

# Earth and Space Systems

*Geol 250, Fall 2014*

- ☀ Ground rules
- ☀ Syllabus
- ☀ Introduction to Earth Sciences
- ☀ Introduction to Space Science

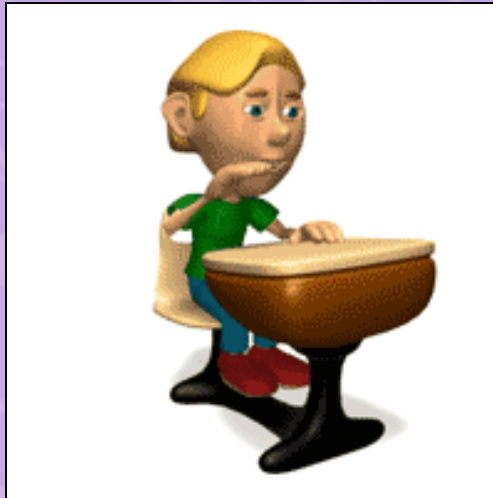


## *Ground Rules*



No food in Sims 201 at any time. Drinks are fine.

## *Ground Rules*



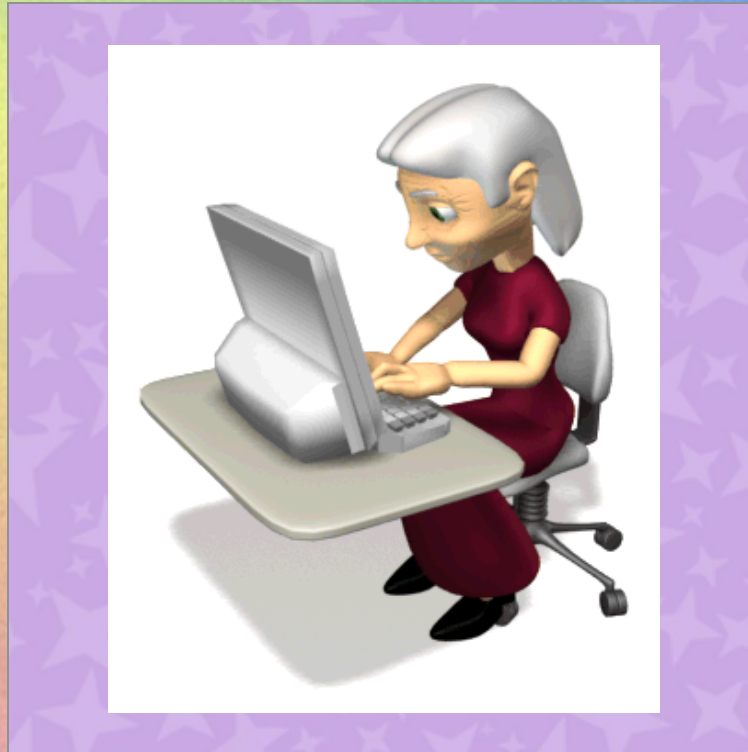
If you have a question or comment, speak up!

## *Ground Rules*



Attendance is mandatory and necessary.  
Please be on time (in your seat, ready to go)!

## *Ground Rules*



Office hours are for students - take  
advantage of them!

## *Ground Rules*



During lecture please refrain from other conversations.

## *Ground Rules*



When it is time for discussion, discuss!

## *Ground Rules*



Please turn off cell phones and other electronic devices. If your cell phone goes off, you will be asked to leave.



## *Ground Rules*



If you fall asleep, we' ll be sure to wake you up...

## *Ground Rules*



Please review the Winthrop University  
student conduct code.

## *Ground Rules*

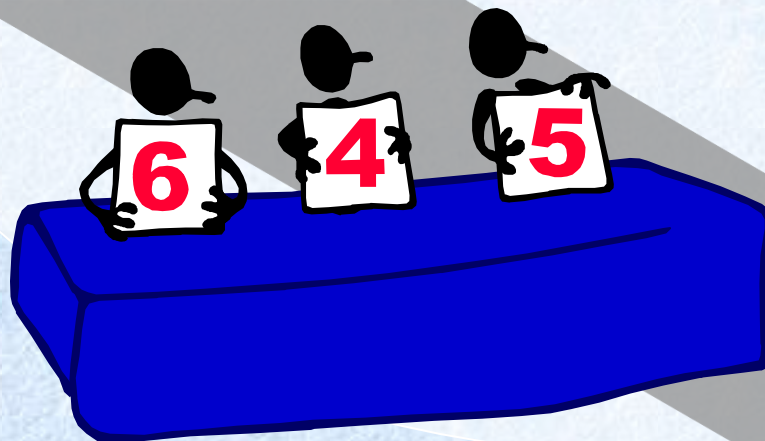
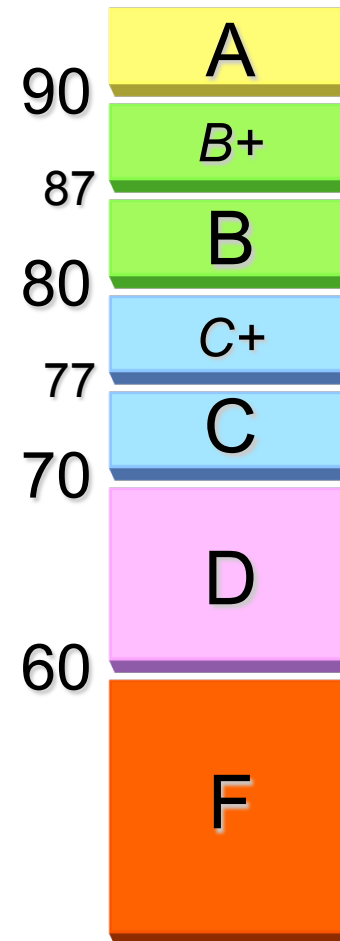


No late work will be accepted. Plan ahead!

# Grading

Exams (3)	15% each	45%
Final Exam		25%
Solar Observation Project		10%
Class Participation		20%
<b>Total:</b>		<b>100%</b>

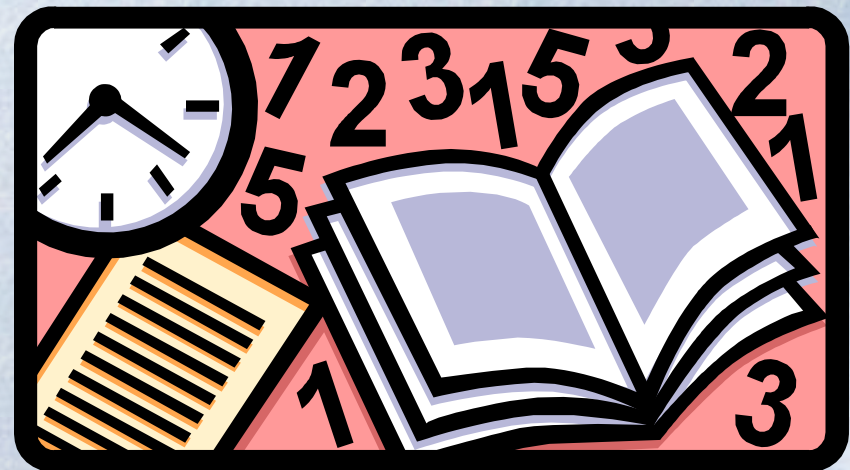
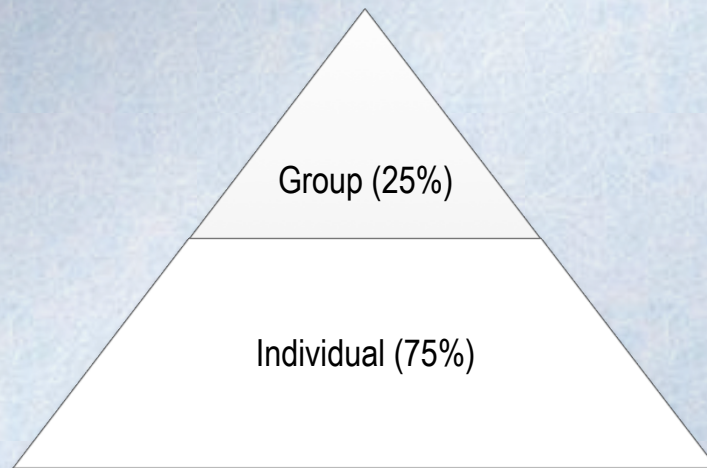
## Scale



# Exams – Pyramid Testing

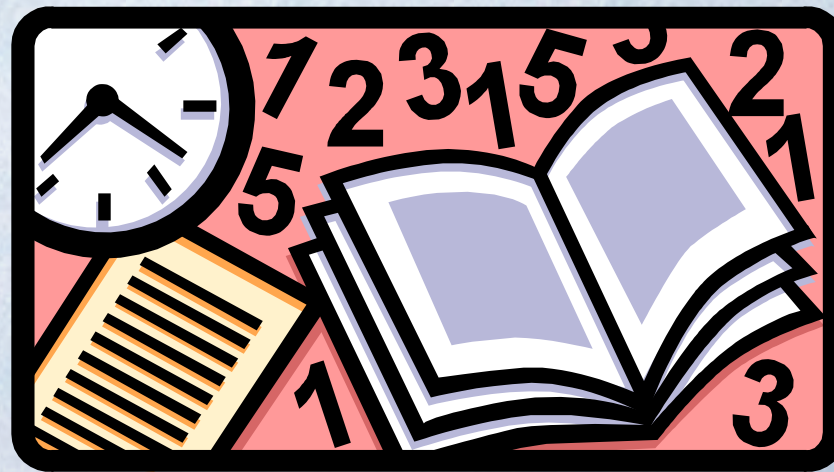
Each exam (including the final) will have two parts:

- ◆ Short answer section (75%)
- ◆ Discussion group session (25%)



## Discussion Group

During the last segment of an examination session, each table of students (maximum of four) will discuss the answers for the short answer questions (and several new questions) and fill out another answer sheet.



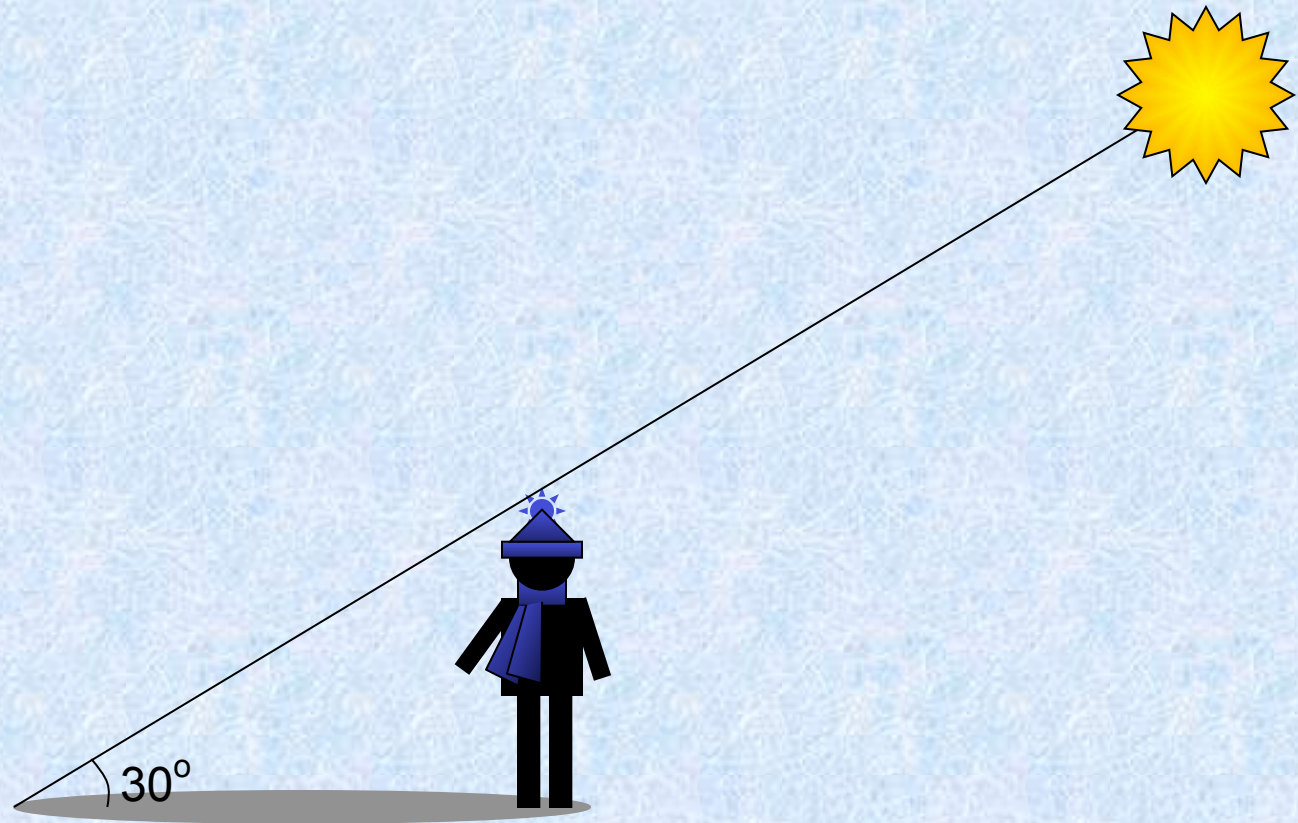
## Class Participation

Your in-class participation grade will be determined based on a combination of attendance, participation in in-class activities and your contribution to class discussions.



# Solar Observation Project

We will engage in a semester-long solar observation project worth 10% of the final grade.





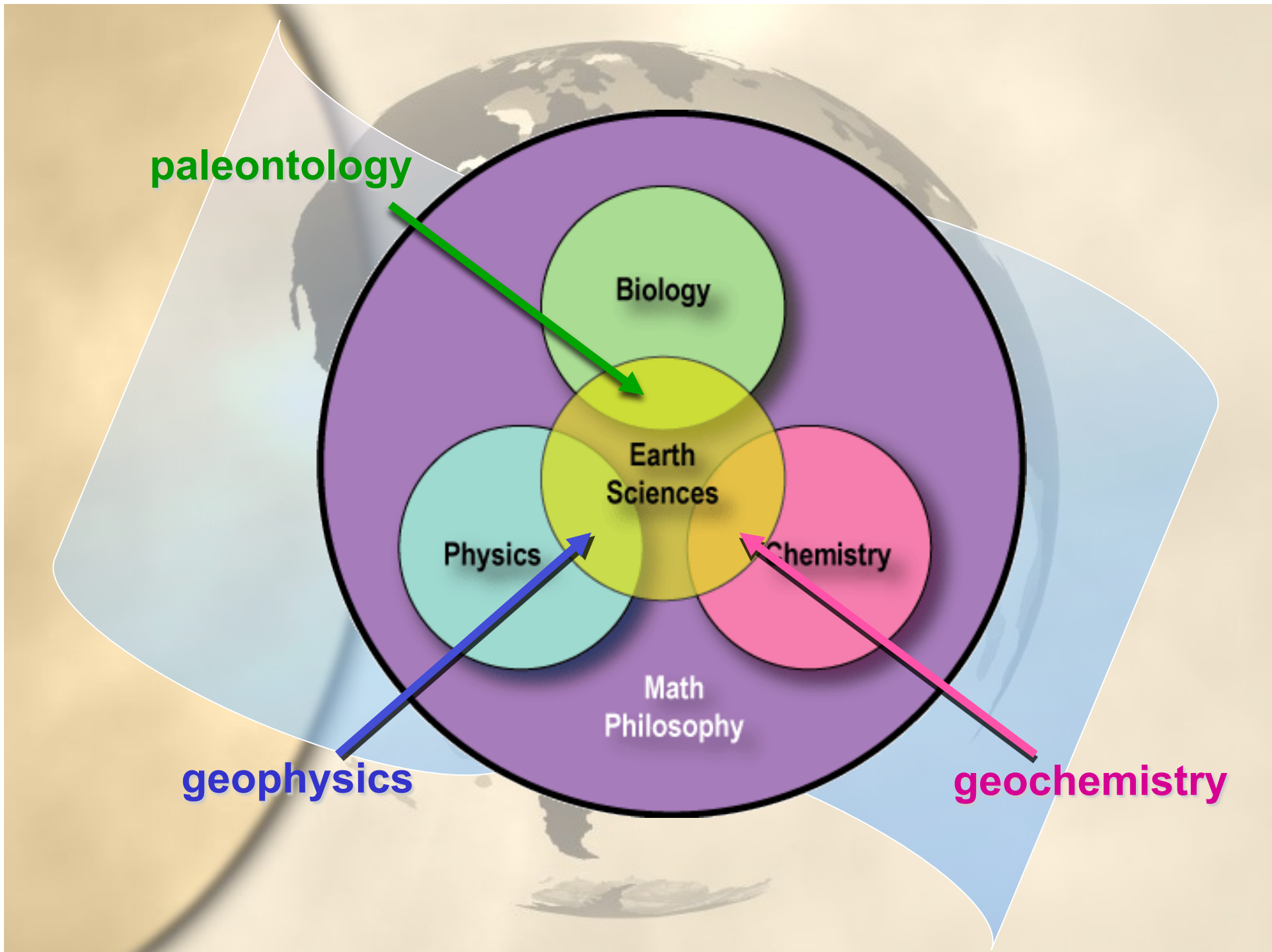
# Physical Geology

*The study of  
terrestrial phenomena.*



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<http://www.dannyhellman.com/pages/apocalypse.html>



**paleontology**

**Biology**

**Earth  
Sciences**

**Physics**

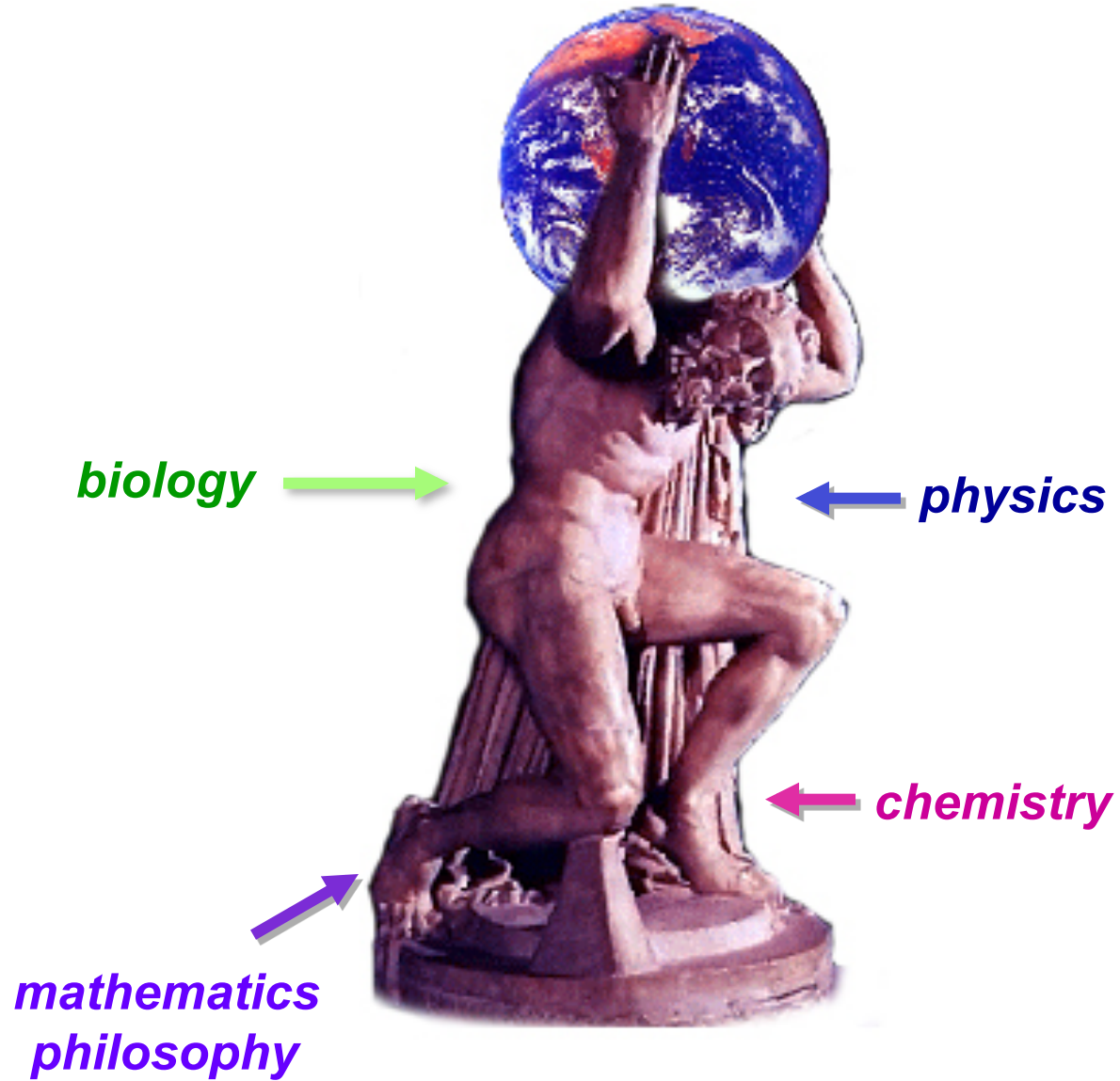
**Chemistry**

**Math  
Philosophy**

**geophysics**

**geochemistry**

# *Earth Sciences*





# Earth "Spheres"

*Lithosphere*

*Atmosphere*

*Hydrosphere*

*Biosphere*

# Earth “Spheres”

## Lithosphere

The “solid” Earth (rocks, minerals, soil, etc.)

A Good Day Collecting



John Betts

# Earth “Spheres”

Atmosphere – the “gaseous” Earth



# Earth “Spheres”

Hydrosphere – the “watery” Earth



# Earth “Spheres”

**Biosphere** – the “living” Earth





# Earth “Sphere” Sciences



**Lithosphere** – includes the study of plate tectonics, topography, soil, mineral resources, the rock cycle, etc.



**Atmosphere** includes the study of weather, solar energy filtering, atmospheric insulation effects, chemical weathering, etc.



**Hydrosphere** – includes the study of oceans, streams, weather, irrigation, erosion, chemical weathering, groundwater, water resources, etc.



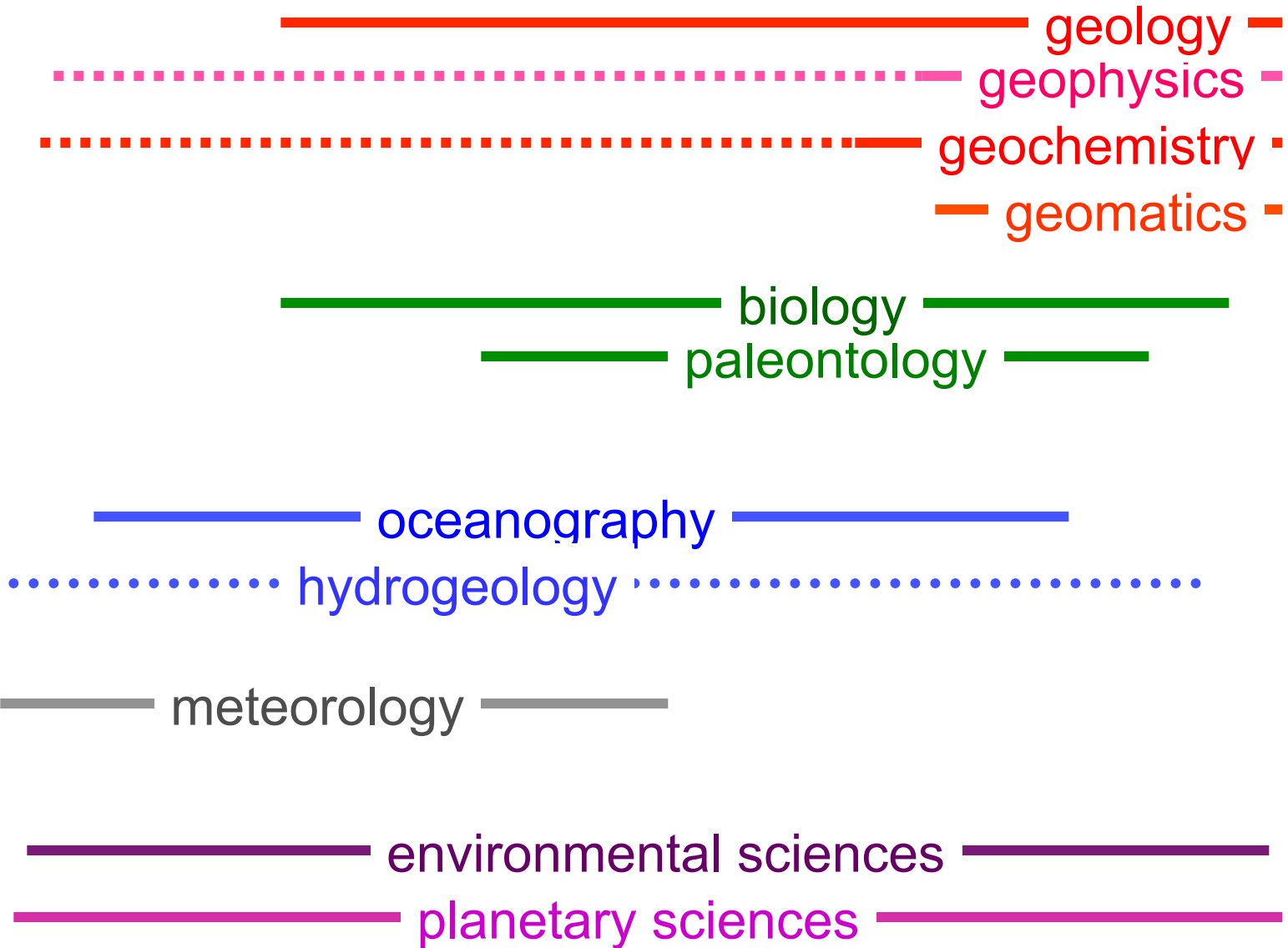
**Biosphere** - includes the study of the regulation of gasses, weathering, soil production, natural resource production, recycling, most of biology, etc.

Atmosphere

Hydrosphere

Biosphere

Lithosphere



# Space Sciences

*The study of everything beyond the Earth*



Atlas V Rocket



<http://spacefellowship.com/>



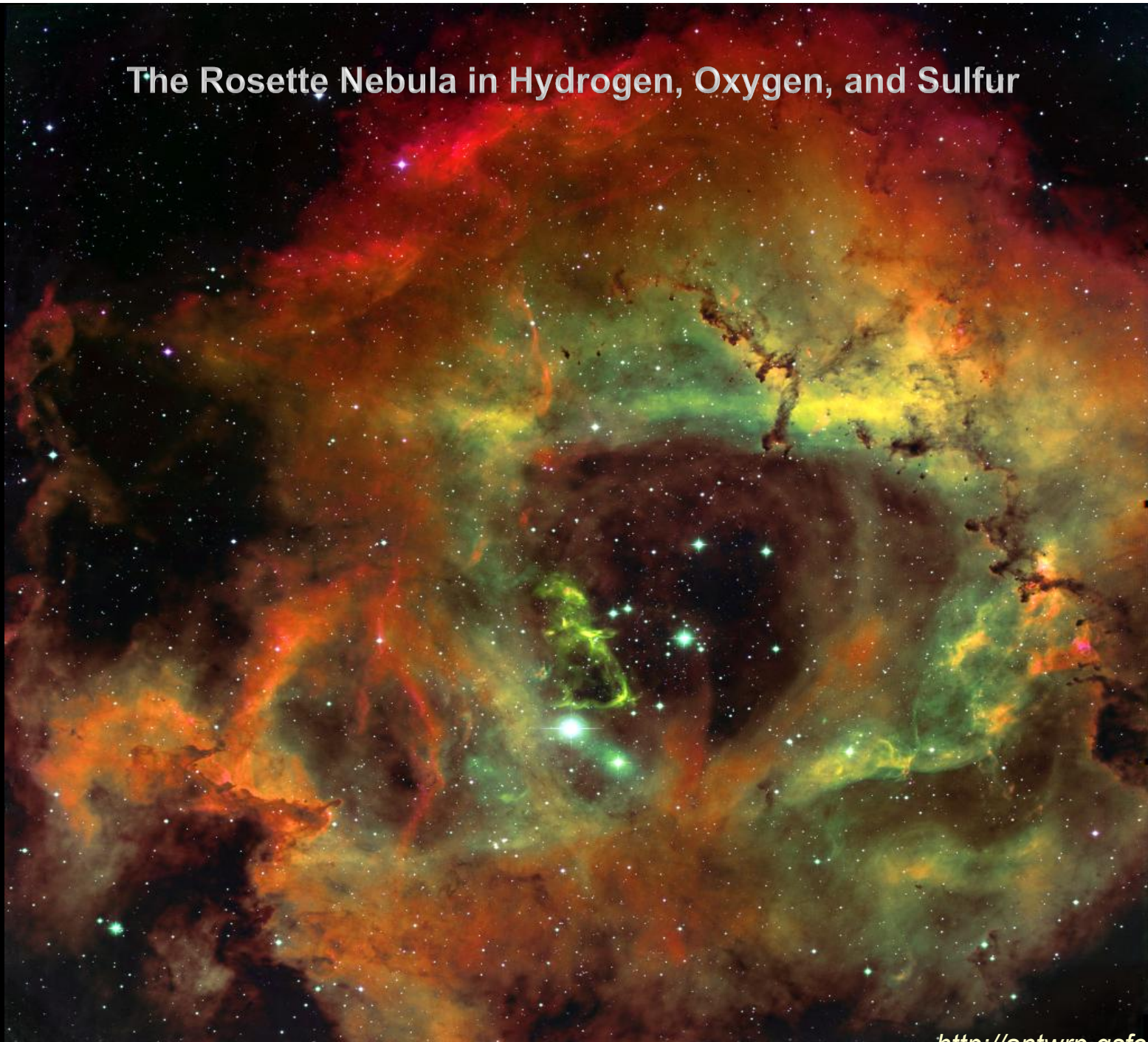
tomski, 1996

Keck Observatory

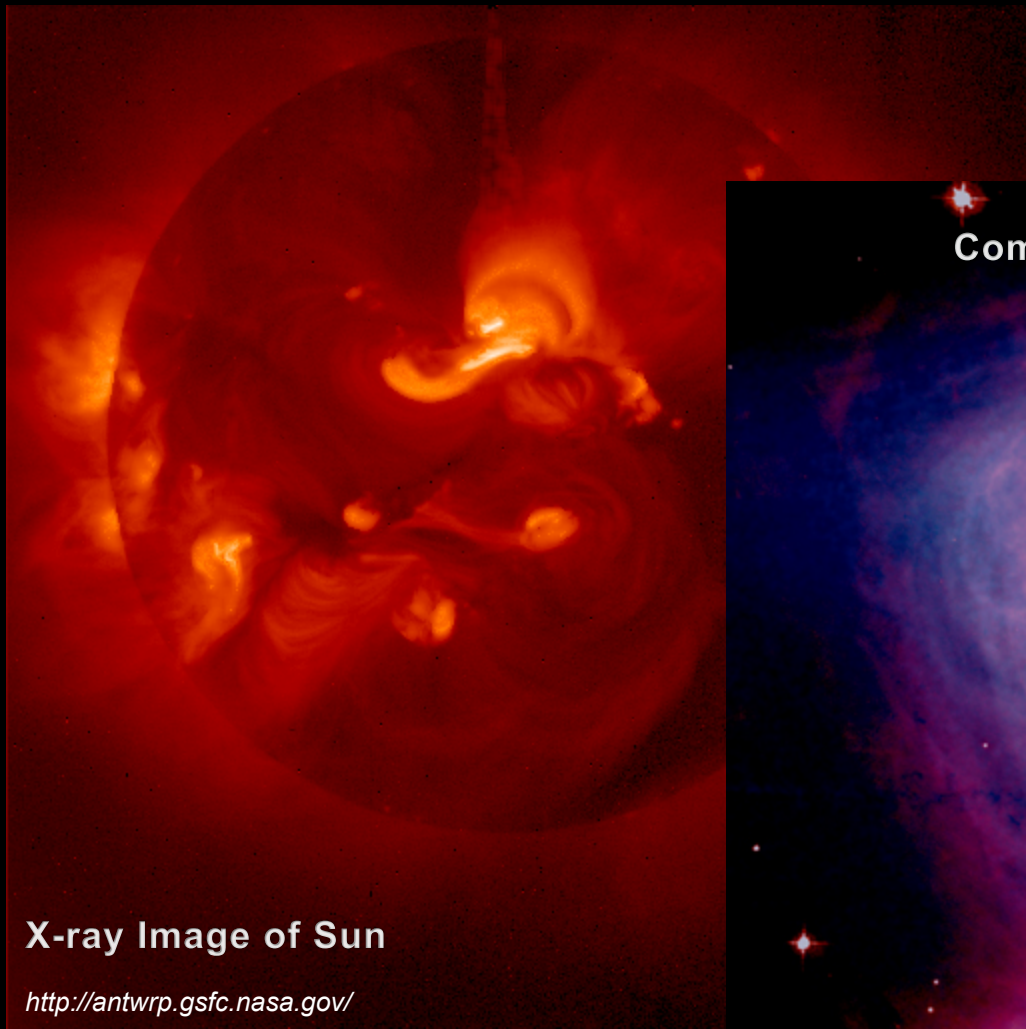


International Space Station

## The Rosette Nebula in Hydrogen, Oxygen, and Sulfur



<http://antwrp.gsfc.nasa.gov/>



**X-ray Image of Sun**

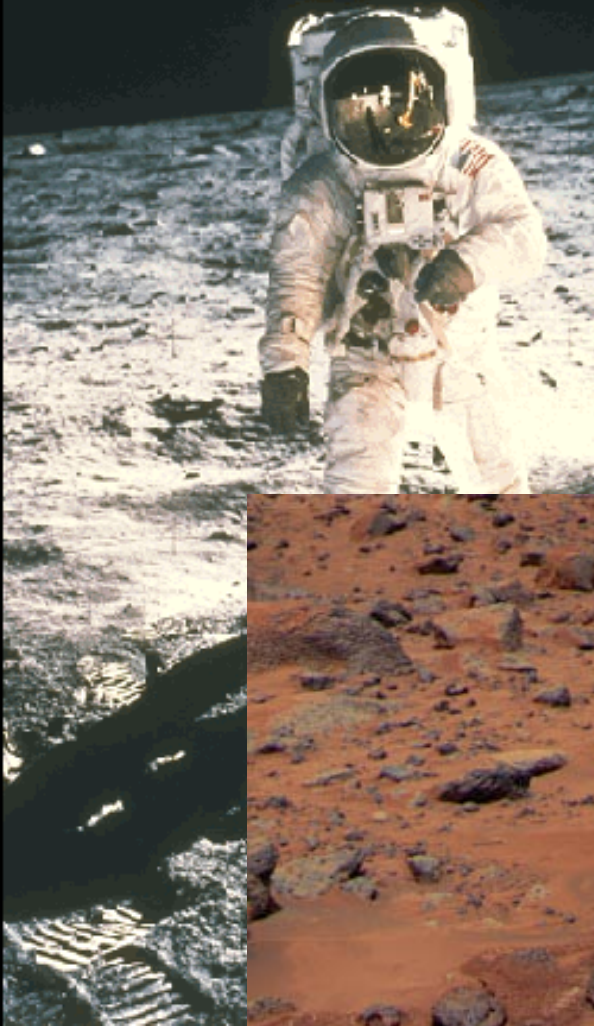
<http://antwrp.gsfc.nasa.gov/>



**Composite X-ray and Visible of Crab Nebula**

<http://chandra.harvard.edu/>

Buzz Aldrin on the Moon



Voyager Spacecraft

<http://voyager.jpl.nasa.gov/where/>



Voyager 1 is over 19,216,751,300 kilometers from Earth! As of 8/21/2014

Sojourner Robot on Mars

<http://antwrp.gsfc.nasa.gov/>

Curiosity: The first of a new generation of Mars rovers

<http://www.nasa.gov/>



**CURIOSITY LANDING ON MARS  
ISN'T INTERESTING AT ALL:**

**ITS GOT FRICKIN LASER  
BEAMS**



**ATTACHED TO ITS HEAD**



<http://www.nasa.gov/>



## Dawn – Asteroid Explorer

Currently touring the asteroid belt on its way to a rendezvous with the giant asteroid Ceres after orbiting asteroid Vesta for a year.

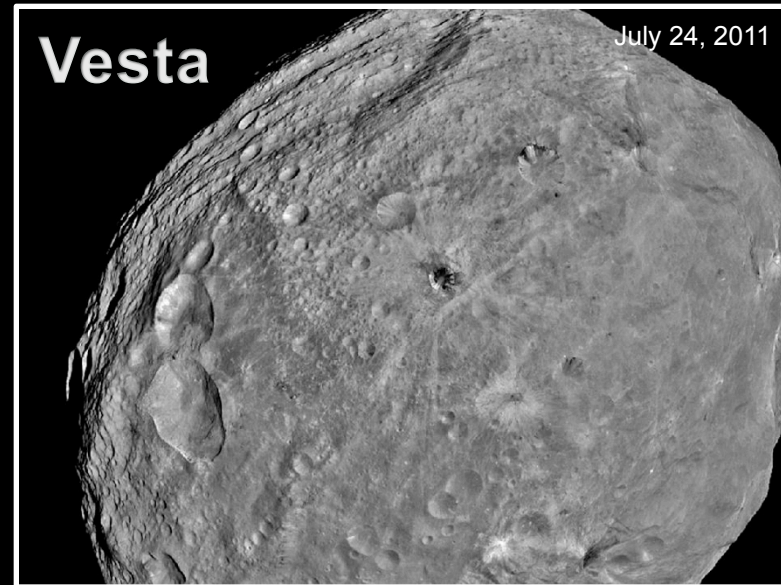
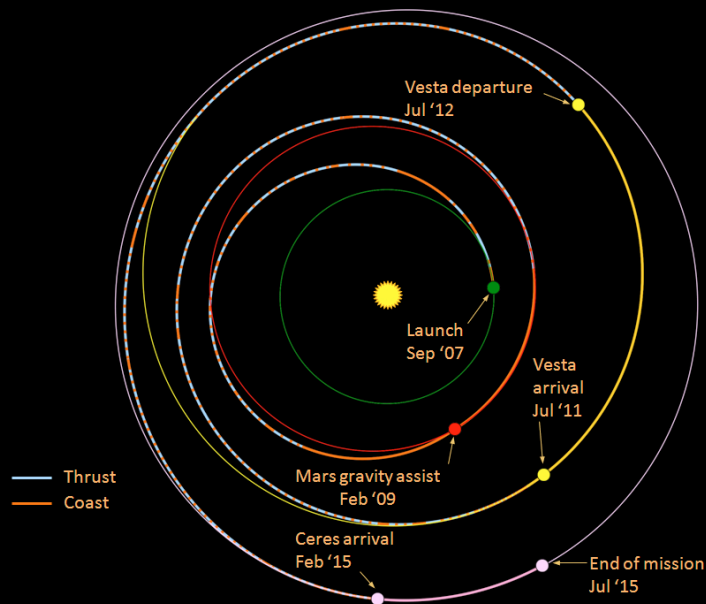


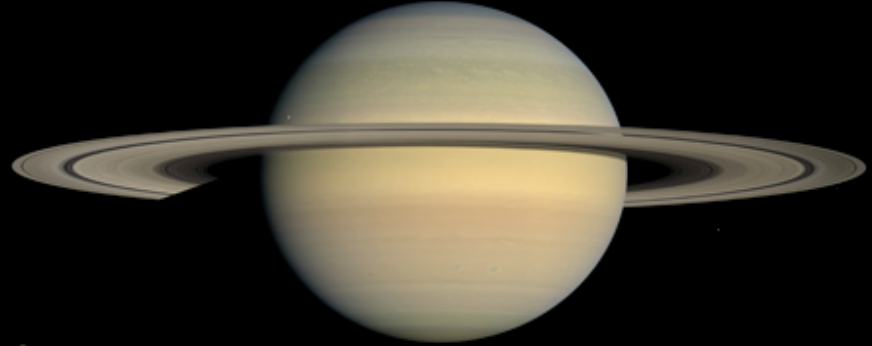
Image credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA





### New Horizons

Halfway to Pluto after  
encountering Jupiter



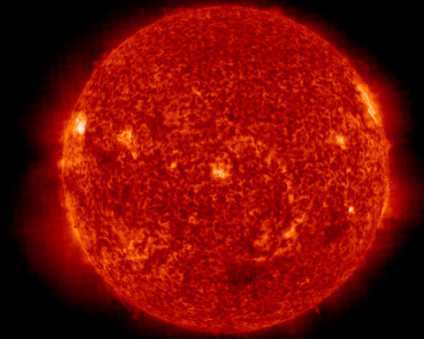
### Cassini-Huygens

Exploring Saturn and its moons



### Smart-1

Mapping Earth's  
Moon



2012/08/19 13:19

### SOHO

Observing Earth's  
Sun from space

## Some of NASA's other extraterrestrial missions