***“A miniaturized Multi Sensor Array for balloon-borne air measurements.”***

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Abstract:

A compact Multi Sensor Array (mini-MSA) is in development by Weber State University’s High-Altitude Ballooning team, HARBOR. The device is intended to be a lightweight, robust, and simple to use system that can be flown on all HARBOR flights to provide a consistent long-term dataset to study changes in Earth’s atmosphere. The long-term objective of the project is to create a mini-MSA kit that can be purchased and assembled by other balloon teams to crowdsource a larger collaborative dataset.

The device measures gas concentrations, particulate matter, atmospheric turbulence, and meteorological parameters such as temperature, pressure, and humidity. We have performed multiple tests, both under high altitude balloons and in the lab, to arrive at the sensor array that the mini-MSA will use. The mini-MSA transmits live telemetry, including both location and sensor data. These RF communications require the system to be electrically insulated by a Faraday cage. The telemetry radios have been tested to function at over 50 km, which will aid in the recovery of our high-altitude payloads. Numerous problems have to be solved including the RF-crosstalk, but also problems with air flow at high altitudes and with oxygen starvation at low pressures.