

ANSHAB: Autonomous Navigation System for High Altitude Balloons

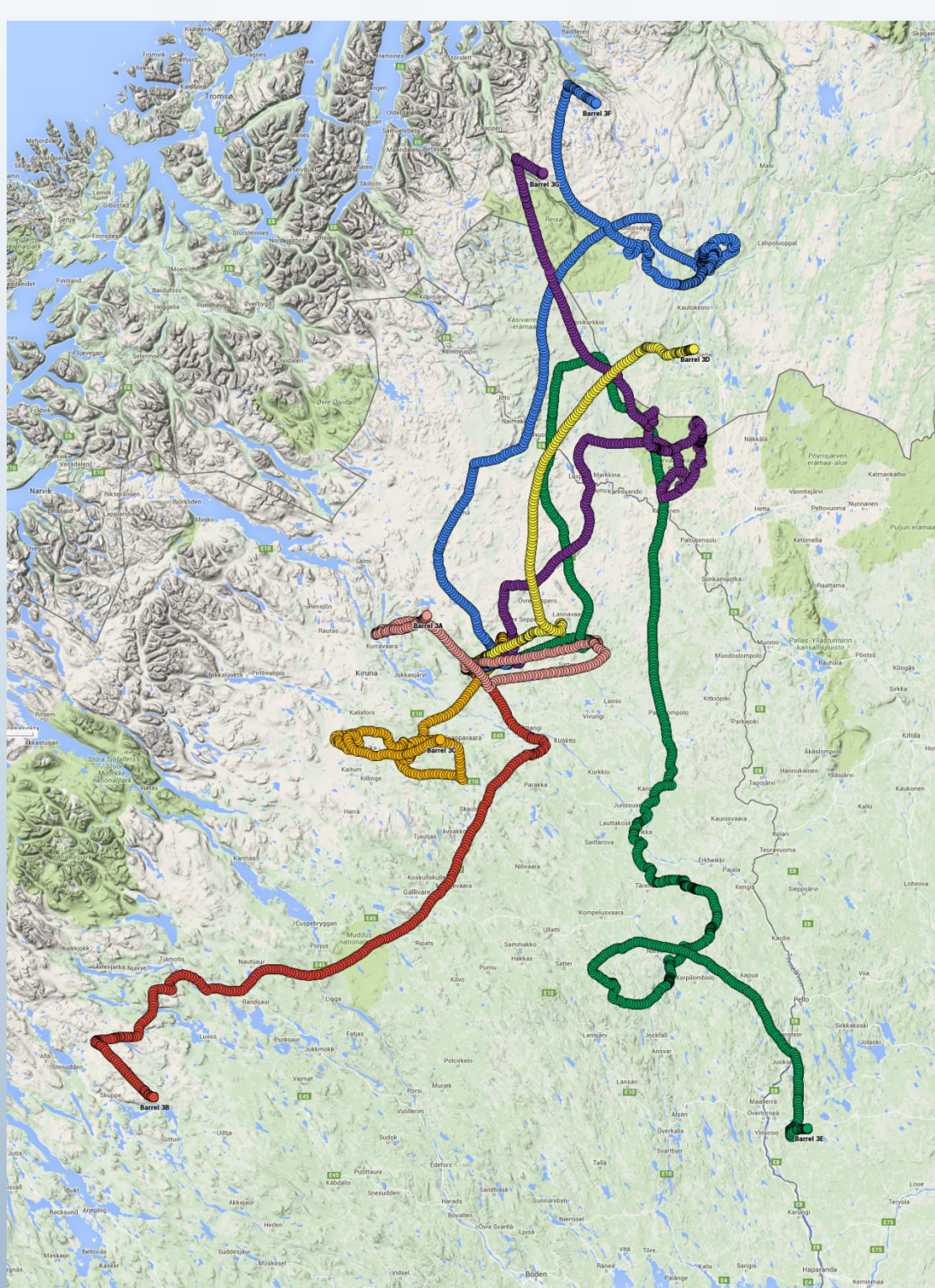


Kanika Garg, Onboard Space Systems
Kanika.garg@ltu.se
Supervisor: M. Reza Emami

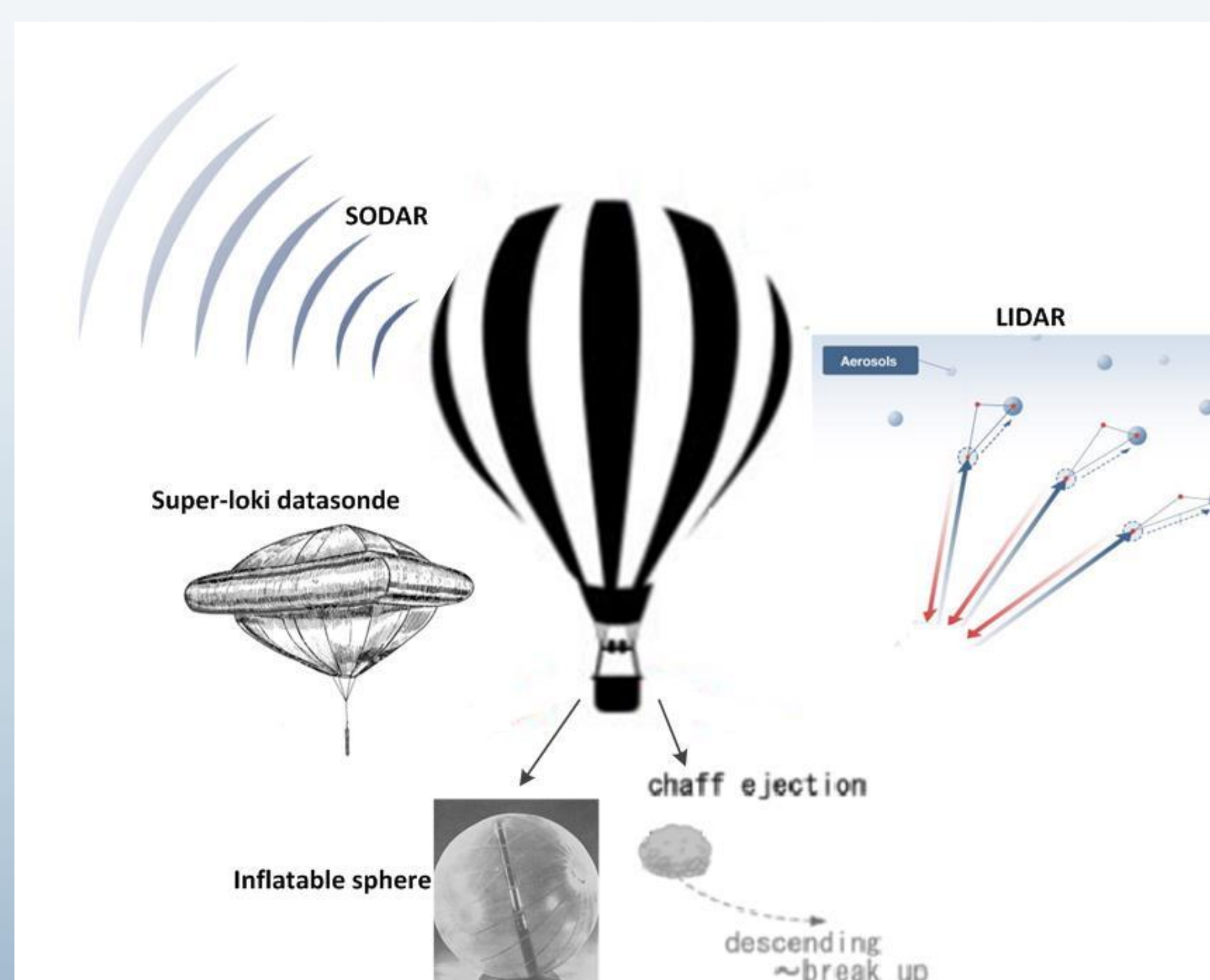
High-altitude scientific balloons provide a platform for environmental research as well as for testing future space instruments. However, operating such balloons is a challenging task. This project aims to provide a solution to the challenges faced by the balloon flight community by studying and providing a methodology and technology to make balloon navigation more accurate.

Balloons float in the direction of the winds and need manual steering for operations like ballasting and venting of the gas. This makes the balloon flight complex in terms of maneuvers and also introduces the risk of losing an experiment as winds cannot be determined to a great extent in the stratospheric region. Therefore, having a system that can facilitate preflight and real time flight path planning could be useful as it will reduce the cost and risk associated with the balloon flight.

An autonomous navigation system and a semi-autonomous piloting system will be designed for use on-board the balloon, that will be capable of trajectory estimation by taking into consideration the environment and system constraints in real time. This will facilitate a decision making system on-board for various steering parameters (ballasting and valving), thus reducing the complexity of balloon flight operations.



Barrel balloon trajectories



Sensor concepts for measurement of winds onboard the balloon

In collaboration with:

