

GeoSummit Meeting Notes – March 18th, 2010

Introductory Remarks

P. Haggerty: Summit significant piece of NSF's portfolio & competing with other facilities for funding. NSF is currently eager to leverage & maximize future investments & investigating traverse to reduce airlift costs. A wide range of options have been considered to date for how to move forward with Summit. SCO provided an excellent whitepaper on the science requirements. Based on the results of the whitepaper NSF tasked CPS to develop what is currently called "Model 5": core complement of 6 people for year round measurements. Seasonal support beyond core science will be provided by separate facilities (which is not part of model 5).

R. Crain: NSF addressing permitting issues in Greenland. No solution but working on it daily.

J. Dibb: This isn't part of the agenda but wanted to provide a SCO update: grants are ending this year. They are deciding how SCO should continue. Roger Bales will likely bow out. Moving forward they are looking to broaden the disciplines. Jack, Bob Hawley, & Zoe Courville are considering a proposal. They are also trying to figure out how to bring John Burkhart in. Also wonders whether the role of the SCO should change.

Summit Science Highlights

J. Dibb: presented slides describing recent, current, and upcoming science at Summit.

Discussion

J. Butler (asked by Renee to discuss NOAA's intent for Summit): NOAA is very serious about making Summit a baseline observatory by next year. They've added Summit to their web site & data are all available for people to use. They hope they can continue to support it in a way that the science grows to meet demands of emerging science. Need additional instruments in there for CO₂ & methane measurements. Also, NOAA baseline observatories often attract other scientists so being able to accommodate some growth seems prudent. On the flip side, biggest concern operationally is preservation of the clean air sector. Their experience at South Pole has been that new projects want to all work in the clean air sector. He is looking forward to Summit as a baseline site. It was refreshing during the Wednesday science sessions to see the presentations pointing out Summit's uniqueness as a site and he agrees. Summit provides excellent background measurements. Barrow has been NOAA's lodestone for the arctic but with shifting weather patterns that data may become more problematic. NOAA does want an observatory on both coasts, and Summit picks up N. America data and transport issues.

R.Crain: NOAA's presence has created an anchor that allows NSF to continue to invest there.

D.Helmig: Why didn't Jack's presentation mention much European contribution?

J.Dibb: While no Europeans sent him any slides, there are a number of contributors:

- Aku Riihela – Albedo work
- German seismometer (Hanka)
- Intl seismic effort led by Geus (Dahl-Jensen)
- Dutch isotopic measurements (Meijer)
- POP sampling (Burkhart)
- M.Albert mentioned her mercury collab with Grenoble.
- J.McConnell mentioned that the Danes are interested in NEEM comparison studies

Synthesized Science Requirements & Impacts

S. Starkweather & K.Gorham presented slides regarding a survey of science priorities, science requirements, and how CPS assesses project impact.

Survey of Science Priorities - Discussion

K.Gorham: Survey was pretty last minute and informal. There may be another more detailed survey if this is useful and if more data is required to explain some of the results. Example: Survey asked about priorities for the research community & got some contradictory results: top 2 are ease of cargo and personnel transport while third is minimizing pollution sources.

Science Requirements - Discussion

K.Gorham (discussing 2010 population projection graphic): Summit population will likely be at an all-time high in 2010. Several peaks will exceed the Summit 40 bed "redline". Spikes: a June turnover, an early July Sci/Ed visit, and a late July IGERT visit.

P.Haggerty: Can't we shift those schedules?

S.Starkweather: We don't need to for this kind of spike. The stepwise nature of the population graph Katrine showed is a result of the flight schedule. There's turnover between scientists & people want to come and turn around quickly. We'd rather have that than people sitting around w/nothing to do so we are willing to absorb short spikes.

J.Dibb: In this case several big spikes are outreach projects and they only want to come when science is there.

P.Haggerty (in response to graphic showing power load of campaign vs. year-round science): What is the mean summer load at Summit?

S.Starkweather: really variable, between 45- 75kW

D.Helmig: How much does the turbine contribute?

S.Starkweather: 6kW turbine can effectively provide up to 5kW.

J.Burnside: It can provide up to 20% of the station load. No storage currently. Need to significantly update overall power system to provide greater RE penetration & storage.

Impact Criteria - Discussion

S.Starkweather: CPS is now developing impact assessments for proposed work & providing them to NSF & proposing researchers. Impacts are gathered from requirements gathering document and based on major requirements Katrine discussed; user days, airlift, power, space, winter tech support. We are over capacity in winter tech support (should be ok because a tech-heavy project is ending) and nearing capacity on airlift.

M. Bergin: It's good news that Summit is operating close to capacity because that means you are fully utilizing the resource!

S.Starkweather: Katrine is updating CPS requirements form & will re-approach funded scientists to update individual project requirements using that new form.

Near & Long-Range Planning

S.Starkweather presented slides explaining the near & long range planning process and current status, including the different models.

Discussion

S.Starkweather : Evaluating all infrastructure projects in terms of Summit vision & goals & weighting them appropriately via a matrix. A weighting factor that the community may not be familiar with is GOLM, the Greenland Operations Logistics Model. This is an NSF-funded modeling effort to assess the efficiency of the Summit logistics chain.

Sandy asked J. Burnside to discuss one of the 2010 projects evaluated & prioritized under the matrix; the traverse.

J.Burnside: Traverse will deliver fuel & vehicles to Summit this year and also testing a number of different mobility approaches. They are good at hauling fuel now but need to get good at hauling cargo. The initial goal is to have one efficient traverse each year. Right now we can save 4 flights with one traverse. It isn't economically viable yet. Goal is to save 8 flights per year.

J.Stutz: Why not put the traverse funding into developing renewable energy to reduce fuel consumption.

R.Crain: In the long run the traverse is more focused on cargo. While they get better at that it's delivering fuel because it can.

J.Dibb: Herc transport will put a lot of constraints on the design of a new station. Traverse could really open that up.

S.Starkweather (talking about the Summit Station models): Everything is compared against model 1; business as usual. Model 2 has been rejected because the science requirements white paper really shows that this is not viable. Model 3 is a very expensive option that probably isn't the direction for Summit because the growth would impact the quality of the clean air science. Model 4 maintains a heavy reliance on hercs. Model 5 is current front-runner for the station proper. This is a no growth option. This model is low impact in terms of airlift. Model 6 has not been evaluated but it disconnects summer science from year-round facilities.

M.Hastings, J. Stutz, J. Butler all expressed their concern about the no growth assumption of Model 5.

J.Dibb: Things can be / will be/ should be more efficient. More science could be done in the same space if it's better designed. Researchers wanting to work at Summit should consider this efficiency when planning to work there.

J.Butler: Modest growth should be a part of any model. Research is pointing to longer-term measurements. Big growth is bad – but modest growth makes sense for emerging science.

S.Starkweather: We're designing a 20-yr building but we only know about a 5-yr science program. There was some discussion to build a lot of flex space into the facility since the composition of things will change as new/different 5-year programs get funded.

P.Haggerty: We don't have the funding to support the big vision. We have the requirement for the basic observatory. If the station is designed properly to be scalable then facilities could be added in the future. We may not be able to build much flexibility into current budget constraints. In the future, if projects want growth they may need to pay for that growth.

J.Dibb: Model 5 is a huge step forward in his estimation because 1) we're getting things off the snow, 2) it includes a scalable, high RE-penetration power system, 3) there's an AWO & its design will allow for a few new instruments to come in.

S.Starkweather (discussing next steps): Full conceptual design due in May. The graphic on the slide includes joint living/berthing space for 6. Power facility includes scalability, moderate fuel storage, water storage, potential for lots of RE penetration. Third module incl back-up generator, balloon launch, storage space. There will be a heat-capable SAR vehicle on the ground. AWO is separate, just over 1000 sq ft. of flexible reconfigurable space.

Lunch Break.

Community Feedback

J.Dibb moderated a discussion to gather community feedback to the morning's presentations.

Survey Results

J.Dibb: Wants to discuss the survey results where we saw a disconnect between ease of cargo & pax transport versus minimized pollution. This portion of the survey asked where there is room for improvement.

A number of researchers thought the question was too open to interpretation. M. Hastings & S. Oltmans said they interpreted the question to ask what should continue to be a future priority. There seemed to be a consensus that people did NOT read this question as asking whether there was room for improvement.

S.Oltmans pointed out that to a certain extent the 2 items are not mutually exclusive. We certainly don't want local contamination but I want something that's representative of a large scale atmospheric regime. The aircraft plumes aren't as much of an issue. Definitely want to minimize. Using the Guard is easy compared to working in other foreign countries.

J.Dibb: How critical is ease of access?

M.Albert: I don't want to be there for a month when I only have 5 days of work.

B.Vasel: The flight periods are so short and widely spaced that sometimes when I am on site I get 2 hours of sleep so I don't have to be there for a month.

M.Albert: asked about use of Twin Otters for personnel.

S.Starkweather: TO costs \$25k (same as a herc RT Kanger <> Summit). It's important to note that our relationship with ANG is changing. On the positive side, we used to plan our science around ANG flight periods, now they are asking us what our needs are. On the more negative side they aren't providing us as many free flights as they used to.

P.Haggerty: There may be a potential for a long-term arrangement with AirGL for access. GOLM will explore these different alternatives.

M.Hastings: Herc is only 20% of the pollution. Sam has a good point about needing to provide a fair amount of access. What about the other 80%? Where does that come from?

J.Dibb: The generator. However, 22 flights contributing 20% of the pollution is big. Also it's not a fixed pollution source & herc flights are expensive.

G.Bernhard: How clean are the generators?

J.Dibb: Tier 3. Most of the fuel burning items have after-treatment.

J.Stutz: What is the cheapest way to reduce the pollution? Need cost benefit analysis. Maybe getting away from hercs is cheaper because they are so dirty and can't be made cleaner.

S.Starkweather: GOLF will get at this information.

P.Haggerty: Another survey should address minimizing short-lead cargo.

S.Oltmans: The survey showed that people don't need 4 weeks turnaround. An efficient traverse would work.

J.Dibb: Using the traverse means 1 year lead time because a vessel must bring the cargo to Thule the summer prior.

G.Bernhard: Efficiency also means being able to replace critical equipment failures.

J.Burkhart: Recommends mapping survey results to the decision matrix.

S.Starkweather: Distinguishing between campaign & year round in the survey is important.

J.Dibb: The global optimum isn't going to be ideal for everyone. Someone will have to give. That's why we need to understand what the community's priorities are.

Model 5 & 6 Discussion

M.Albert: Small clean station and invest in a science traverse like the Norwegians. Take it all over Greenland. Portable science lab.

J.Dibb: That's model 5 & 6. If the science doesn't have to be at Summit then it could happen elsewhere. But some work has to happen at Summit. They could use portable labs for this.

S.Oltmans: Needs to be a strong link between campaign based science & long term measurements, therefore a facility to do long-term science should be capable of doing campaign science. Can't do campaign science 100km away from Summit.

J.Thomas agreed - from a modeler's perspective, measurements need to be geographically close.

J.Dibb - Deep cores 28km apart agree. Snow studies within 100km agree. Why not figure out how much we can separate them?

J.Thomas - If they weren't near TAWO they couldn't benefit from those ongoing measurements and would need redundant instruments/measurements at a remote site.

J.Burkhart – Can we just go wherever we want? Can we assume that the GIS is our playground?

R.Crain – GoG is supportive of science in Greenland. They want to be sure that we are safe & they know what we are doing.

S.Starkweather (discussing the difference between Model 4 and the model 5/6 combo): In model 4 we were scaling the kitchen/dining facility/generators to summer needs. Very expensive. Airlift also doesn't scale well. For a year-round facility you can do minimal skiway maintenance & lose the requirement for much of that.

J.Stutz – It's a temporal issue, isn't it? More than half the facilities at Summit are for 3 months only.

G.Bernhard: He doesn't think having a facility that is scaled toward summer is less efficient than 2 separate facilities.

R.Banta: How much of the desire to work at Summit is scientific collaboration and how much is logistically convenient?

J.Burkhart & S.Starkweather agreed that the next survey must ask people to rank their motivations for working at Summit.

J.Stutz: Wouldn't the need for staff be doubled with 2 separate facilities?

J.Dibb: Yes, but truly modular facilities maximize flexibility.

S.Oltmans: A lot of the things to increase the flexibility are experimental. Summit works.

P.Haggerty: We need to get away from big structures, big requirements.

J.Dibb: We will need to ask people to scale back on their power and footprint.

Power & Space Requirements

J.Stutz: First gen instruments are never optimized but they do interesting science. Optimizing instruments is also expensive.

J.Dibb: Talk to your science program officer to get the funding – don't ask for a facility that is outsized

J.Dibb: surprised that campaign science power requirement is so high.

J.Burkhart: Not surprising, more people, more instruments,

S.Starkweather: less insulation in facilities

J.Stutz: If you want cutting edge science, you will get big power draws.

B.Vasel: You need to draw a line somewhere.

S.Starkweather: Starting early in the process we can work with you to reduce your power requirements. We were able to reduce Jochen's long path DOAS power needs substantially by doing some brainstorming.

Vision for Summit as laid out for the Long Range Plan

J.Dibb: Do you agree with the vision?

J.McConnell: Where is the statement that Summit is important because it's 2 miles high at the middle of the GIS?

J.Stutz: People want to be on the GIS.

B.Hawley: Bob has always felt that using Summit as a base is economical but it's also a good resource for the long term year round measurements.

G.Bernhard: NASA funds cal/val. They should be part of this community.

Decision Matrix for determining infrastructure priorities

J.Dibb: what about the Matrix?

J.Thomas: Makes good sense for long term but what about the short term? It doesn't make a lot of sense to her in the short term.

S.Starkweather: There is a secondary mechanism beyond the matrix. Things like a furnace & raising the big house don't rank high on the matrix but they are "code reds" that would shut down the station (the red pipe on the diagram in Sandy's slides).

B.Vasel: Also need to keep in mind that federal agency funding is really variable from year to year.

P.Haggerty: After Model 5 conceptual design is on the street, NSF is testing the waters to see if a company is interested in design/build/operate. It may save money in the long run. The idea being that there would be a big motivation for the person operating it to design it well – since they'd have to eat the costs of operating it. They are fleshing out the concept. CH2 could bid on that but there could be a different contractor.

J.Dibb: Would they have access to the rest of the arctic program infrastructure?

P.Haggerty: I'd like to see if that contractor could figure it out themselves. We might give them one free traverse ride per year.

J.McConnell: Is there a model out there like that?

B.Wiseman: Not currently. But the Edison Chouest R/V NBP was a design build operate.

J.Burkhart: Ny Alesund is an example. However, this site is different because there are commercial concerns there too; mining, for example.

J.Stutz: Tourism, too. Don't you give up a lot of control?

P.Haggerty: There would need to be deliverables as part of the agreement.

Summary of the Discussion

J.Dibb: The community doesn't seem to have issues with the process – good feedback on Models 5 and 6 – they really need to be fleshed out. I don't think the science direction has changed from a few years ago.

M.Albert: You've done a great job and deserve credit for sticking with it. My last interaction with this was "should Summit be there". Now we're talking about how it will look in the future. That's real progress.

J.Dibb: How do we keep the community in the loop?

Decision to have telecons every 6 months or so.

S.Starkweather: By May there will be a prelim GOLM and more info on Model analysis & designs.

G.Bernhard: When will you make a decision on which model to use?

P.Haggerty: Need a decision for FY11 funding. Moving on AWO now.

Flux Facility

J.Dibb: AWO & clean air zone have 3 components. Moving forward on a permanent AWO. Campaign science is a different issue and could be accommodated with a modular facility. What about a long-term flux facility? Two years ago we were trying to design a 20-year flux facility and could only afford a 2-year facility. Flux will be demobilized this year. Two PIs are proposing flux work in 2011. How do we handle it?

D.Noone: If there is a facility they would love to use it but that's not how they structured the proposal. They are currently proposing to collocate with ICECAPS. What's ideal and what's doable are two different things. Having a pristine surface and underground lab is really useful but very unusual.

D.Helmig: Below-surface facility is ideal for his project. A small low impact building (half the size of current flux) 20m away from the tower could allow one to do 90% of the measurements. Can't think of anyone who has ever done flux measurements in a building on a jackable platform like TAWO. Size of building could be half of current flux facility.

D.Helmig: Wants to continue 3D turbulence measurements through 2010. David Noone, Von Walden, Bill Neff / SODAR have also requested its continuation. Also wants to continue snow tower measurements in 2010. Would be a pity to abandon it; has a proposal in to continue. DRI & Noone have indicated an interest in using the same manifold.

As far as the snow tower, several researchers suggested moving the snow tower & letting it drift.

D.Helmig: Would prefer to add inlets to the existing tower. They have found interesting data from the low inlets.

J.Dibb: What kind of flux facility should be designed in the future? It seems like it would be easier to avoid a buried building? Should we keep the snow tower alive, and out of use, for a year?

D. Helmig: They really want the chemical measurements and the micromet turbulence measurements from the same location.

J.Dibb and J.Stutz: Think having the chemical and met measurements 200m apart is too far. You must co-locate.

J.Burkhart: Should collocated measurements be integral to the future of the station?

J.Dibb: Koni conducted met measurements out of a box at the base of a tower. The measurement of hydrocarbon, NO, ozone fluxes it's hugely complicated.

J.Dibb: Can the instrumentation for the Flux measurements be housed in AWO?

J.Burnside: Insulation doesn't jive.

B.Vassel: Could you do a one-year test using temporary buildings at two separate distances from the Flux tower?

J.McConnell: Can CRREL do turbulence modeling?

J.Burnside: There are companies that will model turbulence.

J.Burnside: Could the turbulence issue be investigated using TAWO?

J.Dibb: The Flux inlets would be naturally drifted in by spring. Do you want your inlets to be that low?

D.Helmig: We like the low inlets. Good data. Could we have a temporary building or the flux facility repurposed aboveground to continue the current flux experiment?

J.Dibb: Building on the surface of the snow will result in drifting that will bury the towers (both the current flux tower and the new TAWO tower) and the building will be inaccessible.

S.Starkweather: Could impact TAWO too. Would you need your gas?

D.Helmig: No. Computing and GC only.

Risk Assessments

S.Starkweather: We'll be providing you documentation before you get to the field this year for things like working on towers, taking out snowmachines, etc.

Summit Server

K.Gorham: Coming up with a system to better organize data & timeline for clearing out files. Goal is to have space available for new incoming projects. Ending projects will be asked to clear out their data when they leave based on a timeline.

Several PIs agreed that they thought the storage on the server was temporary and that it should be deleted after a project departs, but a reminder email would be helpful.

M.Hastings inquired about data sharing & how to access data from specific campaigns.

J.Burkhart: Look to CADIS for AON, NOAA, BSI web site. GeoSummit site does have links to data sources but doesn't have info on a PI-campaign basis.