

A satellite image of Earth from space, showing a large portion of the planet's surface. The image is split horizontally by a dark band containing text. The top half shows a vast expanse of the ocean with visible wave patterns and a thin layer of white clouds along the horizon. The bottom half shows a large landmass, likely North America, with distinct geological features such as mountain ranges, river networks, and large bodies of water. The text "Plate Tectonics From Space" is centered in the dark band.

Plate Tectonics From Space

Overview

- International Space Station
- Astronaut photography of Earth
- Viewing plate tectonics from space!

US Pacific Northwest, ISS060-E-35186, 8/12/2019



New Zealand, ISS059-E-67931, 5/19/2019



The International Space Station!

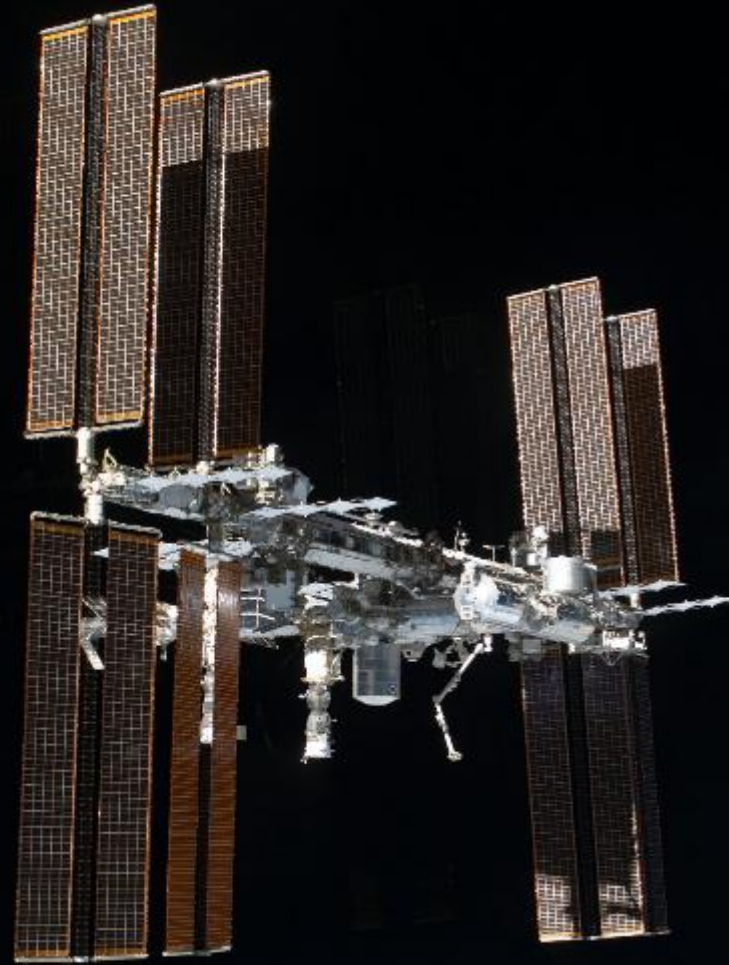


On board the International Space Station



- Astronauts have lived continuously on board since 2000
- The Space Station orbits around Earth every ~90 minutes
- That's 16 times a day!

- ISS orbits ~250 miles above Earth's surface
- Lots of opportunities for astronauts to take pictures of Earth!

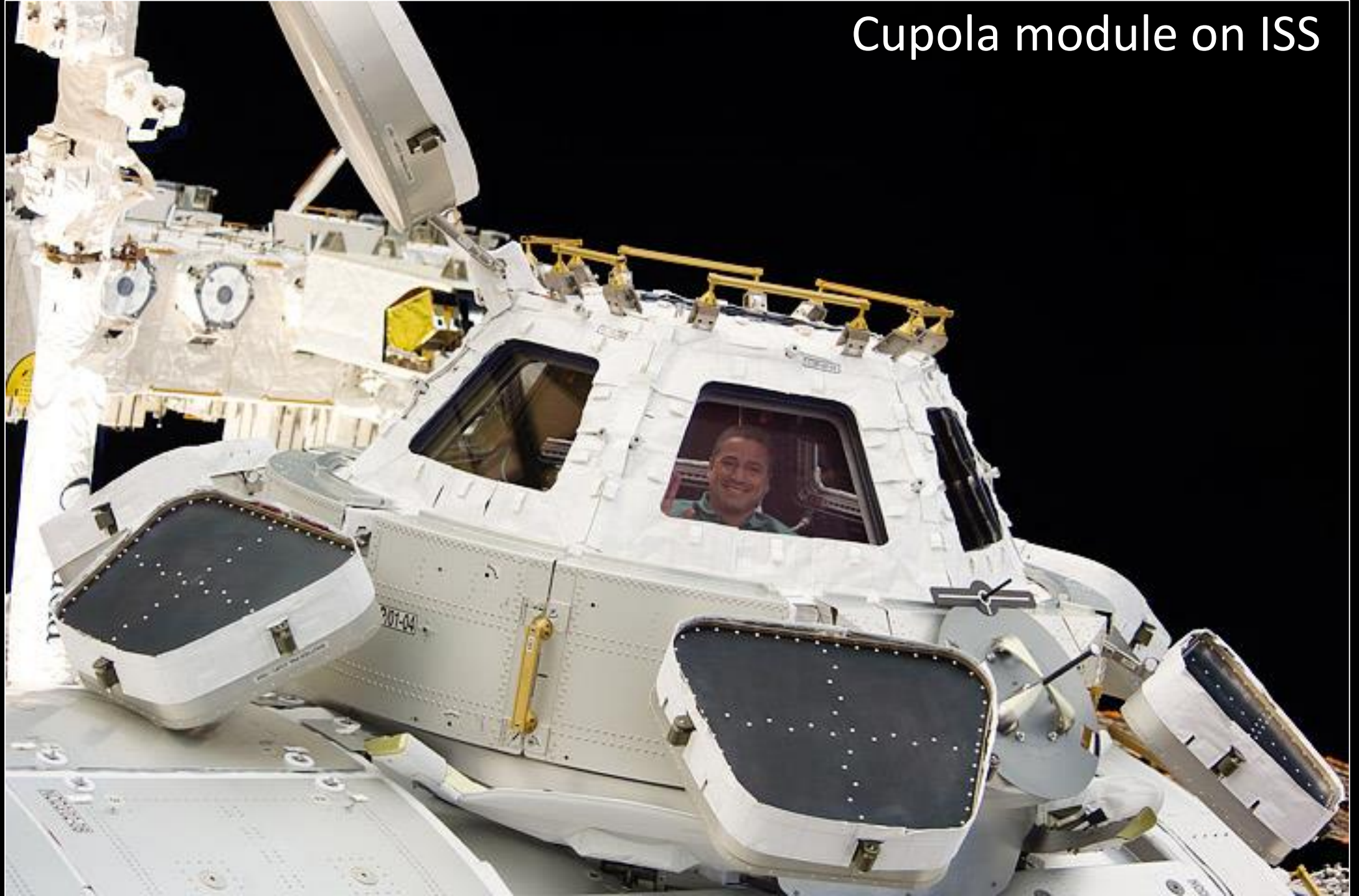




There are many cameras and windows to choose from!



Cupola module on ISS





Benefits of Astronaut Photography:

1) Variable Solar Illumination Angles

- Can see the same locations at any time of night or day

Italy at day and night



Benefits of Astronaut Photography

2) Variable Look Angles

- See the same locations from different directions and orientations

Different Fields of View

- Shorter camera lens sizes take broad and wide pictures
- Longer lens sizes take more zoomed in photos

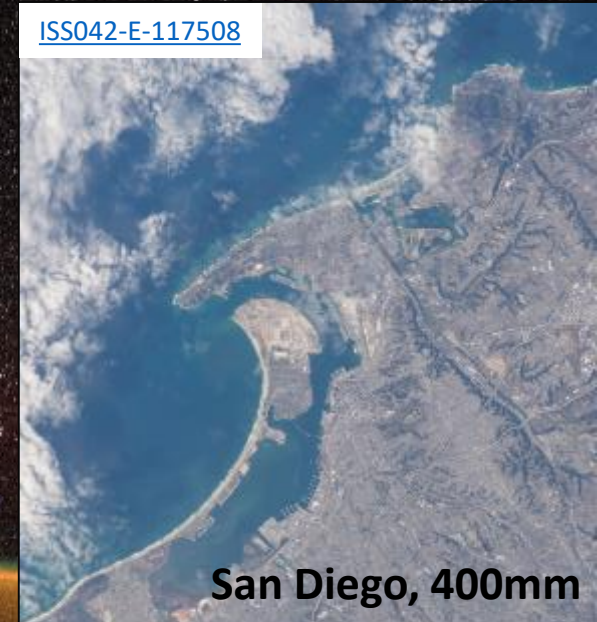
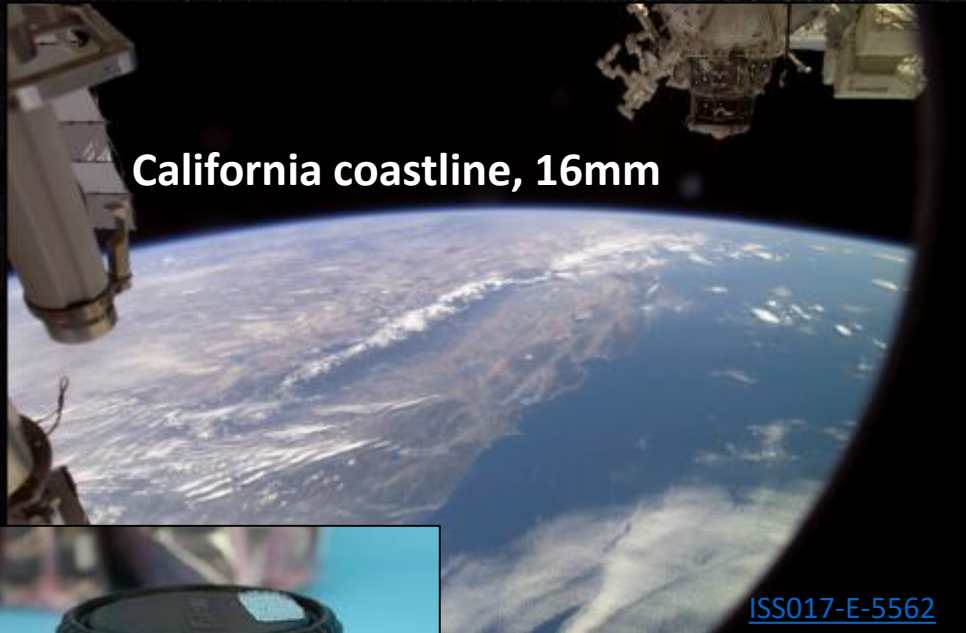
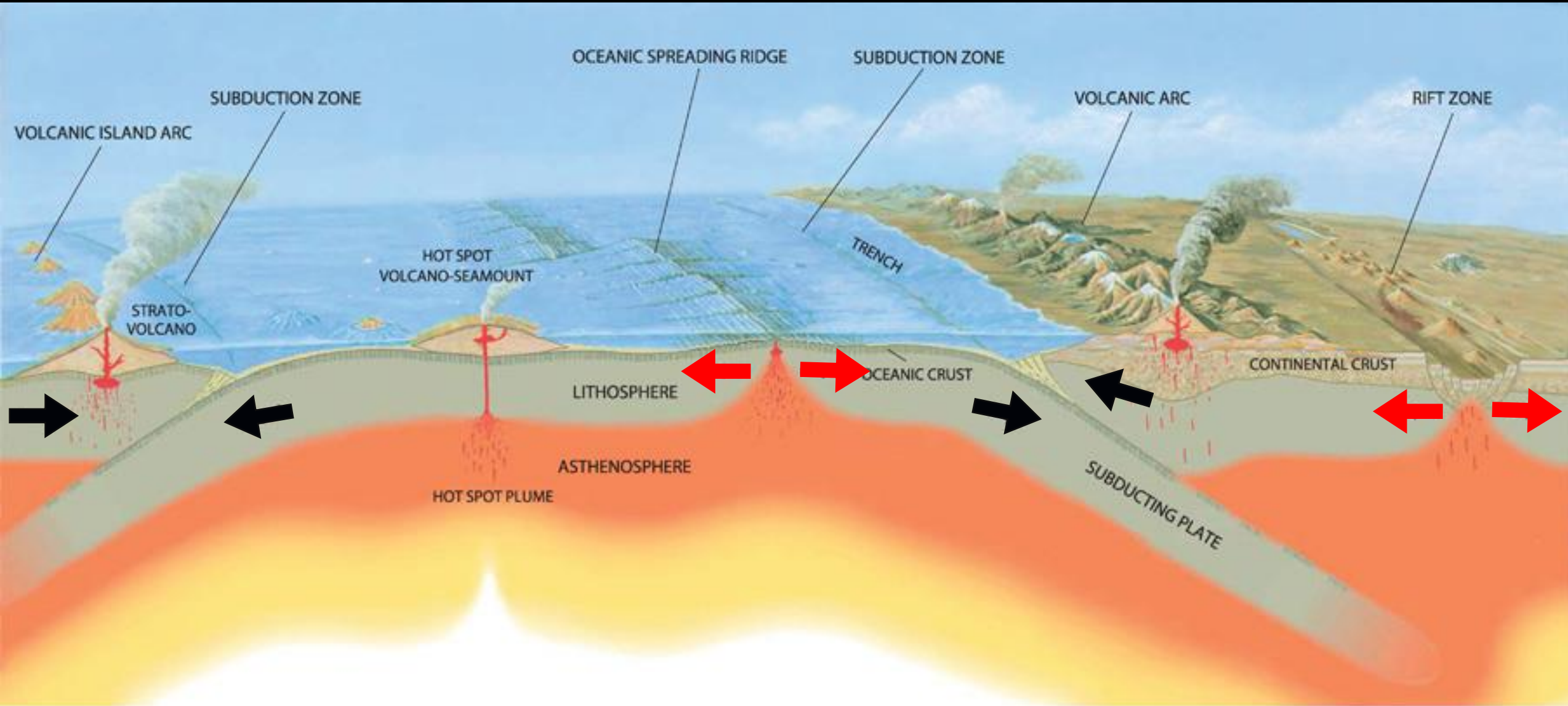


Plate tectonics basics



José F. Vigil

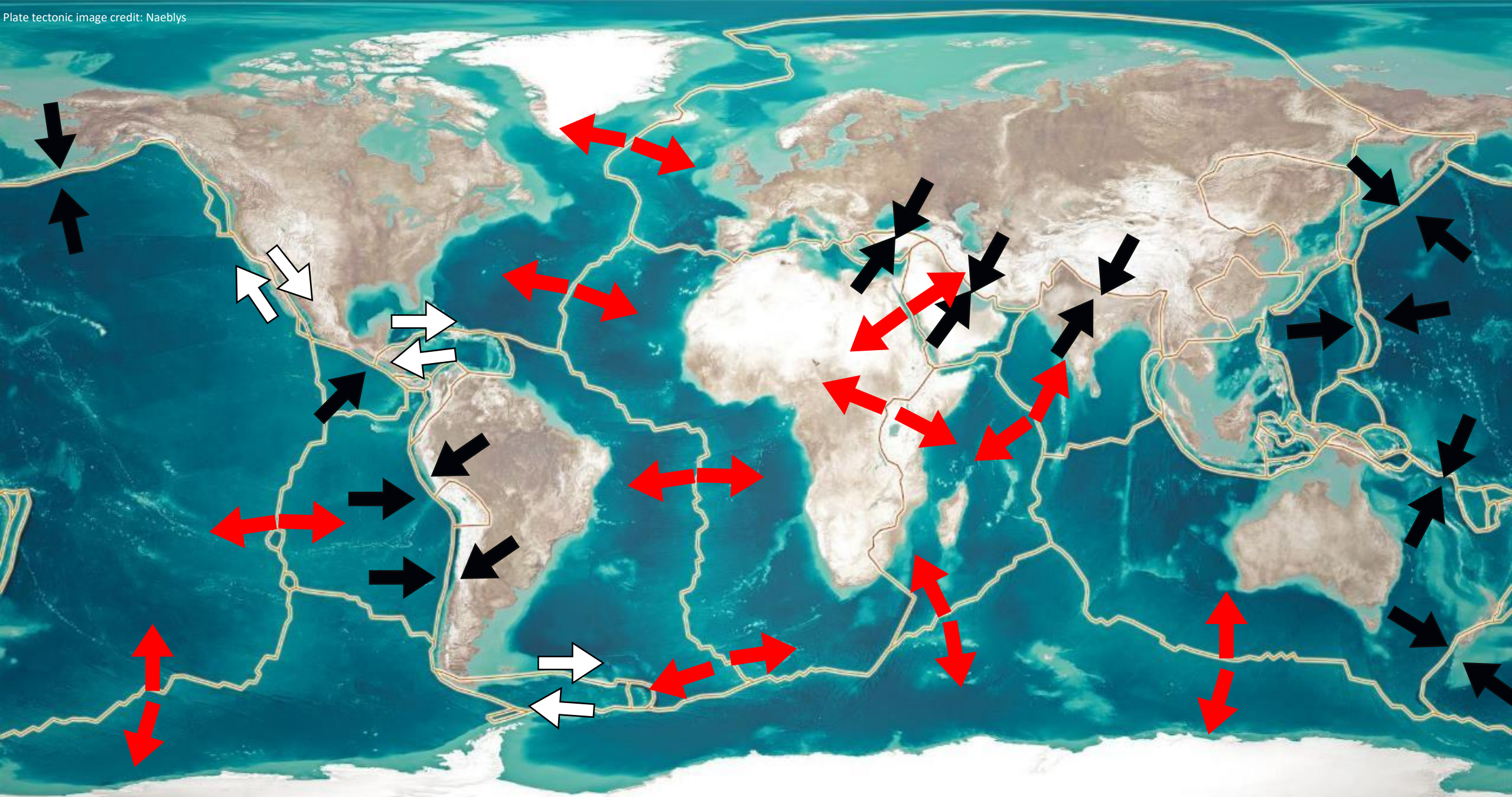
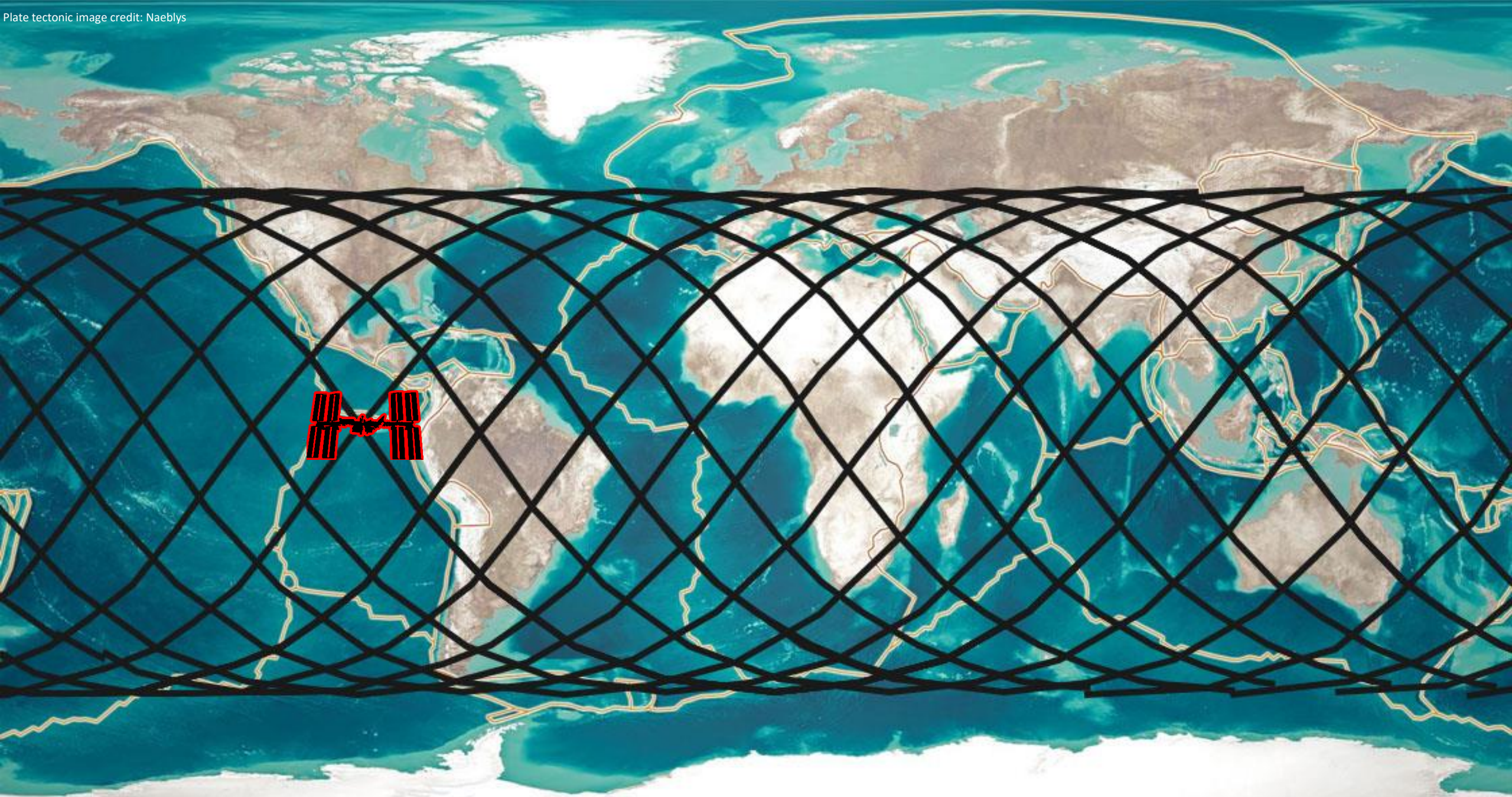


Plate Boundaries: black arrows = convergent red arrows = divergent whites arrows = transform



Astronauts on the ISS have lots of opportunities to take photos along plate boundaries and changes to the crust



Himalayas

Indian
Plate

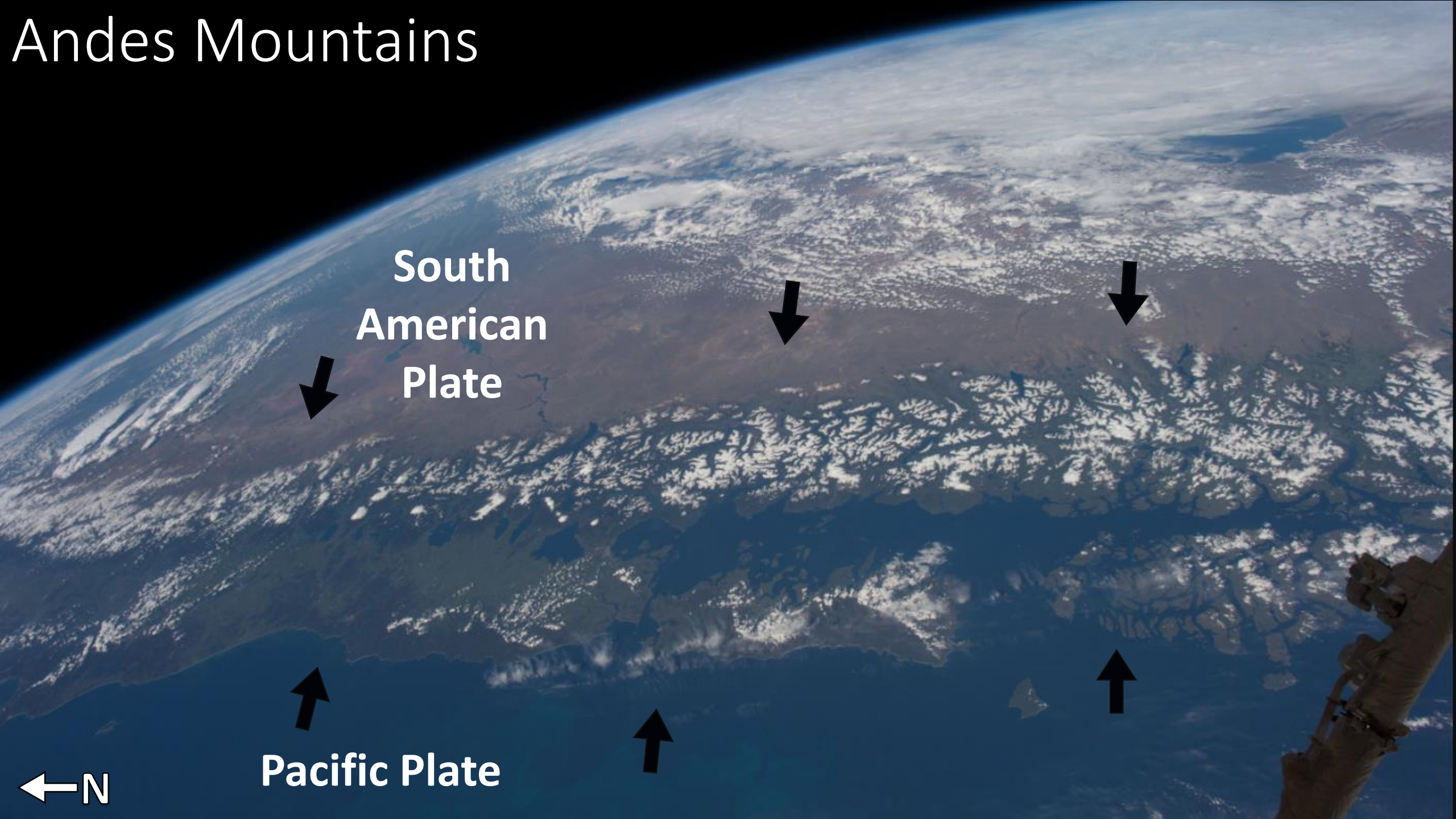
China

Eurasian
Plate

Mount
Everest



Andes Mountains



**South
American
Plate**

Pacific Plate

← N

Patagonia Ice Fields of South America



(10/09/2007) ISS015-E-33587



(03/24/2016) ISS047-E-18778



(11/08/2018) ISS057-E-71393



Viedma glacier, South Patagonia icefields

Measurable glacial tongue retreat over past decade
from astronaut photography

Kamchatka Peninsula, Russia



ISS064-E-33738, 2/15/2021



Klyuchevskoy Volcano, STS068-218-007



Klyuchevskoy Volcano, ISS013-E-5515

Red Sea

Sudan

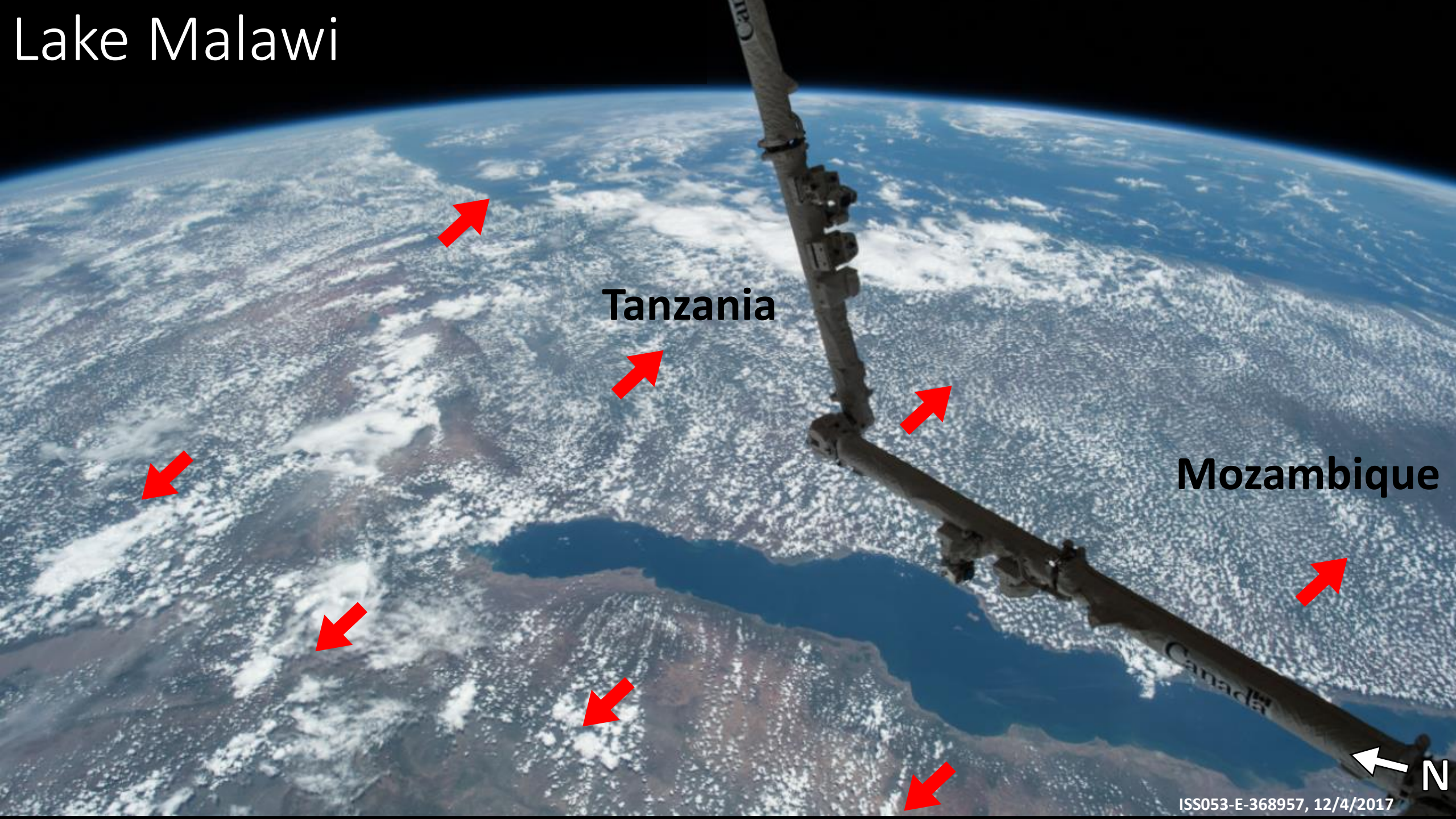
Saudi Arabia



ISS053-E-337162, 12/3/2017



Lake Malawi



Tanzania

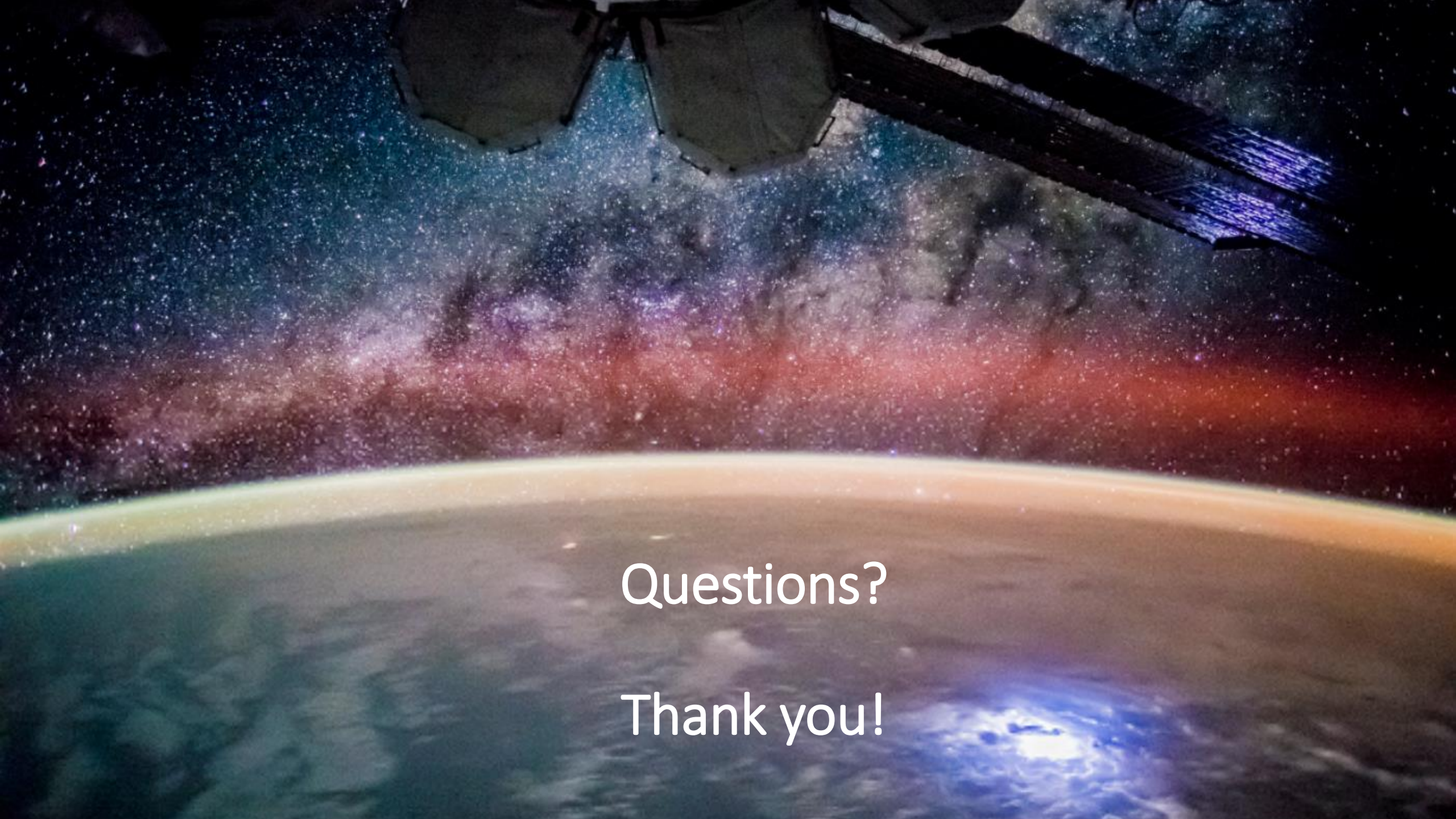
Mozambique

ISS053-E-368957, 12/4/2017

Conclusion

- Convergent plate boundaries
 - Plate pushing together, lots of friction
 - Earthquakes!
 - Active volcanoes
 - Ex: Pacific Ring of Fire
 - Mountain building processes
- Divergent plate boundaries
 - Plates pulling apart
 - Creates low lying areas (basins)
 - Some large bodies of water
 - Ex: Atlantic Ocean and Red Sea
- Transform plate boundaries
 - Plates sliding past each other
 - Also causes earthquakes
 - Ex: San Andreas fault in California



A breathtaking view from space. The bottom half of the image shows the curved horizon of the Earth, with a thin layer of white clouds and a deep blue ocean. Above the horizon, the Milky Way galaxy stretches across the frame, its stars and colorful dust clouds (in shades of red, orange, and purple) clearly visible against the blackness of space. In the upper right corner, parts of a satellite or space station are visible, including a long, dark boom and several large, rectangular solar panel arrays.

Questions?

Thank you!