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GOTO Copenhagen 2021

#GOTOcph

SPEAKER: KENNETH HARRIS II

AN AVERAGE VISIONARY DAY WORKING ON NASA PROJECTS

CLOSING KEYNOTE


ELEMENTS
KENNY HARRIS
kennyfharris

HOW ARE WE PREPARING TO EXPLORE THE COSMOS?

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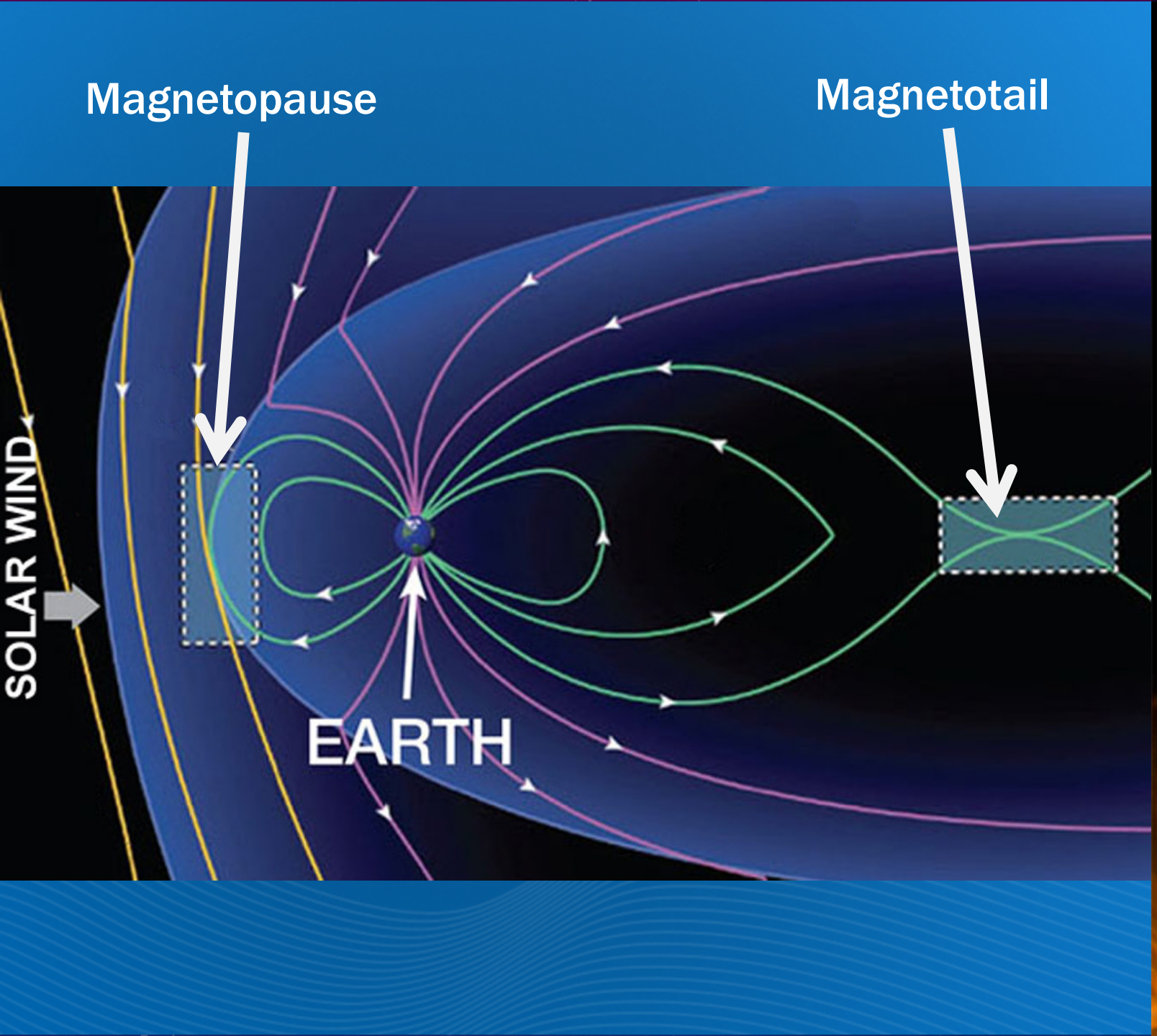
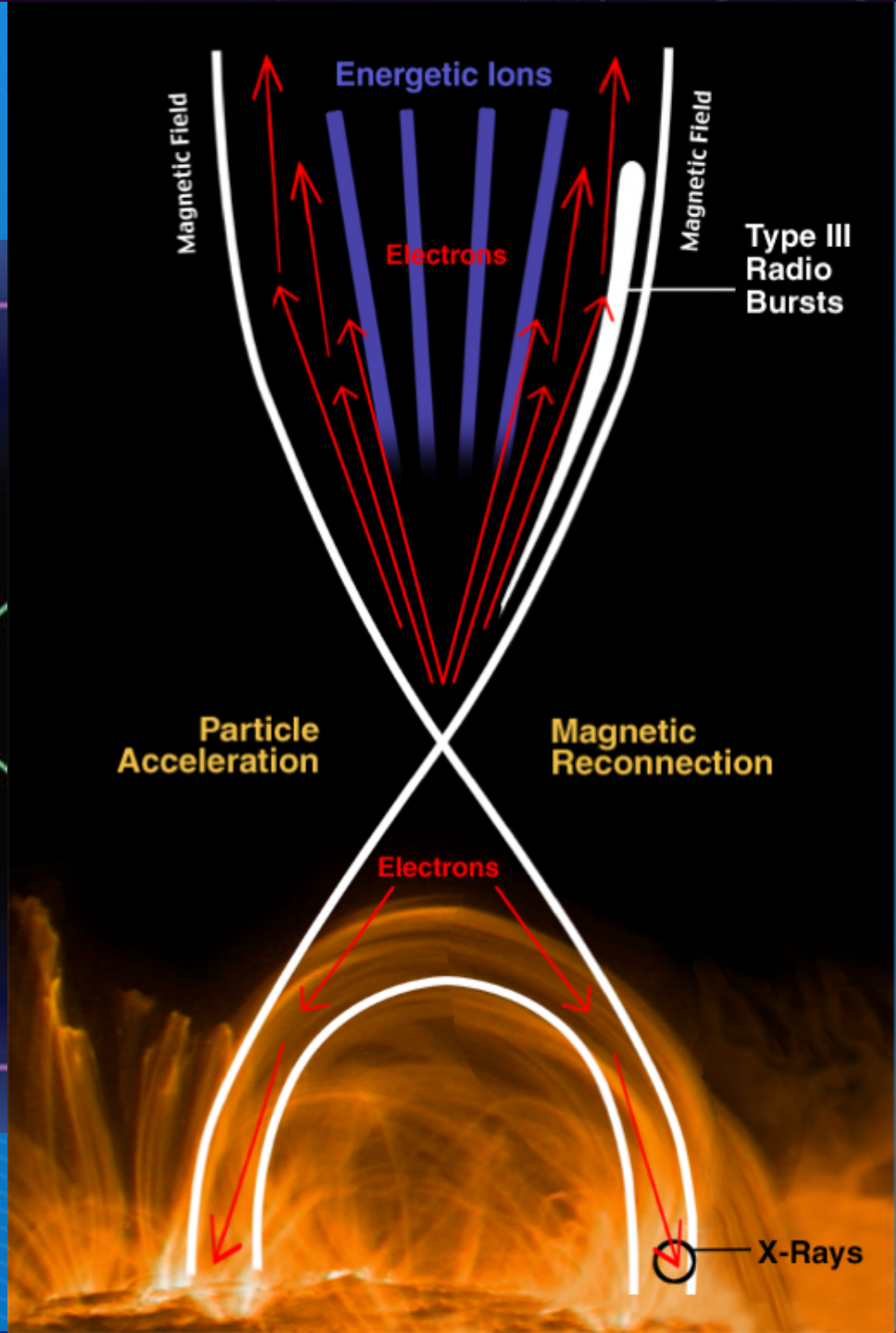
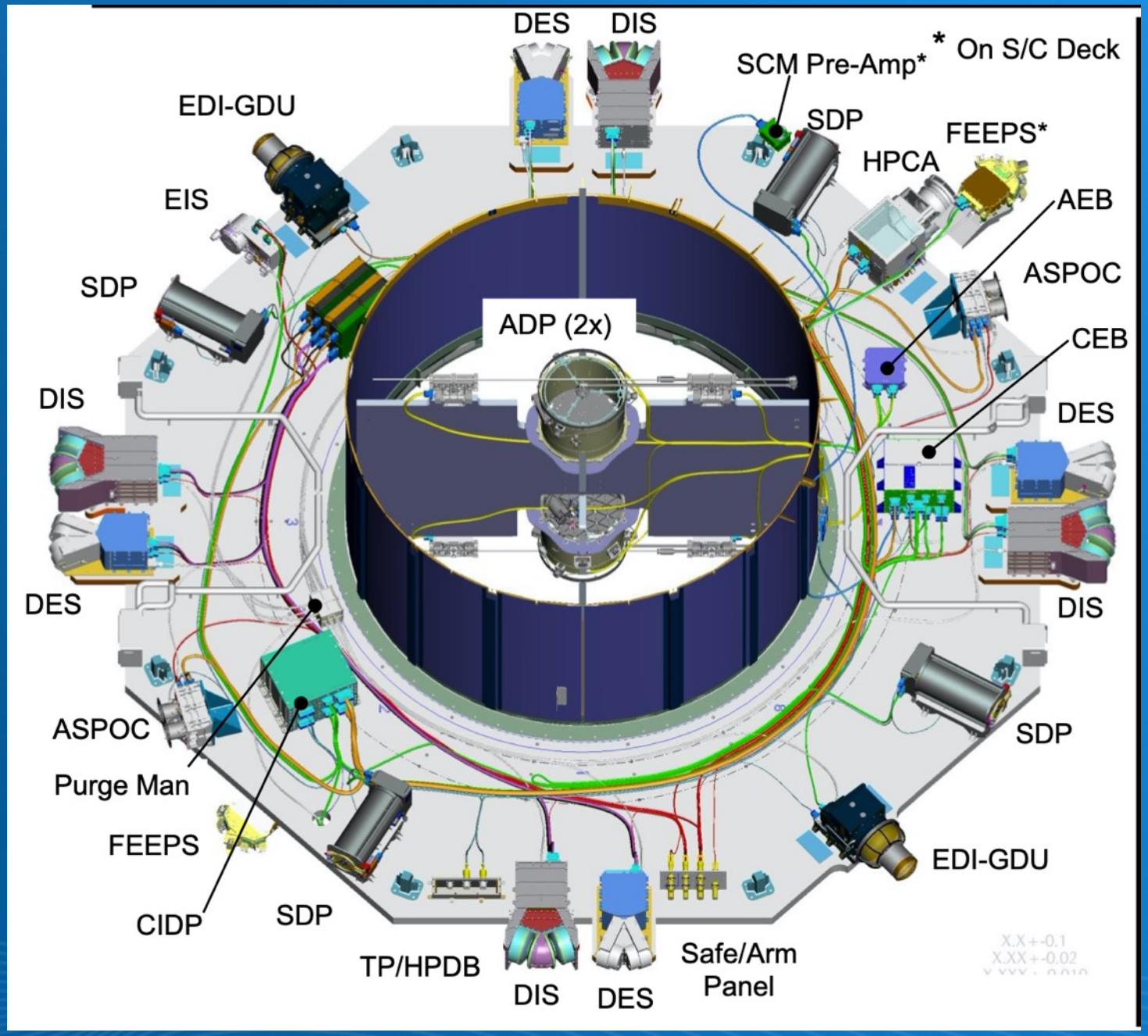
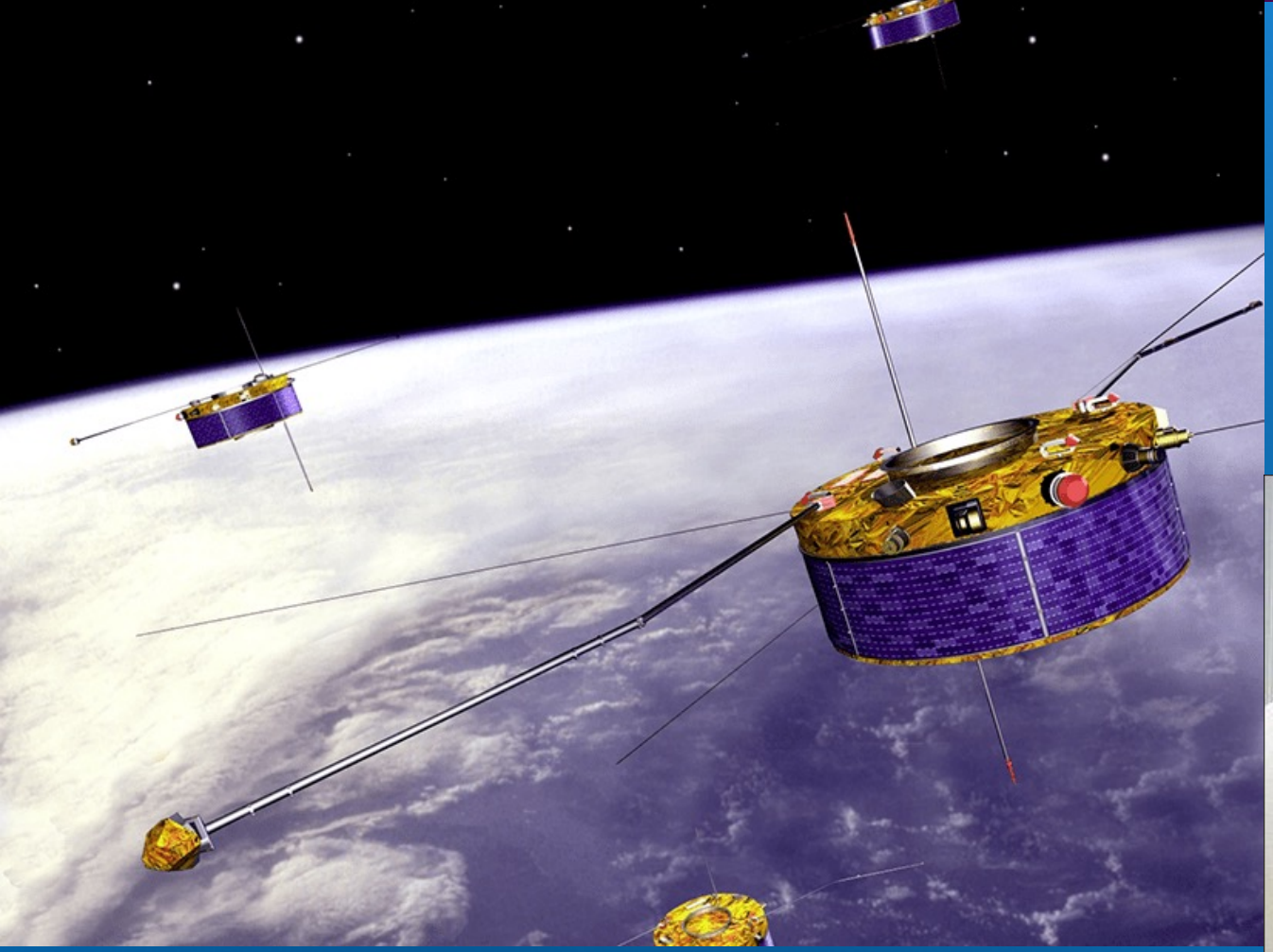
MAGNETOSPHERIC MULTISCALE MISSION

- Studies Magnetic Reconnection
- 4 Identical Spacecrafts
- Observes the kinetic processes in the electron diffusion region


Magnetopause
Magnetotail
SOLAR WIND
EARTH


Energetic Ions
Magnetic Field
Magnetic Field
Electrons
Type III
Radio
Bursts
Particle
Acceleration
Magnetic
Reconnection
Electrons
X-Rays


DES
DIS
* On S/C Deck
SCM Pre-Amp*
SDP
FEEPS*
HPCA
AEB
ASPOC
CEB
DES
DIS
SDP
EDI-GDU
EIS
SDP
ADP (2x)
DIS
DES
ASPOC
Purge Man
FEEPS
CIDP
SDP
TP/HPDB
DIS
DES
Safe/Arm
Panel
EDI-GDU
SDP
DIS
DES



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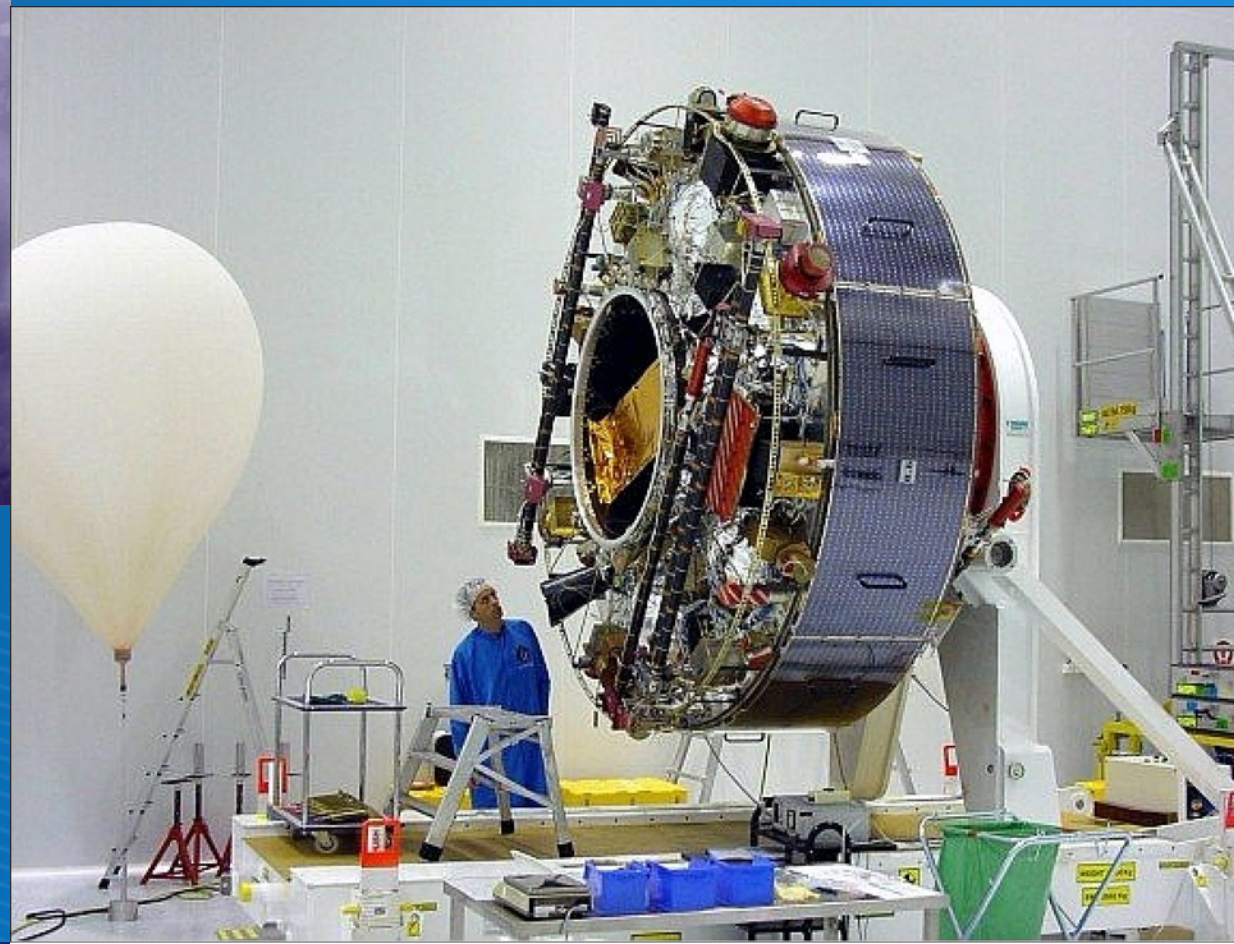
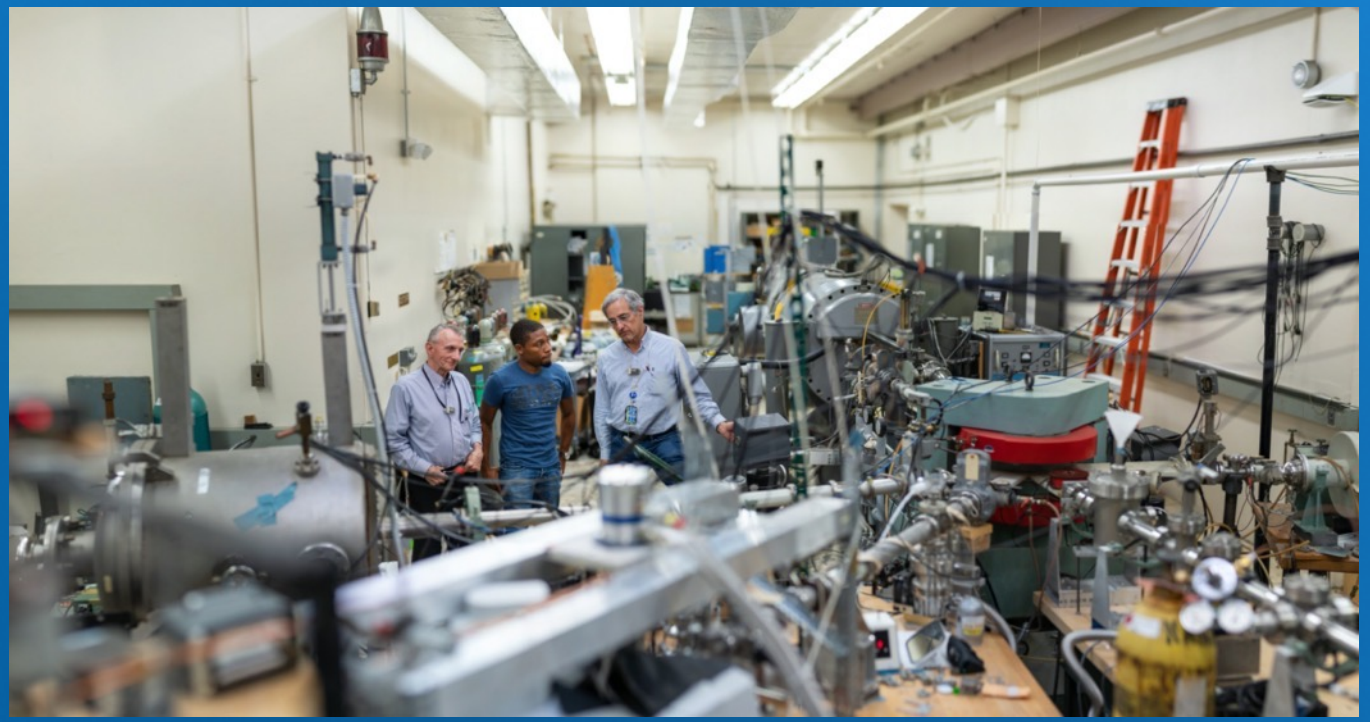


CLUSTER



HOW ARE WE UNDERSTANDING OUR HOME PLANET BETTER?

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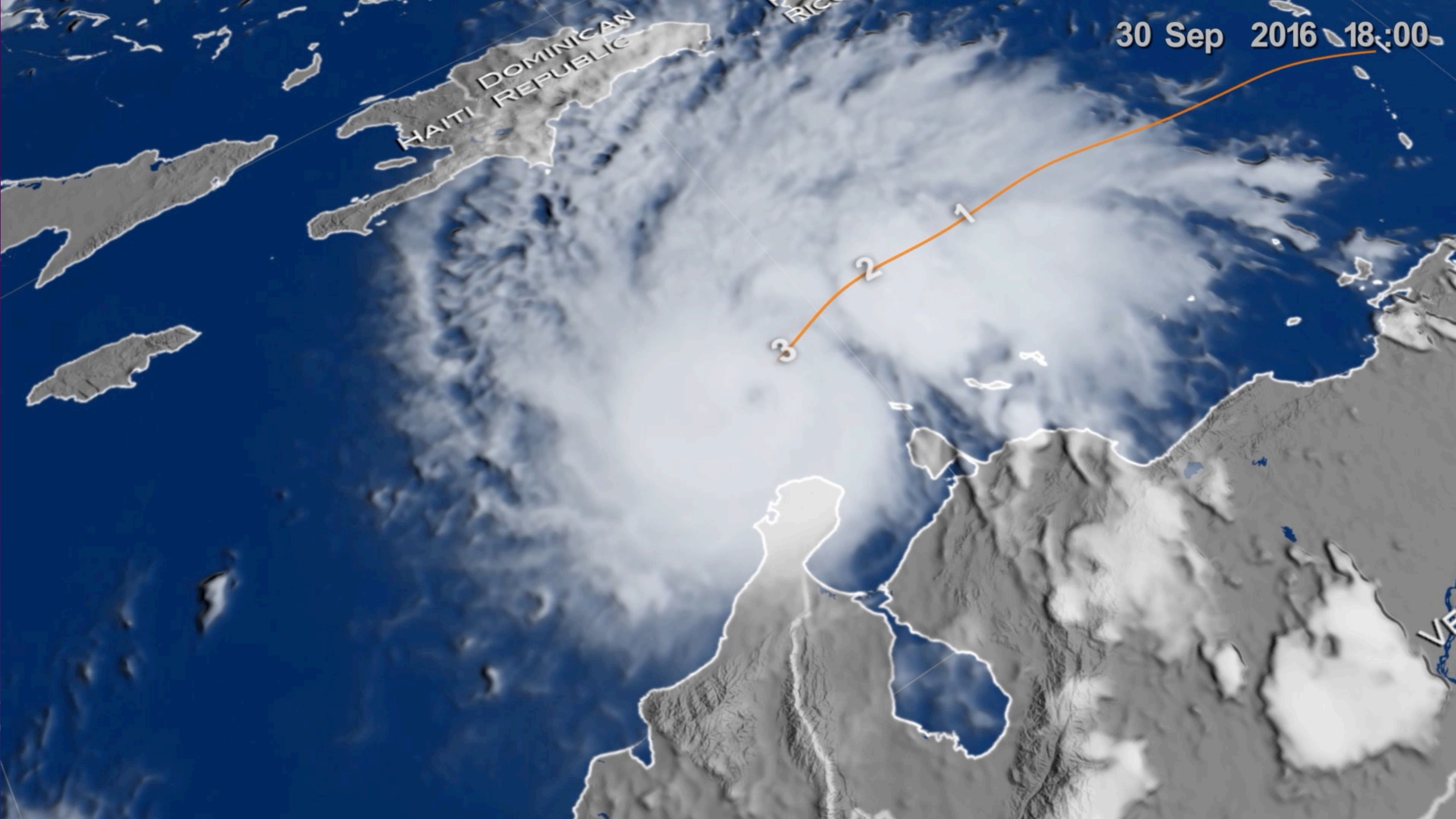
30 Sep 2016 18:00
HAITI
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GLOBAL PRECIPITATION MEASUREMENT

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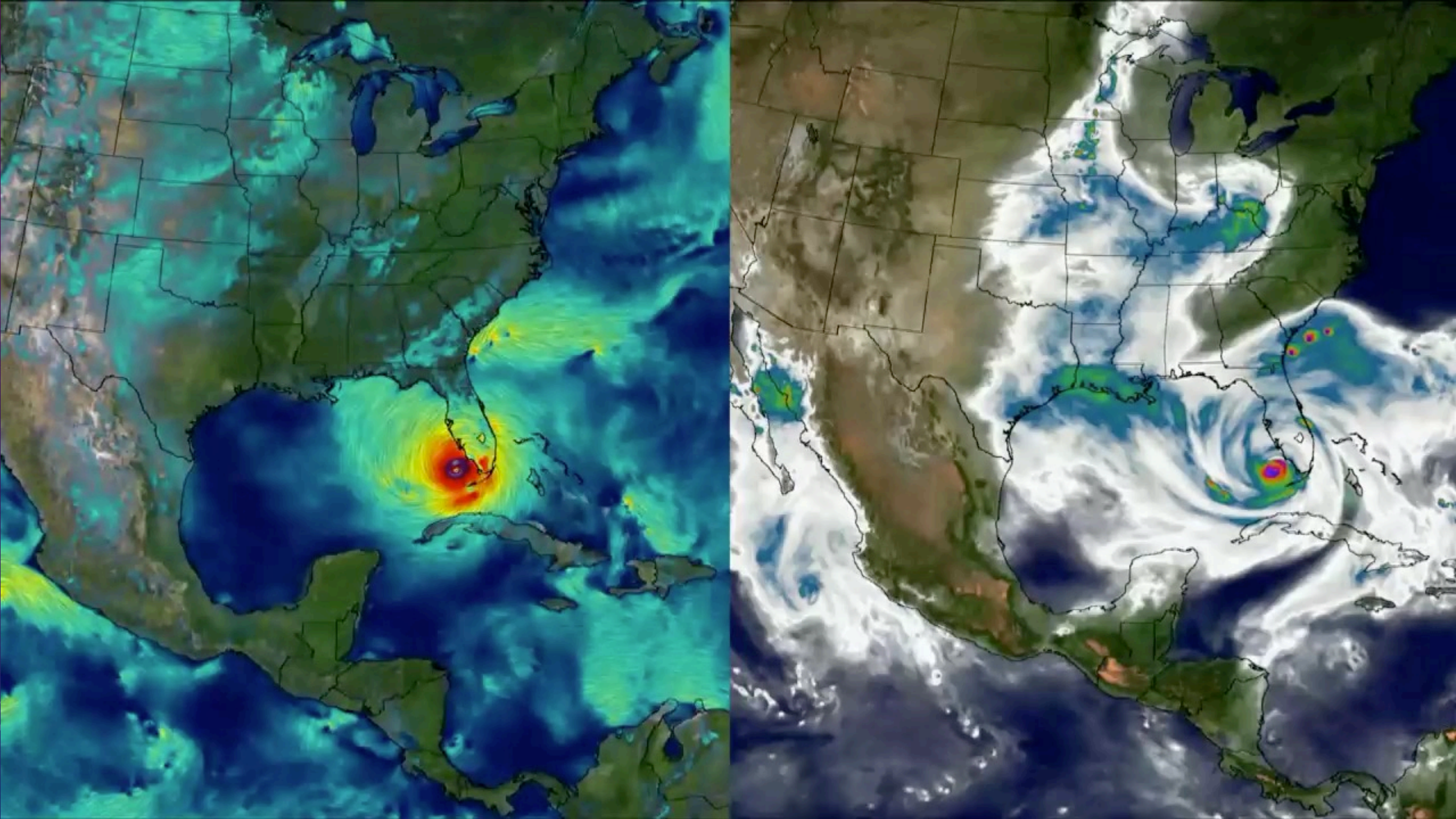
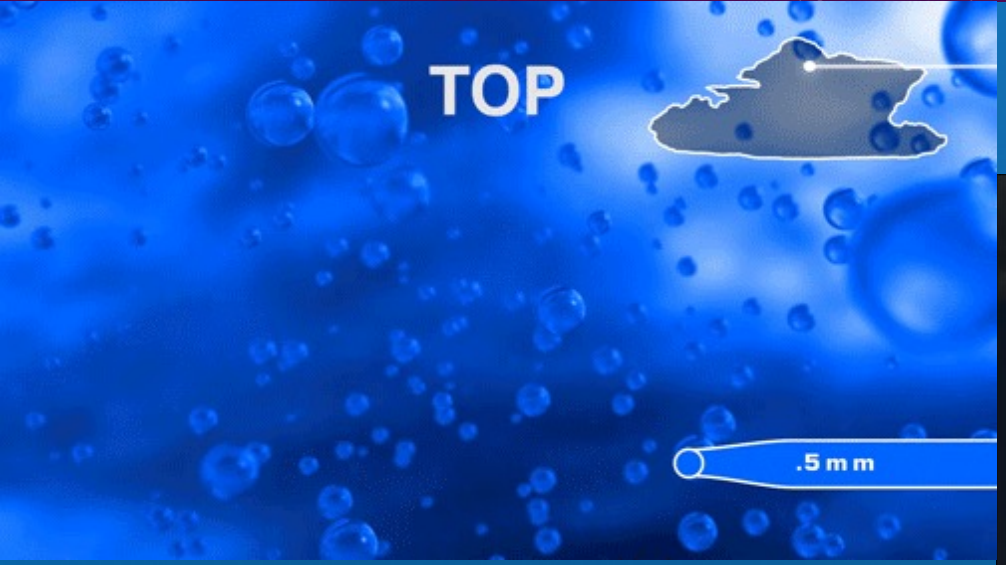
- Advance our understanding of Earth's water and energy cycles
- Improve forecasting of extreme events that cause natural disasters
- Enhance our capabilities of using accurate data on precipitation to directly benefit society





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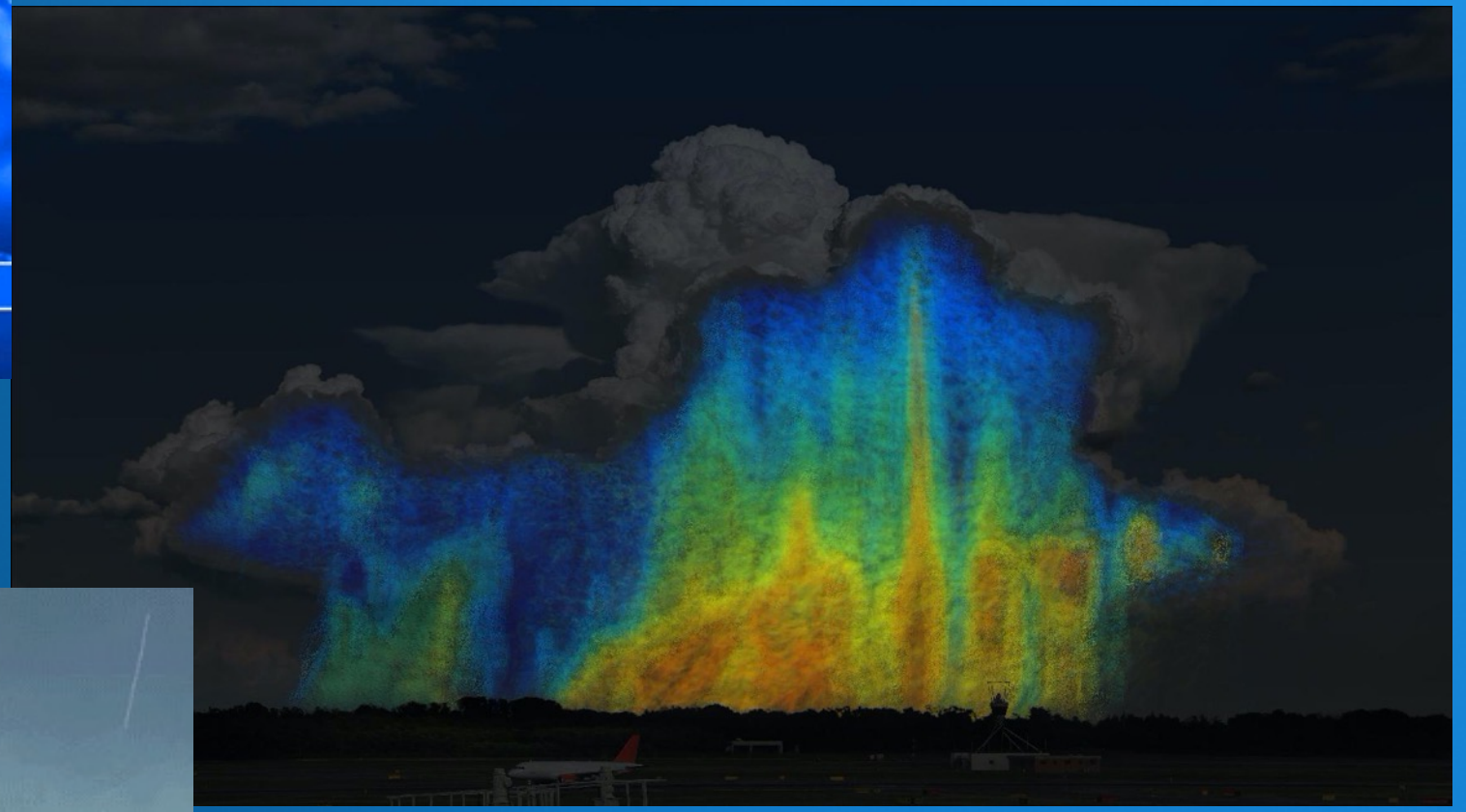

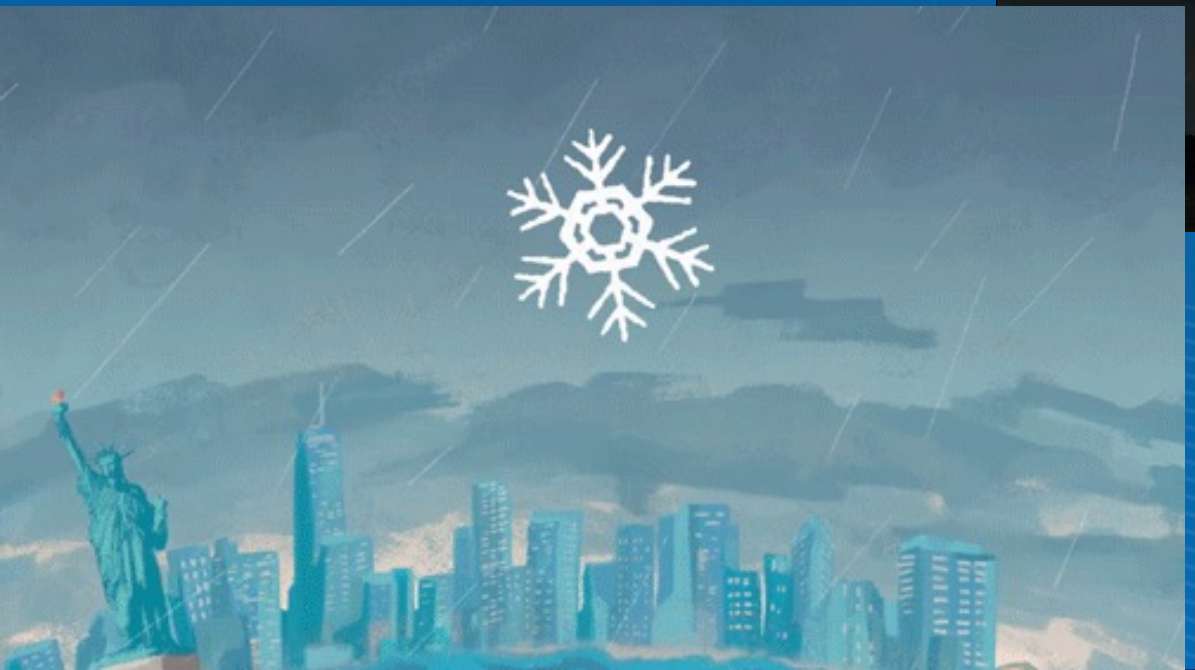

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TEKLAN
P.O. 0646697
P/N AA2209-33-10002A
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WHERE DID IT ALL BEGIN?

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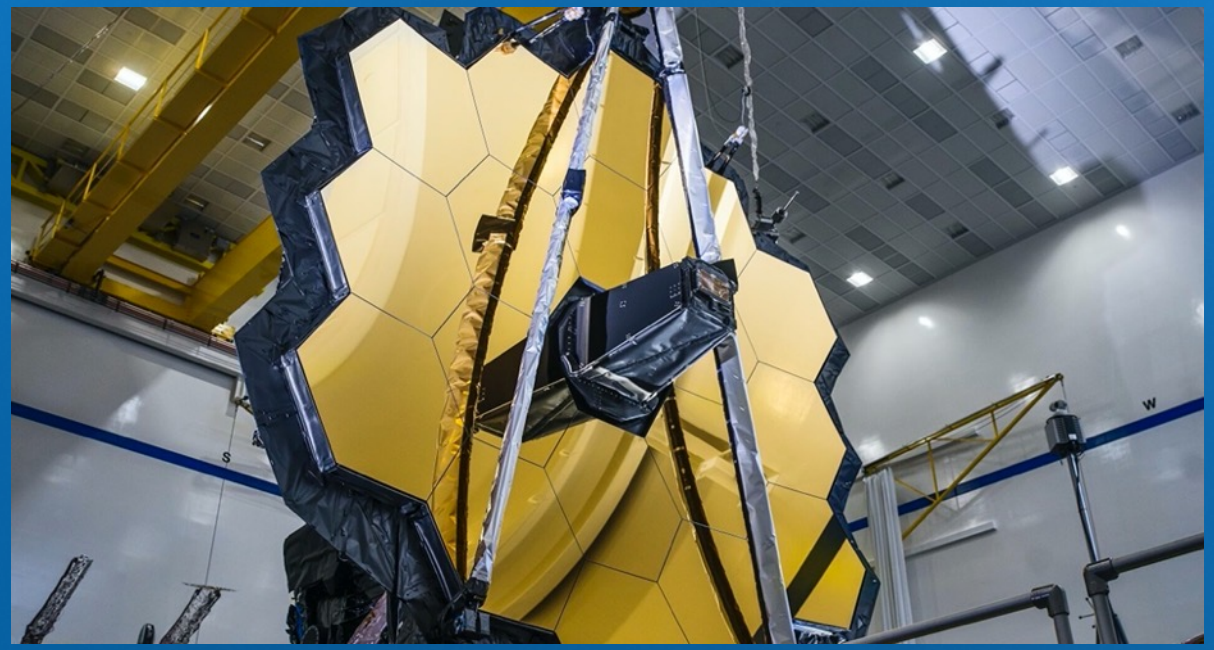


QUICK HISTORY – VESTO SLIPHER

- **In 1912 Vesto Slipher measured what we call radial velocities from 25 spiral galaxies.**

- He discovered that 21 of these galaxies displayed “redshift” with speeds as great as 2000 km/sec. Simply put this meant that galaxies are rapidly receding from us! But he did not have distances between these galaxies.

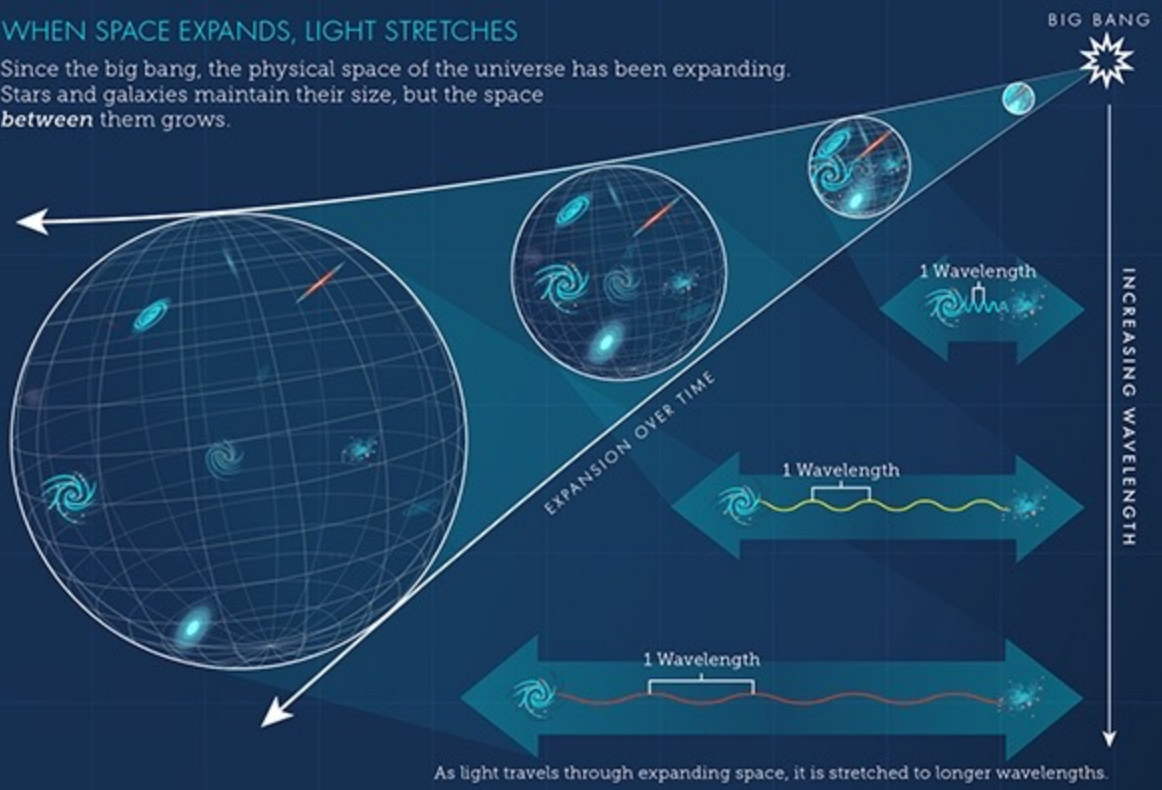
QUICK HISTORY – EDWIN HUBBLE

- Hubble continued the work of Vesto and was able to measure the distances between the galaxies studied.
- Then by comparing the distances with the recession velocity it was discovered that the velocity got larger with distance. This was the Systematic Expansion of the Universe!

WHAT IS COSMOLOGICAL REDSHIFT?

WHEN SPACE EXPANDS, LIGHT STRETCHES

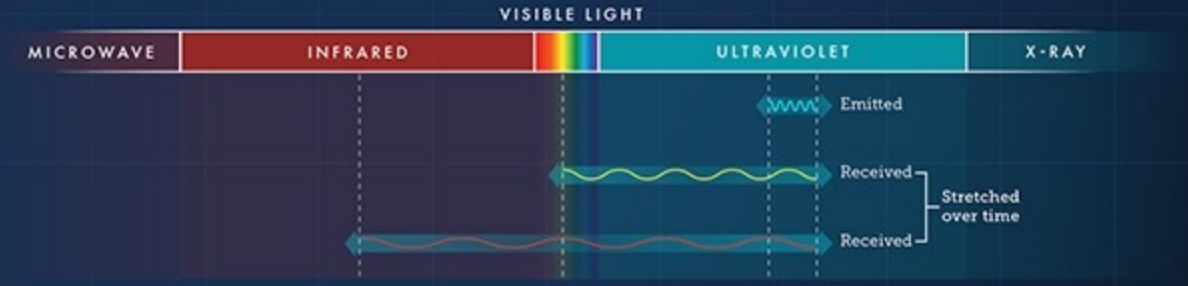
Since the big bang, the physical space of the universe has been expanding.
Stars and galaxies maintain their size, but the space
between them grows.



As light travels through expanding space, it is stretched to longer wavelengths.

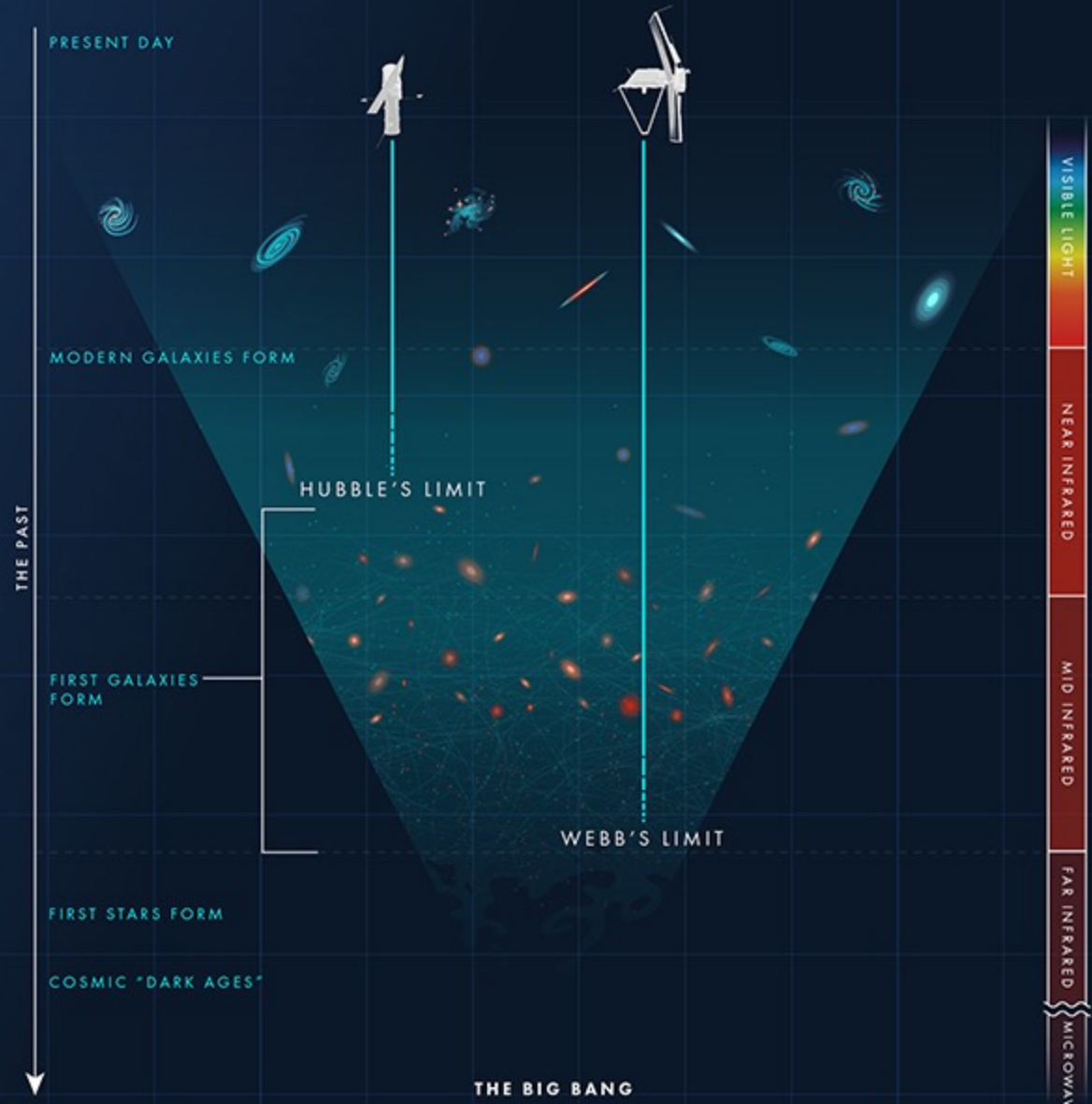
REDDER THAN RED

The longest visible wavelength is red.
Beyond red are longer wavelengths that we can't see, starting with infrared.
When light is stretched by the expansion of space, we say that it is **redshifted**—
from its original wavelength to a longer, redder one.

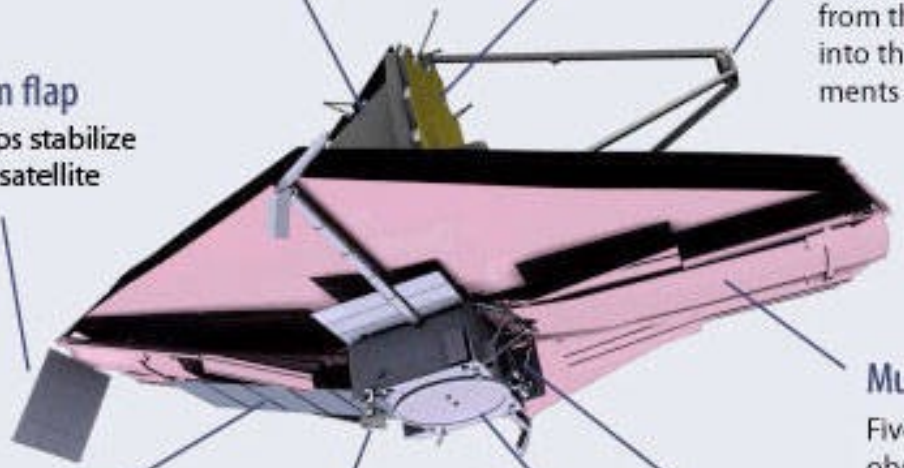


SEEING THE PAST

Telescopes with **infrared** detectors allow us to see the ancient light of the first galaxies,
which has been redshifted over space and time.



THE JAMES WEBB SPACE TELESCOPE



Science Instrument Module (ISIM)

Houses all of Webb's cameras and science instruments

Trim flap

Helps stabilize the satellite

Solar power array

Always facing the Sun, panels convert sunlight into electricity to power the observatory

Earth-pointing antenna

Sends science data back to Earth and receives commands from NASA's Deep Space Network

Spacecraft bus

Contains most of the spacecraft steering and control machinery, including the computer and the reaction wheels

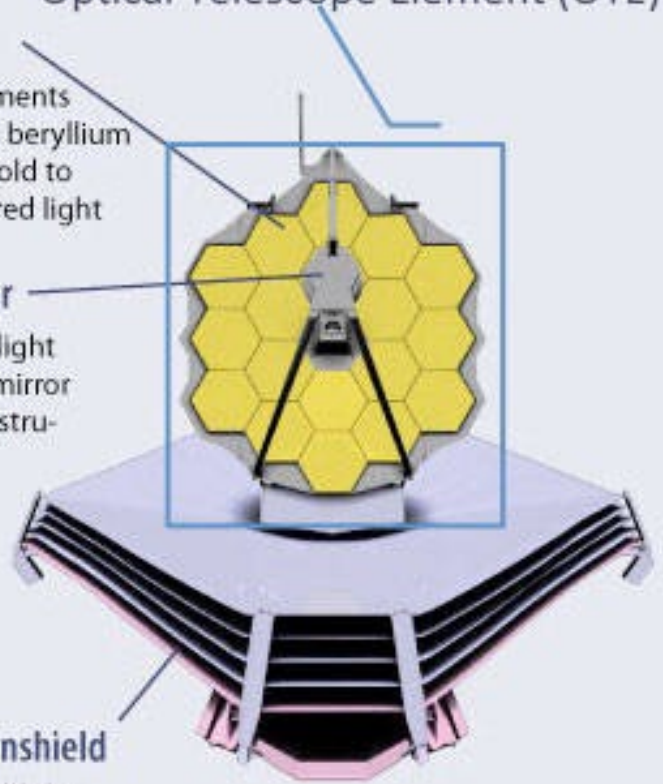
Star trackers

Small telescopes that use star patterns to target the observatory

Multilayer sunshield

Five layers shield the observatory from the light and heat of the Sun and Earth

Optical Telescope Element (OTE)

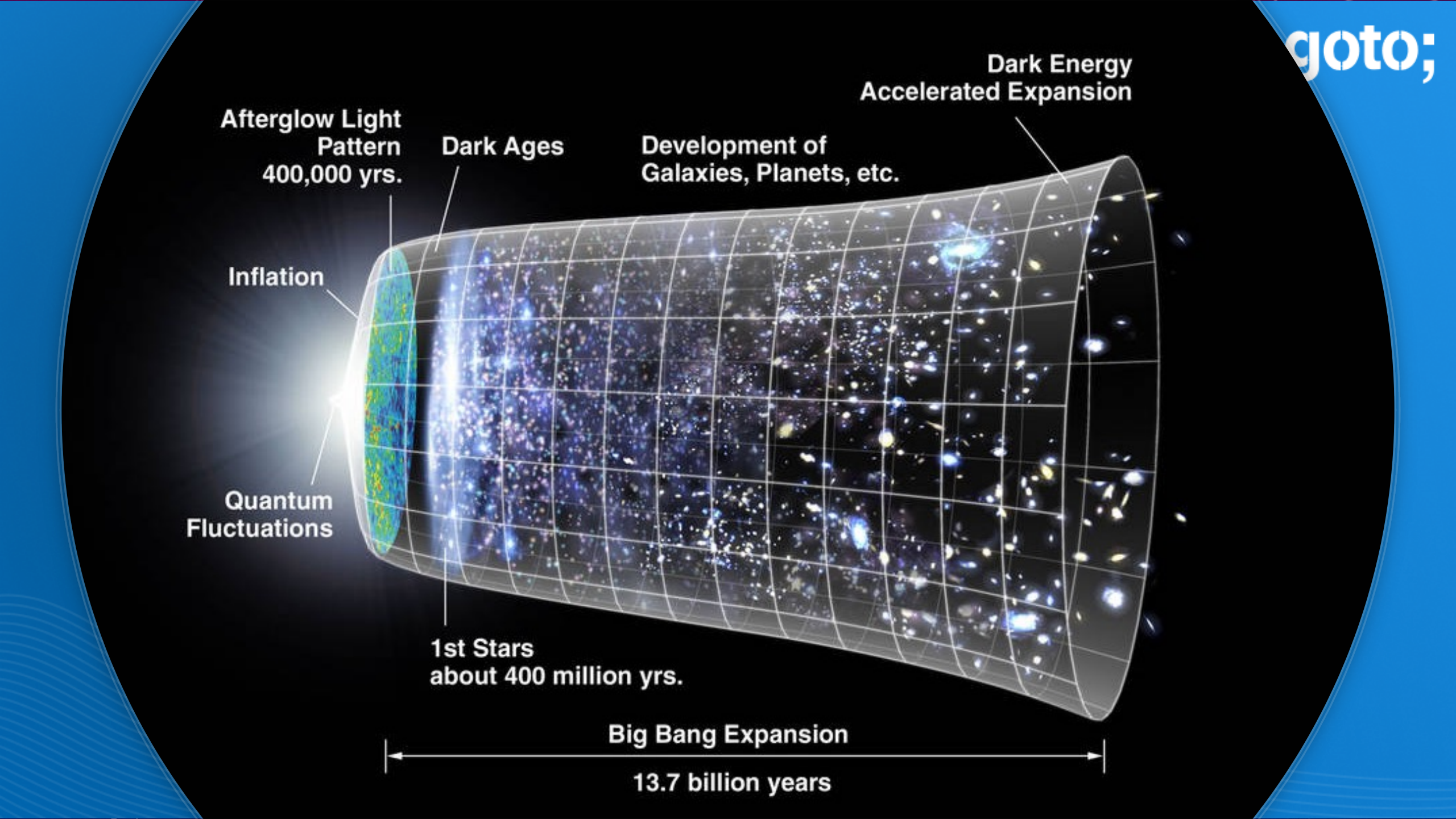


Primary Mirror

18 hexagonal segments made of the metal beryllium and coated with gold to capture faint infrared light

Secondary Mirror

Reflects gathered light from the primary mirror into the science instruments


Dark Energy
Accelerated Expansion
Afterglow Light
Pattern
400,000 yrs.
Dark Ages
Development of
Galaxies, Planets, etc.
Inflation
Quantum
Fluctuations
1st Stars
about 400 million yrs.
Big Bang Expansion
13.7 billion years

Gowning up

2 – 10 minutes
How long it takes to suit up; considered part of the worker's shift

$1,200
Daily cost of new booties or boot covers. Company uses 8,000 per day

$20 – $25
Cost of a pair of shoes

$5 – $8 Non-prescription safety goggles
$300 Prescription safety goggles (300 people wear prescription goggles)

25 cents
Cost of surgical mask

50 cents
Cost of a low sodium pen (only type allowed in cleanroom)

$5
Cost of a lint-free notebook

THANK YOU

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Images and Content Reference(s)
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Taylor Mickal - Photographer
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