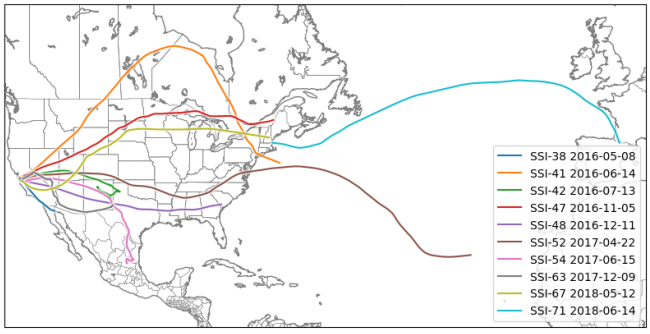
STANFORD STUDENT SPACE INITIATIVE

ValBal

Altitude controlled latex high altitude balloon system

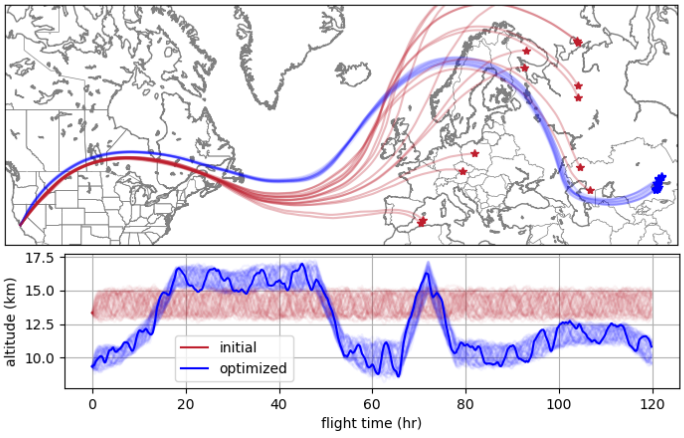
ValBal[1] is a high altitude latex balloon platform that controls its altitude by venting lifting gas and dropping ballast mass. This extends the life of a low-cost latex balloon from a few hours to a record-breaking 5 days. It's designed to facilitate a broad range of high altitude research thanks to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

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



Flight heritage: The system has been developed though 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.[4]



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.

[1] The name is a contraction of "Valve" and "Ballast"

[2] This reflects our current best mission, but we believe that longer missions are feasible with the system.

[3] System can be reflown many times if recovered.

[4] Above image shows a slightly older version than the current design.