GO4ST8 Physics and NASA’s MN Space Grant Consortium (MnSGC) is providing a great opportunity this summer through a high-altitude ballooning 4-day teacher workshop. Participants will design, build, help fly to “near space” (AKA the stratosphere) payloads containing cameras, stand-alone sensors, and microcontroller-logged sensors, then analyze the data collected. Participants will also learn skills for launching weather balloons, tracking flights with gps, and recovering payloads after they return to the ground by parachute.

Prof. James Flaten of the MnSGC and the University of Minnesota – Twin Cities Aerospace Engineering and Mechanics Department will lead this workshop, which is being offered to participants at no cost (though you don’t get to keep the hardware after the flight). The balloon will be flown outside of the Twin Cities – probably over southern Minnesota – and participants will need to cover their own transportation costs (and food and drinks).

This is an opportunity for physics teachers to gain some spacecraft hardware and operations experience and have fun; after this experience you may want to involve your own students in stratospheric ballooning (that will be up to you).

The 4-day workshop will take place the week of August 16 – 20, 2021 in/around the Twin Cities. The tentative schedule is as follows:

**Day 1, Monday, August 16** *(delivered via Zoom)*: Overview of stratospheric ballooning – both weather ballooning techniques and payload building – and how teachers have used it to engage students. Preliminary design of payload: what cameras/sensors will be carried, what information will be collected and logged, how the payload “box” will be constructed and physically organized.

**Day 2, Tuesday, August 17** *(delivered in person – site TBA)*: Construct payload boxes; install the cameras/sensors; ground testing, practice data analysis. Also demonstrations of skills and hardware used in weather ballooning.

**Day 3 either Wednesday, August 18 or Thursday, August 19** *(the date will be announced no later than Tuesday, August 17)*: Balloon launch and “chase” (launch location is weather-dependent). This is an all-day, out-of-town activity, probably in southern MN. Note: Participants don’t have to participate in the balloon launch, tracking (AKA “chase”), and recovery, but this may well be the most-fun part of the workshop.

**Day 4, Friday, August 20** *(delivered via Zoom, unless attendees decide they would rather meet in person)*: Data analysis. Mini-presentations. Discussion of next steps for those interested in pursuing stratospheric ballooning.

Days 1 and 2 will be about 6 hours each (9 a.m. till about 3 p.m., with a 30-minute lunch break). Day 3 will be longer – probably at least 8 hours, starting about 8 a.m. – return timing depends on ease of recovery: tree or water landings usually slow recovery operations. Day 4 might be shorter (9 a.m. till about 1 p.m., possibly with a working lunch).

The workshop will be limited to 12 participants from GO4ST8 Physics: Jon Huber, Steve Ethen, plus up to 10 others, selected on a first-come, first-selected basis. Prof. Flaten will draw from his ballooning team for student assistants (and may also invite a few non-GO4ST8 observers). Participants will work together to build 4 payloads weighing no more than 1.5 lb each (on average) and will probably fly them all on the same balloon “stack.”

If interested, e-mail your name, school, and phone number. Participants will be contacted confirming registration in the workshop. As mentioned above, the workshop is free but participants need to provide their own transportation (and food and drinks).