

Inflation sequence tradeoffs and laboratory demonstration of a prototype variable-altitude Venus aerobot

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We present a new inflation sequence for the aerial deployment of a two-envelope Venus aerobot.

- Balloon-based platforms, or aerobots, are a budding exploration technology for Venus to collect scientific data in-situ while keeping a safe distance from the inhospitable surface.
- We compare different inflation sequences in simulation for Venus, starting from balloon extraction to the nominal mission flight altitude.
- Flagging loads in the envelope can be substantially reduced by disposing of the inflation tanks shortly prior to the parachute. A subsequent further descent with ballast ensures no recontact with the parachute.
- We also demonstrate a set of rapid inflation experiments, conducted on a subscale prototype, from the vertical configuration required for hanging under the parachute.

Figure 1: Simulated Venus descent of the aerobot during inflation sequence

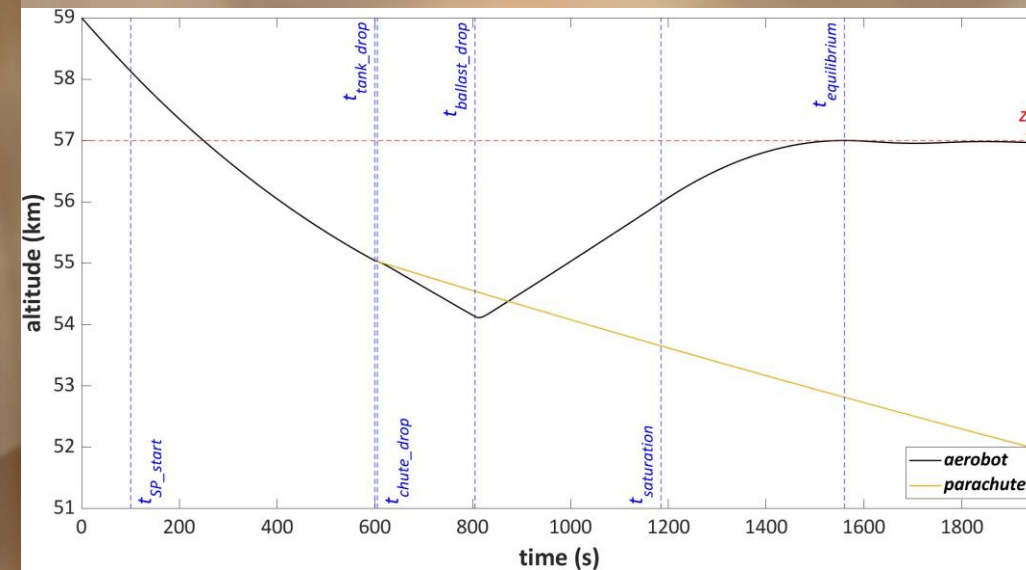


Figure 2: Rapid inflation (left) of subscale prototype (right) to meet descent timeline.

