

Overview of Typical Venus Mission Architectures

by

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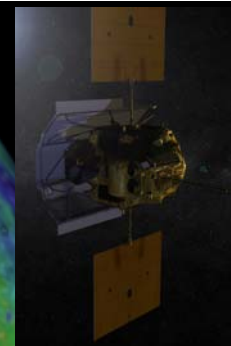
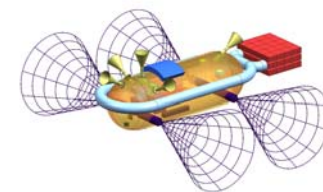
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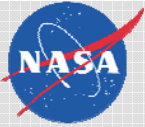
Presented at the

3rd Meeting of the Venus Exploration Analysis Group (VEXAG)

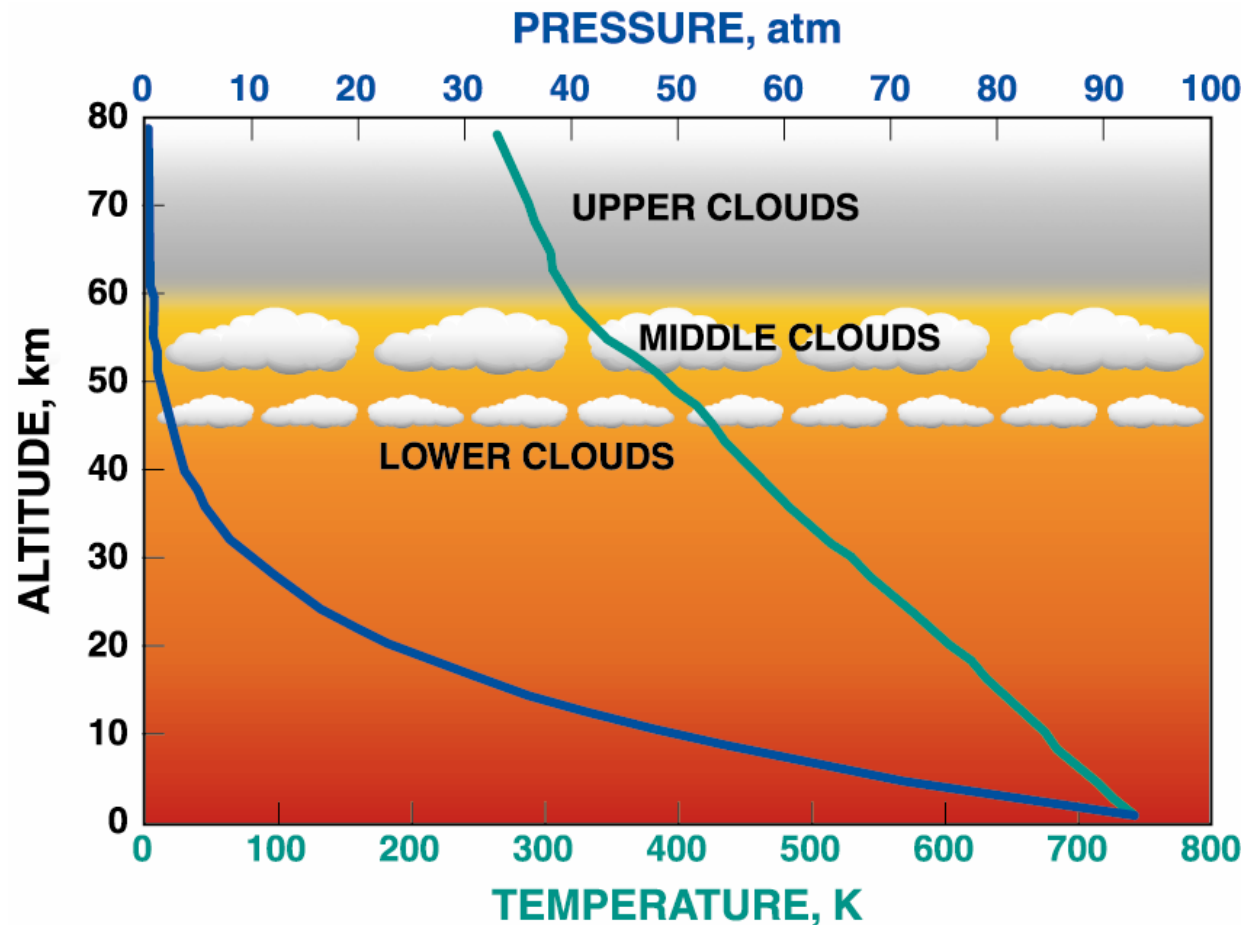
Crystal Gateway Marriott Hotel, Crystal City, Virginia

January 11-12, 2007

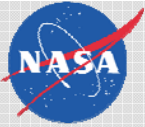




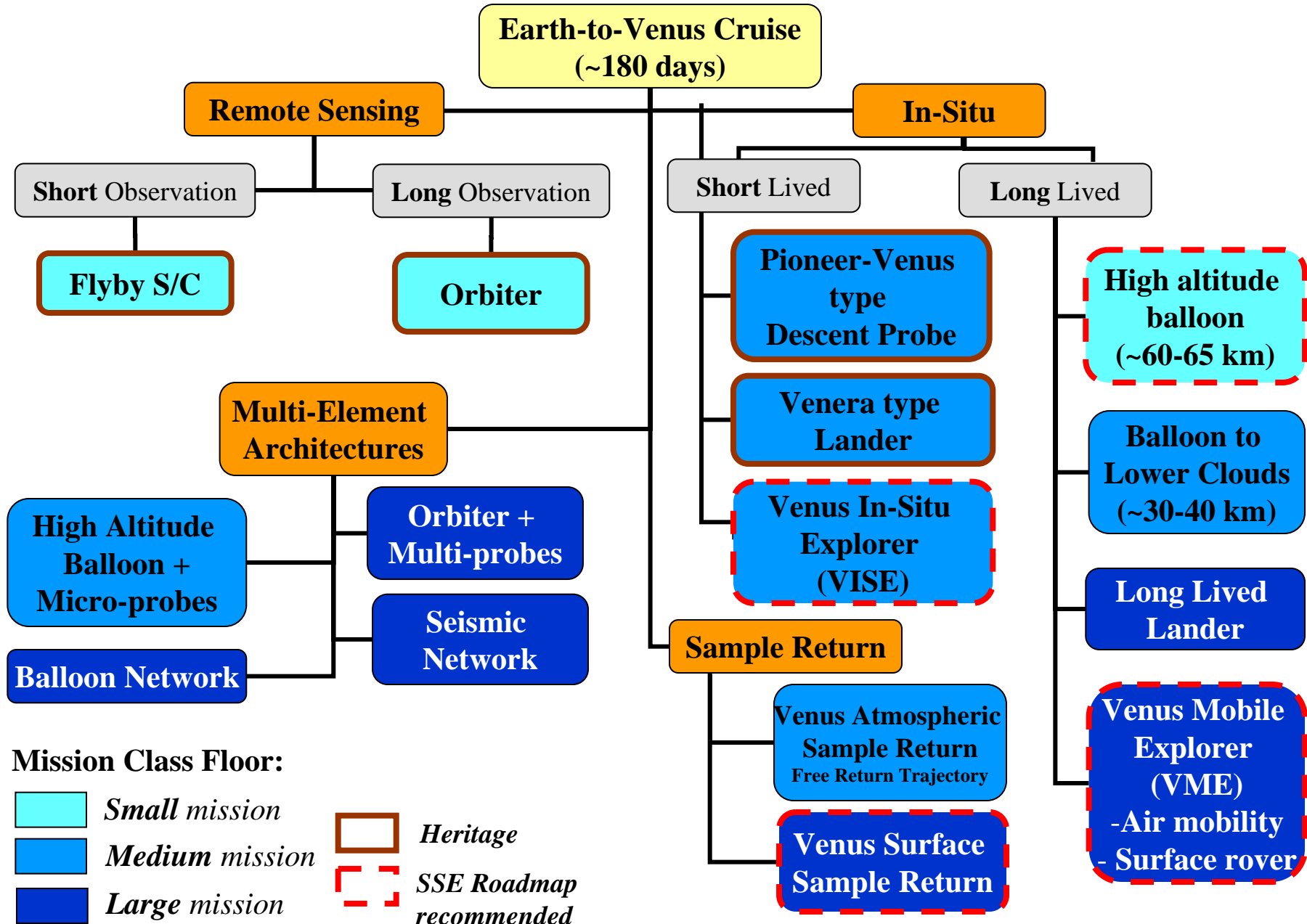
Venus Environment

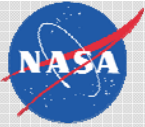


- Greenhouse effect results in **very high surface temperatures, ~460 to 480 °C**
- Pressure at surface: **~92 bars**
- **Sulfuric acid clouds** (dry up at ~11 km)
- Composition: **Supercritical** 96.5% **CO₂** & 3.5% N₂; & various trace gases
- **Zonal winds**: at near surface ~1 m/s; at 60 km altitude ~60+ m/s



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Potential Future Venus Exploration Options



Mission Type (class)	Advantages	Disadvantages
Orbiters (with or w/o in-situ element) (Discovery/NF/Flagship)	Simple architectures; Solar Power (simplicity); Relay from In-situ to Earth	Remote sensing only; Resolution issues
High altitude balloon (Discovery/NF)	“Earth-like” conditions; Solar Power (simplicity)	Limited mobility control; Limited in-situ presence
Low altitude balloon (NF/Flagship)		
Low altitude balloon network (Flagship)	Same as balloon, but multiple sampling; redundancy	Issues with surface access; lifetime; power; environment etc.
Probes (Discovery/NF/Flagship)	Heritage, simple	Short lifetime; limited science return; surface access
Landers (short lived) (NF/ Flagship)	Simplicity; heritage	Limited science return; lifetime; no mobility
Landers (long lived) (Flagship)	Good surface access; seismic measurements	Technology challenges with deployment; p/T; power (RPS); high-T electronics, corrosion; no mobility
Seismic Network (Flagship)	Multiple sampling locations; redundancy	Technology challenges with deployment; p/T; power (RPS); high-T electronics, corrosion
Surface rover (Flagship)	Good surface access for sampling; heritage;	Limited mobility, issues with seismic measurement; technology challenges with RPS; high-T/p; corrosion
In-situ Explorer with Metallic Bellows (Flagship)	All axes mobility; go-to capability; good traversing; surface mapping / resolution	Technology challenges with RPS; high-T electronics; pressure; corrosion; telecom?;
Sample Return (Flagship)	Decadal Survey recommended mission	Most complex / expensive of all