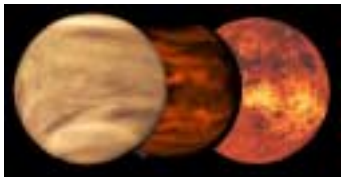


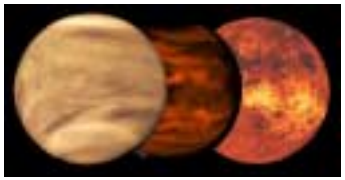
JPL

## Workshop on
## Extreme Environments

# *Venus Dynamics Explorer*

David Crisp (JPL)

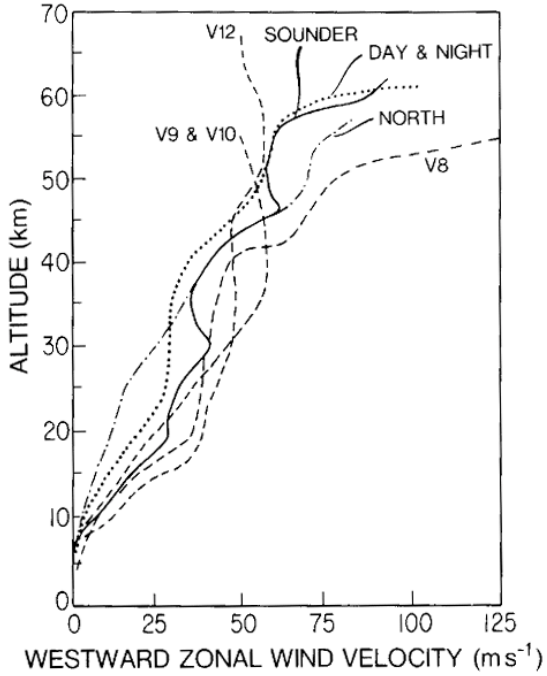
May 16, 2003

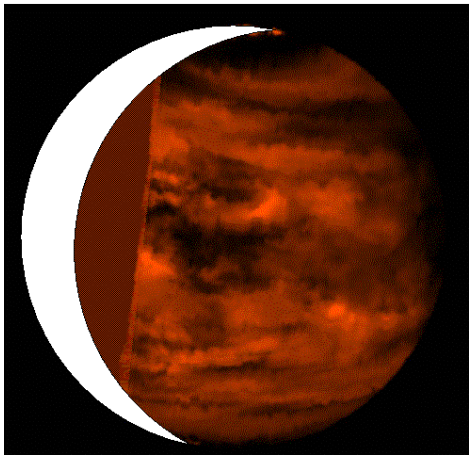


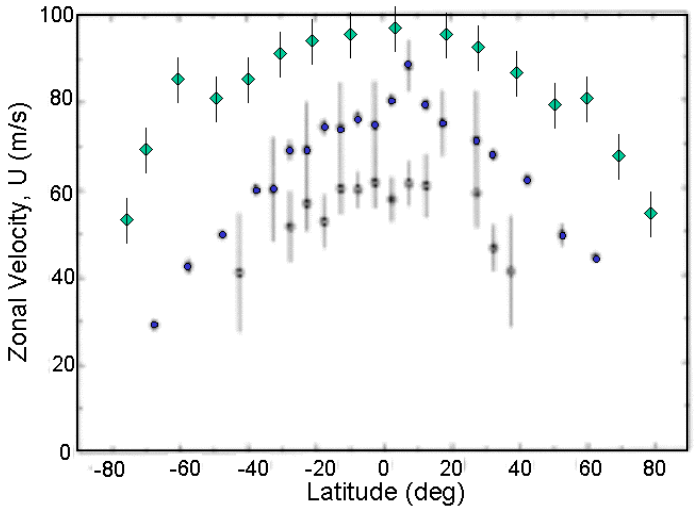
# *Venus Dynamics Explorer*

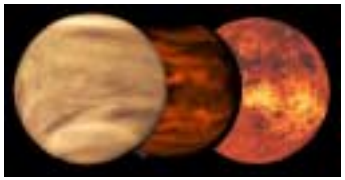
**Objective: Obtain Measurements to explain the general circulation of the Venus atmosphere**

- The cloud-level atmosphere (~70 km) rotates about 60 times faster than the planet's slowly-rotating surface (4 days vs 242 day period)
  - The mechanisms responsible for this superrotation have evaded theoretical explanation for >30 years



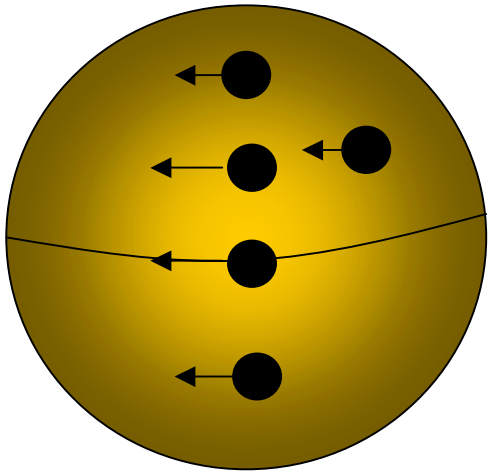


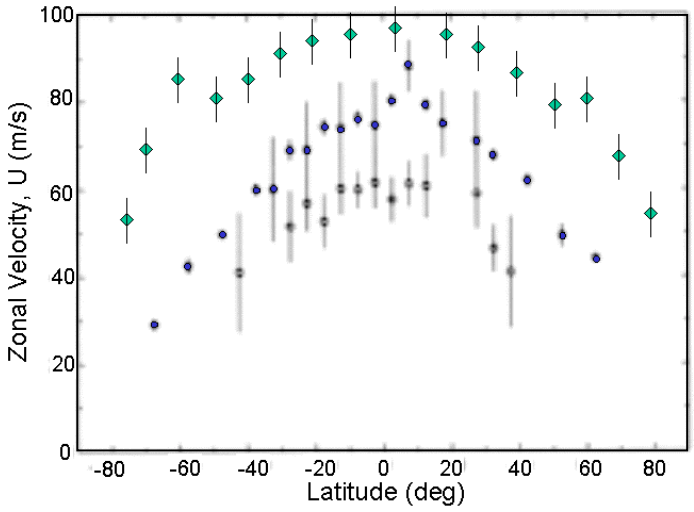


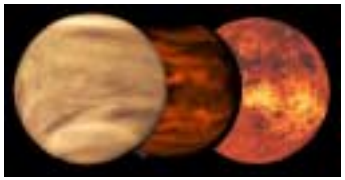
# *Venus Dynamics Explorer*

**Approach: Long-lived balloons and Orbiter**

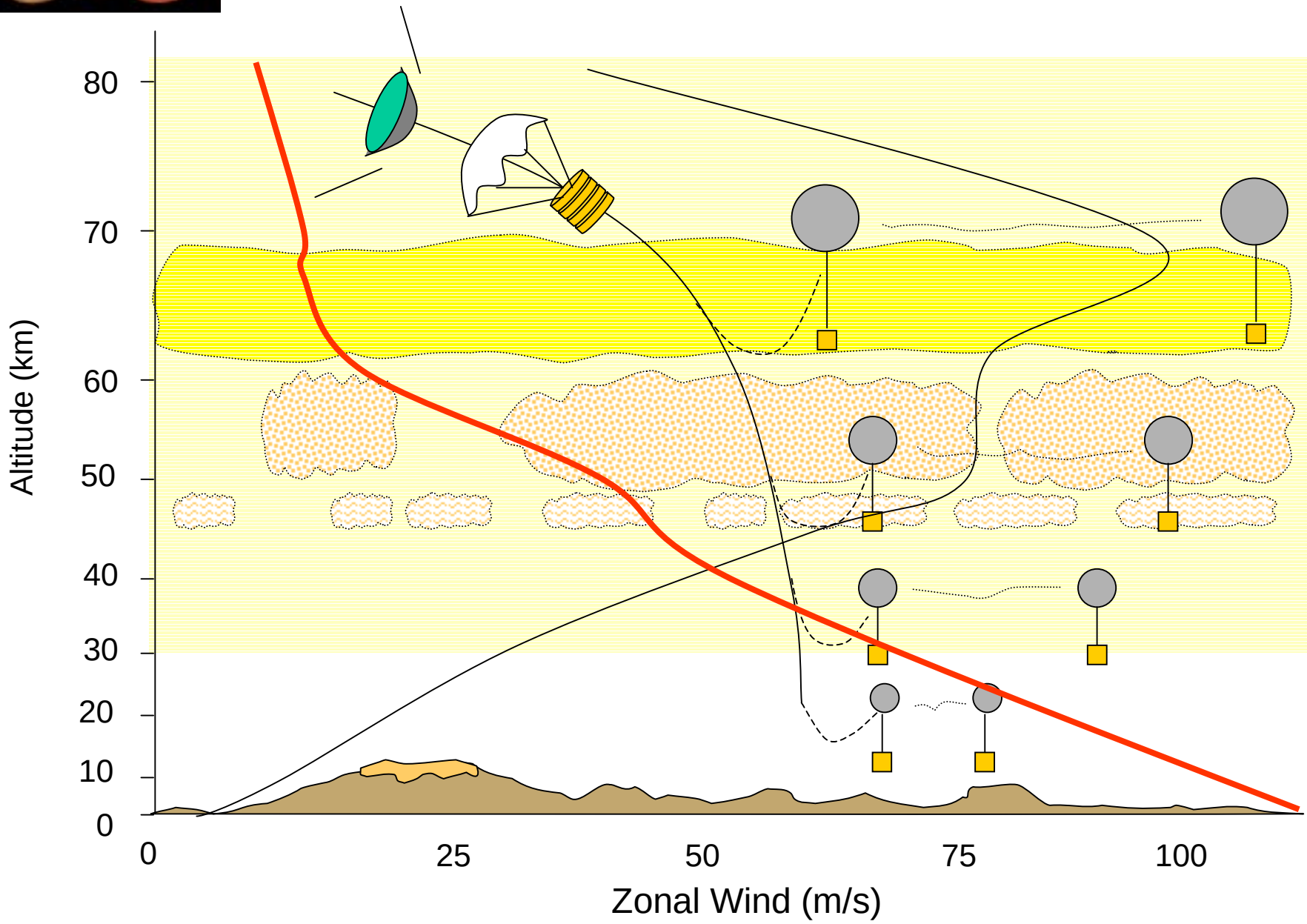
- Network of 12 to 24 long-lived balloons
  - Deployed between the surface and cloud tops at 3-4 latitudes (equatorial, mid, high)
  - Time resolved measurements over ~1 week
    - Discriminates eddies from mean flow
  - VLBI tracking, p, T, solar/thermal radiation
- Orbiter
  - Required for communications/ tracking
  - UV and Near IR imaging spectrometers for tracking the upper, middle, and lower clouds S- and/or X-band radio science package to retrieve density profile at 34 km and 100 km

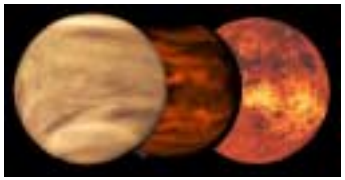






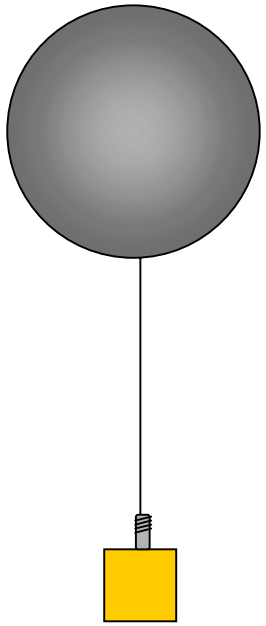
# Balloon Deployment Approach





# *Balloon Requirements*

- Super-pressure balloons
  - Near constant altitude operations
  - Deployment altitudes
    - < 5, 15, 30, 60 km
- Lifetime: ~1 week
- Tracking Requirements (from orbit)
  - Velocity: 1m/sec
  - Position:
    - +/- 5km horizontal
    - <<1km vertical
- Instruments
  - S/L-band Transponder
  - Pressure sensor (altitude)
  - Temperature sensors
  - Relative wind speed
  - Cloud particle sensors
  - Solar/Thermal radiation sensors



- Technologies
  - High-temperature electronics
  - High temperature batteries
  - Balloon materials
  - Deployment architectures