



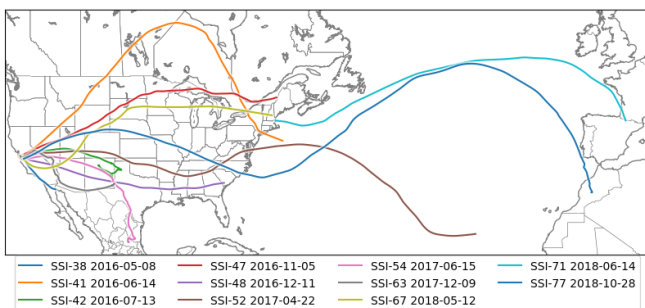
STANFORD STUDENT SPACE INITIATIVE

# ValBal

Altitude controlled latex high altitude balloon system

ValBal<sup>1</sup> is a high altitude latex balloon platform that controls its altitude by venting lifting gas and dropping ballast mass. This extends the life of a low-cost latex balloon from a few hours to a record-breaking 5 days. It's designed to facilitate a broad range of high altitude research thanks to its unique ability to maintain and dynamically transition between altitudes.

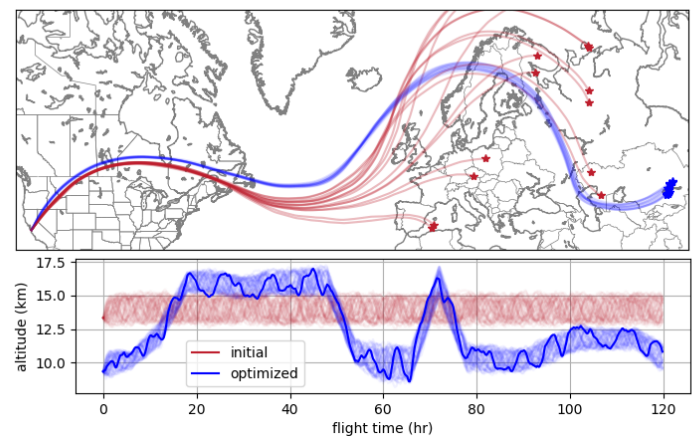
<b>Altitude range</b>	Standard: 12.25–17 km Extended: 0–23 km
<b>Endurance<sup>2</sup></b>	No payload: 5 days 1 kg payload: 3 days 5 kg payload: 1 day
<b>Communications</b>	Iridium, 8¢/50 byte. Custom 433 MHz radio, 5 kbps line-of-sight.
<b>Cost<sup>3</sup></b>	Consumables: \$400 Reusables: \$1000



**Flight heritage:** The system has been developed through more than 20 test flights, 10 of which are shown above.



**Ease of assembly:** ValBal requires only six custom components and can be assembled in under 2 hours. No manual machining, cutting, gluing, or soldering is required.<sup>4</sup>



**Control capabilities:** Plot of possible 5-day flightpaths for a given launch time through monte carlo simulation with NOAA data. Red: altitude-bounded flight plans with no objective. Blue: flight plans optimized for distance.

<sup>1</sup>The name is a contraction of “Valve” and “Ballast”

<sup>2</sup>This reflects our current best mission, but we believe that longer missions are feasible with the system.

<sup>3</sup>System can be reflown many times if recovered.

<sup>4</sup>Above image shows a slightly older version than the current design.