***Update on MnSGC challenges: national high-power rocketry (on pause), statewide quadcopter challenge (proceeding with 12 schools). Other national challenges/activities (some modified to be more remote-friendly) currently signing up participants: First Nations Launch, Moon Pod Essay, ROADS on Asteroids, HASP (or BABBSS – local version), Plant the Moon, Lava Tube Robotics, RockOn workshop, eclipse ballooning with MT Space Grant (broad funding pending), GLEE (broad funding pending), etc.***

As requested during our meeting on Saturday, here are some additional notes about the student challenges mentioned in the excerpt from the agenda above.

1. Our annual **Space Grant (in-the-) Midwest High-Power Rocketry Competition** is on hold right now, but if things look significantly better for the spring (I doubt they will) we might announce a 1-semester challenge at the end of 2020 to be done during spring 2021. On the other hand, now might be a good time to support students who would like to get certified (Level 1 and/or Level 2), since that requires people to build a rocket on their own anyway. I am willing to provide advice if anyone has groups students (not random individuals, please), with or without high-power rocketry experience, who would like to try that (on your dime). I think about $250 per individual would cover a basic Level 1 rocket build, including a Level 1 motor. Once built, the rocket could be flown (to earn certification) at their convenience, perhaps in spring 2021 or later. Although it would be more interesting to build all-different rockets, here is the kit I recommend for first-time users: <https://www.madcowrocketry.com/2-6-fiberglass-arcas-hv/> *Overall cost: modest*
2. We have already started this year’s **MnSGC Quadcopter Challenge** so we aren’t currently open to more schools joining up. But, for the (cost) record, we provided about $150 for parts plus a $100 drone to participating schools and we encouraged them to give their teams access to another $100 (or more) to let them try out other/custom parts. Since we aren’t having teams get together for the fly-off this year, there are no travel costs. If you would like to learn more, even if you aren’t formally signed up, let me know and I can point you to a recording of our “kick-off” videocon. *Overall cost: inexpensive*
3. The WI Space Grant continues to push forward with their **First Nations High-Power Rocketry Competition** for teams from Tribal Colleges and teams from Native American student groups at other schools. During the meeting I showed a list of MN schools they (the WI Space Grant) believes are eligible in Minnesota. Participating teams get some funding (a few thousand dollars) from the competition organizers. Check with Kelly Nipp and/or Steve Highland about whether or not that is enough to actually participate, or what other costs you might incur (e.g. for travel). (Students typically aren’t paid to participate, I believe.) *Overall cost: modest (I suspect, even after the financial support provided)*
4. The **Moon Pod Essay Contest** <https://www.futureengineers.org/artemismoonpodessay> is for K-12 students. You can get involved by spreading the word and/or offering (you or your students) to help review essays. *Overall cost: free*
5. The **ROADS on Asteroids** robotics challenge <https://nwessp.org/asteroids/about/> is for pre-college students, with slightly different rules for high school, middle school, and elementary school students. It doesn’t have a “(state by state) hub” structure this year, so we can help spread the word but otherwise probably don’t have much of a role to play. Here is a kick-off video: <https://www.facebook.com/nwessp/videos/984485858686165/> Most schools will do this during this school year, but some groups might organize summer programs around this theme next summer. Some financial support is available to teams with high numbers of underrepresented minority participants. *Overall cost: modest (I suspect, even after the support provided)*
6. **HASP (High Altitude Student Platform)** is an opportunity to develop a research-grade payload to fly on a NASA-size (huge!) balloon out of Fort Sumner, New Mexico. I will pass along a Call for Payloads (expected any day now). There will be a telecon about this year’s opportunity on Nov. 13, 2020, and proposals will be due Jan. 8, 2021 – you need to “earn a spot” on this flight for either a “small” (< 3 kg) payload or a “large” (< 20 kg) payload. The U of MN – Twin Cities has flown “small” payloads several times. The main costs are the hardware for your experiment (varies) and the cost to send a team to Texas in July for “integration” (ground testing of the hardware with other HASP systems). The flight itself, which is typically NOT attended by teams unless their experiment requires their in-person presence, is around Labor Day. *Overall cost: expensive*
7. **BABBSS (Build A Balloon-Borne Stratospheric Spacecraft)** is basically like HASP, but less formal and less expensive. This involves working with James F. at the U of MN to build a small payload (~1 kg limit) to fly on one of his local weather balloon flights, possibly in ~May (usually over southern MN – attendance encouraged, but not required). James can provide feedback about what you might try: it could be “do a genuine science/engineering experiment” or just “experience (and document) the near-space environment”. The cost will depend on whether or not you purchase your own hardware or borrow from him (in which case you need to return the parts). Skills that students will acquire with almost any such payload build include microcontroller programming, sensor suite data analysis, wiring (and usually soldering), photography, and (sometimes) radio telemetry. BABBSS is encouraged for schools considering starting a stratospheric ballooning program and/or as a stepping stone toward applying for a seat on HASP. *Overall cost: inexpensive to modest (depending on hardware needed and borrowing)*
8. **Plant the Moon** <https://www.competitionsciences.org/competitions/plant-the-moon-challenge/> is a new competition for grade 6 through undergraduate students. It involves trying to grow plants in 10 samples of simulated lunar regolith (“Moon soil”) in the spring of 2021 (so sign up, or pass the word along) right away. *Overall cost: inexpensive*
9. **Lava Tube Robotics** is a new competition being rolled out by the Washington State Space Grant – think of it as a college-level version of their ROADS on Asteroids challenge. This is a newly-funded Artemis Student Challenge and, unlike other states who received awards to start up new competitions, this one seems to be willing to consider applications from schools far from their home state and they even plan to provide $2K - $3K support to about 30 qualifying teams. Once the robot is completed and tested by the students at their “Earth Base” it will be sent away to a remote “Lunar Base” for the final testing. *Overall cost: modest (I suspect, even after the support provided)*
10. The annual **RockOn Workshop** at NASA’s Wallops Flight Facility in Virginia is a week-long summer workshop in which participants build a kit to fly (during the same week) on a suborbital rocket flight. The main costs are registration (perhaps about $1000 per person) and travel for a week (at least that same amount). This exceptional experience will give participants a taste of genuine, albeit temporarily, spaceflight. We recommend this for schools considering getting involved in building their own payloads to fly on suborbital (RockSat) launches (in later summers) or, perhaps, schools considering getting involved in building CubeSats for outer space deployment. *Overall cost: expensive (and leads to even more-expensive follow-on activities which will require well-beyond-Space-Grant funding)*
11. **Eclipse Ballooning and/or other Eclipse Experiments** for the Oct. 14, 2023, and Apr. 8, 2024 eclipses. The Montana Space Grant is seeking funding for up to 70 teams to participate in stratospheric ballooning during these eclipses (and I suspect they will get the funding eventually) after which they will be recruiting students teams, especially teams that can promise significant numbers of underrepresented student participants, to learn to use their equipment and fly it (plus the team’s own experiments) during the two eclipses mentioned above. Support from the MT Space Grant program will cover flight hardware, balloons, and helium, but not travel nor funds to pay student participants. Thus schools that participate will need to come up with quite a bit of their own funding, making this both a long-term and expensive endeavor, but one that needs to be planned for starting soon. We have reserved some funding in our Year 2 – 4 Augmentation for schools interested in doing eclipse activities – not limited to ballooning. But even that funding is only likely to cover pre-eclipse expenses (hardware, a few student stipends, testing costs) – probably not actual eclipse travel costs. Participating in ballooning, whether with the MT effort or not, will not be a pre-requisite for requesting the reserved MnSGC funds. But having an explicit plan to work with other schools who are also interested in doing eclipse activities, whether they are MnSGC affiliates or not, probably will be a pre-requisite for requesting the reserved MnSGC funds. *Overall cost: expensive (though some extra MnSGC funding and some outside funding may be available)*