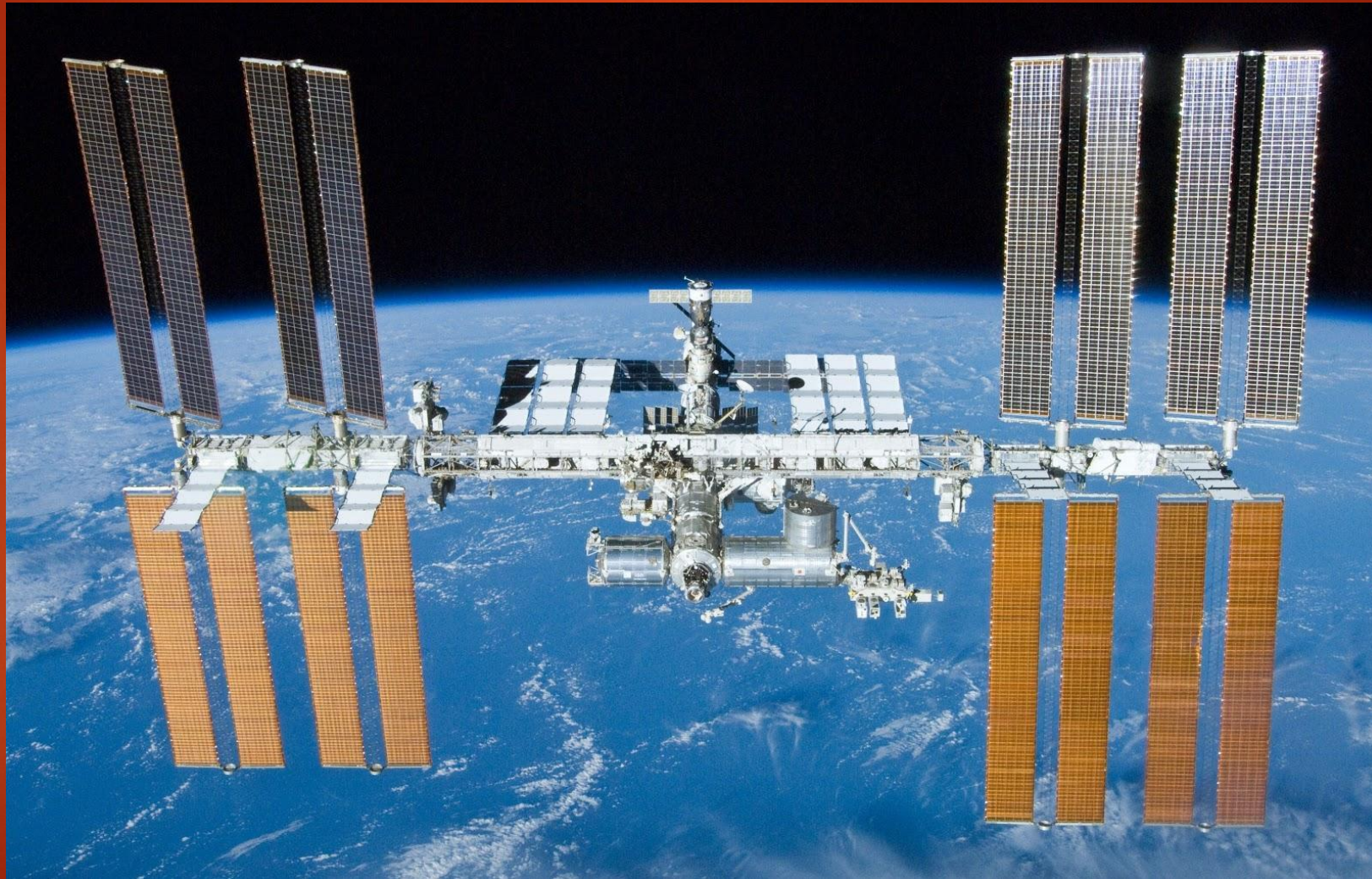




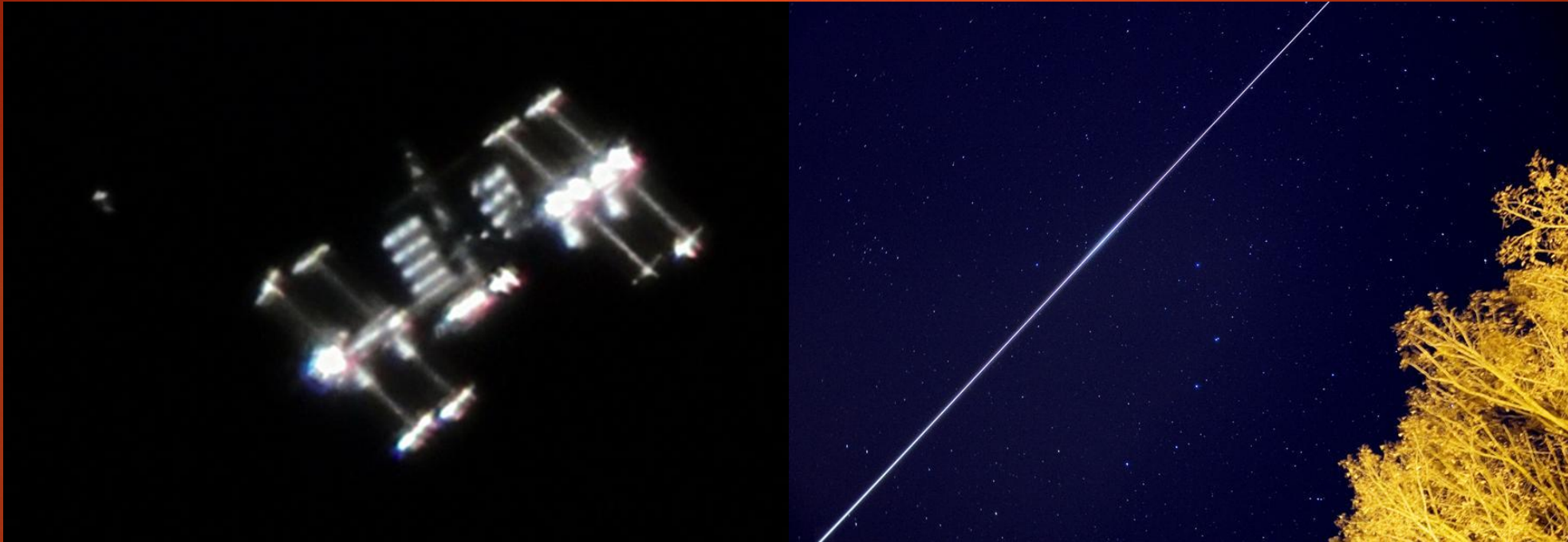
International Space Station

RYAN CRAFTON

International Space Station



(L) The ISS and HTV photographed using a telescope-mounted camera by Ralf Vandeborgh
(R) A time exposure of a station pass



The Beginning of the International Space Station

- ▶ • Most expensive man-made structure ever built at \$100 billion
- ▶ • The ISS is an orbiting laboratory and construction site that synthesizes the scientific expertise of 16 nations to maintain a permanent human outpost in space
- ▶ • Originally named Freedom in the 1980's by president Ronald Reagan, who authorized NASA to build the station within 10 years
- ▶ • Was redesigned in the 1990s to reduce costs and expand international involvement, at which time it was renamed
- ▶ • In 1993 the United States and Russia agreed to merge their separate space station plans into a single facility integrating their respective modules and incorporating contributions from the European Space Agency (ESA) and Japan.

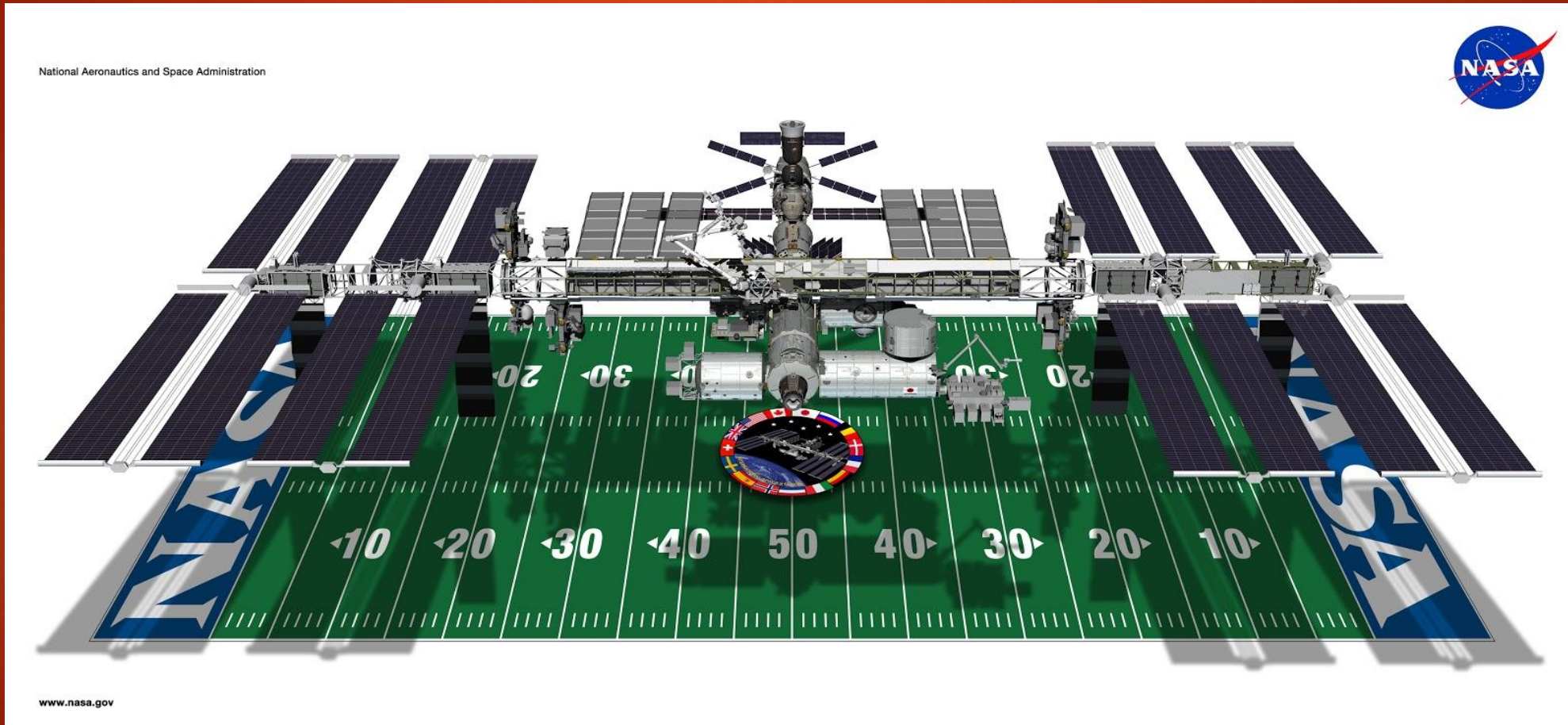
Structure of the Station

- ▶ •Has been under construction since 1998
- ▶ •Zarya Control Module- first structural piece launched; mainly used for storage and external fuel tanks
- ▶ •Zvezda Service Module houses the crew's living quarters and the station's many life-supporting systems
- ▶ •In 2008, the two-billion-dollar science lab Columbus was added to the station, increasing the structure to eight rooms; designed to house experiments in life sciences, fluid physics, and other fields.
- The station's Destiny laboratory functions as a unique floating facility for tests of materials, technologies, and much more
- Docking Ports
- Quest Airlock- Used for spacewalks
- Canadarm2 - Canadian-built apparatus is a large, remote-controlled space arm that functions as a crane and can be utilized for a wide variety of tasks
- The space station is powered by solar panels and cooled by loops that radiate heat away from the modules

Structure (Continued)

- ▶ •Module Length: 167.3 feet (51 meters)
- ▶ •Truss Length: 357.5 feet (109 meters)
- ▶ •Solar Array Length: 239.4 feet (73 meters)
- ▶ •Mass: 924,739 pounds (419,455 kilograms)
- ▶ •Habitable Volume: 13,696 cubic feet (388 cubic meters)
- ▶ •Pressurized Volume: 32,333 cubic feet (916 cubic meters)
- ▶ •Power Generation: 8 solar arrays = 84 kilowatts
- ▶ •Lines of Computer Code: approximately 2.3 million
- ▶ •Spans the length of a U.S. football field, including the end zones

ISS compared to a football field



The complex now has...



- ▶ • more livable room than a conventional six-bedroom house
- ▶ • two bathrooms
- ▶ • a gymnasium
- ▶ • a 360-degree bay window.

Inside the Space Station – *ISS Expedition 37 crew portrait inside Kibo*



Since the launch in 2000

As an orbiting laboratory

- ▶ • has been visited by 214 individuals
- ▶ • 10 year anniversary, odometer read more than 1.5 billion statute miles over the course of 57,361 orbits around the sun
- ▶ • 180 spacewalks, totalling over 1,130 hours, or approximately 47 days

As a port for a variety of international spacecrafts

- 97 Russian launches
- 37 Space Shuttle launches
- 1 test flight and 3 operational flights by SpaceX's Dragon
- 1 test flight and 1 operation flight by Orbital Science's Cygnus
- 4 Japanese HTVs
- 4 European ATVs

Expedition 1 — L-R: Sergei K. Krikalev (Russia), William M (Bill) Shepard (United States), and Yuri Pavlovich Gidzenko (Russia)



Why is the ISS Important?

- ▶ •Research that could improve life on Earth
- ▶ •Thousands of experiments are running at any one time
- ▶ •Medical research, physical sciences, curing diseases and developing new materials
- ▶ •The future of space exploration/Improving space exploration
- ▶ •Allows us to spend a longer amount of time in space
- ▶ •Discover how the human body reacts to life in space
- ▶ •Serves as a destination for a new generation of spacecraft designed by both national and private space agencies

Life in Space

- ▶ The station experiences a sunrise and sunset every 90 minutes as it orbits the Earth
- ▶ The astronauts structure their days like they would on Earth
- ▶ •The station operates on GMT, where the astronauts would wake up in the mornings before completing tasks throughout the day
- ▶ ◦Examples of tasks are station maintenance, experiments, and sometimes extravehicular activities (EVAS, or spacewalks) outside the station
 - Down time
- ▶ •“Bedrooms”
 - Telephone booth-sized private quarters
- ▶ •Exercise
 - To ensure that each astronaut’s body survives the adverse effects of living in a microgravity environment, such as the decreased bone mass that can occur
- ▶ •Lack of gravity
 - Astronauts would float objects rather than setting them down

ISS Crew Quarters



NASA astronaut Ron Garan (bottom) and Cady Coleman, European Space Agency astronaut Paolo Nespoli (left) and Russian cosmonaut Alexander Samokutyaev, all Expedition 27 flight engineers, pose for a photo in the Harmony node of the International Space Station



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