GT Meeting Minutes (31. October – GT - and 3. November – GTRI - combined)

Overall main feedback:

- Good mission design and reaching out to science.
- They also liked the HSI in general (HW+layout for data processing)
- Including the other robotic agents at some point was especially interesting (the agenda on coordinated observations for ocean color + potential altimetry and micro-SAR applications)

GTRI was *very* interested in the AUVs and AMOS activities on this. I promised to follow up on this. Mick E. West, prominent in underwater robotics (developed YellowFin and IceFin - http://www.gtrirobolab.gtri.gatech.edu/index.php/projects/yellowfin/ and https://www.nbcnews.com/science/science-news/icefin-robotic-submersible-probes-antarctic-depths-n335481), wants to connect. They are aware about the projects done at AMOS, and are already connected to Kongsberg and FFI (Hugin/Munin).

Detailed points on HSI mission:

- Calibration will be major work, sensitivity of the lenses also need to be thought about.
- They said the goal is good, raw spatial resolution good but they were concerned about the slewing maneuver and precision:
  - According to them the imaging precision will be bad, and even worse if we don't understand why and listening to COTS providers that say they may achieve 0.01 degrees precision - it is very unlikely. We should even expect 5 degrees pointing error, which turns out to give several 100s m error on ground. Thus we might have to consider a 6U or a Nadir-looking satellite with stable un-actuated pass. They said essentially I should have done analysis on this before reaching conclusions (plus buying all the ADCS products may be even an overkill if you just achieve 0.5 degrees better precision). Propulsion might aid stability better than stacking all ADCS modules.
  - We should consider mapping larger/longer areas to test on first - then go on to smaller targets. Easier for post-processing and "seeing something" useful to start with, i.e. instead of 30x30 km do for example 500x30 km target.
- SNR:
  - Too rough calculations on SNR, but indicators were good. Need to understand how the atmosphere distorts the signal better - or we don't know what and how to extract the signal we have. However they were enthusiastic about Rick Stumpf's methods on derivatives - but understanding it is key.
  - Also here, what is the actual SNR... Also if we have OK SNR on blue-green bands, it will be bad for 700 nm and above (i.e. less photons) making it "useless" without longer exposures. This is already indicative on plots.
  - **A lot of expertise on optics and SNR at GT, may ask them for feedback and help. They are interested (same questions arised when they worked on their own optics for RECONSO Cubesat to be launched in 2018).**

Follow ups:

1. Coordinate between AMOS and GTRI when it comes to AUV activities. Connect AUV folks with Mick E. West (GTRI)
2. Look into GT's program called Center for Space Technology and Research (CSTAR), they manufacture a lot of space components. May give some valuable feedback on our systems design when we get there.

3. Write up a list of candidates of PIs at NTNU to Prof. Marcus Holzinger who might be interested in maritime and space situational awareness through electro-optical sensing at high latitudes. These being projects funded by AFOSR, and will involve master and PhD students working on long-term projects. Collaborators: Chile, Norway, USA

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- Mick E. West, Senior Research Engineer at Electronic Systems Laboratory (ELSYS), GTRI, email: mick.west@gtri.gatech.edu. AUVs.

- Marcus Holzinger, Assistant Professor at School of Aerospace Engineering, GT, email: holzinger@ae.gatech.edu. SSA and space. Worked on Reconso.