Meeting notes:

Present: Carolina Sa/Ocean Color lab, Univ. of Lisbon (former student of Vanda Brotas), Davide Alimonte/Univ. of Algarve, Tamito Kajiyama/Alimonte collaborator and computer scientist/Japan, Joao Tasso/UPorto, Mariusz Grøtte, Kanna Rajan

- Validation of the sensor (HSI) is key to remove uncertainty (e.g. in-situ).
- If you're flying this purely for observing structural properties of the ocean (i.e. "patterns") its not a big deal.
    - For doing good science, ground-truthing and validation is critical — need to quantify uncertainty (e.g. with validated error bars in image products)
    - So in handing data to a scientist, they can be certain that HSI data is to be trusted (or not).
    - Therefore, a validation plan needs to be carefully thought thru
    - HSI specs are good for science, but our vision of GSD<30-100 should be carefully validated.

- Regarding problems with camera viewing angles when looking off-nadir, the complexity of dealing with image correction is high (anisotrophy). Better to focus on-nadir.
    - This should be investigated related to our proposed slewing maneuver. Apart from only specular reflection, the bi-directional distribution function (BRDF), when assuming ocean surface is Lambertian, is highly varying when viewing with off-nadir angles.
    - Reflectance/signal get's degraded when viewing at an angle. Due to BRDF characteristics, instead of albedo=0.3, you may get 0.1 or worse and not be able to see at same depths as on-nadir, which is not good since algae and phytoplankton are nominally in 10-20 m range beneath ocean surface.
- Light sources like moon, sun are important as stable sources for in-orbit calibration — therefore need defusers to be able to see these bright spots (sunglint). Attitude control is flexible, but then again viewing angles in terms of getting a proper signal may be difficult due to the anisotrophy.
- Another option is to use existing calibration sources on ground (both NASA and ESA have specific target buoys one has to fly over to calibrate)
- 400-800nm spectral range is good
    - however, turbid waters might need higher (NIR) bands if you want to not be obscured by DOM (dissolved organic matter)
    - Ideally 800-1000nm
    - Longer wavelengths can be used to correct for sunglint (for inferring what is underneath the reflections)
    - sensitivity analysis of HSI will need to be done with prior imagery
- Impact of HSI data will depend on resolution
    - coastal targets will be better since ESA/Sentinel competition would be less — not so for open waters where they (Sentinel/NASA) dominate

    - Otherwise, in open ocean observations the SmallSat data may just add to the bigger set of data and add to the temporal resolution - but less unique.
- Advice: focus on 1-2 areas of interest for first flight
    - ensure there is no or almost-no cloud cover
    - offer of Portugal which has less cloud cover most times — Tagus estuary (off of Lisbon) is well studied and can be used
    - Possibly include Portugal in addition to observing off the coast of Trondheim, during subsequent SmallSat passes or same passes.

- Further information about Dr. David Alimonte (Environmental modeling & information engineering; expertise in optics and ocean remote sensing) and Dr. Tamito Kajiyama (high-performance computing & image processing), their work:
    - http://aequora.org/team.html
    - http://www.researcherid.com/ProfileView.action?returnCode=ROUTER.Unauthorized&Init=Yes&SrcApp=CR&queryString=KG0UuZjN5WmckfVaLDuIrv1StZXdFDnU9ih6C1c0rIs%253D
    - Further talks with them is advised regarding the HSI processing architecture.
    - Invited Davide to the NTNU SmallSat workshop taking place on Thursday 23rd-Friday 24th Nov in Trondheim for further connections and talks.