PROJECT INFORMATION

Lead Principal Investigator	Richard Honrath
Institute	Michigan Technological University, Department of Civil and Environmental Engineering
Project Title / Grant #	Collaborative research: A synthesis of existing and new observations of air-snowpack exchanges to assess the Arctic tropospheric ozone budget (**0713992**) **and** Biomass-burning and anthropogenic impacts on arctic tropospheric chemistry (**NASAPolarcat**)
NSF Program and Manager	NSF\OD\OPP\ARC\ARCSS, Dr. Neil Swanberg **and** NASA, Dr. Tom Wagner
PFS Project Manager	Sandra Starkweather

LOGISTICS SUMMARY

Logistics 0713992

Note: This summary was developed prior to PI Helmig's request that the experiment remain at Summit Station through the summer of 2010. The below-described work planned at the MTU/Aspen FACE research site in winter 2009-2010 also would be delayed until 2011-2012. As the request for additional work at Summit Station is pending NSF review/approval, CPS has not yet altered the logistics summary to show these changes.

Researchers on this collaborative project, Honrath (MTU, 0713992, LEAD) and Helmig (CU,0713943), will conduct extensive campaign ozone and nitric oxide measurements from 2008-2011. They will work at three main sites: Summit, Greenland, representing glacial snowpack; Toolik Lake, Alaska, representing snowpack above permafrost soil and snowpack above frozen lakes; and the Michigan Tech Aspen-FACE research site, representing snowpack above biologically active soil (activities at the latter site will not be covered in this database). Scientists will gather their information during one extended season each at Summit Station, Greenland, and Toolik Lake Field Station, Alaska.

For the work at Summit, a research team of about 3 will set up their experiment during a 12-week long campaign at the station starting in June 2008. The tasking will include installing a new ozone instrument and a new nitric oxide instrument. The researchers intend to make the experiment operational coincident with POLARCAT (aircraft based pollution studies) flights over Summit, as the researchers will take simultaneous measurements for cross-validation.

When the installation is completed, 1-3 researchers will remain on site, the first in a series of occupations as the team rotates through Summit through station closing on August 22, 2008. During this period, the team member will maintain the instruments and conduct intensive measurements. These include eddy correlation flux measurements, vertical gradients of O3 and NOx, and snowpack measurements. As needed, the station's technical staff will assist the researcher. A subset of the instruments will be operated over the winter period by Summit staff members. The team will return to Summit with this experiment during the spring of 2009 for a second campaign. This study period at Summit will end in August 2009. Personnel/support for some Summit Station activities may be combined with the PI's NASA grant (see the record for NASAPolarcat in this database).

In August 2010, a team of 3 will travel to Toolik Field Station to install the same instruments. A team member will return at 3-week intervals until May 2011 to maintain the instruments and conduct the same suite of experiments as they will have done at Summit. The instruments will be removed in May 2011.

The team will travel to Michigan's Upper Peinsula for a winter season in 2009-2010.

This work is part of IPY activity #213, "Air-Ice Chemical Interactions," or AICI, and is collaborative with IPY activity #32, POLARCAT ("Polar Study using Aircraft, Remote Sensing, Surface Measurements and

Models, of Climate, Chemistry, Aerosols, and Transport ").
For the work in Greenland, CPS will provide ANG coordination (and air charters as needed to access Summit during non-seasonal periods), user days at Kangerlussuaq and Summit, and access to support infrastructure and services at the station, including science technical services. In addition, prior to the closing of the ANG logistics chain at the end of summer, 2007, CPS purchased and shipped gases to Summit needed for the 2008 effort. For the work in Alaska, CPS will provide Toolik user days, provision of a vehicle, and construction support to power the PIs' instrument sites. IAB will provide infrastructure support and services at Toolik. The researchers will pay all other costs from the grant.

Logistics NASAPolarcat:
For this NASA project, the investigators will make continuous year-round measurements of a suite of nitrogen oxides and nonmethane hydrocarbons (NMHC) at Summit Station, Greenland, and then will analyze them in conjunction with transport simulations and simultaneous observations of carbon monoxide, ozone, selected chlorofluorocarbons (CFCs) and black carbon particles.

A research team of ~3 will install project instruments during an ~ 3-week stay in early summer, 2008, in time to coordinate project measurements with overflights by the IPY POLARCAT project airplane. The experiment will be operated continuously from June of 2008 until August of 2010.

The research team will return to Summit for at least 3 weeks during 2009; on-station science technical staff will run the experiment in their absence. The team will return for at least 3-5 weeks during the summer of 2010 to finish the experiment and remove the instruments.

Some field activities for this project may be combined with the PI's NSF grant (see the record for 0713992).

This project is part of IPY activity #32, POLARCAT, and is funded through NASA ROSES 2006 NRA.

CPS support includes ANG coordination of cargo/personnel, provision of Kangerlussuaq user days, access to the Summit infrastructure and services (including ~4 hours weekly of science technical support), and procurement of compressed gasses. Some of the latter were purchased for shipment in late 2007.

NSF will recoup the cost of CPS support via an interagency funds transfer.

For the complete CPS online project record for this grant, including science objectives, go to:
http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0713992
http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=NASAPolarcat

For up-to-date information on the project's schedule, please view the online Greenland calendar (http://www.polar.ch2m.com/ > Greenland > Calendars/Schedules).

OUTSTANDING ACTIONS AND NOTES

Issue	Responsibility	Date Completed
Review support plan for accuracy and distribute to all field team members	PI	
Obtain all necessary permits for fieldwork	PI	Falls under collective Summit Permit
Visit all hyperlinks and review all documents referred to in the support plan	Entire field team	
Contact the GEOSummit Science Coordination Office (SCO) sco at summitcamp.org regarding your project's plans for the season	PI	
Complete medical clearance process 6-8 weeks before desired deployment date	Kramer Hueber	

(Helmig exempt due to flight period)	Toro Van Dam Ganzeveld Boylan	
Provide cost estimate for interagency transfer Provide end of season actual costs	CPS	
Note: Passports are required for Air National Guard and international travel. It is a good idea to bring two IDs and to pack a copy of your passport in case the original is lost.	Entire field team	
Complete Critical Success Factors	PI	

ALLOCATIONS AND SERVICES

Allocations from Inventory

Quant/Unit	Item
1/ea	Arctic oven sleep tent
2/ea	Sleep pad

CPS will provide the following support, and costs associated with the NASA project will be recouped via an interagency funds transfer between NASA and NSF.

Other Services

Project Allocations	Comments
User days Kangerlussuaq	NASA pays for 4 people R/T
User days Summit	NASA pays 50%
Travel: Kanger > Summit	NASA pays for 4 people R/T
Cargo Services	NASA's portion broken out in appendix
Science Technical Services	NASA portion: 10 hours/week
5 racks, 40 cylinder, 2 storage shelf allocation in Buried Flux Facility	In 2008 CPS completed extensive work with this group on requirements and design development of the Buried Flux Facility. Requirements have not changed for 2009 work.
Flux Facility maintenance	CPS plans several maintenance projects for the Flux Facility this spring: Replacing broken exhaust duct work; repairing differential settling in the staircase; installing winch to support cylinder delivery. The installation of the temporary exhaust duct in late April and the permanent replacement later in the summer will both require instrument shut downs. CPS will provide 48 hours of advance notice prior to shut down.
Flux Facility snow removal	Snow accumulated substantially at the Flux Facility over the course of the last winter. The PI's would like to restrict snow removal to need-based events (i.e., prior to large material deliveries to the facility, etc.). CPS will inform the PI's prior to any equipment activity in the vicinity so they can shut down sensitive instruments.
Gas Cylinder procurement and delivery	CPS will procure and stage gas at the facility for the researchers' use. Gas procurement for 2009 was completed in August 2008. A final procurement will be completed by Jul 2009 for the following year. Amounts as currently understood by CPS are found in the cost estimate (see Appendix) with 2009 prices. Any changes to 2010 procurement should be provided no later than July 1, 2009.

Gas piping and regulators	PI's will provide all of their own regulators and tubing to pipe in-use gases from stored gas shed to module equipment racks.
Small NO (UN1660) cylinders	PI's will provide small NO cylinders for use in the specific ventilated gas enclosure for this gas. PI will take responsibility for transferring NO to smaller cylinders from large cylinders that were procured last fall. Limit: 15 ft^3 at STP at any given time.
Cylinder transfer	CPS will provide a hand truck and provide gas cylinder compatible transport bag and winch at Flux to support cylinder movement from above-ground storage (cargo berm) to Buried Flux Facility (BFF) storage (ventilated storage sheds).
Climbing equipment for BFF tower	CPS will provide safety gear to the PIs for safe ascent of the BFF tower during set up. This gear will be compatible with the BFF systems as ordered. All field team members must be trained on tower climbing by the station medic prior to first ascent.
Safety protocols	PIs will adhere to safety protocols outlined by the CH2M Hill safety engineer for those using the BFF These are found in the appendix.
Toilet facilities	Occupants of the BFF should plan to use the rustic local toilet facilities. These facilities are maintained by the field team. BFF occupants should share in the responsibility of transporting bagged and liquid waste back to station.
Snacks/Break Area	The BFF occupants should plan to store snacks and beverages at the BFF. A kettle can also be provided.
Meals	The BFF occupants will use the Big House facilities for meals and observe regular meal times. They should notify the camp manager and chef if they plan to eat outside normal meal times. Any special diets or food allergies should be reported to the chef upon arrival at Summit. If possible, the science group can send an early email to manager at summitcamp.org to prep the cook for special diet requirements.
Summer Clean Air Sector Management Protocol	The PIs participated in a pre-season clean air policy review and have signed off on the new protocol for this season's operation. See Appendix.
Summer Planned Electrical Power Outages	Planned power outages must be coordinated with on-site field team members AS WELL AS remote field team members. An email alert should be sent over the Summit science distribution list 24 hours in advance of any planned power outages.

LOCATION INFORMATION

Please visit http://www.polar.ch2m.com/ and navigate to the Greenland menu for en route and location-specific Greenland information. Prior to deployment, your entire field team should be familiar with the content of the *Greenland Guide* and with the guidelines provided in the *Summit Users' Guide*. Both are available electronically via our Web site's Greenland menu.

CARGO AND CUSTOMS

All cargo required for your project should arrive in Scotia, NY, **no later than 2 weeks prior** to the desired northbound Air National Guard (ANG) flight, must be entered into our online Cargo Tracking System, and must be properly registered with Customs.

For the most current ANG flight schedule go to http://www.polar.ch2m.com/ and navigate to Greenland > Calendars/Schedules.

If you need **technical support** with the Cargo Tracking System, contact Mike Dover .

Customs instructions are available on our Web site at http://www.polar.ch2m.com/ (go to Greenland > Customs). More information is available via the *Greenland Guide*, under Greenland on the CPS site.

The following is our current understanding of your overall cargo requirements:

Cargo List

ROS Date*	Description	Origin	Dest.	Wt. Est (lbs)	Vol. Est. (ft^3)	Notes **
4/19/2009	Compressed gas NOS, 3 cylinders of very dilute NO in N2	Scotia	Summit	300		Haz-deck req.
4/19/2009	Flux spare parts and tools	Scotia	Summit	50		
5/11/2009	Fast Ozone Gray Hardig	Scotia	Summit	400		
5/11/2009	Fast Ozone pumps and tubing	Scotia	Summit	100		
5/11/2009	Aluminum Snow tower parts	Scotia	Summit	100		
5/11/2009	Mercury Analyzer Instrument	Scotia	Summit	100		

*(Delivery to Scotia must be 2 weeks prior to ROS Date)
** Delivery date estimate, special instructions, etc.)

FIELD TEAM INFORMATION

For the most up-to-date information on the project's schedule, please view the online Greenland calendar (http://www.polar.ch2m.com/ > Greenland > Calendars/Schedules).

Name	Location	Date In	Date Out	Email
Hueber, Jacques	Kangerlussuaq Summit Kangerlussuaq Summit	2/3/3009 2/9/2009 TBD	2/16/2009 6/25/2009	jacques.hueber at colorado.edu
Kramer, Louisa	Kangerlussuaq Summit Kangerlussuaq Summit	5/11/2009 5/12/2009 8/17/2009 8/18/2009	5/21/2009 5/19/2009 8/24/2009 8/21/2009	lkramer at mtu.edu
Toro, Claudia	Kangerlussuaq Summit Kangerlussuaq Summit	5/11/2009 5/12/2009	6/25/2009 6/23/2009	catoro at mtu.edu
Helmig, Detlev	Kangerlussuaq Summit Kangerlussuaq Summit	5/27/2009 5/29/2009 8/17/2009 8/18/2009	6/6/2009 6/4/2009 8/24/2009 8/21/2009	detlev at instaar.colorado.edu
Ganzeveld, Laurens	Kangerlussuaq Summit	Comm. Air 6/19/2009	 7/8/2009	laurens.ganzeveld at wur.nl
Van Dam, Brie	Kangerlussuaq Summit	7/7/2009 7/9/2009	8/24/2009 8/21/2009	Brie.Vandam at Colorado.EDU
Boylan, Patrick	Kangerlussuaq Summit	TBD	TBD	Travel not certain yet. Will be determined as needed.

PROJECT CONTACT INFORMATION

Research Team

Role	Name	Email	Phone / Fax
Co-PI	Detlev Helmig	detlev at instaar.colorado.edu	303.492.2509 /303.492.6388
Additional project contact	Louisa Kramer	lkramer at mtu.edu	

CPS Team Members

Contact for	Name	Email	Primary Phone(s)
Summit operations	Sandy Starkweather	Sandy at polarfield.com	Denver: 303.518.8714
Greenland on-island support	Mark Begnaud	Mark at polarfield.com	Denver: 720.320.6160 Greenland: 011.299.524218
Greenland on-island support, Cargo	Ed Stockard	Ed at polarfield.com	Greenland: 011.299.524281
Scotia operations & customs	Earl Vaughn	Earl Vaughn at gmail.com	Scotia: 518.331.3103
Medical	Jason Buenning	Jason at polarfield.com	Denver: 303.638.6669
Denver operations	Jill Ferris	Jill at polarfield.com	Denver: 720.320.6155

CPS Offices

Denver	Kangerlussuaq	Scotia
CH2M HILL Polar Services Western Office 8110 Shaffer Parkway Suite 150 Littleton, CO 80127 Tel: 303.984.1450/1439 Fax: 303.984.1445	CH2M HILL Polar Services Attn: Name of Employee/Researcher Postboks 1015 DK-3910 Kangerlussuaq, Greenland Tel: 011.299.841598 Fax: 011.299.841599	Earl Vaughn C/O 109th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Cell: 518.331.3103 Fax: 518.344.2537

Summit Station

Winter	Summer
CH2M HILL Polar Services Western Office Attn: Name of Employee/Researcher 8110 Shaffer Parkway Suite 150 Littleton, CO 80127 Tel: 303.984.1450/1439 Fax: 303.984.1445	CH2M HILL Polar Services Attn: Name of Employee/Researcher - Summit Station C/O Earl Vaughn 109th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel:518.344.2635 Fax: 518.344.2537

Other

Organization	Internet	Phone
Summit Science Coordination Office (SCO)	http://www.geosummit.org sco at summitcamp.org	John Burkhart +47 96 82 5011

SAFETY, ENVIRONMENT, HEALTH and PERMITS

Medical Clearance

Arctic Program participants traveling into the Greenland field generally must pass a National Science Foundation-mandated physical exam. All field team members should plan to complete their medical clearance process 6-8 weeks prior to travelling to Greenland. For more information, refer to CPS' *Greenland Guide*, available at http://www.polar.ch2m.com/ under Greenland.

CRITICAL SUCCESS FACTORS

Please list the factors that are most important for the success of your science. We track these factors in order to measure the success of CPS' support. Examples might be the availability of the helicopter or camp gear.

Factors
Stable power and network communication at the Flux Facility.
All requested gases being available as requested.
Flux facility operational as specified in 2008 requirements.
Repair exhaust vents and monitor the proper function, identify and remedy any ventilation problems as soon as possible.
Maintain no/low contamination levels of interfering gases at Flux Facility.
Provide Summit Science Tech support as specified in project request.
Provide personnel travel and cargo delivery to and back from Summit as scheduled, weather permitting.

GOVERNMENT AND PERFORMANCE REPORTING ACT OF 1993 (GPRA)

NSF/OPP requires your help in complying with the Government Performance and Reporting Act of 1993 (GPRA). One measure of CPS' performance is a "facility-performance metric" which counts the number of productive days your project has in the field while relying on CPS facilities or support. Please keep track of any "lost days" and report these to us at the end of the season.