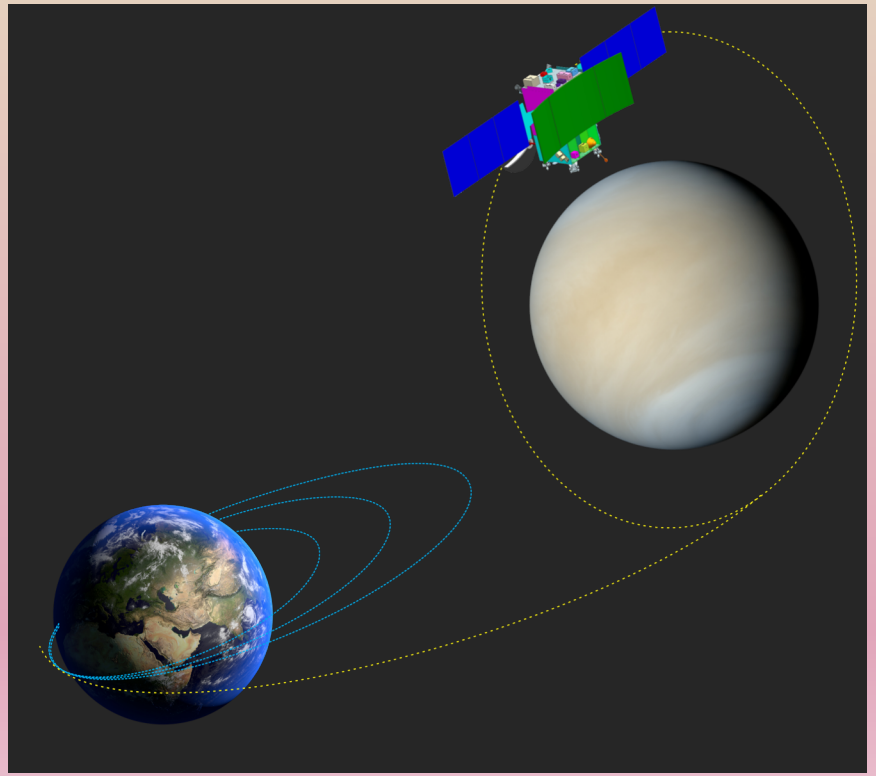
Venus Orbiter Mission

….to study surface, atmosphere and plasma environment



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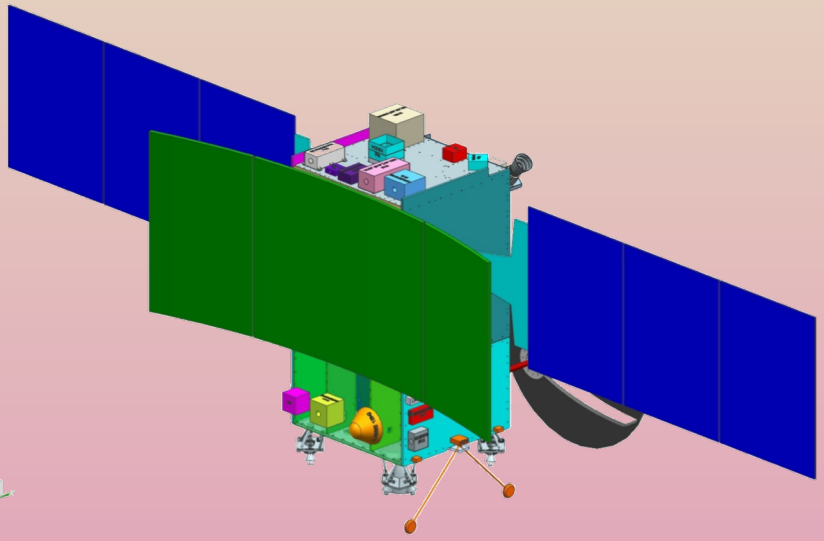
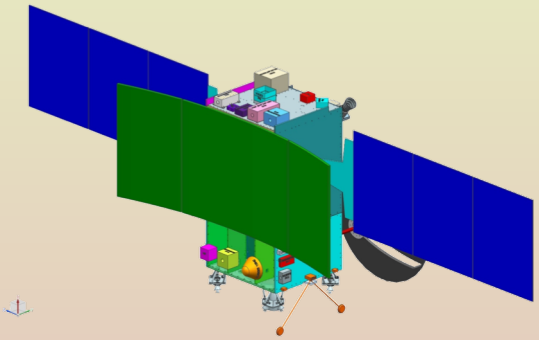
Venus Orbiter Mission (to be approved)

- Baseline Mission
  - ✓Orbiter
- Potential Augmentation
  - ✓Sub-Satellite
  - ✓LLISSE-TD from NASA



Science Objectives



- Mapping the Venusian surface at high spatial resolution of 30-40 m
- Determining the structure and stratigraphy of surface/sub surface features -- volcanic hot spots
- Determining the structure and composition of the atmosphere
- Understanding Cloud Dynamics
- Investigating Venusian Ionosphere

Indian Proposals – 54

✓**Recommended- 16**

International Proposals – 21

✓**Recommended-7**

- **(USA-3, Russia-1, Russia-France -1)**

Colloborative payloads

- **India/Germany-1**
- **India/Sweden-1**

Indian Payload (short-listed)

Theme / Payloads Selected	Surface/Subsurface	Atmospheric	Ionospheric	Sun-Venus Environment
Venus L&S-Band SAR	X			
VARTISS (HF radar)	X		X	X
VSEAM (Surface Emissivity)	X	X		
VTC (Thermal Camera)		X		
VCMC (Cloud Monitoring)		X		
LIVE (Lightning Sensor)		X		
VASP (Spectro Polarimeter)		X		
SPAV(Solar occultation photometry)		X		
NAVA (Airglow imager)		X	X	X
RAVI(RO Experiment) *		X	X	X
ETA (Electron Temperature Analyser)			X	
RPA(Retarding Potential Analyser)			X	
Mass Spectrometer		X	X	
VISWAS (Plasma Analyser) *			X	X
VREM (Radiation Environment)			X	X
SSXS (Solar Soft X-ray Spectrometer)				X
VIPER (Plasma Wave Detector)				X
VODEX (Dust experiment)			x	

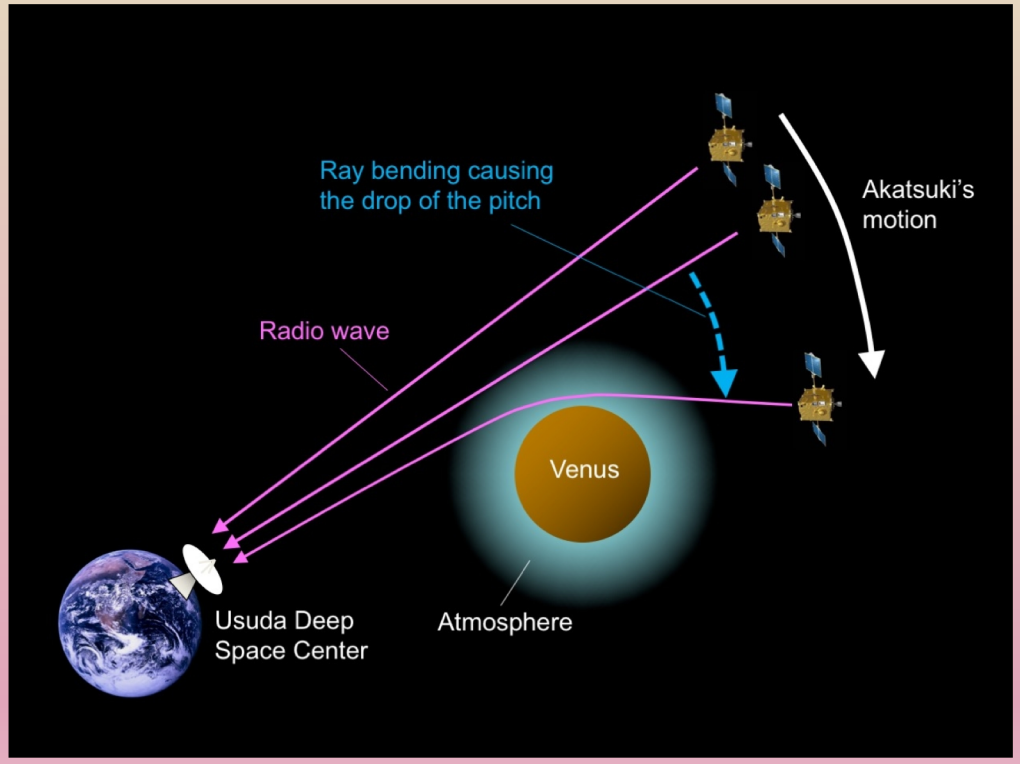
International Payloads (short-listed)

Theme		Surface/Subsurface	Atmosphere	Ionospheric	Sun-Venus Environment
Payloads selected	**Institution**				
Onboard SAR Data Processing and Radar Stereo DEM Generation and Analysis	Jet Propulsion Laboratory Radar Science and Engineering Section	X			
Vesper	NASA/Goddard Space Flight		X		
Venus Lightning Mapper	University of California, Los Angels, USA		X		
VIRAL (Venus InfraRed Atmospheric gases Linker)	Space research Institute,,Moscow &LATMOS, France	X		X	X
IVOLGA: a laser heterodyne NIR spectrometer for studying of structure and dynamics of the Venusian mesosphere	Moscow Institute of Physics and Technology		X		

Contribution to the Perspective of VEXAG Goals and Objectives

II. Understand atmospheric dynamics and composition on Venus.
III. Understand the geologic history preserved on the surface of Venus and the present-day couplings between the surface and atmosphere.

Radio Science experiments using Akatsuki



Courtesy: Immamura et al, EPS, 2017

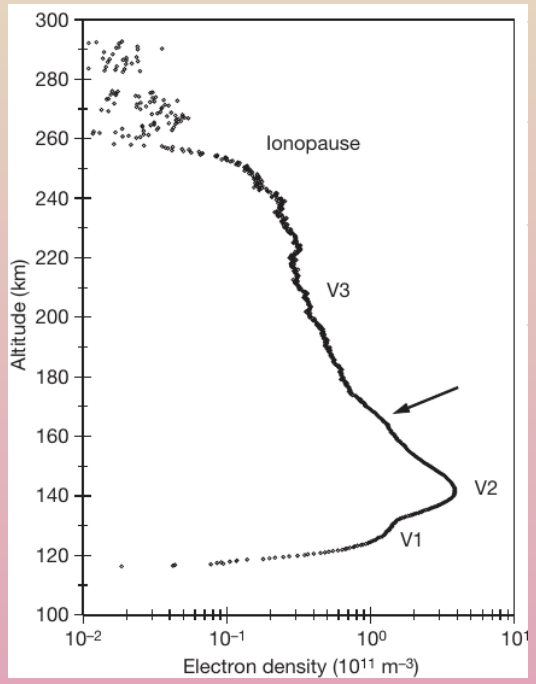
Under MOU between ISRO and JAXA, Akatsuki RS signals are being tracked at ISRO Deep Space Network (IDSN)

~21 Occultation events were captured during 2017 - 2019

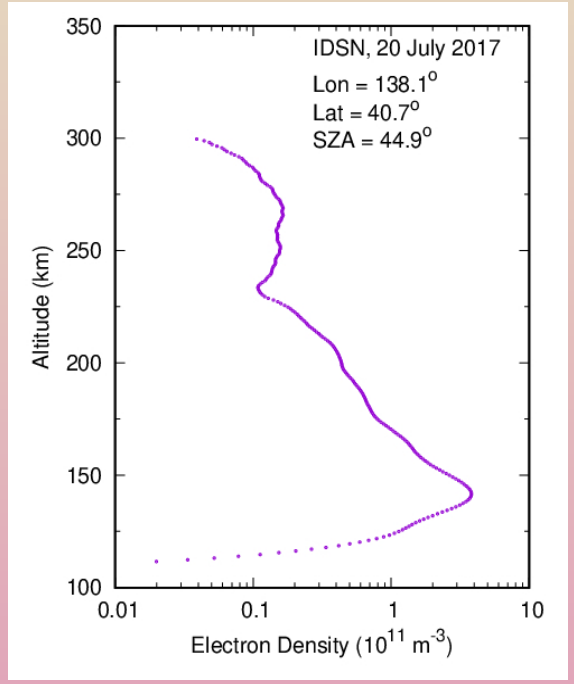
Experiments were conducted in open loop mode and data was recorded in CCSDS-RDEF Format

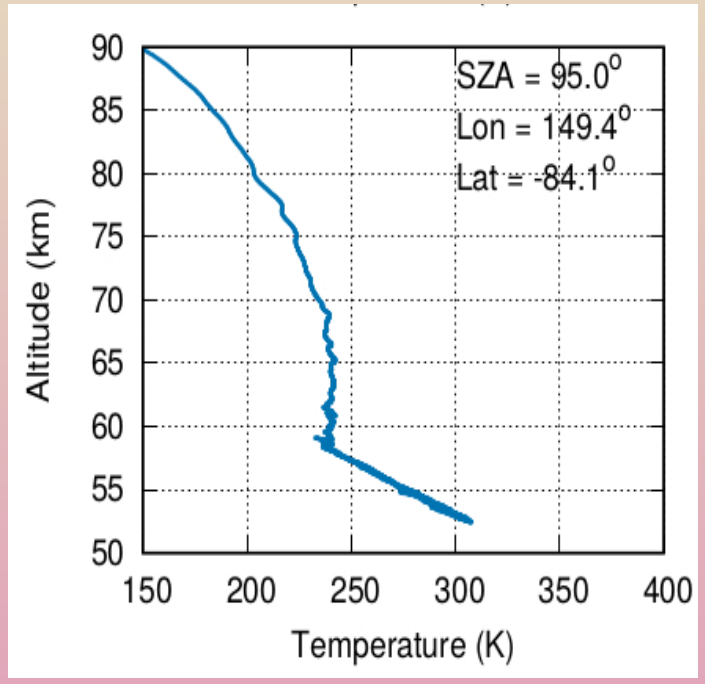
Radio Science experiments using Akatsuki

Profiling the Venus atmosphere and ionosphere



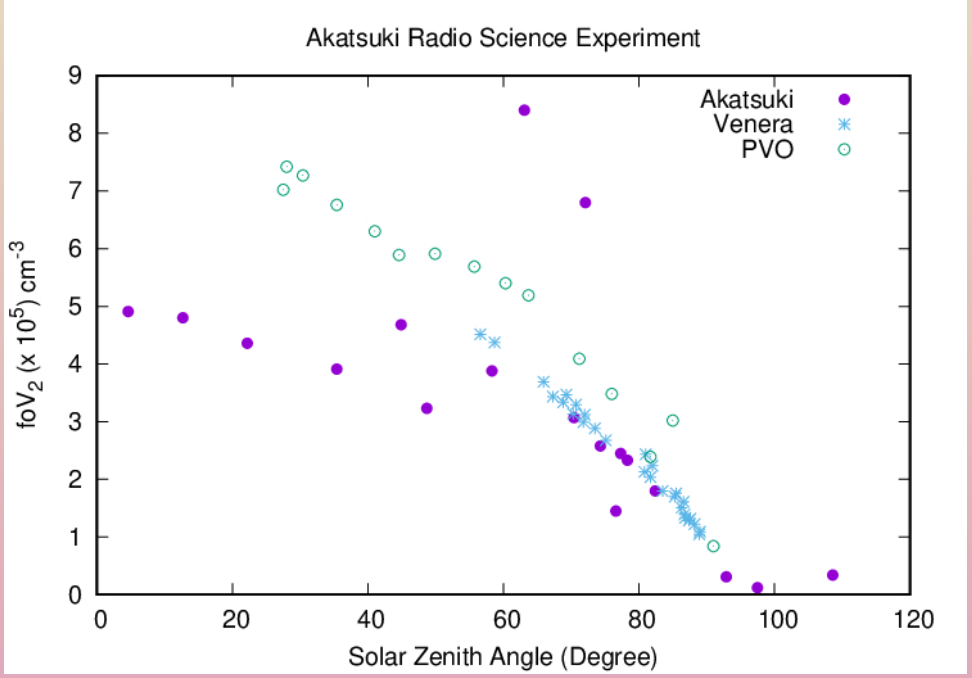
Patzold et al 2007



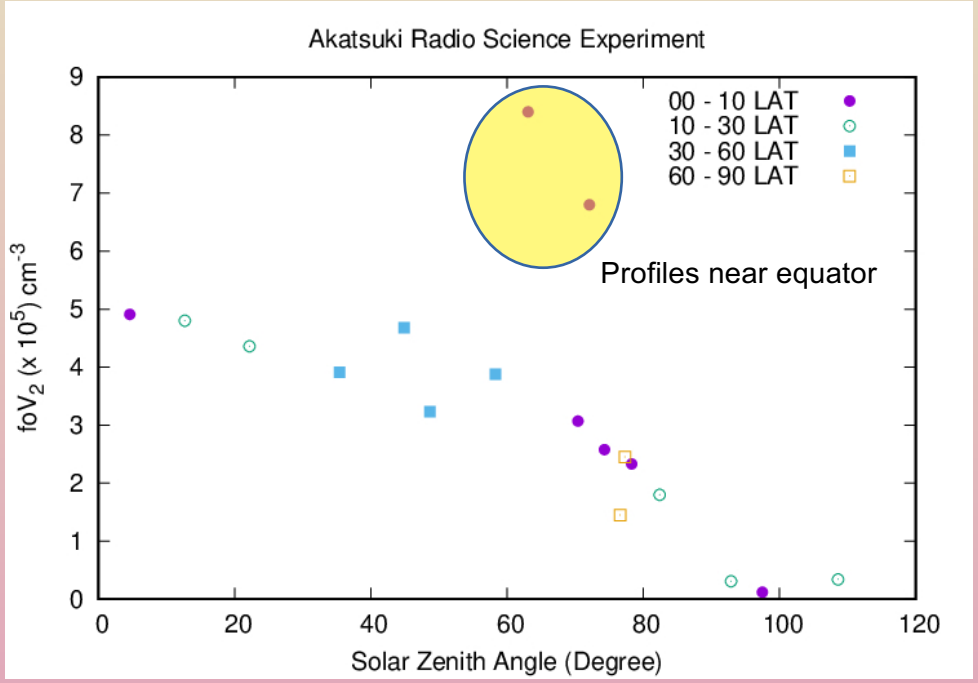


THANK YOU

Venus Ionosphere



Comparison of peak V2 density as observed by different missions during different time periods



Detailed analysis of the profiles observed at the Venus equatorial region is in progress