THE VENUTIAN ATMOSPHERE

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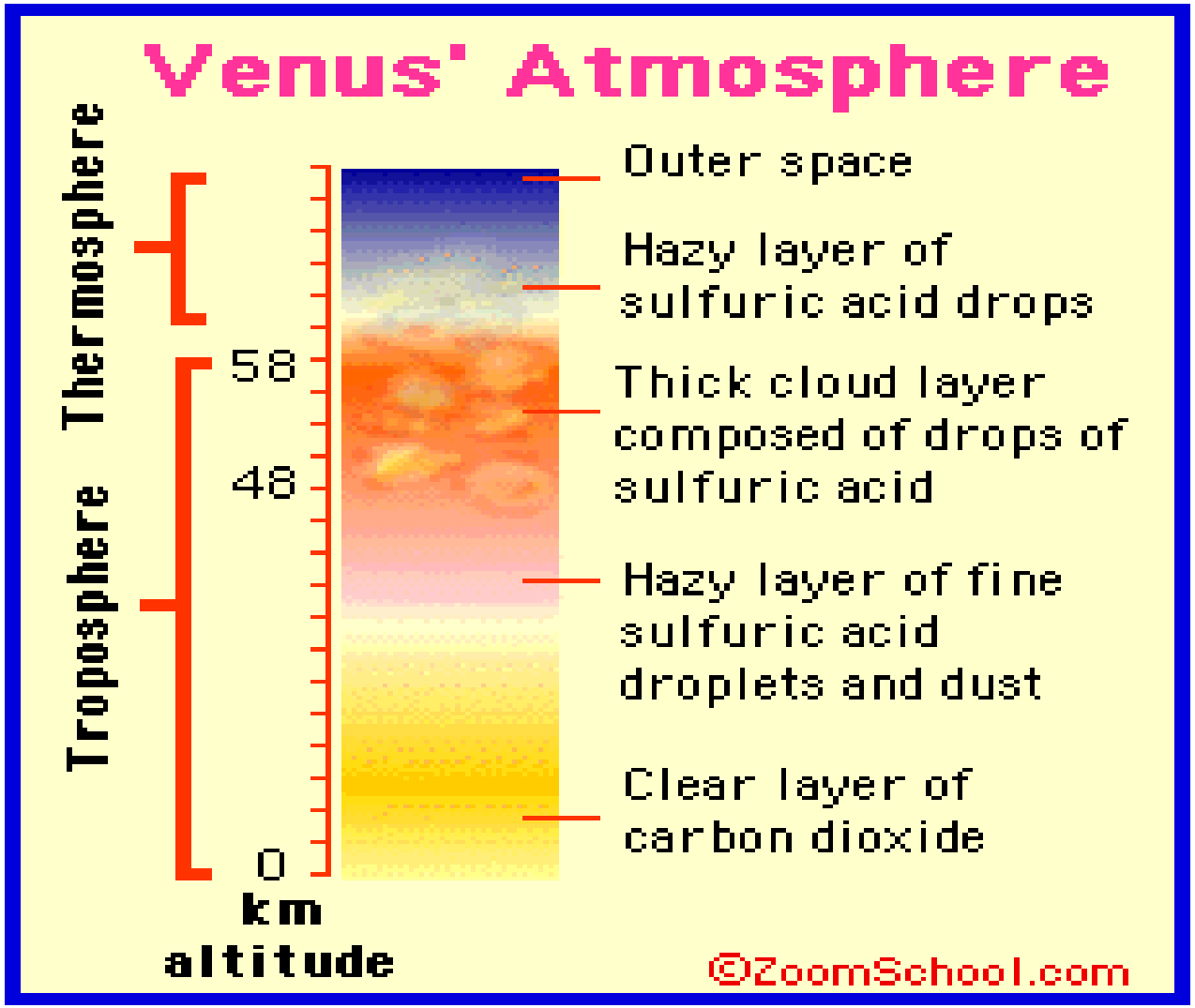
MISSION OBJECTIVES

- The general circulation of the atmosphere
- Composition and chemistry of the atmosphere and the clouds
- Greenhouse effect in the past, present and future evolution of the planet
- Monitoring Three main parameters
  - Carbon Dioxide
  - Sulfuric Acid
  - Radiative Balance

MISSION OBJECTIVES



http://venus.aeronomie.be/en/venus/clouds.htm

MISSION CONSTRAINTS

Cost

Accuracy (Manometry, Infrared Gas Analyzer and Titrimtry…)

Specific visible range (detect the wavelength of the greenhouse and avoid detecting other parameters)

Orbital path of the probe (based on ballistic constrains)

MISSION ARCHITECTURE

Element	Can be traded	Why?
Mission concept	Yes	Alternative approach is always possible
Payload	No	Subject can be tracked by a specific payload
Spacecraft bus	Yes	Depending on type of payload (the infrastructure of the **spacecraft)**
Launch system	Yes	Dependent on the approaching of the company
Orbit	Yes	Geostationary or Geosynchronous
Ground system (stakeholders)	Yes	Potential stakeholders (NOAA, UN, etc.)
Communication architecture	No	Fixed by mission operations and ground system
Mission operations	Yes	Can adjust level of automation and mechanism

Mission Operation Concept

Element	Definition	Verification/ Validation
Data Delivery	How data are collected, distributed and used	Data is detected and saved onboard and transmitted to ground station for analysis. Via using "optical payload"
Communication Architecture	The frequency and fidelity of information flow in the system	Establish and maintain a communication link between satellite and ground station.
Tasking, Scheduling and Control system	How the system decides what to do in the long and short term	Payload sensors (detecting the parameters), continuously imaging Venus atmosphere, ensure satellite is always oriented correctly. Data is processed and analyzed directly after being received. Images generated from data is updated and is given to the stakeholders.
Mission Timeline	The overall schedule for planning, building, operations and end-of-life	The satellite shall have a timeline that is around 10 years. This provides the satellite enough time to collect data and generate models

System Drivers

Why detect Carbon Dioxide, Sulfuric Acid and Radiative Balance ?

Contribute to understand the atmosphere of Venus and compare it with Earth (comparing the atmosphere evolution of both)

Empirical observations suggest that➔

1) the CO_2 absorbs the infrared radiation and it does not all escape into space, but much of it is trapped between the surface and the CO_2 layers in the atmosphere

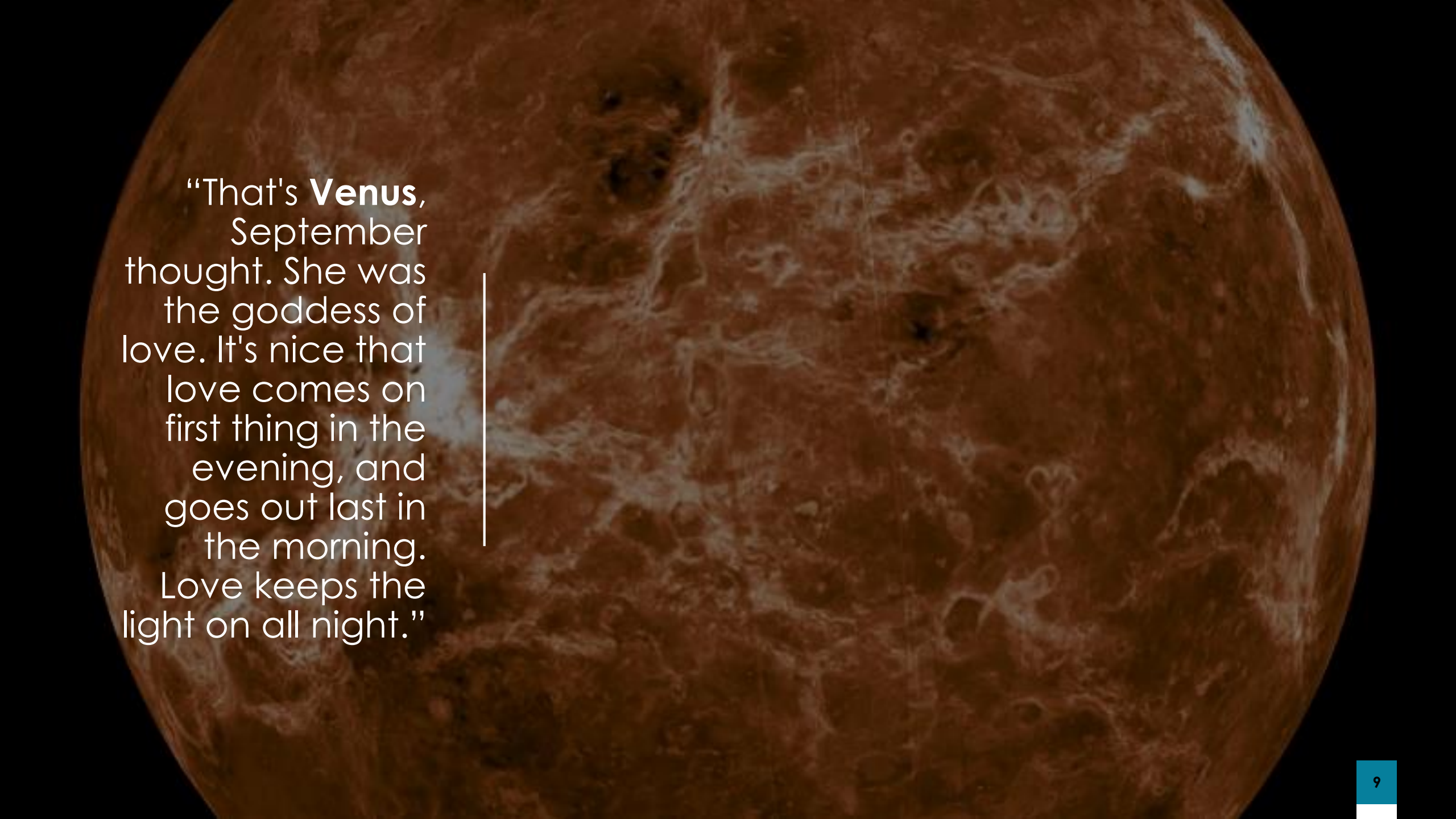
2) The sunlight is mostly at wavelength of~ 0.6 microns = 600nm, which is not absorbed efficiently in CO_2

http://ircamera.as.arizona.edu/NatSci102/NatSci102/lectures/venus.htm

Key requirements

(Description, Justification and Verification)

- Frequent updates for all related parameters of the atmosphere
- Establish and maintain a communication link between satellite and ground station
- Constant view of Venus, on various seasons (short season)



"That's **Venus**, September thought. She was the goddess of love. It's nice that love comes on first thing in the evening, and goes out last in the morning. Love keeps the light on all night."

References

- http://venus.aeronomie.be/en/venus/clouds.htm
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