

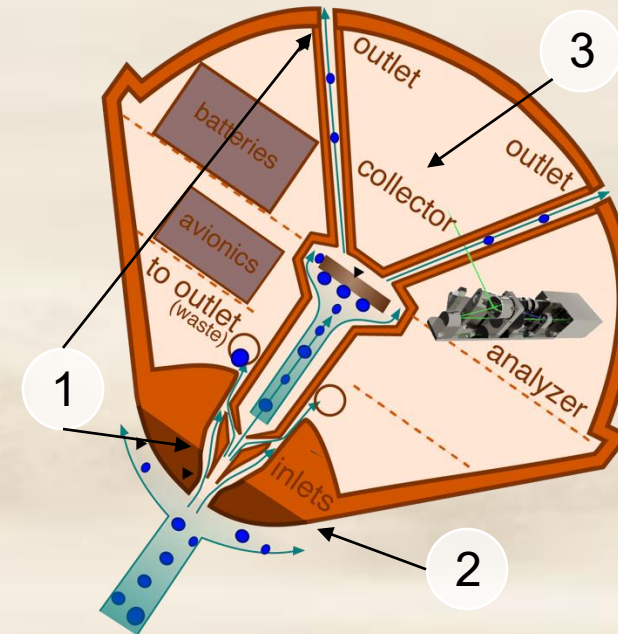
# Enabling Technology for Missions to the Venus Clouds

**Background:** AERACEPT (AErosol Rapid Analysis Combined Entry Probe/sonde Technology) is an early-stage technology development that enables a single aeroshell body to act as both an entry vehicle and aerosol-sampling passive descent sonde. AERACEPT does not require heat shield separation, deployable parachutes, or descent control, thus reducing the mass, volume, and complexity of planetary aerosol sampling. These features meet the rigorous requirements of Venus missions, where the particles of greatest interest are within the subsonic descent regime.

**Innovations:** AERACEPT uses an aeroshell's own velocity to drive aerosol capture and separation through a series of embedded inlets. It takes advantage of recently developed thermal protection materials in combination with heritage aerosol sampling technologies from both planetary and airborne science (Figure).

**Impact:** AERACEPT is included in the [Nephele](#) mission concept study for a small spacecraft targeting the Venus middle and lower cloud layers. Nephele complements larger missions targeting Venus atmospheric gas analysis, such as [DAVINCI](#) and [Venera-D](#), by specifically targeting cloud and haze particles. Because of the short lifetime of the probe in the lower atmosphere, Nephele requires a rapid-fire analysis of the captured particles that can be achieved with AERACEPT combined with modern optical analysis instruments.

ARC Earth Scientist Diana Gentry received NASA's [Early Career Initiative Award](#) in support of her leadership in developing this new technology.



## AERACEPT INNOVATIONS

1. Inlets/outlets embedded in the aeroshell capture/exhaust sample without the need for heat shield separation.
2. Internal secondary flow control isolates sample from aeroshell.
3. Dual capture/analysis of the substrate reduces flow and power requirements.

**Figure:** AERACEPT technology with an aeroshell. AERACEPT uses passive descent to capture aerosols within a single body aeroshell-sonde, fitting aerosol science into a small spacecraft.

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