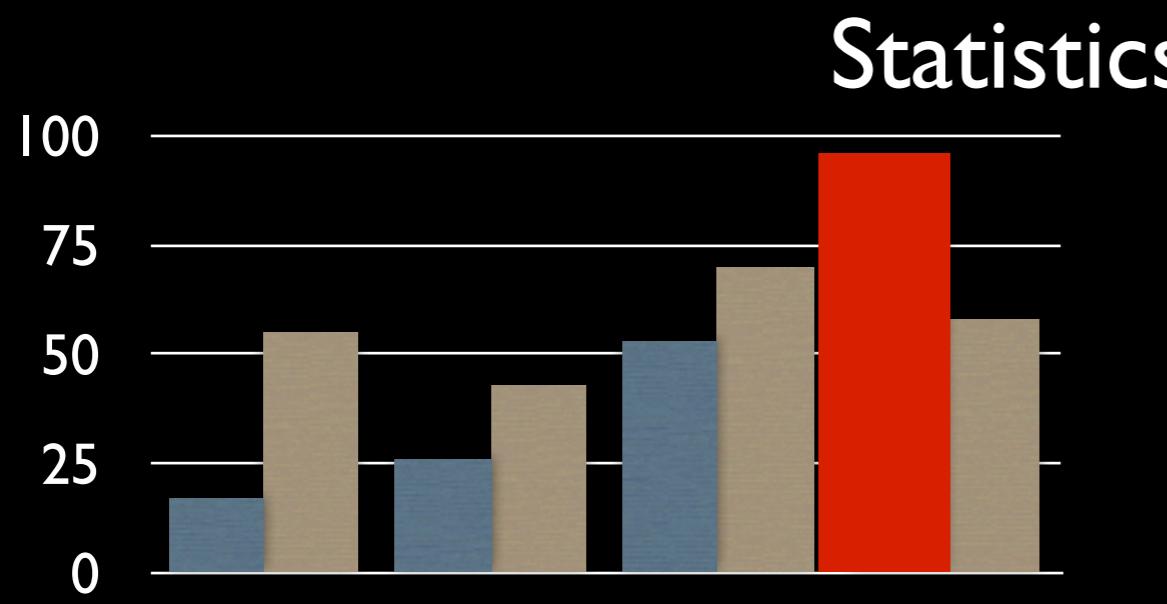


3D

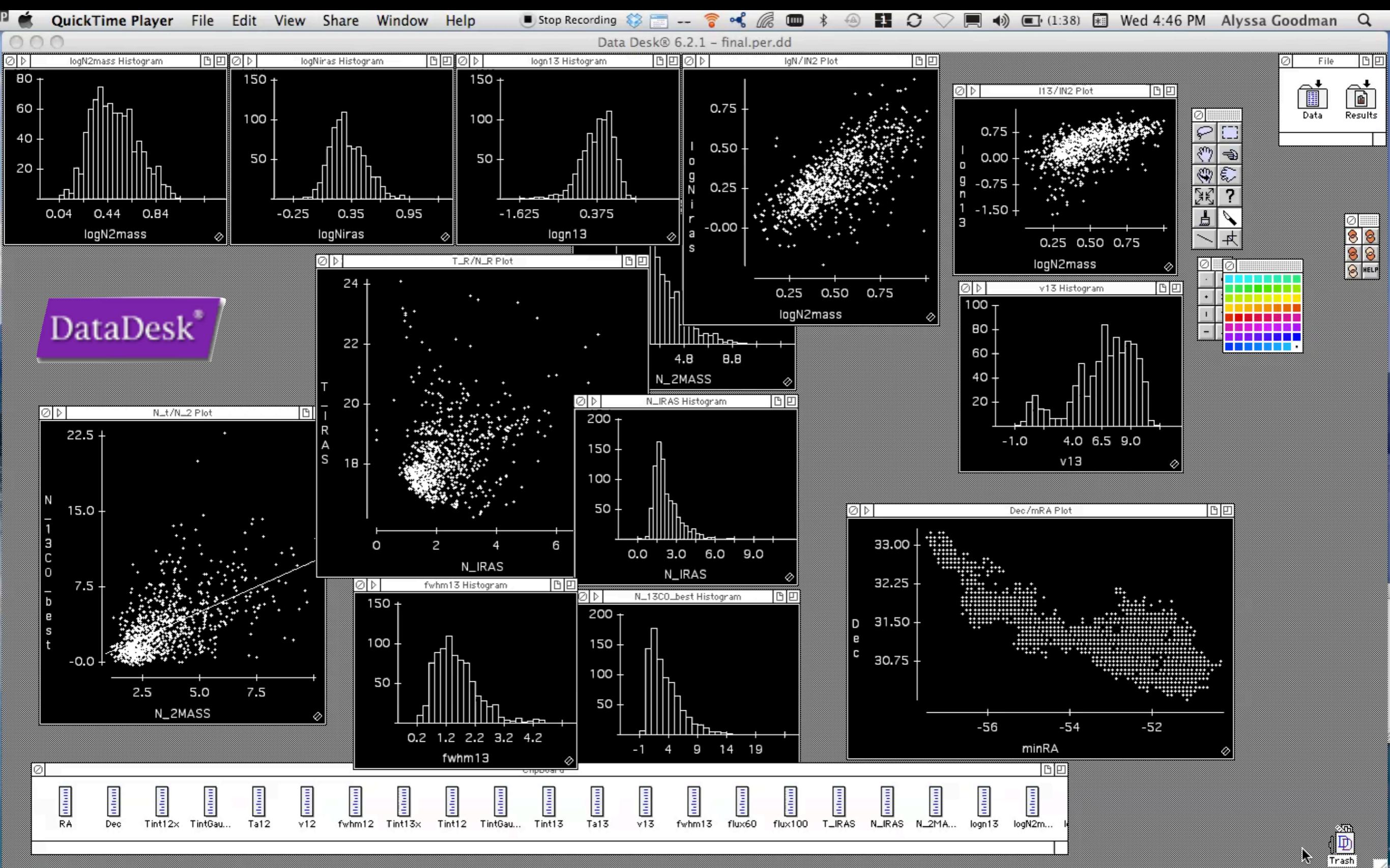


2D

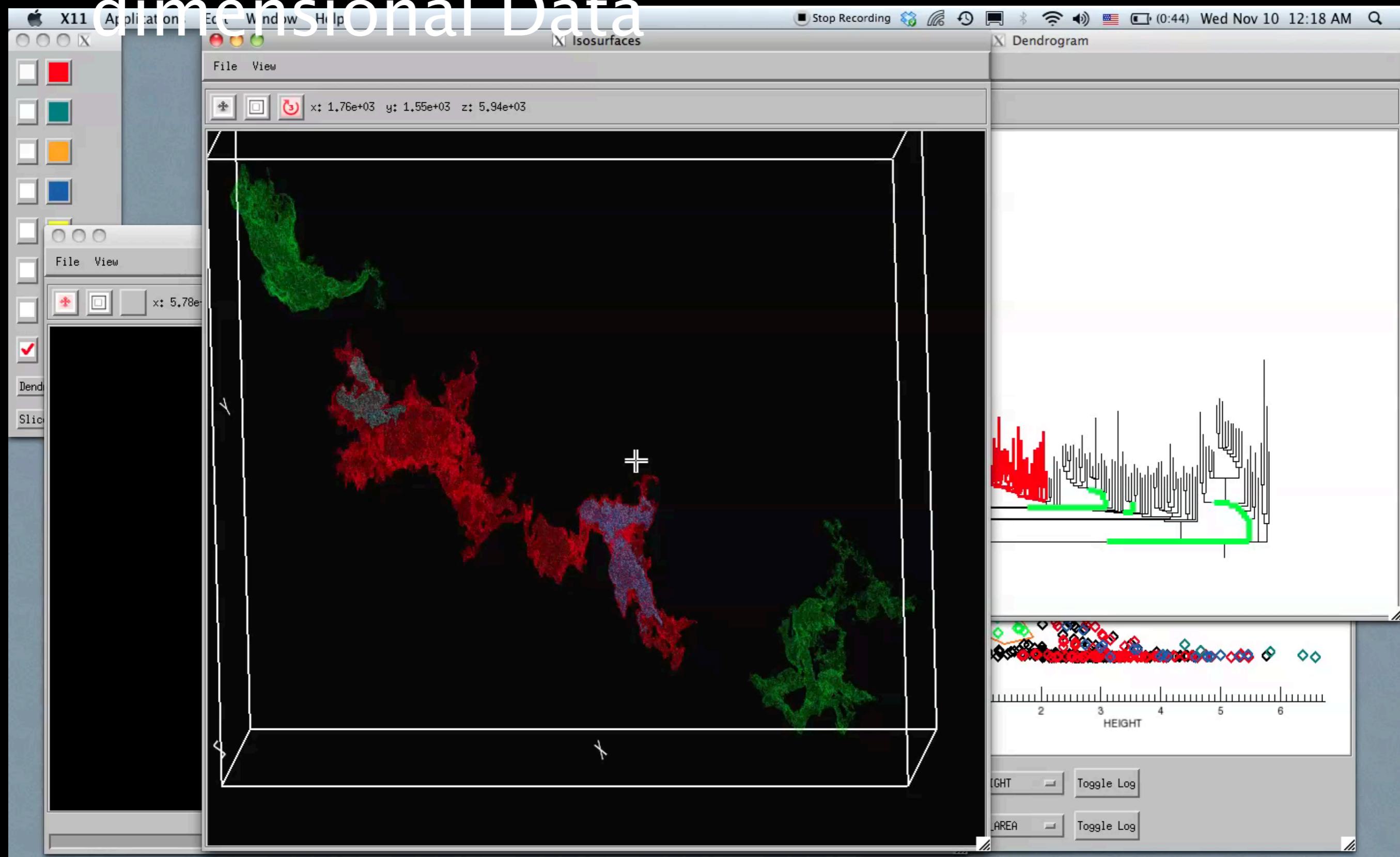
Data Abstraction



DataDesk (est. 1986)

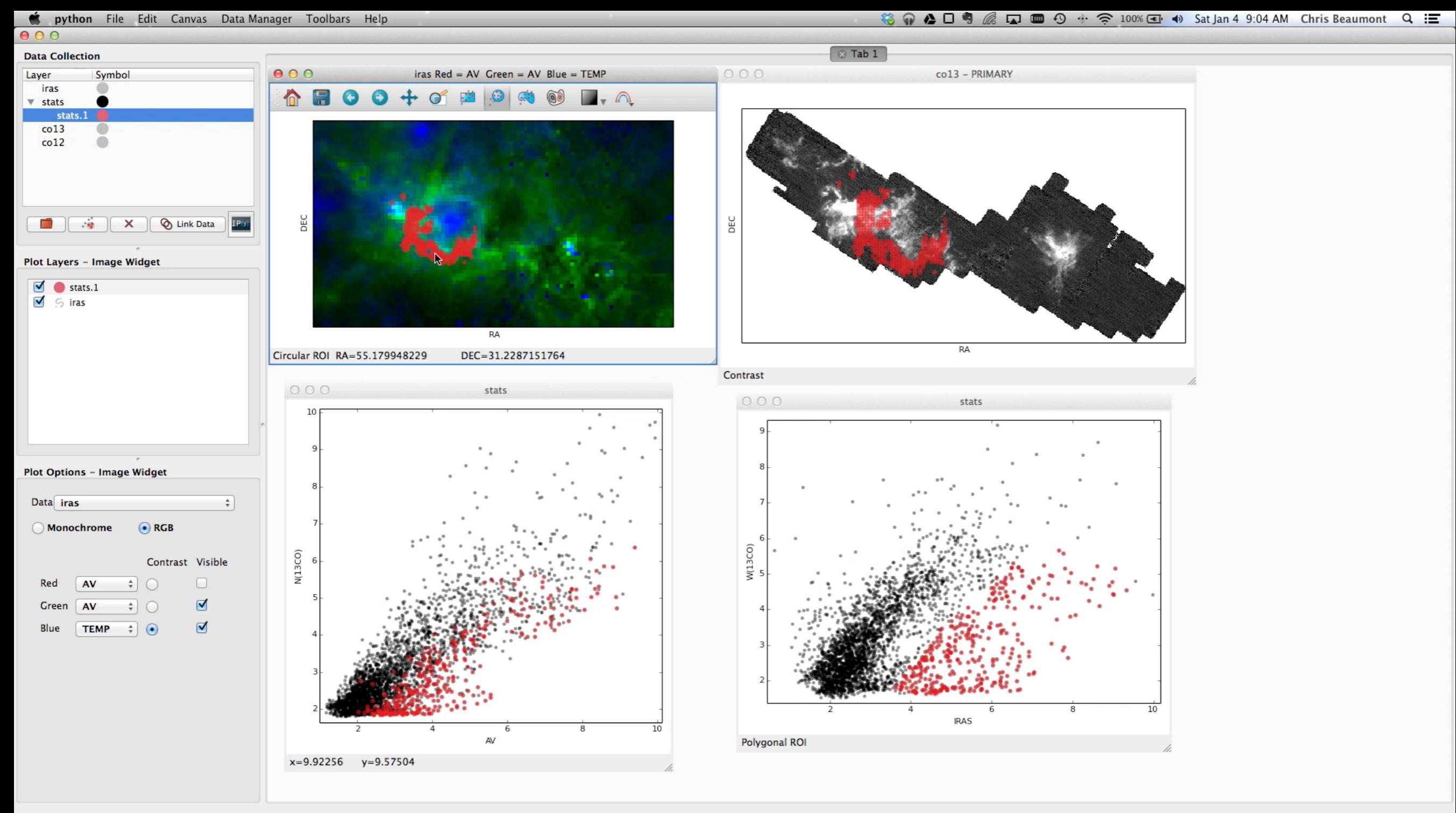
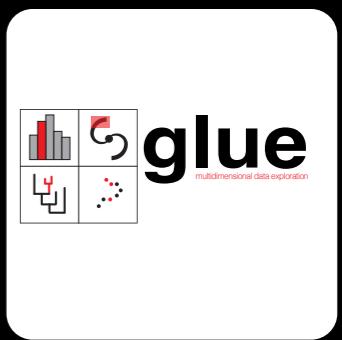


Linked Views of High-dimensional Data



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

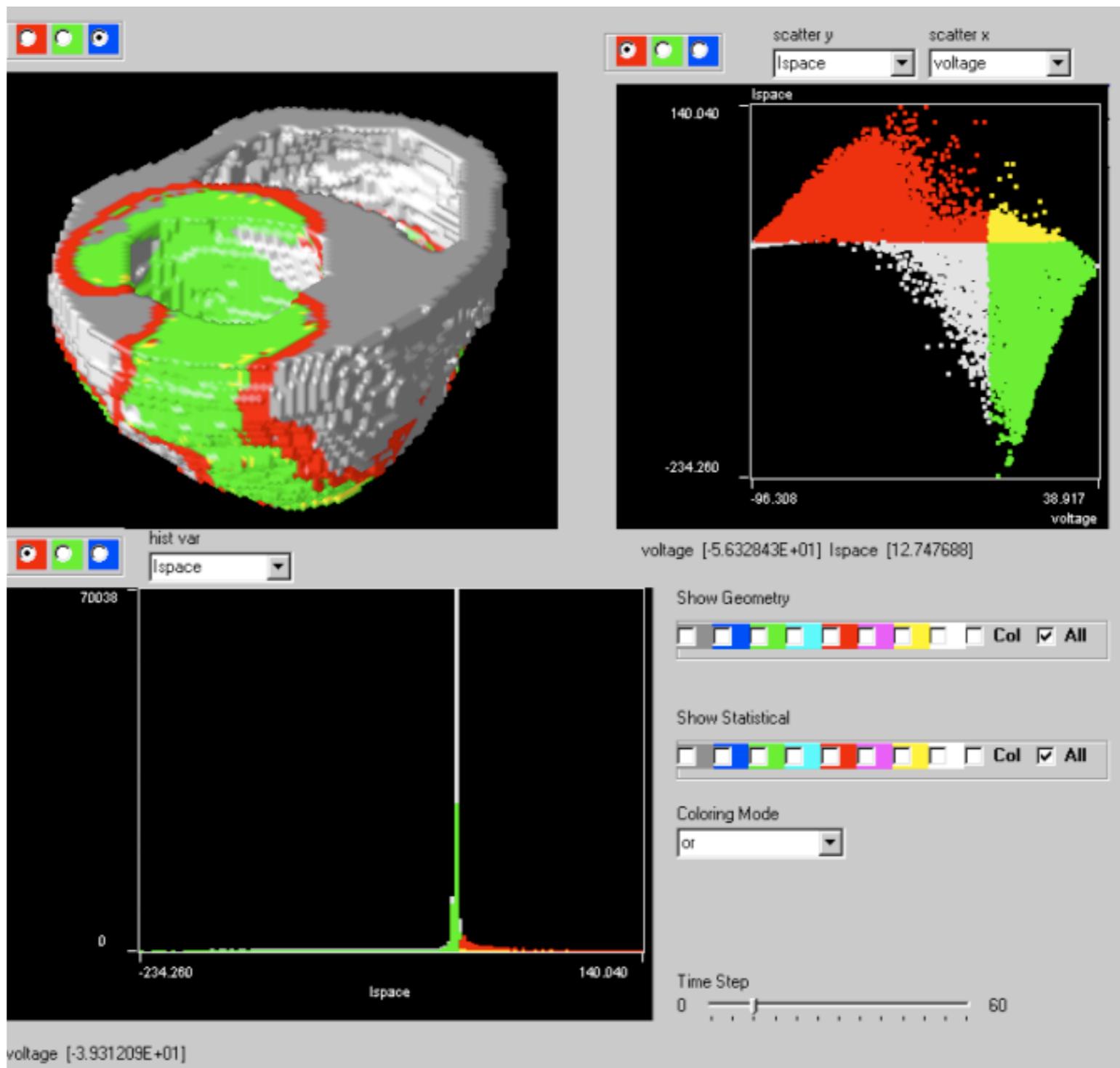
Linked Views of High-dimensional Data (in Python)



WEAVE: A System for Visually Linking 3-D and Statistical Visualizations, Applied to Cardiac Simulation and Measurement Data

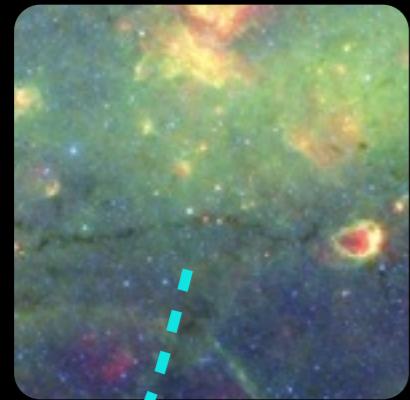
D.L. Gresh and B.E. Rogowitz*
IBM T.J. Watson Research Center

R.L. Winslow, D.F. Scollan, and C.K. Yung †
Department of Biomedical Engineering, Johns Hopkins University School of Medicine

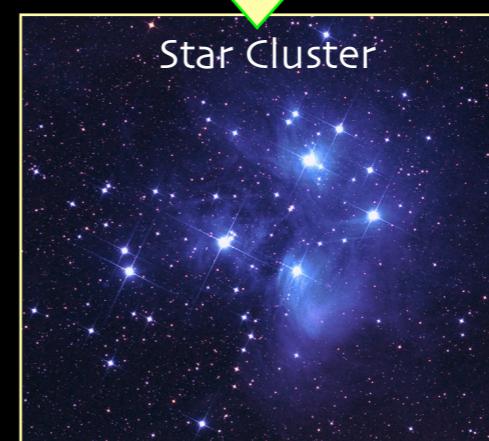
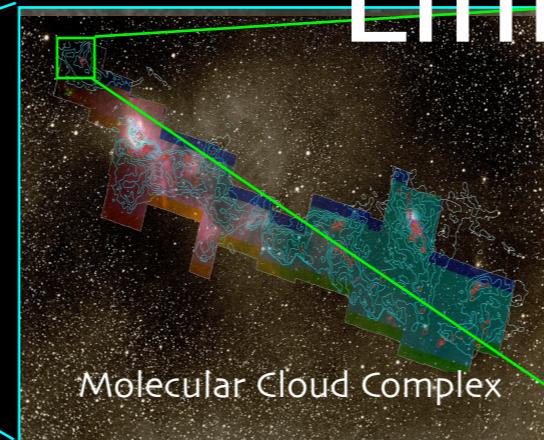
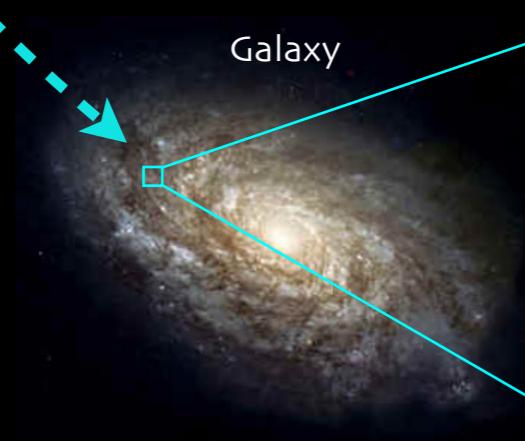


screenshot from Gresh et al. 2000; reproduced as shown in Goodman 2012

“Nessie”



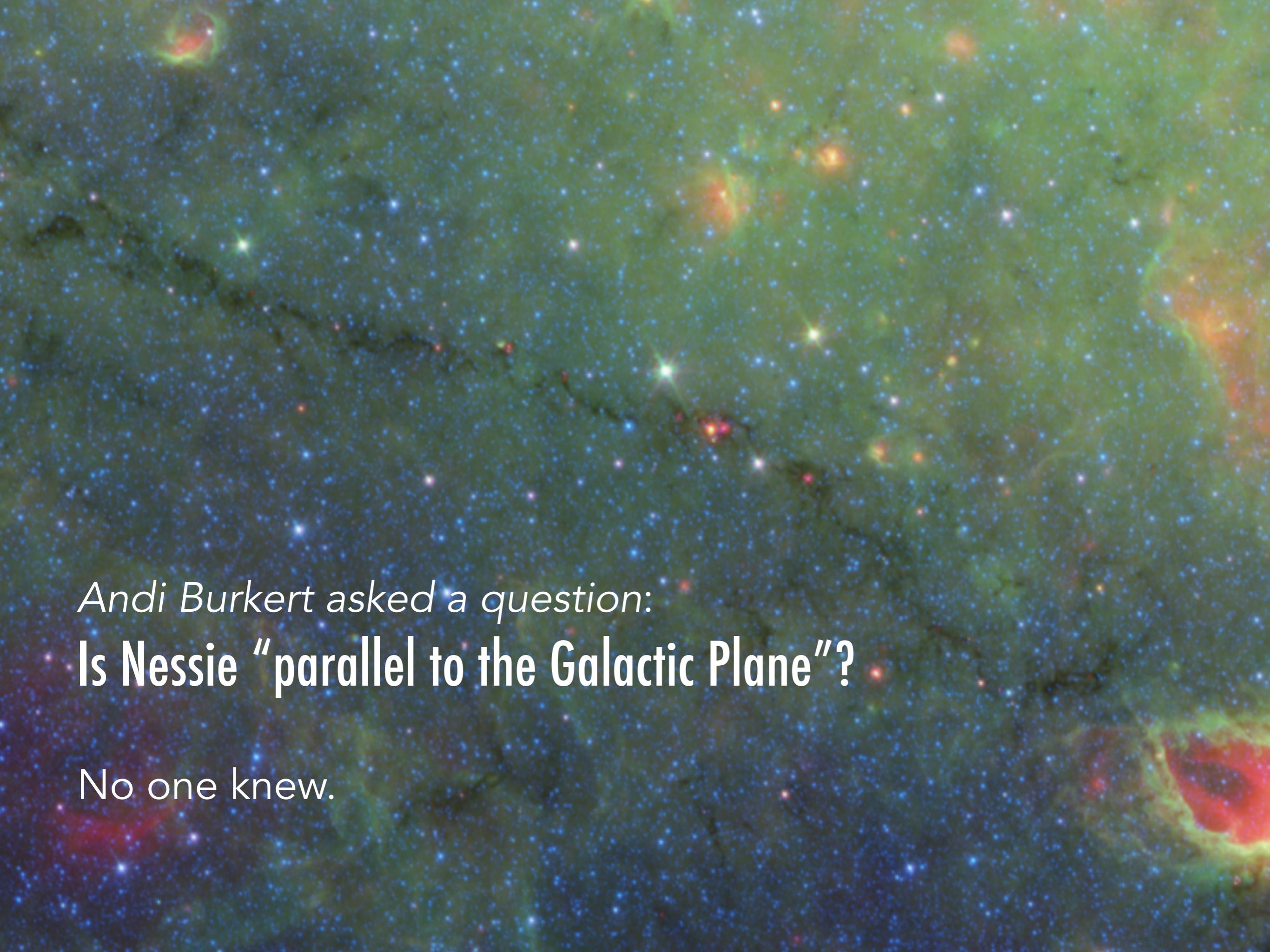
Nessie’s story of Resolution, Context, Big Data, Wide Data, Dimensionality, and Linked Views



Once upon a time (2012), in an
enchanted castle (in Bavaria)

...at a conference about
“The Early Phases of Star Formation”





Andi Burkert asked a question:
Is Nessie “parallel to the Galactic Plane”?

No one knew.

The Milky Way

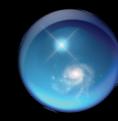
“Galactic Plane”



The Milky Way
(Artist's Conception)



"Is Nessie Parallel to the Galactic Plane?"

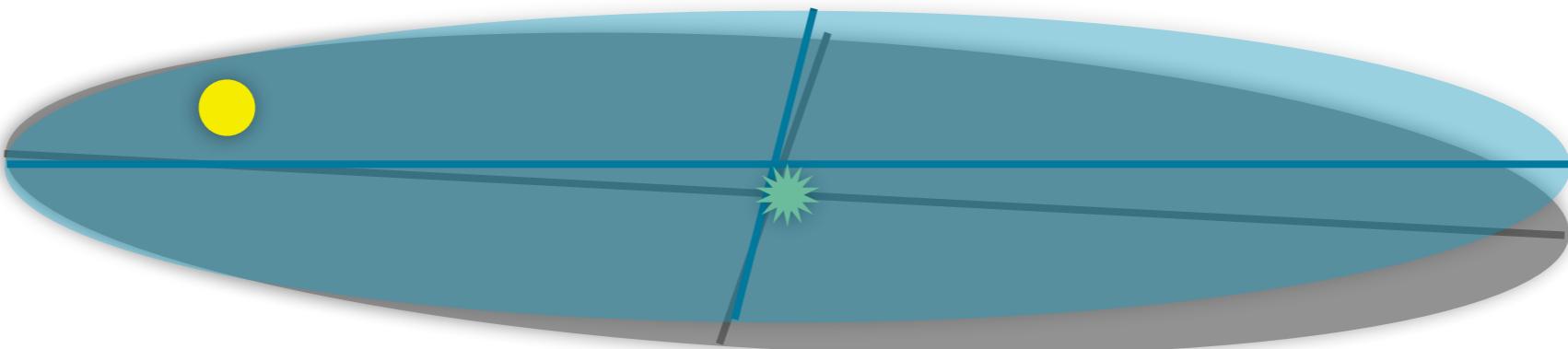


Celestial
North

Yes but why not at Zero of Latitude ($b=0$)?

Where are we, really?

“IAU Milky Way”, est. 1959



True Milky Way, modern

The equatorial plane of the new co-ordinate system must of necessity pass through the sun. It is a fortunate circumstance that, within the observational uncertainty, both the sun and Sagittarius A lie in the mean plane of the Galaxy as determined from the hydrogen observations. If the sun had not been so placed, points in the mean plane would not lie on the galactic equator.

[Blaauw et al. 1959]

Sun is
~75 light years
“above” the
IAU Milky Way
Plane

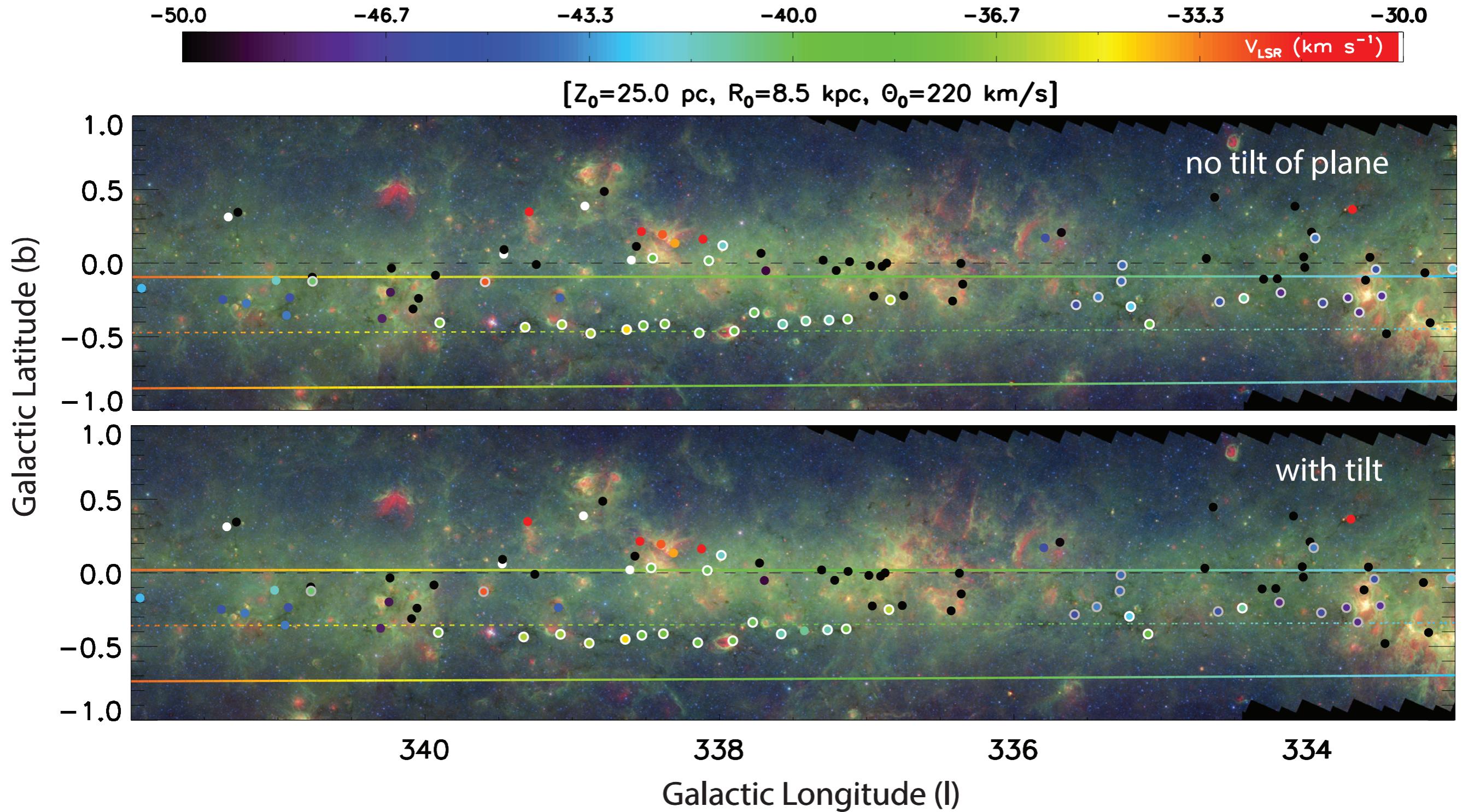
+

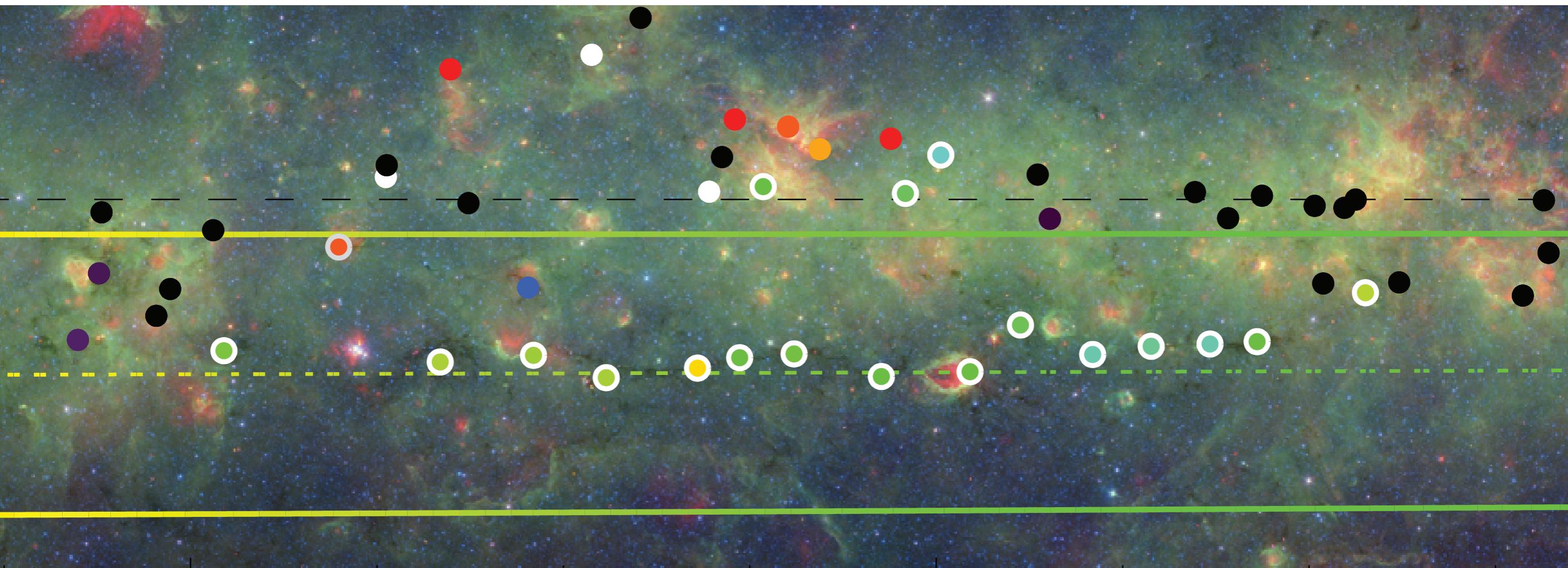
Galactic
Center is
~20 light years
offset from the
IAU Milky Way
Center

=

The **Galactic Plane is not quite
where you'd think it is**
when you look at the sky

In the plane! And at distance of spiral arm!





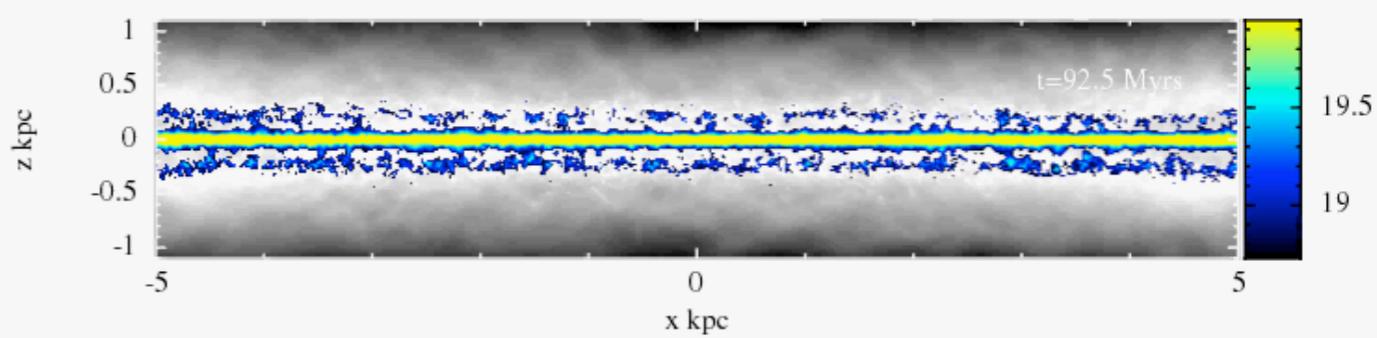
...eerily precisely...

How do we know
the velocities?

A full 3D skeleton?

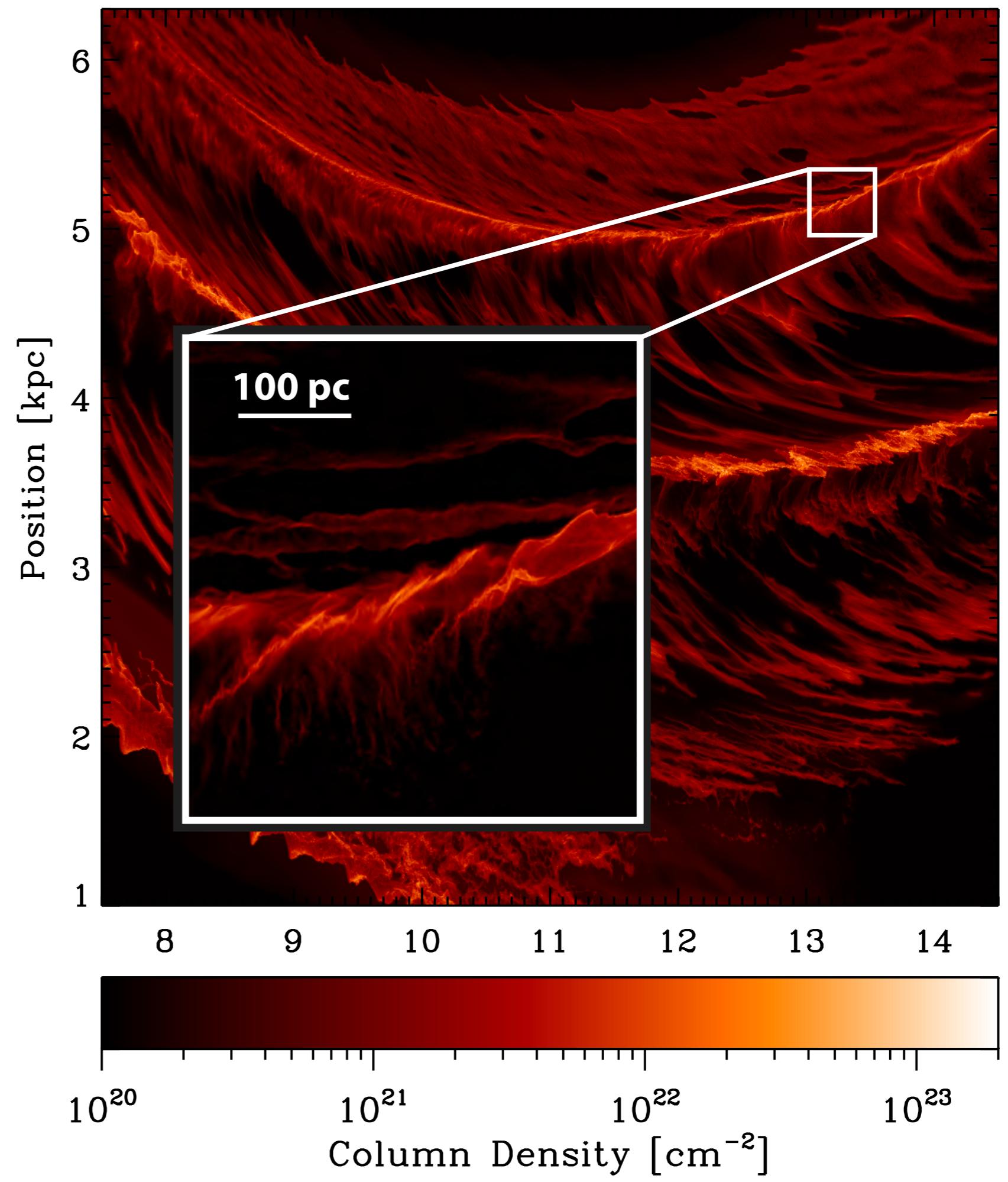


(flipped) image of IC342 from Jarrett et al. 2012; WISE Enhanced Resolution Galaxy Atlas

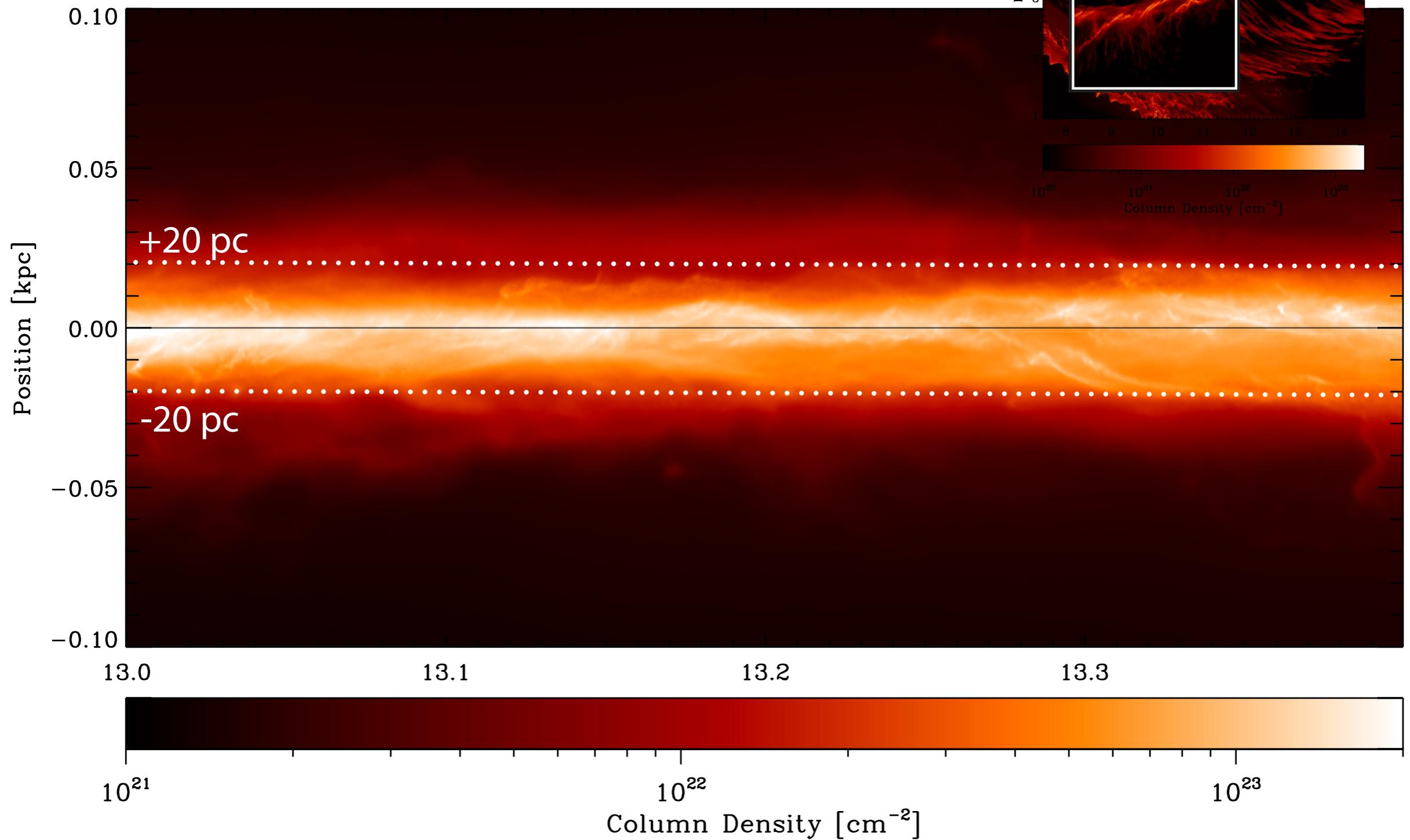


simulations courtesy Clare Dobbs

New! 2014 Simulation

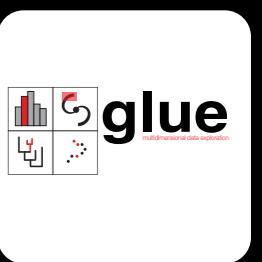


New! 2014 Simulation





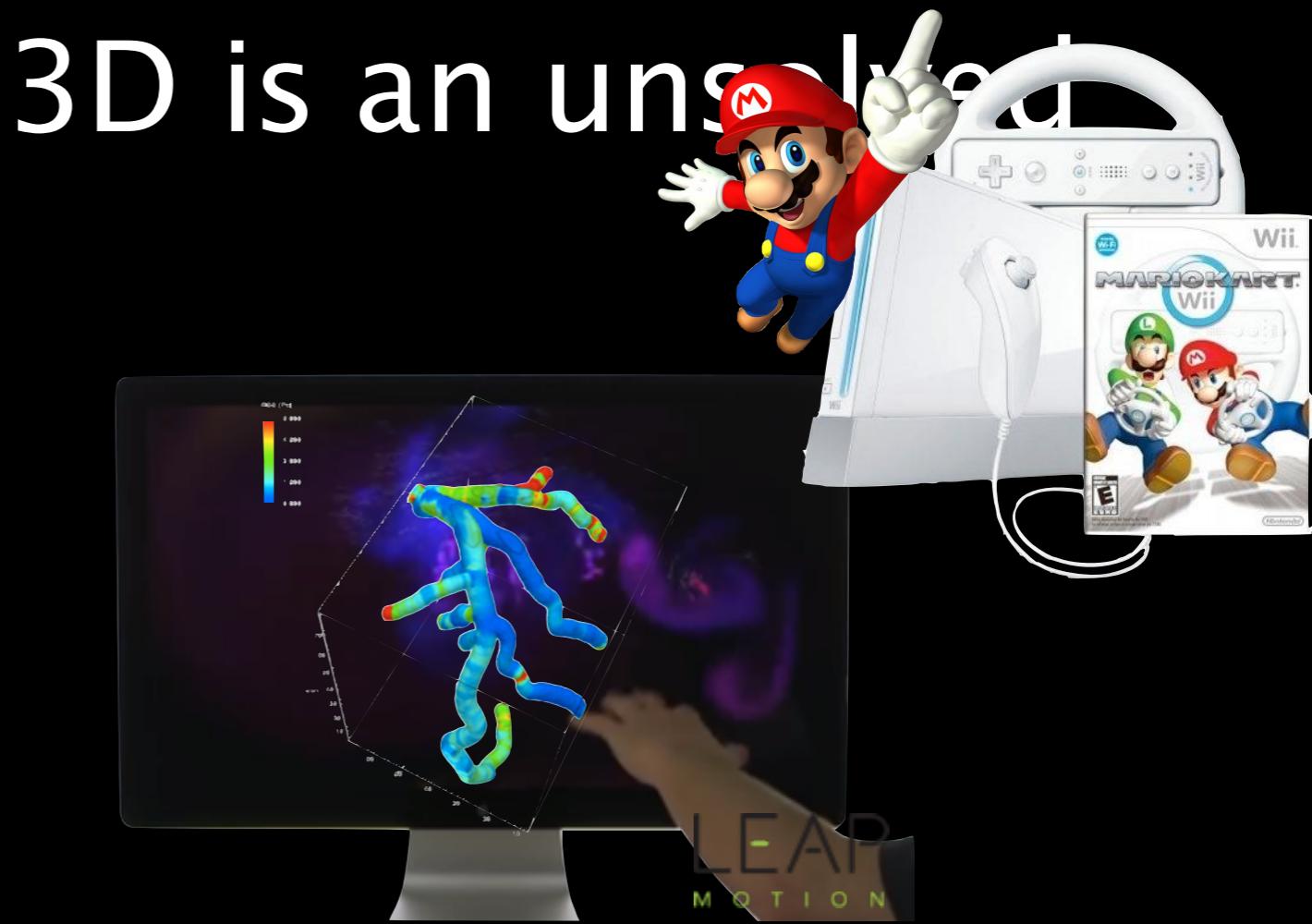
Nessie in Glue



(BUT) Selection in 3D is an unsolved problem



John Tukey's warning:
"details of control can
make or break such a system"



open collaboration and communication

n



Article [Talk](#) [Read](#) [Edit](#) [View history](#) [Search](#)

Mario Kart 8

From Wikipedia, the free encyclopedia
(Redirected from Mario kart 8)

Mario Kart 8 (Japanese: マリオカート 8 Hepburn: Mario Kart 8) is a 2014 kart racing game and the eighth major installment in the Mario Kart series, developed and published by Nintendo for the Wii U video game console. First announced at E3 2013, the game was released worldwide in May 2014.

Like other games in the series, in Mario Kart 8, players control characters from the [Mario franchise](#) and participate in kart racing on various race tracks, using items to hinder opponents or gain advantages. While incorporating game mechanics originally featured in earlier Mario Kart games, Mario Kart 8 introduces anti-gravity sections that allow players to drive on walls or ceilings. The game features multiple single-player and multiplayer game modes. The game incorporates [Miiverse](#) functionality and online multiplayer supported via [Nintendo Network](#).

Mario Kart 8 was a critical and commercial success upon its release, currently holding aggregate critical scores of 88.52% and 88% on [GameRankings](#) and [Metacritic](#), respectively. It is the fastest selling Wii U game as of June 30, 2014, with 1.2 million copies sold within the first four days of its release, and 2.82 million copies during its first month.^[3] It's the best-selling Wii U game with almost 5 million copies sold. The game has continued to receive post-release patches and downloadable content, including additional characters, vehicles, and tracks, and support for Nintendo's [Amiibo](#) line of figurines.

Contents [\[hide\]](#)

- 1 Gameplay
- 2 Development
- 3 Updates
- 4 Promotion
- 5 Reception
- 5.1 Sales
- 5.2 Legacy
- 5.3 Accolades
- 6 See also
- 7 References
- 8 External links

Gameplay [\[edit\]](#)

See also: [Gameplay in the Mario Kart series](#)

The game continues the traditional gameplay of the [Mario Kart](#) series, in which characters from the [Mario](#) universe race against each other in go-karts, attempting to hinder their opponents or

en.wikipedia.org/wiki/Mario_Kart_8

article [discussion](#) [View source](#) [History](#)

Mario Kart 8

SUPER MARIO WIKI

Shutterfly **DISCOVER A NEW WAY TO SHOP STYLES & SPACES SHOP BY ROOM >** **DESIGNED FOR YOU**

Mario Kart 8 has been nominated to become a Featured Article! If you want to support or oppose, go [here](#)

Mario Kart 8 is a game in the [Mario Kart](#) series for the [Wii U](#). It is the eighth installment in the main [Mario Kart](#) series, and including the arcade games the eleventh overall. Like other [Nintendo 3DS](#) and [Wii U](#) games, this game can be purchased both physically at retail and digitally through the [Nintendo eShop](#), with the digital version requiring 499.8 MB (approx. 4.83 GB) of memory to be installed.

A prominent new addition is anti-gravity, allowing players to drive on almost any surface. Elements from [Mario Kart Wii](#) and [Mario Kart 7](#) are reused, such as [Bikes](#) and [2-Player online](#) from [Mario Kart Wii](#), and gliding, underwater driving, and kart customizing from [Mario Kart 7](#). In addition, [ATVs](#) join the returning [karts](#) and [bikes](#) as a new class of vehicle. The game also features more detail in courses, specifically [Retro Tracks](#), which appear more redesigned than their original appearances.

Contents [\[hide\]](#)

- 1 Gameplay
- 1.1 Controls
- 2 Game modes
- 2.1 Grand Prix
- 2.2 Time Trials
- 2.3 VS Race
- 2.4 Battle
- 2.5 Online
- 2.6 Mario Kart TV
- 3 Characters
- 3.1 Drivers
- 3.1.1 Starting drivers
- 3.1.2 Unlockable drivers
- 3.1.3 Downloadable characters
- 3.1.4 Unlocking criteria
- 3.1.5 Driver statistics
- 3.1.6 Body frame sizes
- 3.2 Other
- 4 Vehicle parts
- 4.1 Unlocking criteria
- 4.2 Special parts
- 5 Courses
- 5.1 Nitro Courses
- 5.2 Retro Courses

Mario Kart 8

Developer(s) [Nintendo EAD](#) [Namco Bandai Games](#)^[1]

Publisher(s) [Nintendo](#)

Platform(s) [Wii U](#)

Release date [May 29, 2014](#) [May 30, 2014](#) [May 30, 2014](#) [May 30, 2014](#) [May 30, 2014](#) [May 31, 2014](#)

Genre [Racing](#)

Rating(s) [ESRB: E - Everyone](#) [Pegi: 3 - Suitable for ages 3 and up](#)

Shutterfly **INTRODUCING DESIGN-A-WALL** **Create a gallery of**

www.mariowiki.com/Mario_Kart_8

scholarly Communication

1610



SIDEREUS NUNC

10 minutes removed from this one. They were absolutely on the

On the fourth, at the second hour, there were four stars around

East * * O * * West

on a straight line, as in the adjoining figure. The eastermost 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 star 30 seconds apart. Jupiter was 2 minutes from the

one, while he was 4 minutes from the next western one was 3 minutes from the westernmost one. They extended on the same straight line along the ecl. On the fifth, the sky was cloudy.

On the ninth, and May 16th, on the tenth, only two stars appeared flanking Jupiter.

449 page 5 of 5

ed a little smaller

(1811) Volume 91

PHILOSOPHICAL TRANSACTIONS

Editor, Dr. J. R. Green

THE CONTENTS

An Experimental Dissertation on the Nature of the
MATERIAL, & the Properties of the Air, in the
Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 1-100

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 101-110

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 111-120

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 121-130

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 131-140

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 141-150

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 151-160

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 161-170

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 171-180

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 181-190

An Experimental Dissertation on the Nature of the Air
in the Atmosphere, in the Month of January, 1811. By Dr. J. R. Green, F. R. S. &c. pp. 191-199

On the Condition of Quadrupeds and Birds, pp. 200-205

By Dr. J. R. Green, F. R. S. &c.

The Introduction of the Parrot. pp. 206-210

Through the following difficulties the Author is enabled
to give a short account of the Parrot, and to shew
the manner in which it is to be introduced into
the society of the English, and its present
habits among them. He also, in consequence, considers
a few different Suppositions, and makes a few
short Remarks, with respect to the Parrot.

pp. 211-212

SAPPHIAR SECTION 1

ASTROPHYSICAL JOURNAL

AN INTERNATIONAL REVIEW OF SPECTROSCOPY
AND ASTRONOMICAL PHYSICS

VOLUME I JANUARY 1895

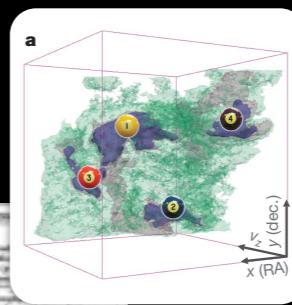
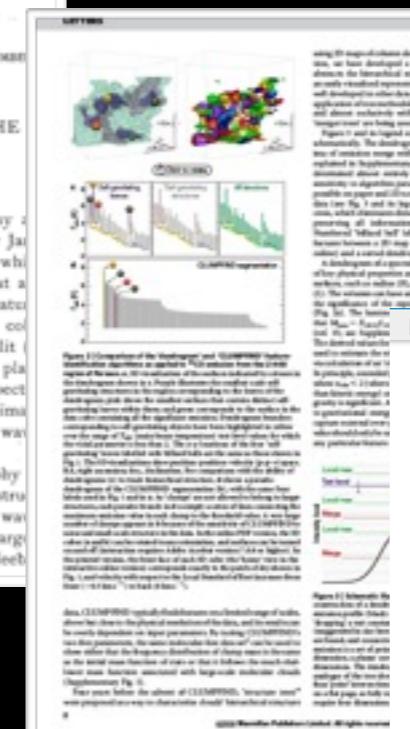
ON THE CONDITIONS WHICH AFFECT THE SPECTRO-PHOTOGRAPHY OF THE SUN.

By ALBERT A. MICHELSON.

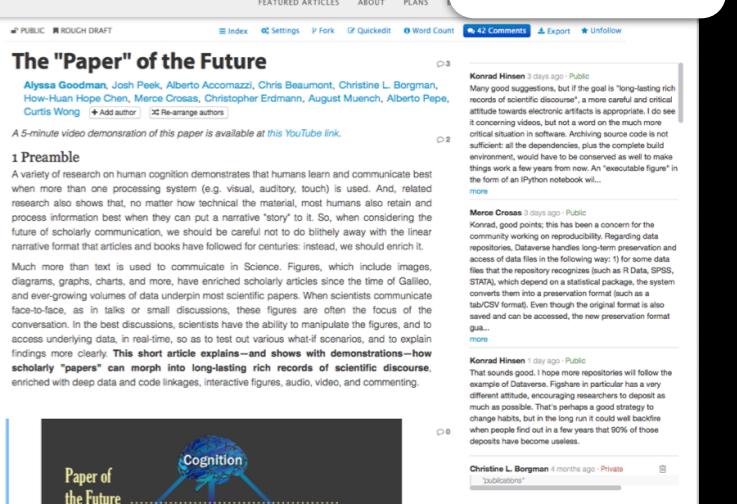
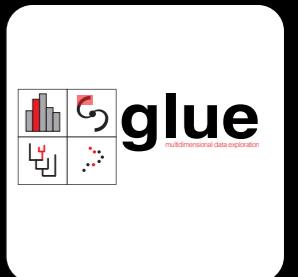
The recent developments in solar spectro-photography are in great measure due to the device originally suggested by Jasen and perfected by Hale and Deslandres, by means of which a photograph of the Sun's prominences may be obtained at a time as readily as it is during an eclipse. The essential feature of this device are the simultaneous movements of the coronator-slit across the Sun's image, with that of a second slit (the focus of the photographic lens) over a photographic plate. If these relative motions are so adjusted that the same spectral line always falls on the second slit, then a photographic image of the Sun will be reproduced by light of this particular wavelength.

Evidently the process is not limited to the photography of the prominences, but extends to all other peculiarities of structure which emit radiations of approximately constant wavelength; and the efficiency of the method depends very largely upon the *contrast* which can be obtained by the greater or less

2009



2015



The "Paper" of the Future

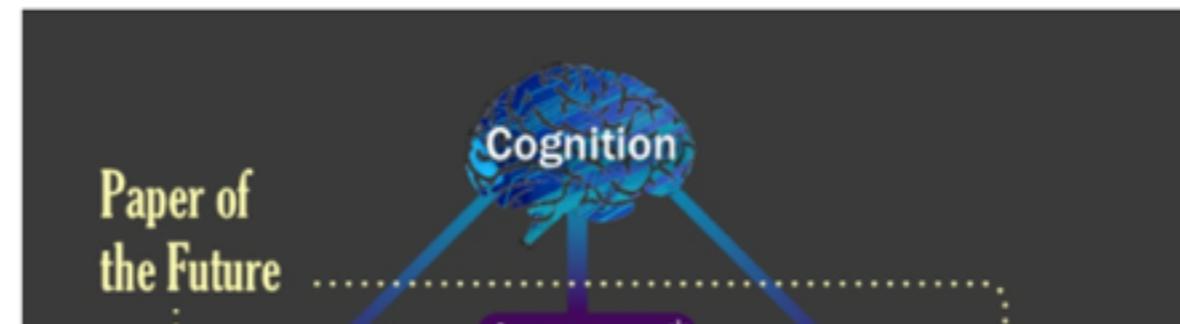
Alyssa Goodman, Josh Peek, Alberto Accomazzi, Chris Beaumont, Christine L. Borgman, How-Huan Hope Chen, Merce Crosas, Christopher Erdmann, August Muench, Alberto Pepe, Curtis Wong [+ Add author](#) [Re-arrange authors](#)

A 5-minute video demonstration of this paper is available at [this YouTube link](#).

1 Preamble

A variety of research on human cognition demonstrates that humans learn and communicate best when more than one processing system (e.g. visual, auditory, touch) is used. And, related research also shows that, no matter how technical the material, most humans also retain and process information best when they can put a narrative "story" to it. So, when considering the future of scholarly communication, we should be careful not to do blithely away with the linear narrative format that articles and books have followed for centuries: instead, we should enrich it.

Much more than text is used to communicate in Science. Figures, which include images, diagrams, graphs, charts, and more, have enriched scholarly articles since the time of Galileo, and ever-growing volumes of data underpin most scientific papers. When scientists communicate face-to-face, as in talks or small discussions, these figures are often the focus of the conversation. In the best discussions, scientists have the ability to manipulate the figures, and to access underlying data, in real-time, so as to test out various what-if scenarios, and to explain findings more clearly. **This short article explains—and shows with demonstrations—how scholarly "papers" can morph into long-lasting rich records of scientific discourse**, enriched with deep data and code linkages, interactive figures, audio, video, and commenting.



Konrad Hinsen 3 days ago · Public

Many good suggestions, but if the goal is "long-lasting rich records of scientific discourse", a more careful and critical attitude towards electronic artifacts is appropriate. I do see it concerning videos, but not a word on the much more critical situation in software. Archiving source code is not sufficient: all the dependencies, plus the complete build environment, would have to be conserved as well to make things work a few years from now. An "executable figure" in the form of an IPython notebook wil...

[more](#)

Merce Crosas 3 days ago · Public

Konrad, good points; this has been a concern for the community working on reproducibility. Regarding data repositories, Dataverse handles long-term preservation and access of data files in the following way: 1) for some data files that the repository recognizes (such as R Data, SPSS, STATA), which depend on a statistical package, the system converts them into a preservation format (such as a tab/CSV format). Even though the original format is also saved and can be accessed, the new preservation format gua...

[more](#)

Konrad Hinsen 1 day ago · Public

That sounds good. I hope more repositories will follow the example of Dataverse. Figshare in particular has a very different attitude, encouraging researchers to deposit as much as possible. That's perhaps a good strategy to change habits, but in the long run it could well backfire when people find out in a few years that 90% of those deposits have become useless.

Christine L. Borgman 4 months ago · Private

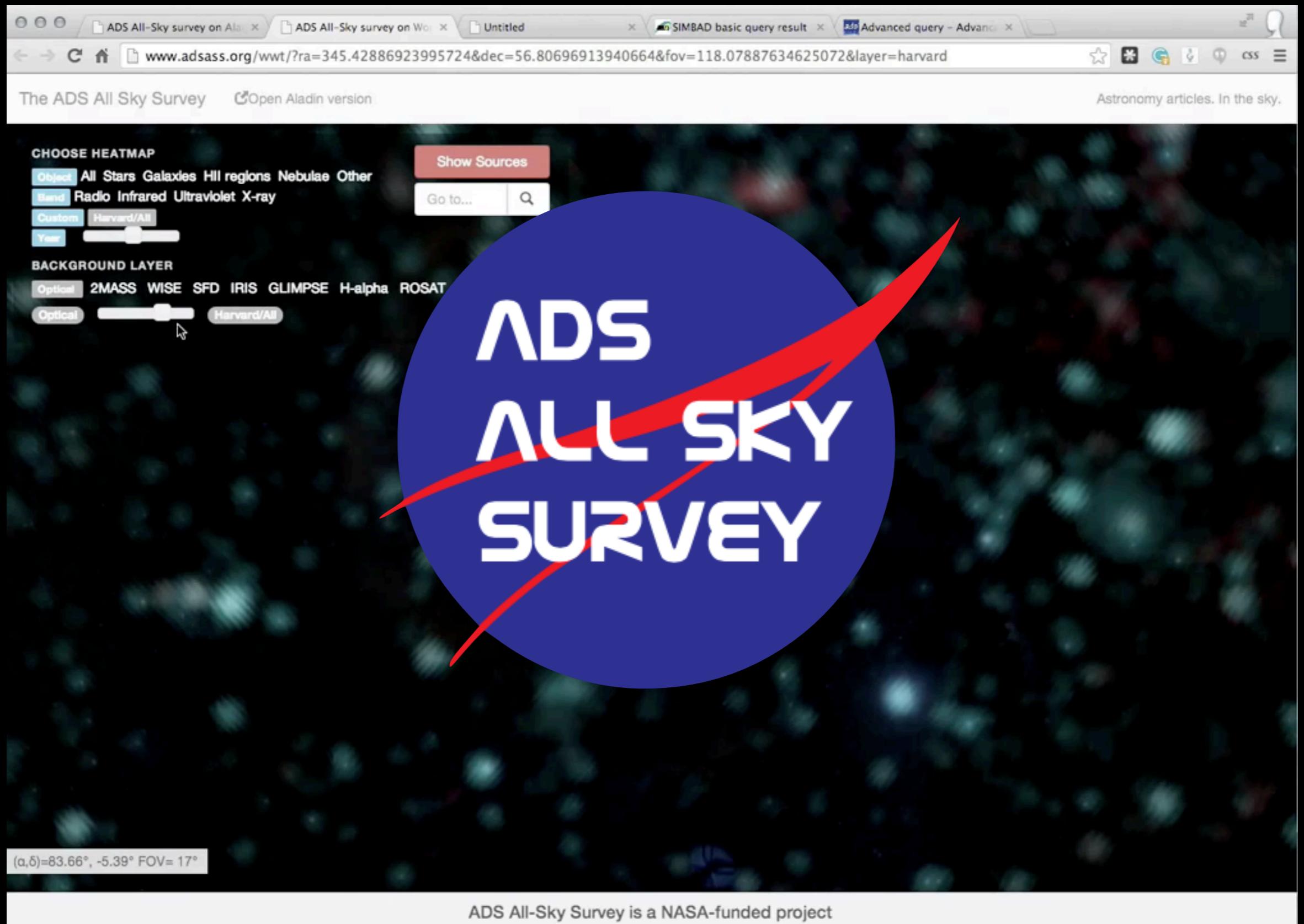
"publications"

Communication: Literature as a filter for (BIG) Data



[View in Aladin](#) • [View in WorldWide Telescope](#) • [Demo Videos](#)

[Demo]





Region: In Perseus and Taurus

ads NASA

α (2000) 3h 38m 14s, δ (2000) +31° 25'

α (1875) 3h 30m 30s, δ (1875) +31° 00'

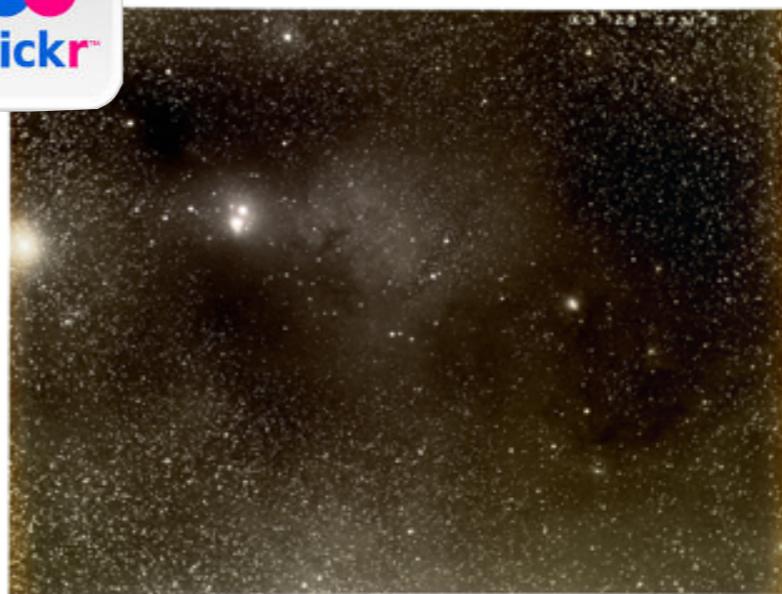
Area: In Perseus and Taurus

Galactic Coordinates: 127°, -18°

Scale: 1 cm = 18'.2 or 1 in = 46'.2

Chart, Plate & Chart, Table, Text

enlarge (+) printable PDF



Bar-pd1-p003_sm
Bernard's Image of Perseus, www.librarygatech.edu/space

0 December 15

Add a comment

astrometry.net 12m
Hello, this is the blind astrometry solver. Your results are: (RA, Dec) center: (54.3098782184, 21.4252643274) degrees Orientation: 5.21349889764 deg E of N Pixel scale: 16.5163711997 arcseconds Your field contains: NGC 1465 IC 1985 C Per / Atk o Per 40Per 42Per NGC 1303 IC 348 IC 2003 View in WorldWide Telescope — If you would like to have other images solved, please submit them to the astrometry group.

astrometry (group)



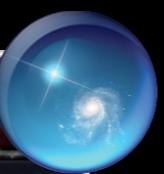
Explore Guided Tours Search View Settings

Calibration > All-Sky Sources > California Results

ADS All Sky Survey, Digitized Sky Survey, VLSS, VLA Low Res, Planck CMB, WMAP 5-Year, GPC Dust Map (2d), WISE Improved Res, WISE All-Sky (3rd), 2Mass Imagery, 2MASS Catalog, Hydrogen

Look At: Sky, Digitized Sky Survey (Color), Info, Image Crossfade

1 of 9, Perseus, Dec 11.23533, RA 12:03:24



Explore Guided Tours Search View Settings

Calibration > Open Collections > Bar-pd1-p003_sm > California Results

Bar-pd1-p003_sm

Look At: Sky, Digitized Sky Survey (Color), Info, Image Crossfade

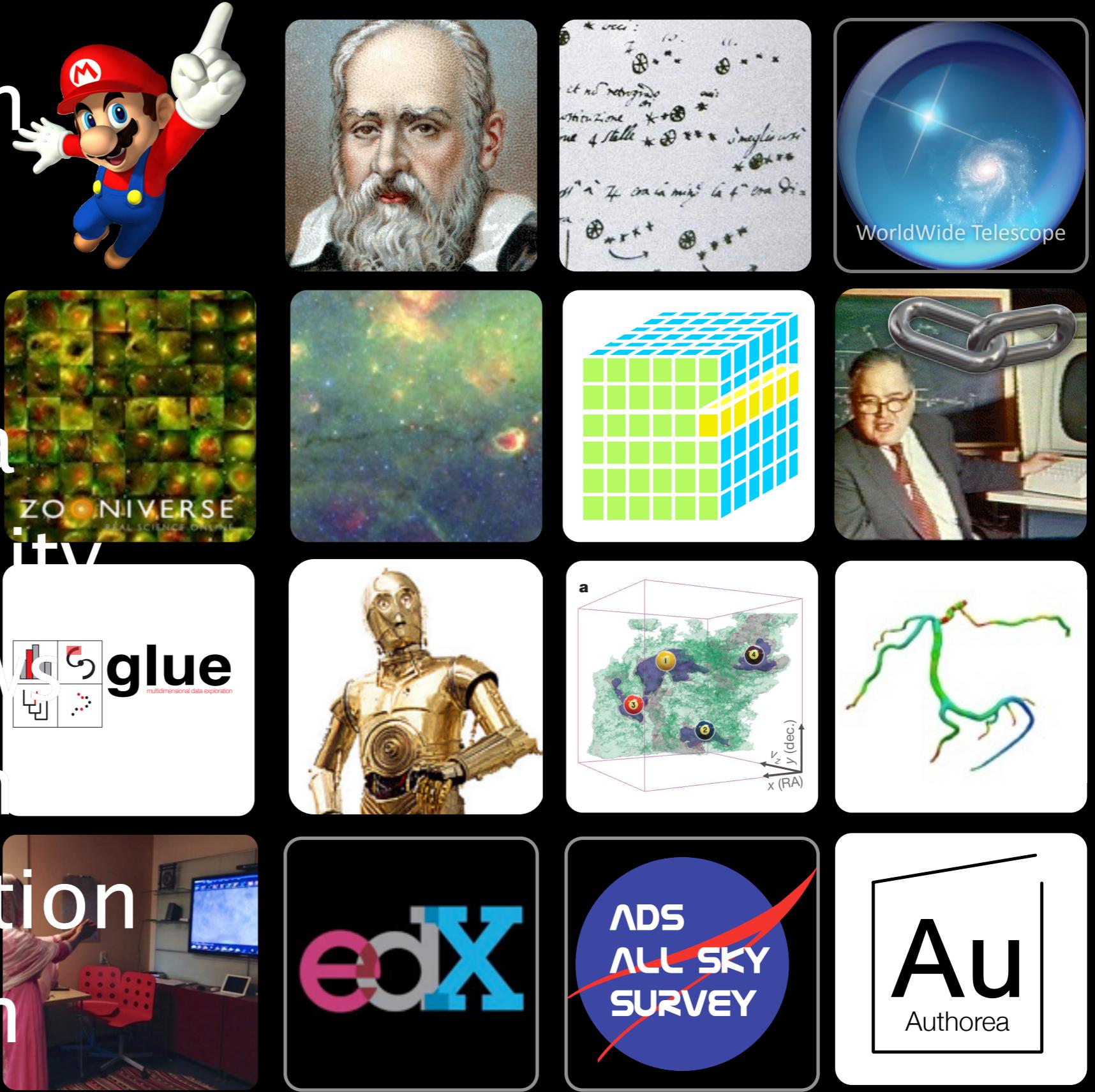
1 of 9, Perseus, Dec 11.23533, RA 12:03:24



WorldWide Telescope: ADSASS/oldAstronomy

flickr.com/groups/astrometry/

Resolution
Context
Big Data
Wide Data
Dimensionality
Linked views
Interaction
Communication
education



Education: Visualization → new Ways to learn

WorldWide Telescope Ambassadors

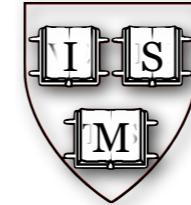
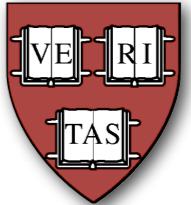


wwtambassadors.org

Higher Ed

the 2013 experiment

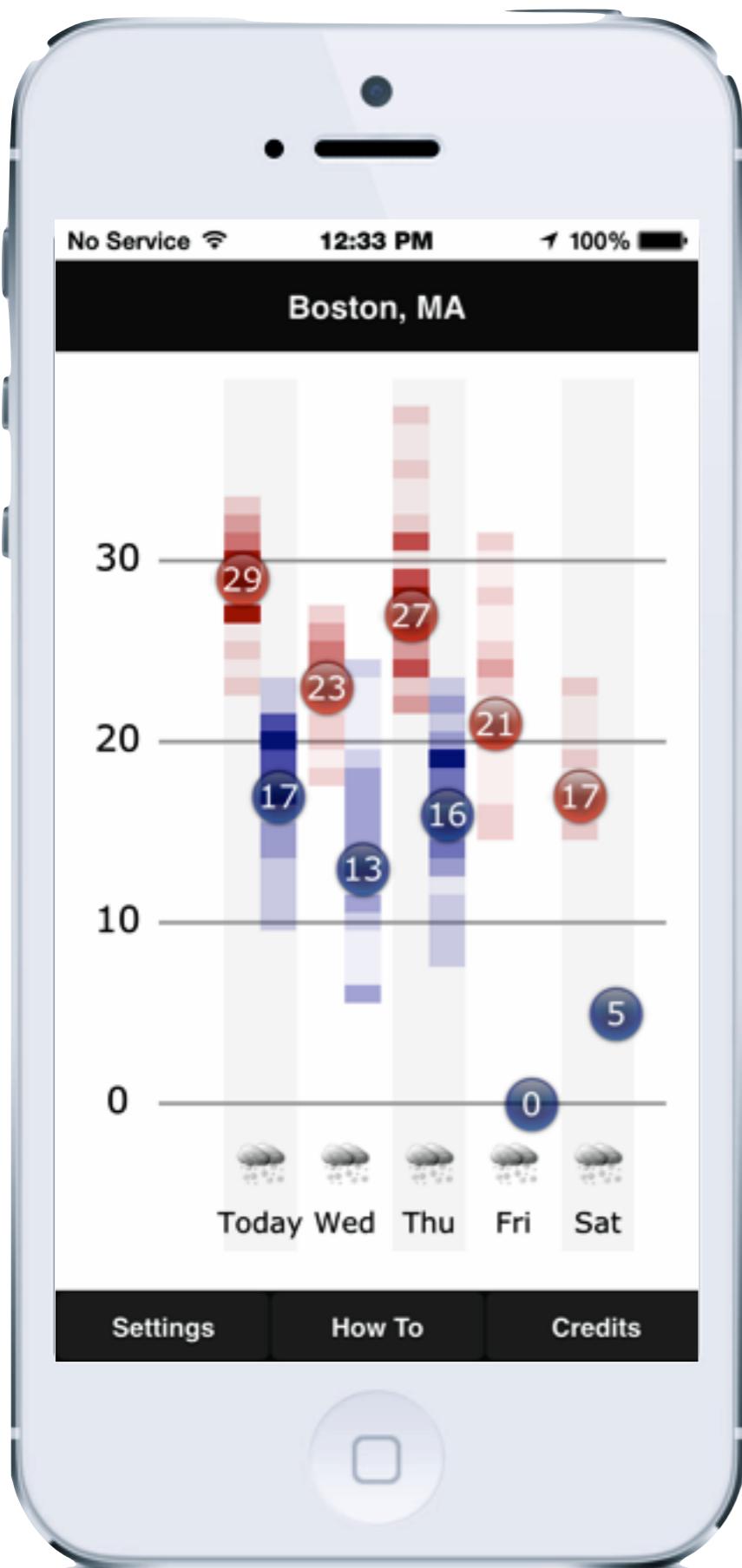
HARVARD UNIVERSITY
ASTRONOMY 201B
DEMOFEST

LOCATION
Perkin Lobby and Wolbach Library, 60 Garden Street

TIME
11-12 for drop-in demos
12-12:45 lunch for students & their guests

PREVIEW
<http://ay201b.wordpress.com/topical-modules>



PREDICTIONX

App Store > Weather > Harvard University

Take A Sweater
Harvard University >

Details Ratings and Reviews Related

iPhone Screenshots

Carrier 2:29 PM Boston, MA

Carrier 2:30 PM Mar 15

What does this show me?

Number of Occurrences

(Actual - Predicted) Temperature

50
40
30
20
10

50
40
30
20
10

49 49 49 40
35 30 30 21
29 30 21 10
18 10 21 21

Today Thu Fri Sat Sun

Settings How To Credits

Settings

Select City: Boston, MA

Date Tolerance (+/- Days): 10

Temperature Tolerance (+/- Days): 5

Show Results

Historical forecast data from ForecastWatch.

Description

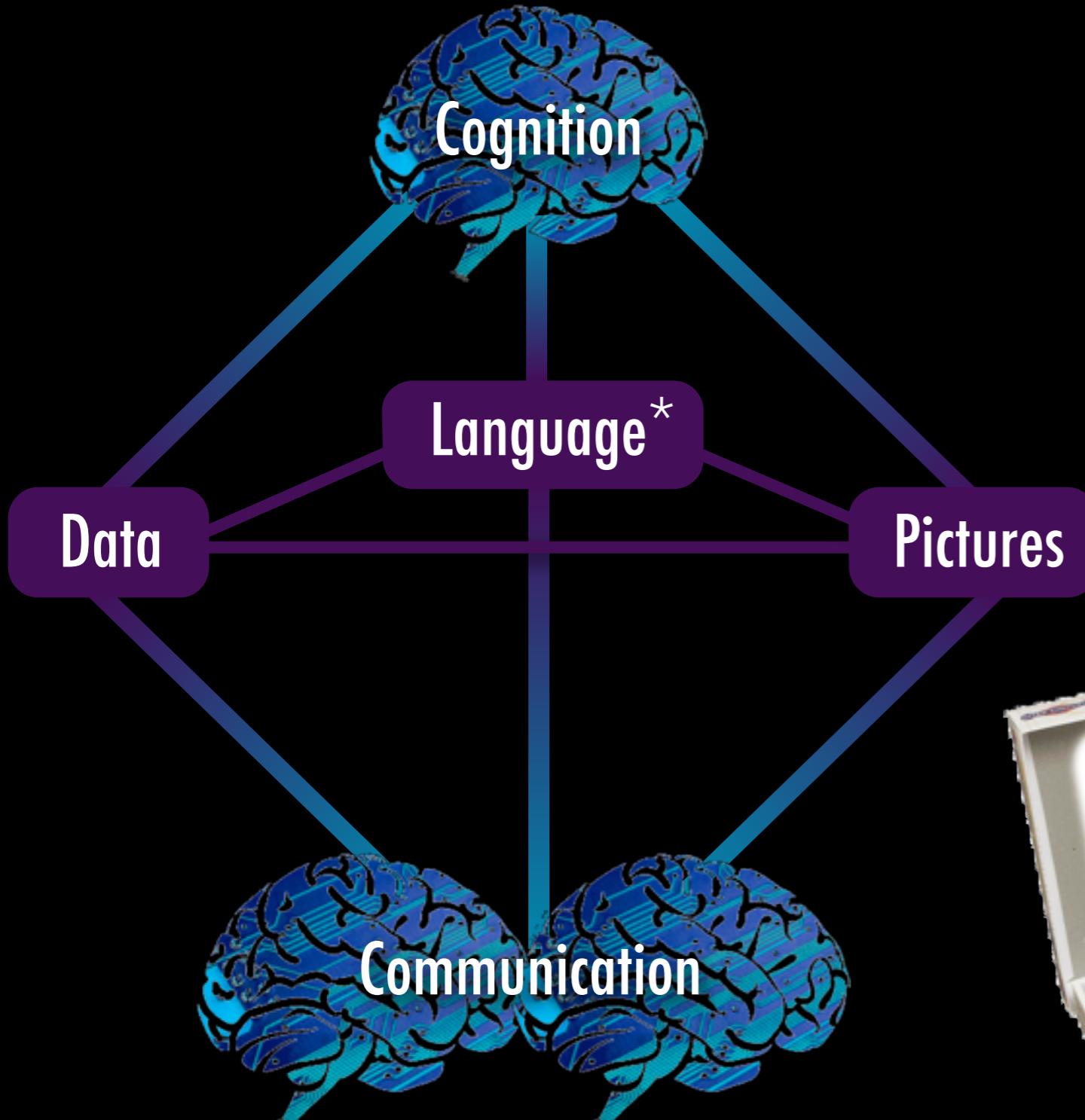
NOTE: Take-A-Sweater currently only has data for Boston, MA. This will be changing with the next release.

This App was created in 2012, for use in the Harvard University General Education course "The Art of Numbers," taught by Prof. Alyssa Goodman. The code was written by Bill Barthelmy of Harvard's Academic Technology Group. Historical data were kindly provided by ForecastWatch, a product of Intellivations, LLC. Current five-day weather forecast data are provided by NOAA....

takeasweater.com, and "TakeASweater" in the Apple App Store



The future is about Integration



IP[y]: IPython
Interactive Computing



plotly



[CFA](#)[NASA ADS](#)[HARVARD LIBRARY](#)

John G. Wolbach Library and Information Center

Harvard-Smithsonian Center for Astrophysics
60 Garden Street, Cambridge MA 02138

Search



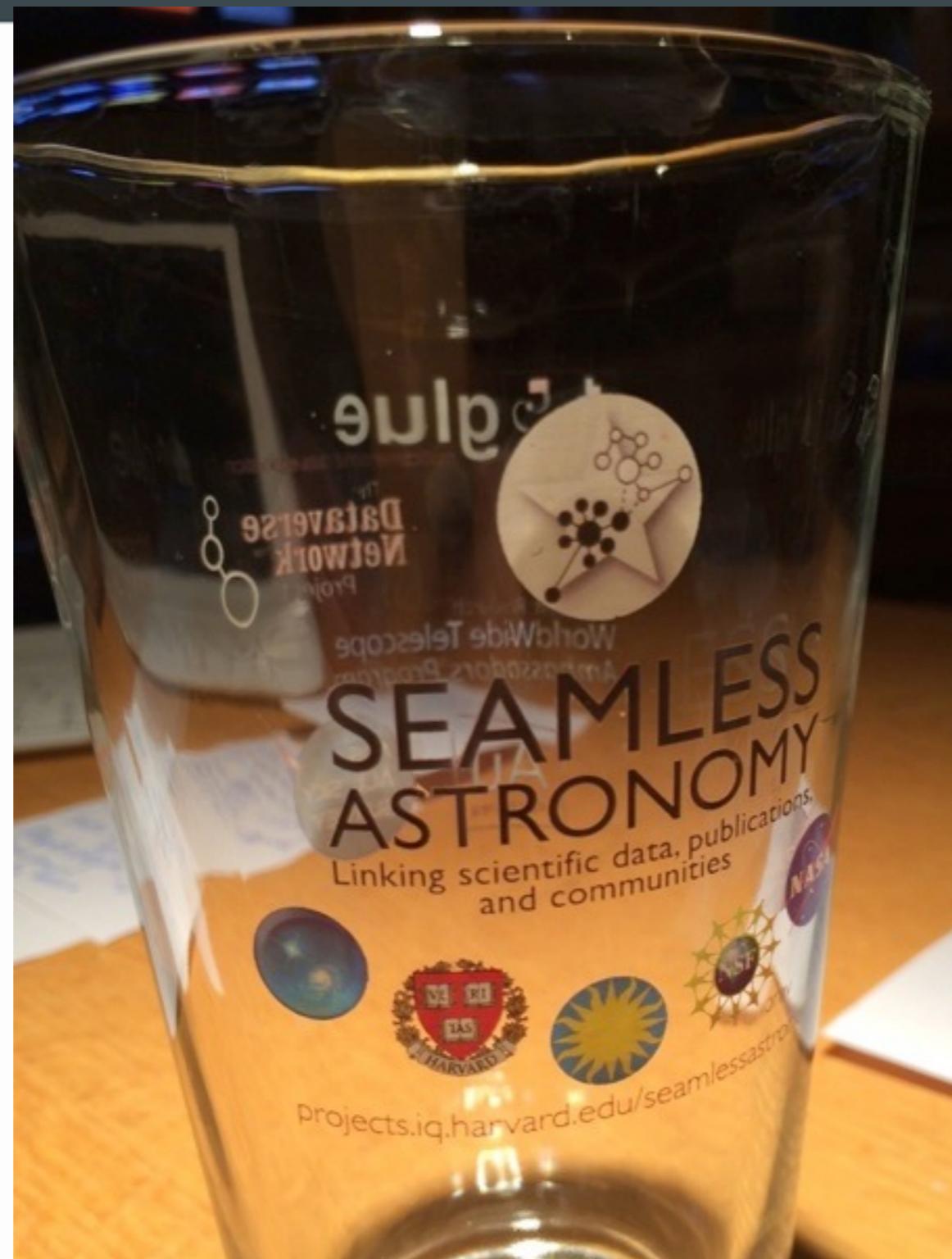
Reference Desk hours
10 am - 4 pm M-F

[Home](#)[Search Literature](#)[Facilities](#) ▾[FAQ](#)[Research Tools](#)[Galactic Gazette](#)[Contact Us](#)

INFORMATION

[About the Library](#)[Hours, Parking, Map](#)[Collaboration Space](#)[Request a PIN](#)[Policies and Procedures](#)[Library Projects](#)[Staff List](#)

SERVICES

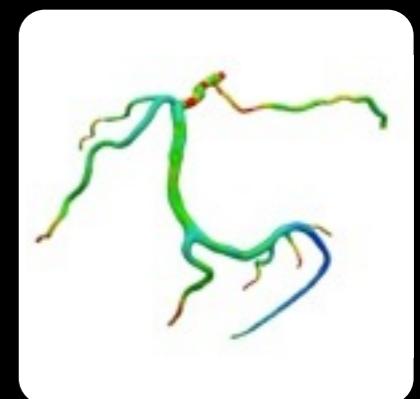
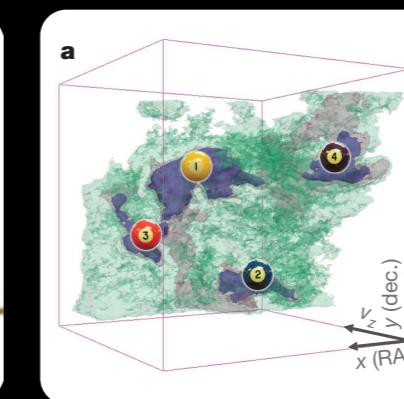
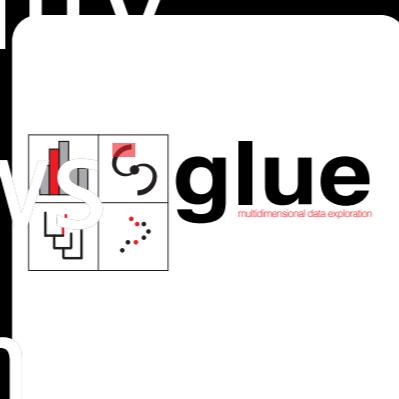
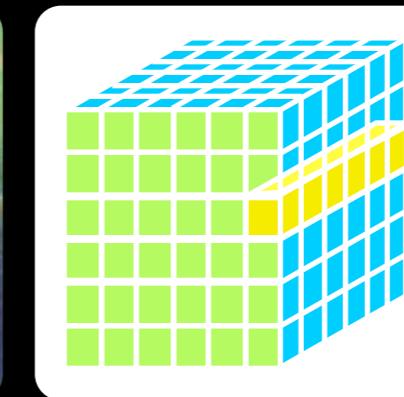
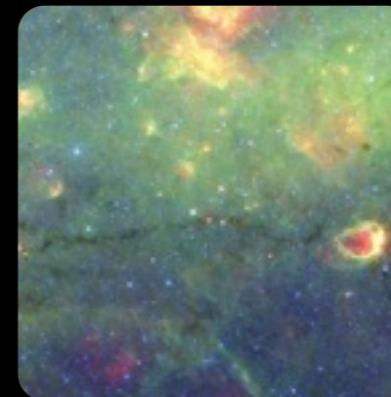
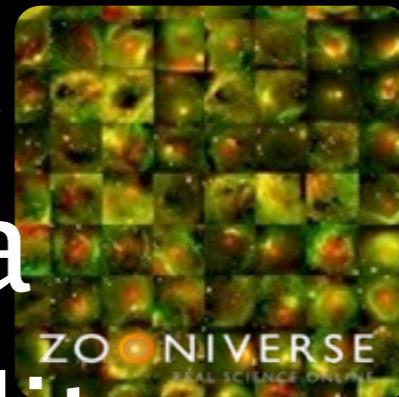
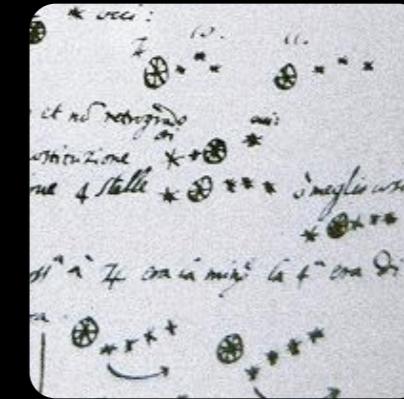
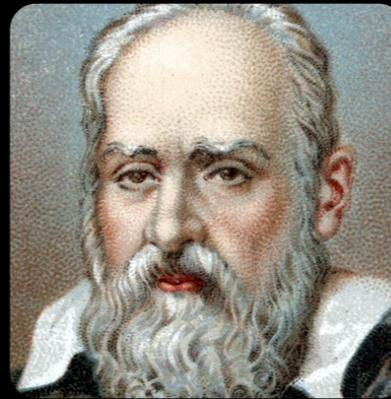
[Material Request](#)[Interlibrary Loan](#)[Ask a Librarian](#)[Purchase Suggestion](#)

SEARCH LITERATURE

[Quick Links](#)[Journals & Proceedings](#)[Electronic Books](#)[Browse New E-books](#)[Astronomy Resources](#)[Astronomical Newsletters](#)[Collections](#)[News Sources](#)

**ask me about the
"Library of the Future,"
at Harvard...**

Resolution
Context
Big Data
Wide Data
Dimensionality
Linked views
Interaction
Communication
education





More?



[projects.iq.harvard.edu/
seamlessastronomy/
presentations](http://projects.iq.harvard.edu/seamlessastronomy/presentations)