Venus Dynamics Tracer (VdT)

a mission dedicated for in-situ measurements of the Venus atmosphere

G. Stenberg-Wieser(1), **M. Yamauchi**(1), M. Persson(2), and VdT team

(1) Swedish Institute of Space Physics, Kiruna; (2) GSFS, University of Tokyo, Kashiwa

1. Main Science Target

How is the absorbed solar radiation energy re-distributed into other forms of energy for non-rotating planets?

- **internal (temperature, latent heat, chemical)**
- **kinetic (wind, eddy, wave, ion-neutral collision)**
- **electric (ionization, lightning)**

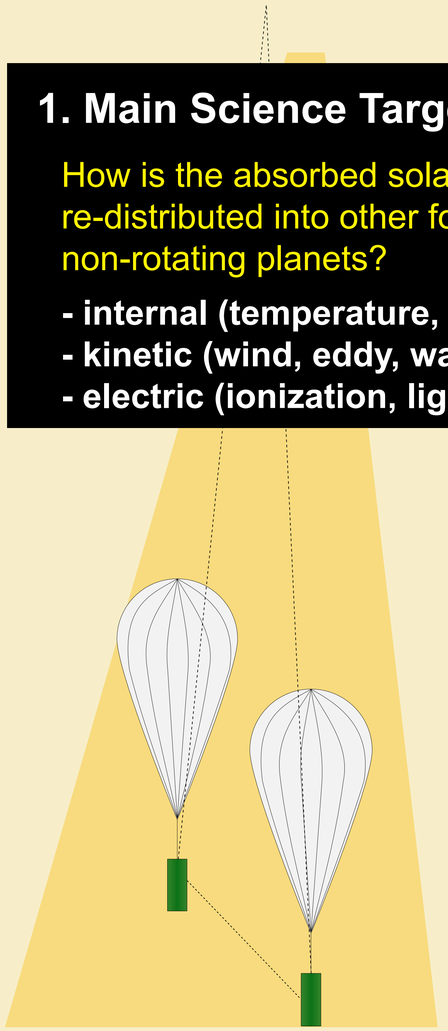
2. Science cases

(a) Super-rotation (cloud)
(b) Effect of mountain wave at > 45 km
(c) Other structures
→ **Roles of virtial motion?**
Roles of latent heat?
(d) Neutral wind and ion wind (ionosphere)
(e) Any dawn-dusk asymmetry (ionosphere)
→ **Thermospheric thermal tide?**
Atmospheric super-rotation drags?
External force on ions (e.g., solar wind)?
→ **Roles of ion-neutral interaction?**

3. What must be measured?

- **Local thermodynamics (in-situ)**
- **Local electrodynamics (in-situ)**
- **Local kinetics (in-situ)**
- **3D motion (in-situ + remote)**

→ **We need multiple balloons**



4. Mission Profile

(1) Baseline: two balloon probes (in-situ)
- Entry module (most challenging technology)
- Decent & inflation sequence ≈ VEGA missions
- Altitude 50-55 km and below 50 km
- Diameter of 4-4.3 m + gondla (5 kg payload)
- Direct communication to the Earth at inflation
- 20 days mission phase

(2) Nominal: + orbiter (in-situ + remote)
- Small spacecraft with 15-40 kg payload
- Piggy-back of the entry module
- Altitude > 400 km with dives < 180 km
- Aditional telemetry for balloons

(3) Extra: + 3rd N_2-gas balloon (in-situ)
- Test for long monitoring (less leak)

5. Baloon Payload (5 kg)

(1) Core
- **Balloon location (telemetry)**
- **Temperature and Pressure**

(2) Precision
- **Humidity**
- **Heat flow/thermal conductivity**
- **Relative wind**

(3) Global context
- Lightning (remote turblence)

5. Orbiter Payload (5 kg)

(1) Core
- **Balloon location (telemetry)**
- **Balloon altitude wind (NIR camera)**
- **Neutral wind & Ion wind**

(2) Global contect
- **IR camera at higher altitude**
- **Monitoring camera**

(3) Precision of global contect
- Altitude propiles (electron density)
- Altitude propiles (pressure)
- secondary IR camera

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