

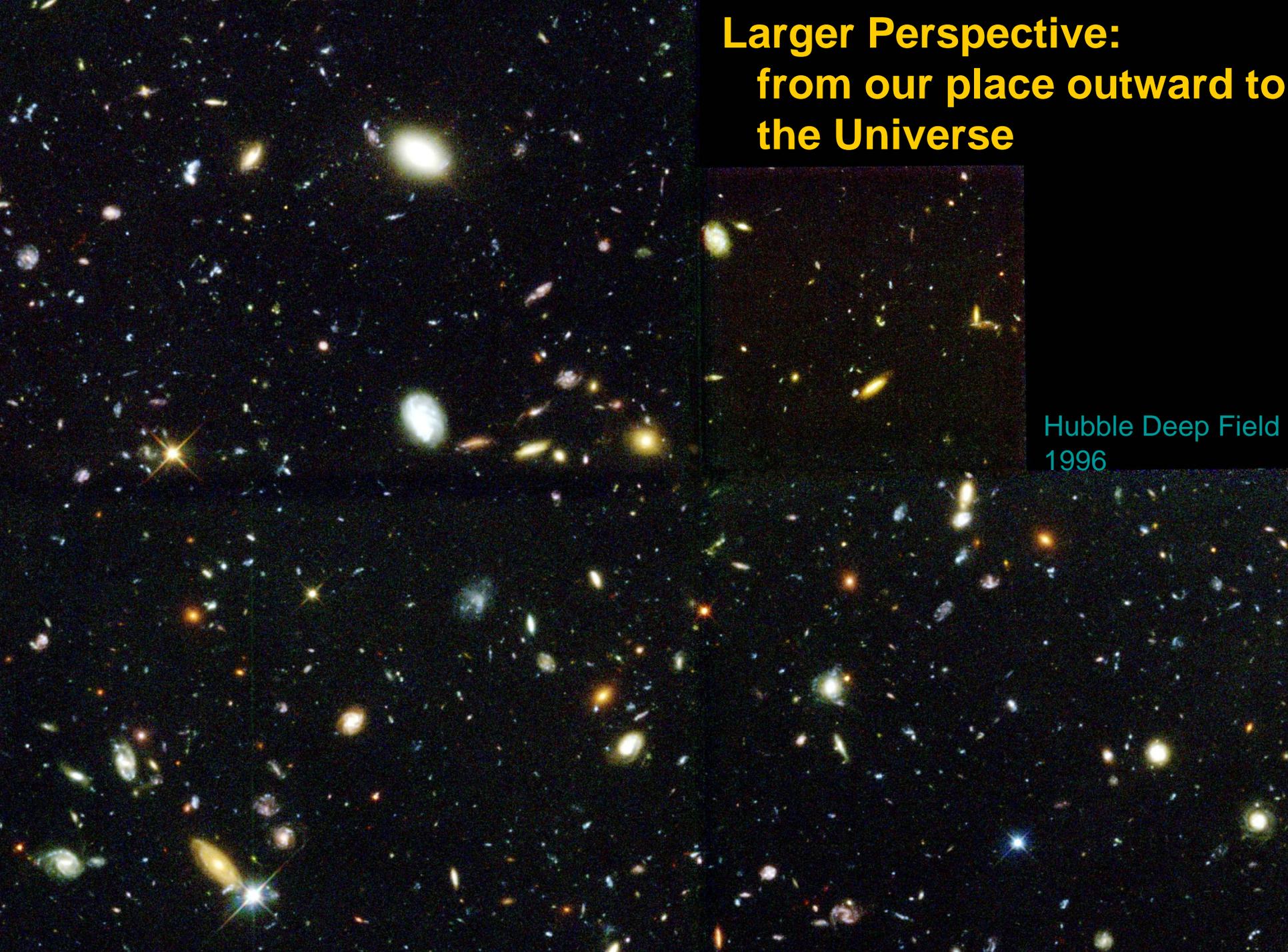


Premana W. Premadi --- Astronomy --- Institut Teknologi Bandung

The Heaven
from
our backyard



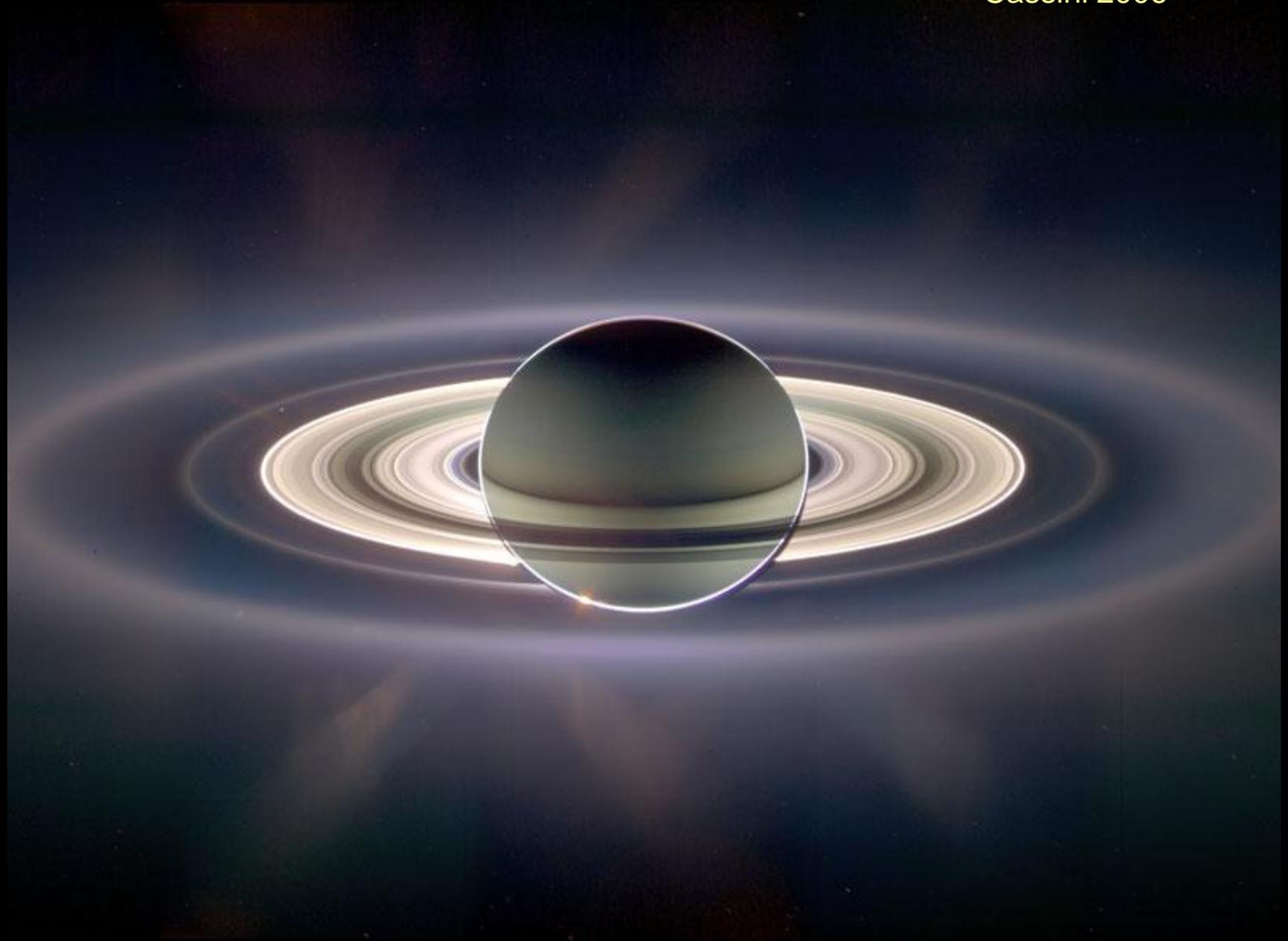
**Larger Perspective:
from our place outward to
the Universe**

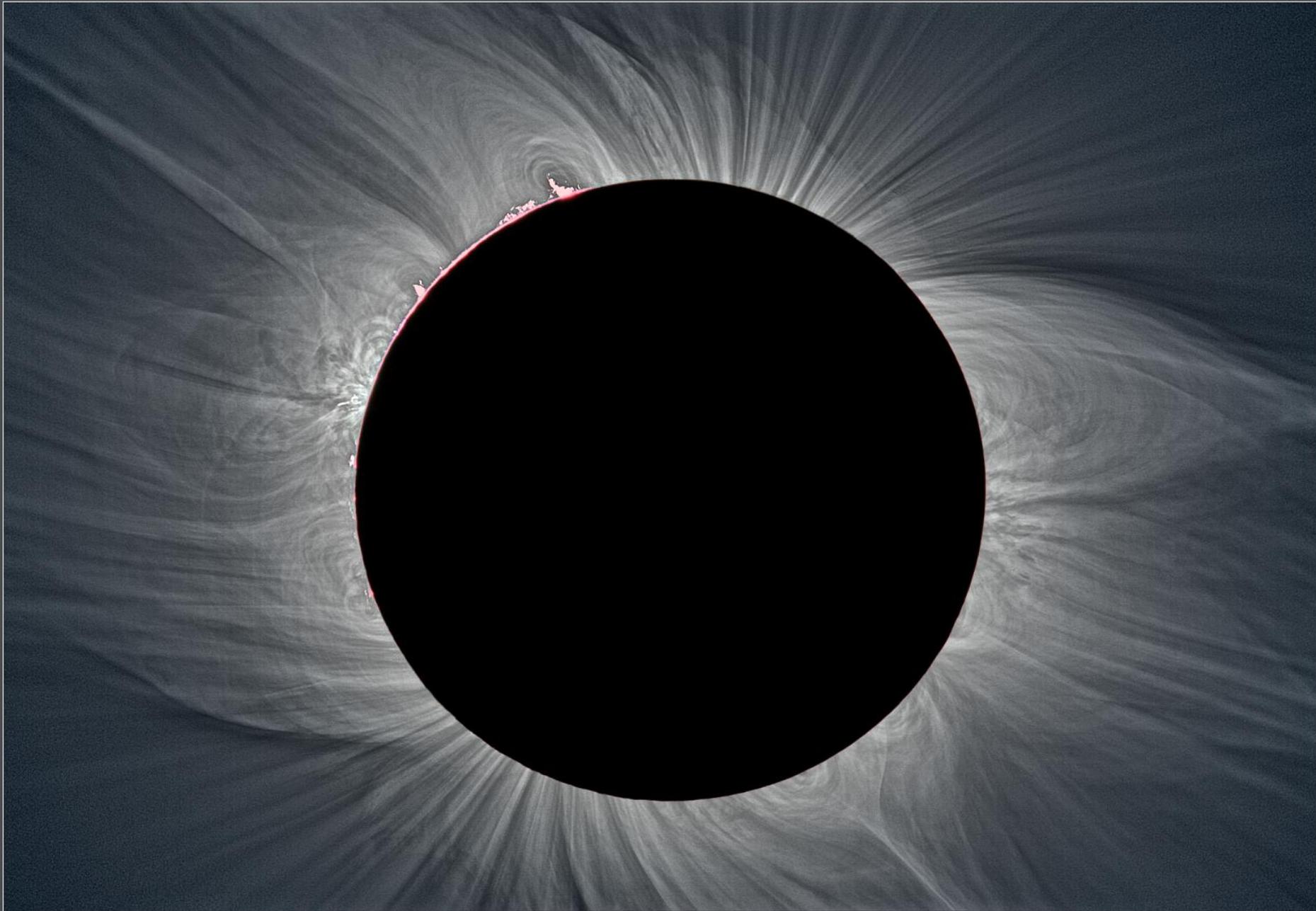


Hubble Deep Field
1996

Perspective 2: looking at us from Saturn

Cassini 2006





Total Solar Eclipse 2006

© 2006 Miloslav Druckmüller, Peter Aniol

OXYGEN IN OUR ATMOSPHERE (~ 2.2 MYEARS)

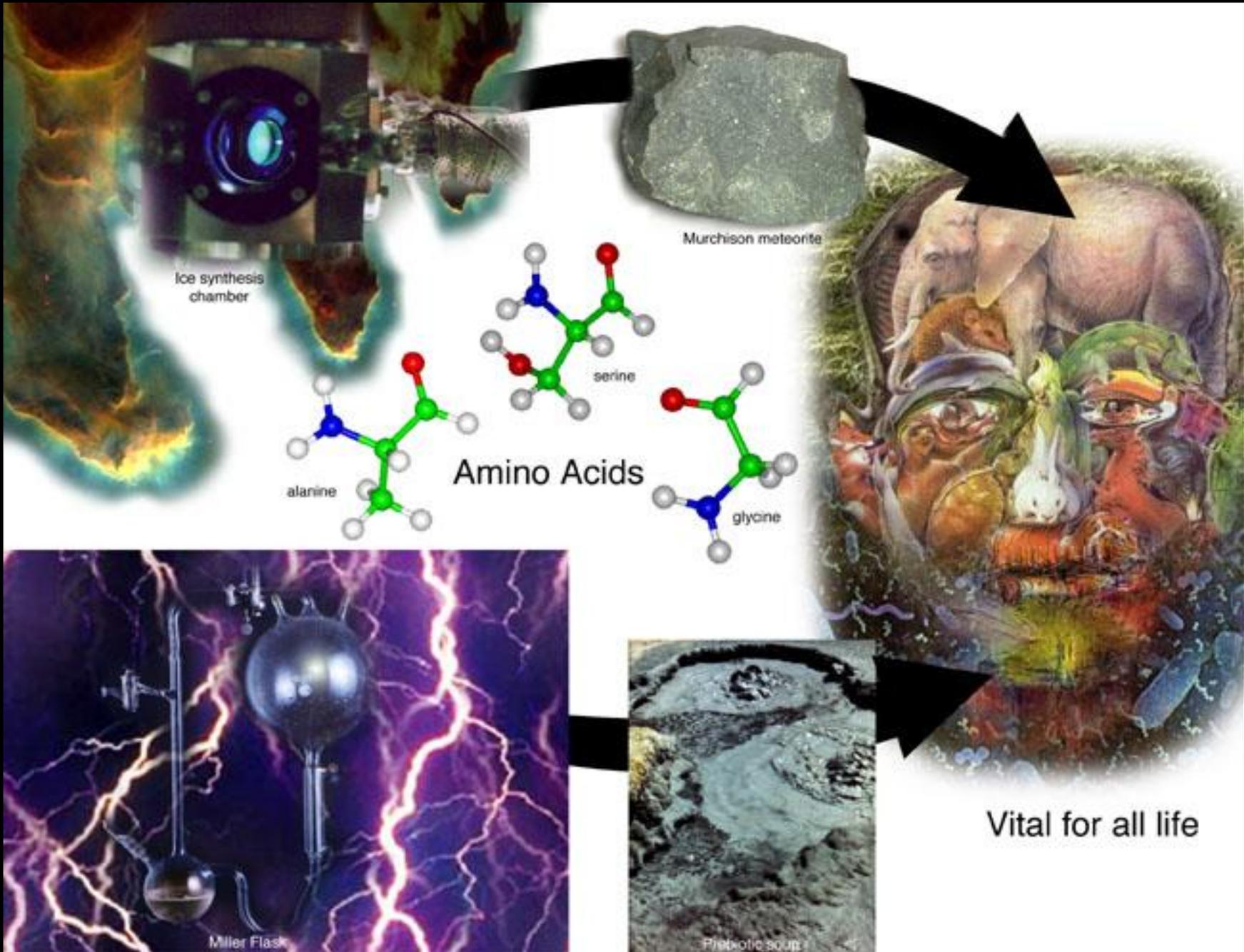


Bacterial photosynthesis might have begun 2.5 Gyears ago



O₂ enables the formation of ozon (O₃), which protects from high energy rays so that more complex living beings could evolve





Polar bear and cub, Norway

Enjoy and appreciate life



Photograph © Jason Roberts

bbc.co.uk/planetearth

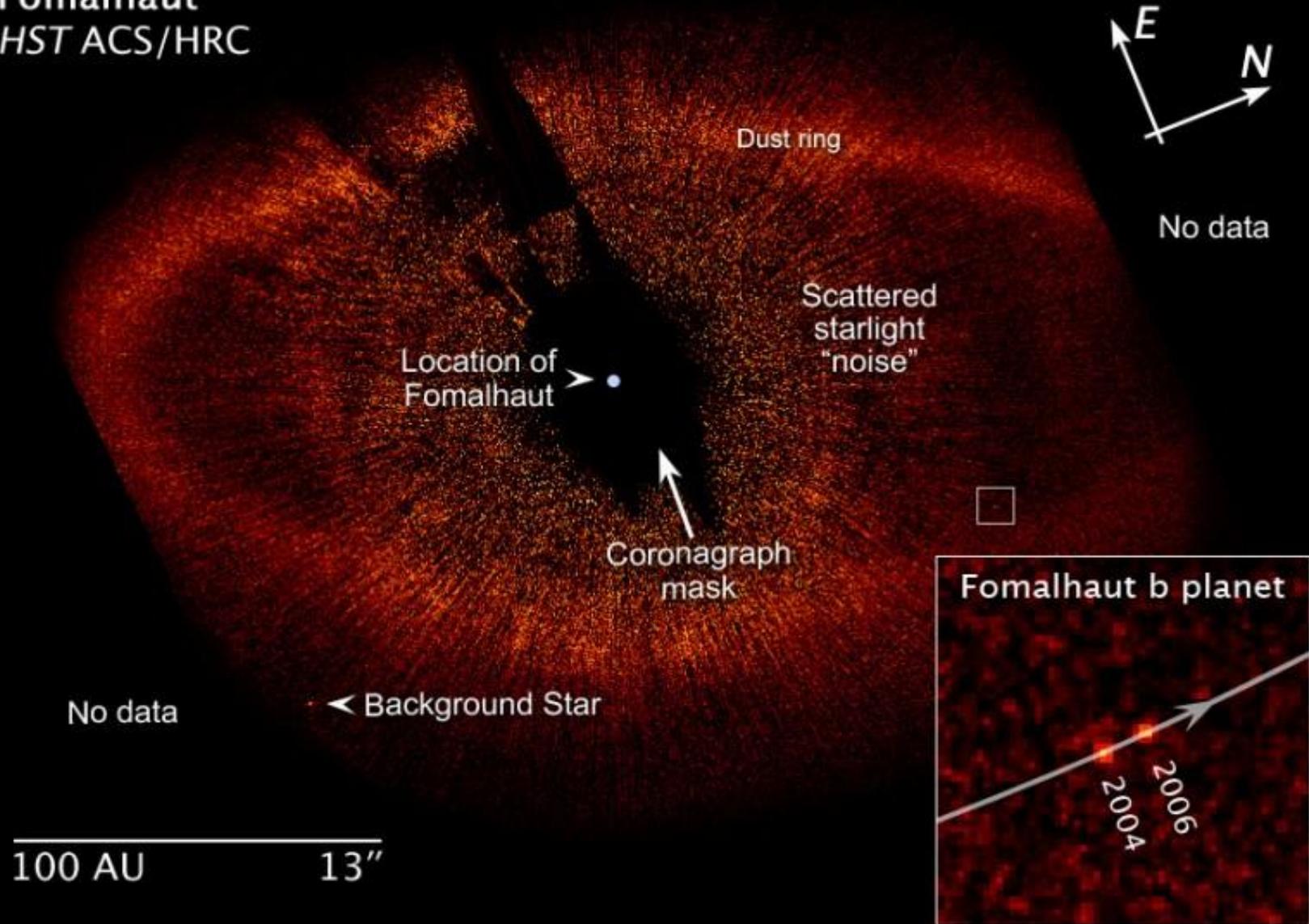




Natural disaster is probable, but so is human-caused disaster

Searching for planets around other stars

Fomalhaut
HST ACS/HRC



Stars shine so brightly



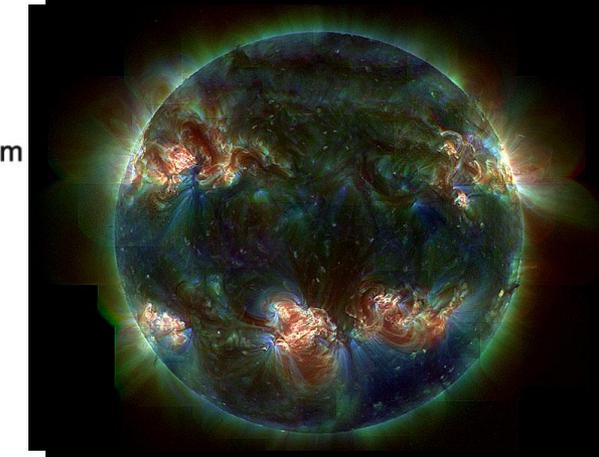
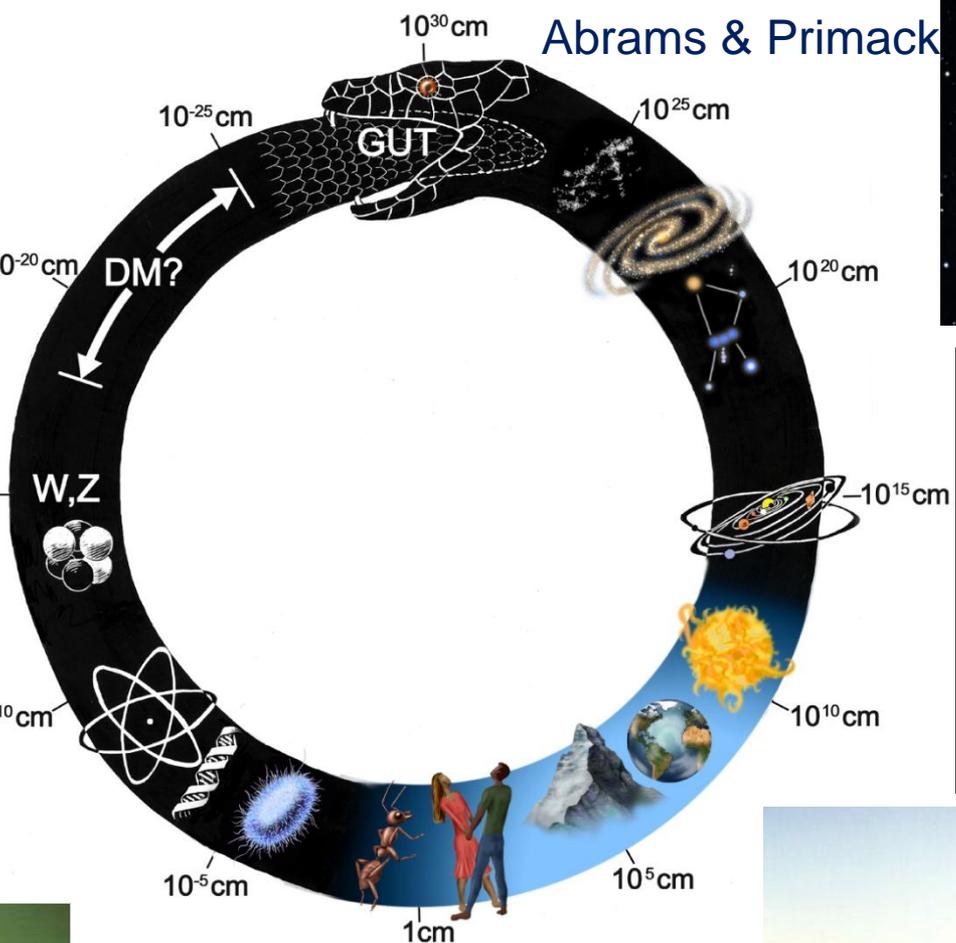
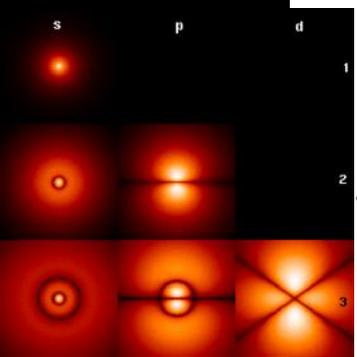
Finding planets around other star is like finding fireflies around a lighthouse



Where are we in the physical scale?



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mack, Inc.



Reflection: our existence in spacetime

We need to expand our view,
even leave our Home to understand our existence



Where and how do we learn science?

Until recently curriculum around the world, for any level of education, was designed to provide knowledge and skill for the students to survive in their future. This is particularly true in the field of science and engineering where the aim is emphasised on the building of personal capabilities, and thus individual survival.

Considering current world situation however, the design of curriculum must include substance that will also build community survival and the survival of natural environment. A healthy and constructive network of surviving individuals is necessary for humanity to survive as long as possible. The word “survive” means more than just being in a state above a minimal standard of living, but must constitute wholesome meaning of being human.

Just how does one incorporate such a constitution in a curriculum?

Individual survival:

- Coverage: individual's knowledge, skill, physical health, mental and spiritual state
- Motivation:
 - Each person has the right to be at his/her best at all those life aspects
 - Each person has the right to develop himself/herself, take charge of his/her life, and participate in matters wherein she/he is a part or is potential
- The general worldwide curriculum covers at least basic materials that have the potential to prepare students to achieve the personal state listed above. However, the learning/teaching process is often such that the materials are delivered in boxes that do not communicate with one another. An even more problematic issue is that learning is often taken as a process of collecting information, rather than building reasoning capacity. Without reasoning capacity, the process of information analysis may lose reference. Many current problems in the world are the result of misjudgment, misunderstanding; they stemmed out of narrow-minded root.

Community survival:

- Coverage: networks of individuals; membership; citizenship: family, regional, national, international
- Motivation:
 - Assurance of the holding-up of values (family values, traditional values, religious values, etc), the feeling of security, trust, peace, and justice in all aspects of life
 - Assurance of fair chance to develop and to play a role in issues in the community wherein the individual/group is a part
- The sense of belonging an individual has towards a certain group (family, region, religion, etc) should be shared with others in the group to construct a positive outcome, while also understanding that there are other groups having similar sentiments and motivation. Whereas differences at the surface should be recognised and respected, the commonality at the foundation level should be given at least equal exposure and be more explored to find strong threads to bridge the differences.

Natural environment survival:

- Coverage: Earth, Universe

- Motivation:

Human, being the sentient Guardian of Earth, which is the habitat and supporter of lives of human and other creatures, must be able to protect Earth and share it fairly with the other creatures for as long as possible. Human has the most capability to exploit and benefit from the Earth, and therefore should be the one responsible in taking charge in its preservation: beneficiary □ guardian

- Earth is the station from where human explore the Universe and construct a system of reference in an endeavour to understand human existence within this great Universe, physically and spiritually.

- It is obvious that coverage and motivation of **individual survival, community survival, and natural environmental survival are not disconnected**. Nonetheless, they operate on different levels and must be clearly stated as such. Consequently, it is necessary that their presentations in the integrated curriculum are not separated, but should be interwoven such that the emerging large picture is seen but the individual threads can still be recognised.
- An example: in teaching a particular subject of science, rather just explaining a theory and the fact based on observational/experimental data, it is suggested to deliver the whole subject in a fuller context. It can be in a descriptive-illustrative manner, wherein each of the **what, how, and why** of the subject matter is given a full-body elaboration. It can also be delivered in a full narrative manner, where the history of the development of the subject matter is appreciated as an evolution of thinking, elaboration of ideas, elaboration of engineering required, understanding of data, etc. Also the narration can be expanded to include relation with other field which otherwise seemed disconnected



COMPOSITE



CHANDRA X-RAY



HUBBLE OPTICAL



SPITZER INFRARED



GALEX ULTRAVIOLET

Being and Growing TOGETHER

newborns
young and restless
matured and experienced

luminous – dark
fast - slow
known – unknown

**DYNAMIC
and
BEAUTIFUL**

THE TEACHING COMPANY

Big History: The Big Bang, Life on Earth, and the Rise of Humanity **Prof. David Christian ; San Diego State University**

SCOPE:

Big history surveys the past at all possible scales, from conventional history, to the much larger scales of biology and geology, to the universal scale of cosmology. It weaves a single story, stretching from the origins of the Universe to the present day and beyond, using accounts of the past developed within scholarly disciplines that are usually studied quite separately. Human history is seen as part of the history of our Earth and biosphere, and the Earth's history, in turn, is seen as part of the history of the Universe. In this way the different disciplines that make up this large story can be used to illuminate each other. The unified account of the past assembled in this way can help us understand our own place within the Universe. Like traditional creation stories, big history provides a map of our place in space and time; but it does so using the insights and knowledge of modern science.

Big History: The Big Bang, Life on Earth, and the Rise of Humanity

Prof. David Christian ; San Diego State University

1. What is Big History
2. Moving across Multiple Scales
3. Simplicity and Complexity
4. Evidence and the Nature of Science
5. Threshold 1 - Origins of Big Bang Cosmology
6. How Did Everything Begin
7. Threshold 2 - The First Stars and Galaxies
8. Threshold 3 - Making Chemical Elements
9. Threshold 4 - The Earth and Solar System
10. The Early Earth - A Short History
11. Plate Tectonics and The Earth's Geography
12. Threshold 5 – Life
13. Darwin and Natural Selection
14. The Evidence for Natural Selection
15. The Origins of Life
16. Life on Earth - Single-celled Organisms

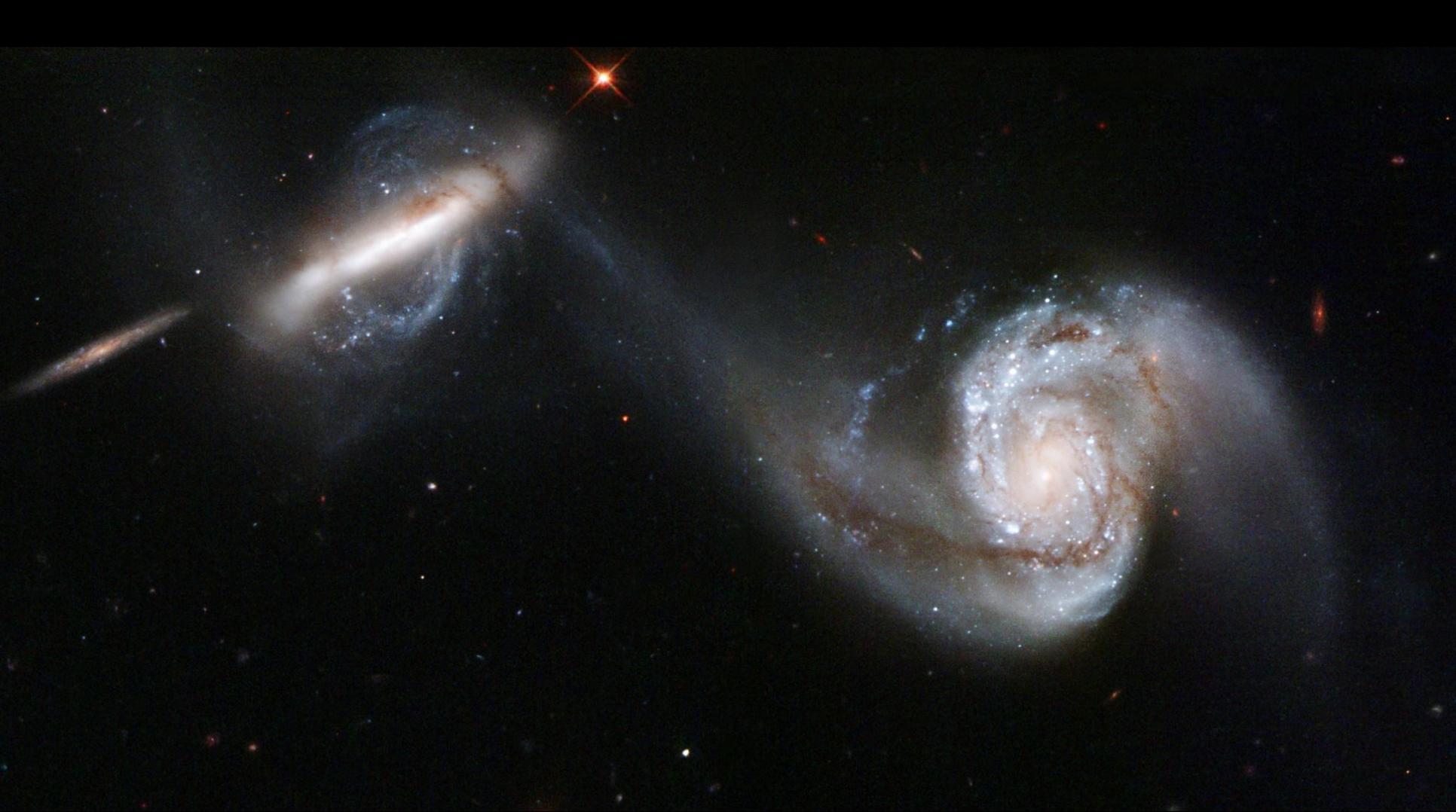
17. Life on Earth - Multi-celled Organisms
18. Hominines
19. Evidence on Hominine Evolution\
20. Threshold 6 - What Makes Humans Different ?
21. Home Sapiens - The First Humans
22. Paleolithic Lifeways
23. Change in Paleolithic Era
24. Threshold 7 – Agriculture
25. The Origins of Agriculture
26. The First Agrarian Societies
27. Power and Its Origins
28. Early Power Structures
29. From Villages to Cities
30. Sumer - The First Agrarian Civilization
31. Agrarian Civilizations in Other Regions
32. The World That Agrarian Civilizations Made
36. Comparing the World Zones

33. Long Trends - Expansion and State Power
34. Long Trends - Rates of Innovation
35. Long Trends - Disease and Malthusian Cycles
37. The Americas in the Later Agrarian Era
38. Threshold 8 - The Modern Revolution
39. The Medieval Malthusian Cycle, 500-135
40. The Early Modern Cycle, 1350-1700
41. Breakthrough - The Industrial Revolution
42. Spread of the Industrial Revolution to 1900
43. The 20th Century
44. The World That the Modern Revolution Made
45. Human History and the Biosphere
46. The Next 100 Years
47. The Next Millennium and the Remote Future
48. Big History - Humans in the Cosmos

Learning Together

- For all ages: university freshman – senior accomplished specialists
 - For all backgrounds: science, engineering, cultural, religious, medical, social
-
- ➔ spectra of perspectives and responses on a particular topic can be very wide, untypical of usual classroom experience
 - ➔ melting boundaries in the learning process: seeing others' perspective is not only enriching but also giving chance for reflection
 - ➔ less restricted by curriculum, yet could achieve the goal (the 3 survivals → sustainability ?) via communications across boundaries

Later discussion: Exploring more possible outcomes from this mode of learning



I am glad we are joining hands

Thank you