My Experiences in Space

SOUTHWEST RESEARCH INSTITUTE®

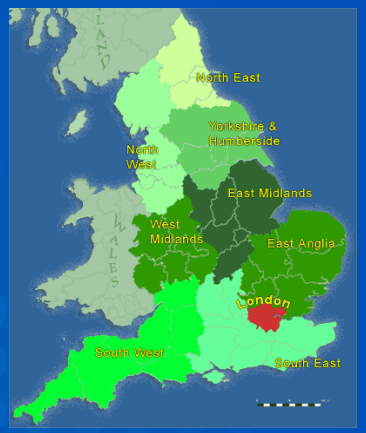
Susan Pope

spope@swri.edu

210-522-2075

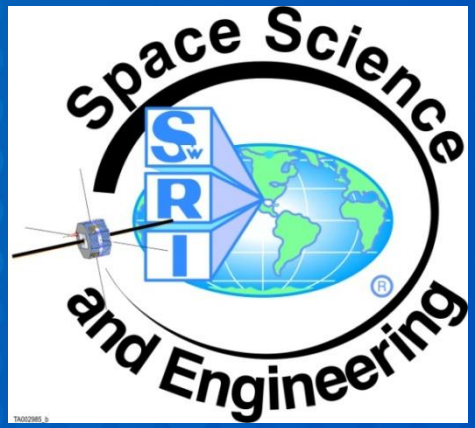
About Me

- 1974: Born in England
- 1979: Moved to Houston, TX
- 1992: Graduated from Jersey Village High School in Houston
- 1996: Graduated with a Bachelors in Mechanical Engineering from UT Austin
- 1997: Started work at Southwest Research Institute (SwRI) as an instrument Mechanical Engineer
- 2002: Graduated with a Masters in Engineering Management from UT Austin
- 2010: Promoted to Assistant Director over the Space Science Department (>100 employees)
- 2011: Honored to be selected one of San Antonio's 40 under 40
- 2012: Passed Project Management Professional Exam
- 2014: Promoted to Director of Space Instrumentation Department
- 2017: Completed Managerial Leadership Certification Program at UT Austin



My Career

- SwRI Space Science and Engineering Division
- Work with great Scientists and Engineers to design instrumentation for space research
- Apply everything I learned in school
  - Inter-personal skills
  - Writing
  - Public speaking
  - Reading
  - Math/Science



- Designed and built many instruments that will explore the solar system and beyond:
  - Mars
  - Earth
  - Jupiter
  - Pluto
  - Comets

Brief History of the Space Program at SwRI

1950-1980s

Late 1950s: Improving Rocket Power Performance

1967-1970s: Safeguarding Against Future Fires

1969-1970s: Solving Tank Slosh Errors

1973/1974: Monitoring Astronauts' Physical Condition

1980s: Failure Analysis Software for Shuttle Engine Components

NESSUS

1980s: Fracture Analysis Software for Space Systems

NASGRO

1981: Hot-Cold Plasma Interactions in the Magnetoshere

1983: Attitude & Experiment Control Processing

1990s

1991: Quantifying Global Ozone Change

1992: Improving Performance of Spacecraft Computer

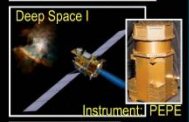
1992: Creating Artificial Aurora

1997: Imaging the Hale-Bopp-Comet

1997: Surveying Saturn and its Moons

1997: Studying Liquid Motion in Rotating Tanks

1998: Advancing Space Physics Measurement Technology



1999: Searching for Vulcanoids

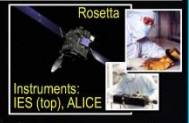
1999: Command and Telemetry for Storm-warning Mission

2000-2007

2000: Imaging the Earth's Magnetosphere

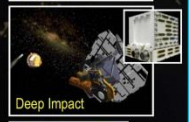
2003: Determing the Cause of the Columbia Accident

2004: Analyzing a Comet's Compostion



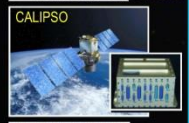
2004: Simplifying Spacecraft Computer Hardware Interfaces

2005: Command & Control Computers for Deep Impact Mission



2006: Exploration Pluto-Charon and the Kuiper Belt

2006: Avionics for Earth Climate Satellite



2006: Capturing Stereo Images of the Earth's Ring Current

2007: Spacecraft Control to Test Robotic Refueling

2008-2014

2008: Mapping the Boundary of the Solar System

2009: Spacecraft Avionics to Find Earth-Like Planets

2009: Viewing Water-Ice in Polar Craters of the Moon

2009: Command & Telemetry Processing for Multispectral Satellite Imagery

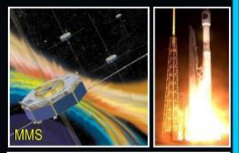
2009: Spacecraft Command & Control to Identify Luminous Galaxies

2011: Unlocking the Secrets of Jupiter's Origins

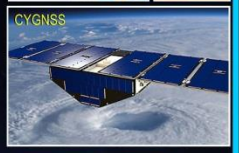
2011: Detecting Radiation from the Sun and Supernovae

2015-2018

2015: To study the Earth's magnetosphere



2016: Gathering unprecedented hurricane data



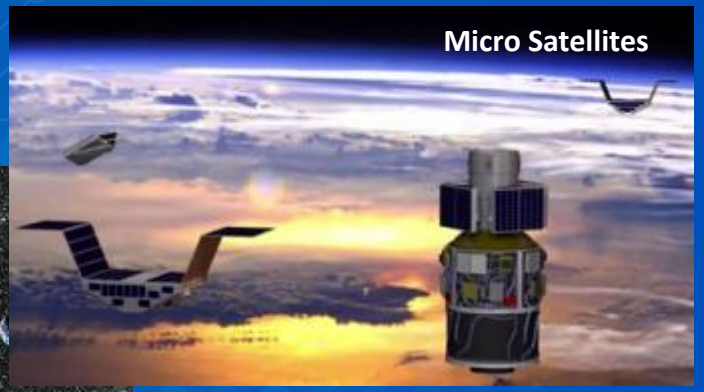
2018: Statistically surveying the outer corona

2018: A unique mass spectrometer that's part of the SERENA suite of instruments

Coming Soon

- **CuSP** - CubeSat to study Solar Particles
- **Lucy** - Surveying the Diversity of Trojans
- **Europa Clipper**- Conducts detailed reconnaissance of Jupiter's moon Europa and investigate whether the icy moon could harbor conditions suitable for life
- **SCORPIO** - Spectrograph and Camera for Observing Rapid Phenomena
- **IMAP** - Interstellar Mapping and Acceleration Probe
- **SolO** - Solar Orbiter
- **JUICE** - Jupiter Icy moons Explorer, Ganymede orbiter

Space Science and Engineering



spacecraft management • system engineering • spacecraft avionics, instrument systems, support systems, & software • electromechanical systems design • power systems design • solar & heliospheric physics • planetary science & astronomy • space plasma physics • space missions • theoretical & observational studies

SwRI Missions in the Solar System

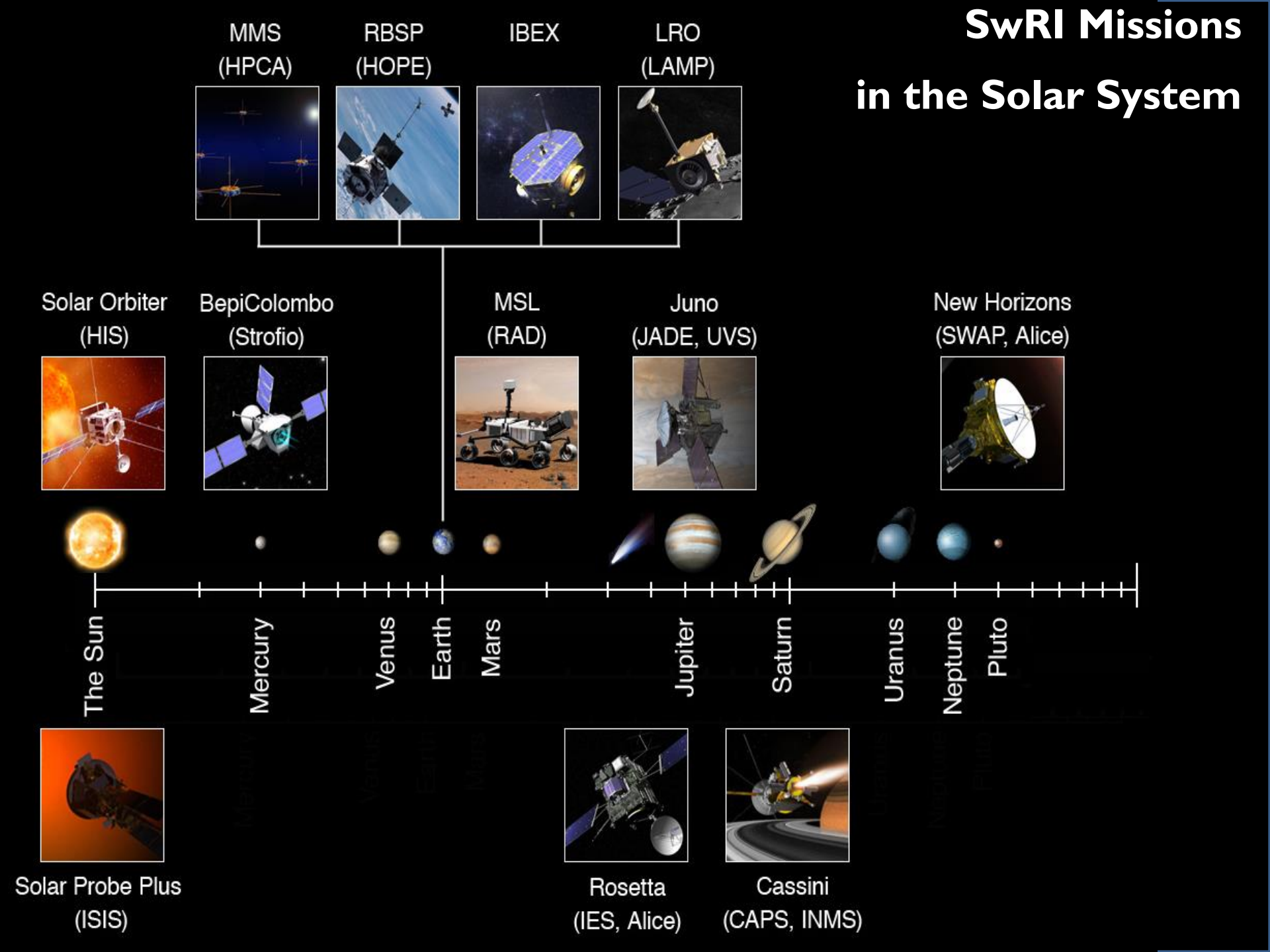
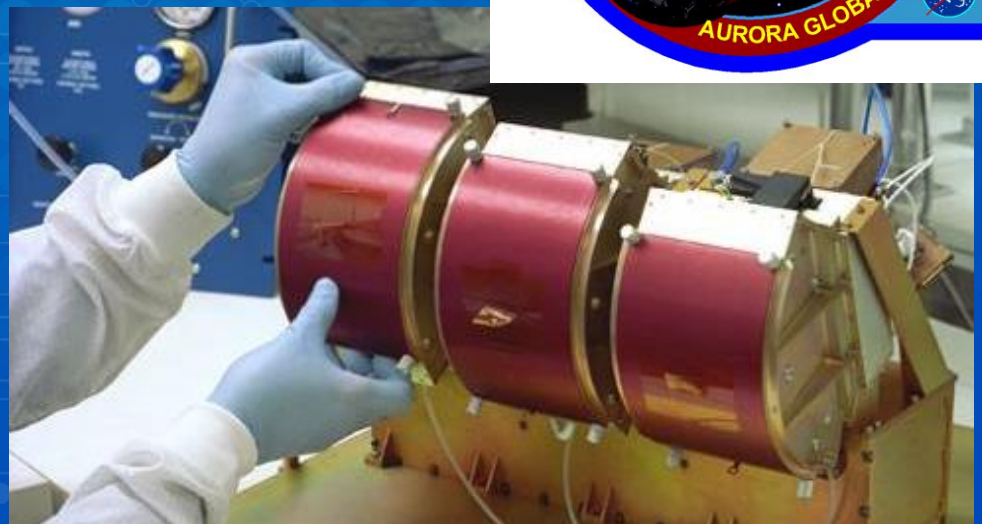


IMAGE – MENA (Medium Energy Neutral Atom) Instrument

- Started work: January 1997
- Role: Mechanical Engineer
- Launch: March 2000

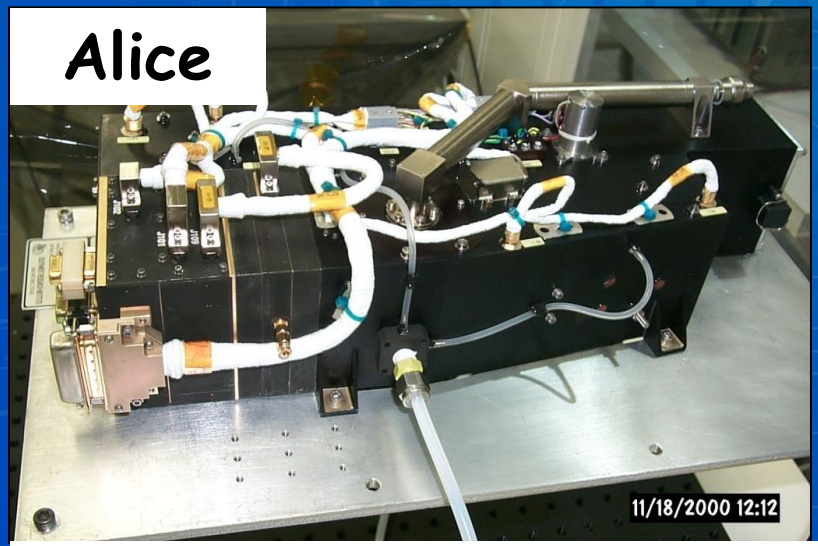


https://www.nasa.gov/feature/goddard/2018/nasa-image-confirmed

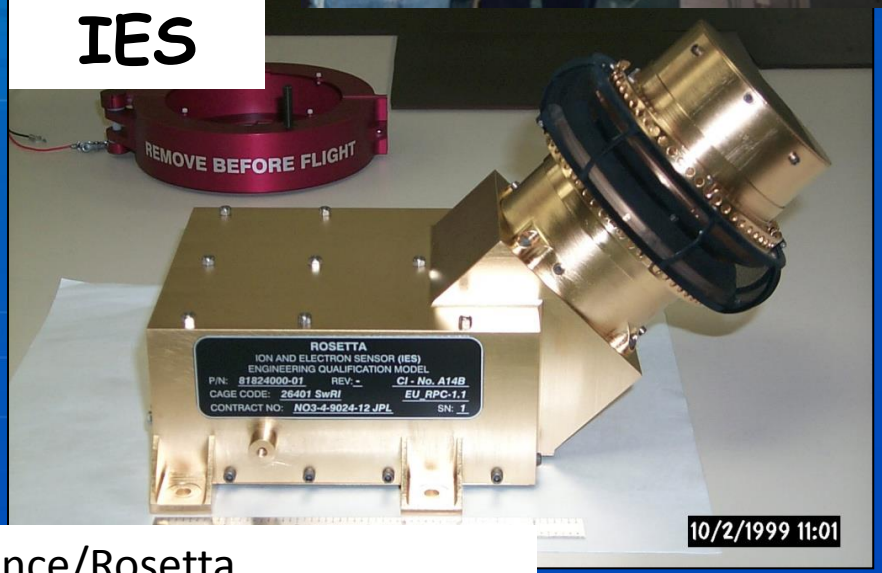
Rosetta - Alice and IES (Ion Electron Spectrometer)

- Started work: 1998
- Role: Mechanical Engineer
- Launch: March 2004

Alice



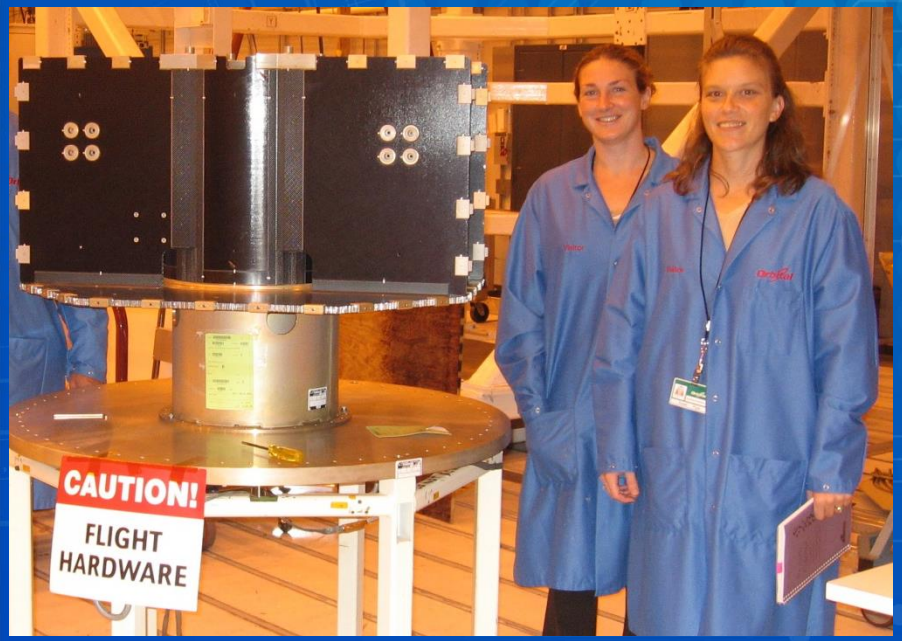
IES



http://www.esa.int/Our_Activities/Space_Science/Rosetta

IBEX (Interstellar Boundary Explorer)

- Started work: Late 2003
- Role: Mission Systems Engineer
- Launch: Oct 19, 2008



http://ibex.swri.edu/educators/index.shtml

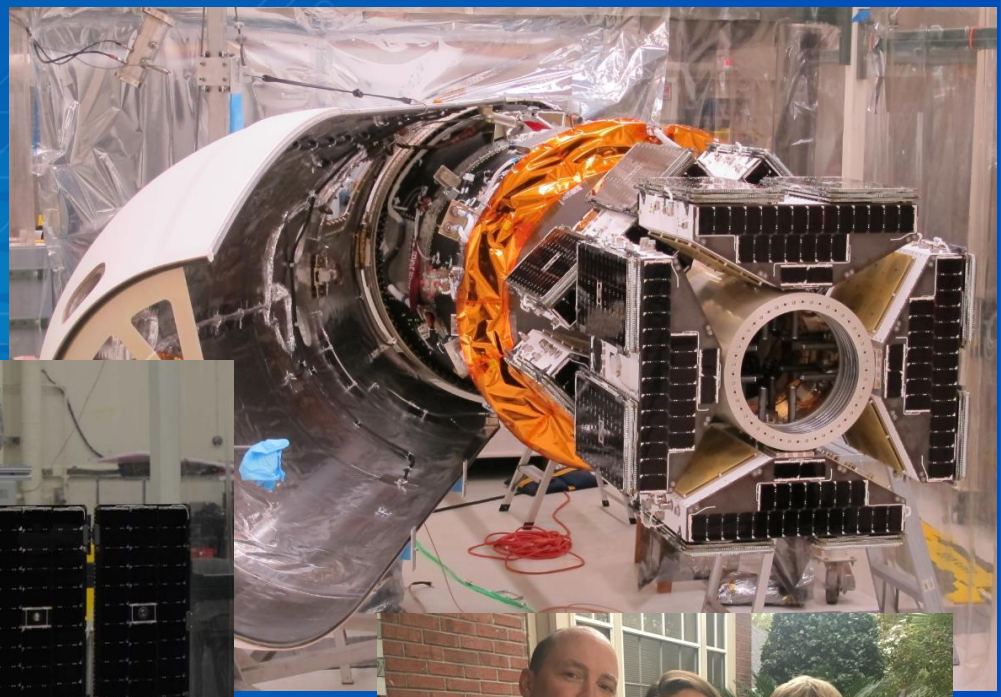
MMS (Magnetospheric Multiscale)

- Started work: Early 2008
- Role: Instrument Suite Systems Engineer
- Launch: March 12, 2015

https://mms.gsfc.nasa.gov/education.html

CYGNSS (Cyclone Global Navigation Satellite System)

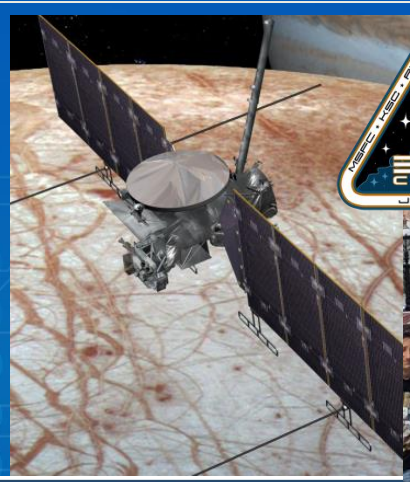
- Started work: Early 2013
- Role: Deputy Project Manager
- Launch: Dec 15, 2016

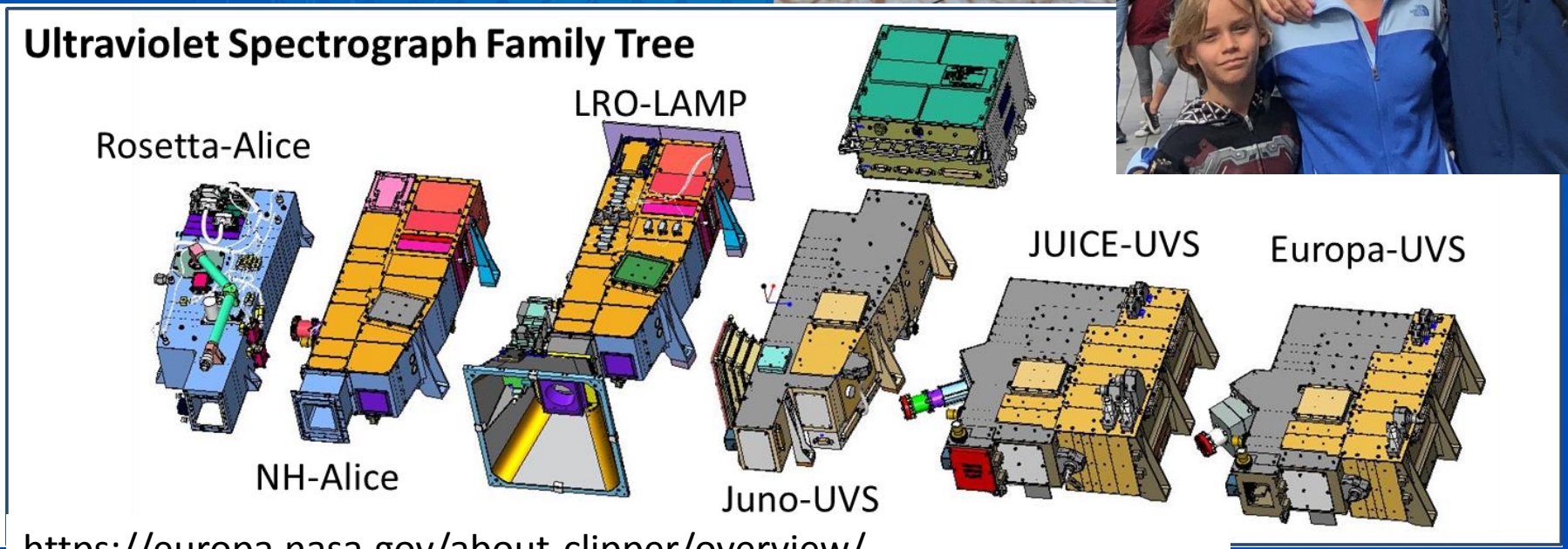


http://clasp-research.engin.umich.edu/missions/cygnss/

Europa-UVS (Ultraviolet Spectrometer)

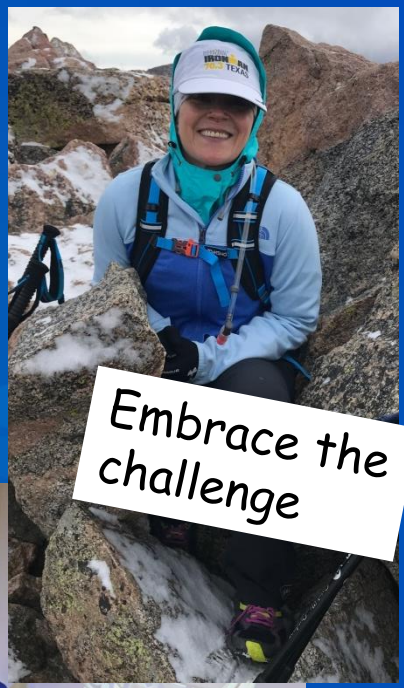
- Started work: Mid 2016
- Role: Project Manager
- Launch: ~June 2022





https://europa.nasa.gov/about-clipper/overview/

Final Thoughts



SwRI Young Engineers and Scientist (YES) Program

- Thirteen day intensive mentoring program,
- Students entering their junior or senior year of high school
- Learn about different fields of study by listening to lectures, taking tours, and working on a project of their choosing with a mentor.
- Signup starts in January and selections are made in March

- Students perform a science experiment in spectroscopy guided by a planetary scientist
- Learn data analysis techniques and web programming
- Build a variable voltage power supply guided by an expert in our Spaceflight Power Systems group
- Interact with dozens of scientists and engineers across a spectrum of fields

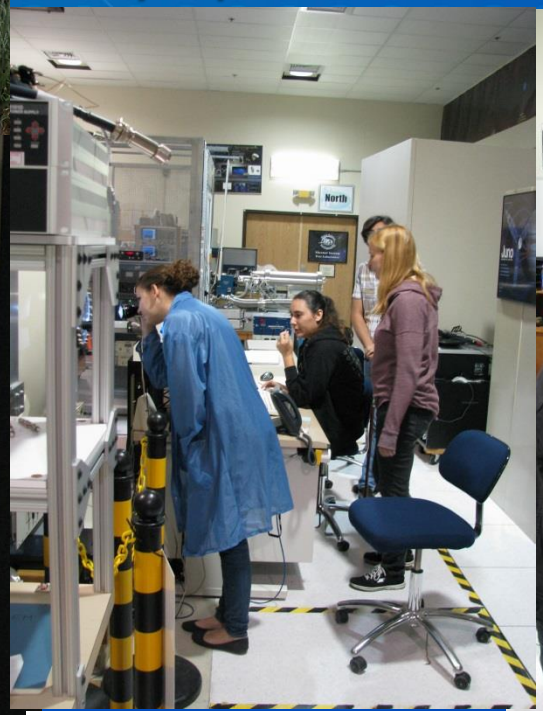
Apply online at https://yes.space.swri.edu

Graduate Studies at SwRI in Space Sciences

- 14 SwRI Adjoint Professors support UTSA PhD and Master's students to work on externally-funded (NASA, NSF etc.) research programs since 2005
- Featured Areas of Space Physics, Planetary Science & Astrophysics
  - Instrumentation
  - Mission planning & Design
  - Data Analysis
  - Theory & simulations

Students work on flight instruments in SwRI's World Class Facilities

- High impact research results published in peer-reviewed journals, presented at meetings, and annual symposium



Space Physics Lab. Class

UTSA Graduate Students

- 14 current graduate students
- Have funding for several motivated, high-quality students each year
- 10 Graduated since 2005
- Employed at JHU/APL, NASA/GSFC, SwRI, UC Berkeley, ESA/ESTEC, Swedish Inst. of Space Physics, West Point, Northwest Vista

More details at http://grad.space.swri.edu.

Questions: Mihir Desai:

email: mdesai@swri.edu

Tel: +1 210 522 6754