

PROJECT INFORMATION

Lead Principal Investigator	Detlev Helmig/Louisa Kramer and Detlev Helmig/ Paul Doskey
Institute	University of Colorado, INSTAAR and Michigan Technological University, Department of Civil and Environmental Engineering
Project Title / Grant #	Biomass-burning and anthropogenic impacts on arctic tropospheric chemistry (NASAPolarcat) and Collaborative research: A synthesis of existing and new observations of air-snowpack exchanges to assess the Arctic tropospheric ozone budget (0713992)
NSF Program and Manager	NASA, Dr. Thomas Wagner and NSF\OD\OPPIARC\ARCSS; Dr. Neil Swanberg
PFS Project Manager	Katrine Gorham (Greenland) and Dana Truffer Moudra (Alaska)

LOGISTICS SUMMARY

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 approximately three will install project instruments during an approximately 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 late July 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 during the spring/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 below).

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. CPS shipped gases in advance for the summer of 2008 and 2009. Gases leftover from 2009 will be used for the summer of 2010.

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

0713992

Researchers on this collaborative project, Doskey (MTU, 0713992, LEAD) and Helmig (CU,0713943), will conduct extensive campaign ozone and nitric oxide measurements from 2008-2011. They will work at Summit, Greenland, representing glacial snowpack; and Toolik Lake, Alaska, representing snowpack above permafrost soil and snowpack above frozen lakes.

A research team of three set up project instruments during a 12-week-long campaign at the station starting in June 2008. They installed a new ozone instrument and a new nitric oxide instrument. The researchers timed the installation to make simultaneous measurements with with POLARCAT (aircraft based pollution studies) flights.

After installing the experiment, one to three researchers remained on site, the first in a series of occupations as the team rotated through Summit through station closing on August 22, 2008. The researchers maintained the instruments and conducted intensive measurements, including eddy correlation flux measurements, vertical gradients of O3 and NOx, and snowpack measurements. As needed, the station's technical staff assisted the researcher. A subset of the instruments were operated over the winter period by Summit staff members. The team returned to Summit during the spring of 2009 for a second campaign running through the summer.

A third study period involving on-site researchers at Summit will begin in April 2010 and end in late July 2010. Then, the team will dismantle the instruments and ship them to Toolik Lake research facility in Alaska. The

Summit Flux facility will be emptied of all instruments, equipment, and gear by July 28th 2010, as the construction team will begin deconstructing the facility on this date. Personnel/support for some Summit Station activities may be combined with the PI's NASA grant (see information above). (Note: the Summit campaign, originally to end in August 2009, was granted an extension by the NSF through July, 2010).

In August, 2010, a team of 5 will travel to Toolik Field Station to install the same instruments. A team member will return at 3-week intervals until June 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 June 2011. **Note: this season plan focuses on the work in Greenland. We will describe support for Toolik Field Station work in a separate season plan.**

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, CPS shipped gases in advance for the summer of 2008 and 2009. Gases leftover from 2009 will be used for the summer of 2010.

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=NASAPolarcat
http://www.polar.ch2m.com/arlss_reports/arlss_projectsdetail.asp?cbPropNum=0713992

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 Due	Date Completed
Review support plan for accuracy and distribute to all field team members	PI	5/9/2010	In progress
Obtain all necessary permits and insurance for fieldwork	PI	5/9/2010	In progress
Visit all hyperlinks and review all documents referred to in the support plan	Entire Field Team	5/9/2010	In progress
Contact the GEOSummit Science Coordination Office (SCO) sco at summitcamp.org regarding your project's plans for the season	PI	5/9/2010	completed
Complete medical clearance process 6-8 weeks before desired deployment date	Entire field team	5/9/2010	In progress
Provide cost estimate for interagency transfer	CPS	5/9/2010	Completed
Provide guidance on approved level of support for NASA components	NASA/Wagner		
Provide end-of-season actual costs	CPS	9/14/2010	
Note: Passports are required for Air National Guard and international travel. Also, please bring TWO copies of your passport to Greenland with you.	Entire field team	5/9/2010	Okay
Complete Critical Success Factors	PI	5/9/2010	Completed
Document support for Doskey/Helmig in Alaska	CPS/PI	8/1/2010	

ALLOCATIONS AND SERVICES

Allocations from Inventory

Quant/Unit	Item
Note	Allocations from the inventory were assigned upon initial move-in to the Summit Flux facility during 2008. No additional allocations are planned for 2010, which will be the final season of this project at Summit.

Other Services

Service	Comments
User days Kangerlussuaq	
User days Summit, including meals	The researchers will sleep in tents provided by CPS. All personnel 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.
ANG travel: NY-Kanger-Summit-Kanger-NY	
Cargo Services	
Gas Cylinder procurement and delivery.	CPS will procure and stage gas at the facility for the researchers' use.
Flux Facility	The field team will use the Flux facility and Flux tower for their science operations. The CPS team will be responsible for maintaining gas sensor system, including regular calibrations. Additionally, the CPS team will be responsible for regular facility inspections in accordance with the Flux SOP. The researchers will be responsible for ensuring that all instruments, equipment, and gear are removed from the Flux facility by July 28 th , 2010, so that the construction team can begin deconstructing the facility on this date.
Retrograde Cargo	The CPS team will provide ANG Summit-Kanger-NY shipment for retrograde cargo. The ability of this cargo to fly Summit-Kanger on July 29 th and Kanger-NY on July 30 th is contingent on the researchers commitment to have all instruments, equipment, and gear removed from the Flux facility and palletized by July 28 th (all activity must be completed by midnight of July 27 th , and the facility must be in clean, ready to remove condition on July 28 th). Additionally, retro grade shipment on these dates is contingent on weather and successful flight operations which are outside the control of the CPS team.
Safety protocols	PI's will adhere to all safety protocols outlined for those using the Flux Facility by the CH2M Hill safety engineer. The Flux SOP will be posted at all times in the Flux Facility, and all field team members will read the document and adhere to the procedures. PI's will adhere to all safety protocols as presented by the Summit Manager (Ken Jessen) and the Project Manager (Katrine Gorham). This includes reading and signing off on Activity Hazard Analysis (AHAs) prior to completing relevant tasks. Additionally, the researchers will adhere to the established clean air protocols and travel policies.

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, if traveling to Summit, 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 are a **new user** requiring access to the Cargo Tracking System, contact [Jason Buenning](#).

(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 2010 cargo requirements:

Cargo List

Items	Weight/Cube
Fast ozone instrument (4 boxes)	300 lbs / 60 cu ft
Retro Cargo for Flux facility instruments/equipment	undetermined

SUPPORT SCHEDULE

Approx Date	Location	Activity
April 21	Scotia ANGB	Initial deployment of first field team (Van Dam) member
April 23	Kanger-Summit	Field team member (Van Dam) flies Kanger to Summit
May 10	Scotia ANGB	Field team member (Toro) deploys
May 12	Kanger-Summit	Field team member (Toro) flies Kanger to Summit
May 19	Summit-Kanger	Field team member (Van Dam) departs Summit
May 21	Scotia ANGB	Field team member (Van Dam) returns to Scotia
June 2	Scotia ANGB	Field team member (Boylan) deploys
June 4	Kanger-Summit	Field team member (Boylan) flies Kanger to Summit
June 9	Summit-Kanger	Field team member (Toro) departs Summit
June 10	Scotia ANGB	Field team member (Toro) returns to Scotia
June 21	Scotia ANGB	Field team member (Kramer) deploys
June 23	Kanger-Summit	Field team member (Kramer) flies Kanger to Summit
June 29	Summit-Kanger	Field team member (Boylan) departs Summit
July 1	Scotia ANGB	Field team member (Boylan) returns to Scotia
July 19	Scotia ANGB	Four field team members (Van Dam; Toro; Hueber; Caramore) deploy
July 22	Kanger-Summit	Four field team members (Van Dam; Toro; Hueber; Caramore) fly Kanger to Summit
July 28	Summit	Field team has completed moving all instruments, equipment, and gear out of the Flux facility so that the CPS construction team can begin deconstructing the facility.

July 29	Summit-Kanger	Remaining field team of five (Van Dam; Toro; Hueber; Caramore; Kramer) and cargo depart Summit
July 30	Scotia ANGB	Field team (Van Dam; Toro; Hueber; Caramore; Kramer) returns to Scotia

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).

FIELD TEAM INFORMATION

Name	Location	Date In	Date Out	Email
Brie Van Dam (1)	Kangerlussuaq Summit	4/23/2010 4/24/2010	5/21/2010 5/19/2010	brievandam@colorado.edu
Brie Van Dam (2)	Kangerlussuaq Summit	7/19/2010 7/22/2010	7/30/2010 7/29/2010	brievandam@colorado.edu
Claudia Toro (1)	Kangerlussuaq Summit	5/10/2010 5/12/2010	6/10/2010 6/9/2010	claudia.torovergara@gmail.com
Claudia Toro (2)	Kangerlussuaq Summit	7/19/2010 7/22/2010	7/30/2010 7/29/2010	claudia.torovergara@gmail.com
Patrick Boylan	Kangerlussuaq Summit	6/2/2010 6/4/2010	7/1/2010 6/29/2010	patrick.boylan@colorado.edu
Louisa Kramer	Kangerlussuaq Summit	6/21/2010 6/23/2010	7/30/2010 7/29/2010	lkramer@mtu.edu
Jacques Hueber	Kangerlussuaq Summit	7/19/2010 7/22/2010	7/30/2010 7/29/2010	jacques.hueber@colorado.edu
Joseph Caramore	Kangerlussuaq Summit	7/19/2010 7/22/2010	7/30/2010 7/29/2010	joseph.caramore@colorado.edu
Detlev Helmig	Kangerlussuaq Summit	TBD TBD	TBD TBD	detlev.helmig@colorado.edu

PROJECT CONTACT INFORMATION

Research Team

Role	Name	Email	Phone / Fax
Principal Investigator (NASAPolarcat) and Collaborator (0713992)	Detlev Helmig	detlev.helmig@colorado.edu	303.492.2509/303.492.6388
Collaborator (NASAPolarcat)	Louisa Kramer	Lkramer@mtu.edu	906.487.2029
Principal Investigator (0713992)	Paul Doskey	pvdoskey@mtu.edu	906.487.2745

CPS Team Members

Contact for	Name	Email	Primary Phone
Summit science planning & support	Katrine Gorham	Katrine@polarfield.com	Denver: 303.349.2884
Greenland science planning & support	Robin Abbott	Robin@polarfield.com	Denver: 303.748.8507
Kangerlussuaq base operations	Kathy Young	Kathy@polarfield.com	Denver: 720.320.6160 Greenland: 011.299.524218
Scotia (Stratton Air Base) operations & customs	Earl Vaughn	Earl_Vaughn@gmail.com	Scotia cell: 518.605.0979

Alaska science planning/support	Dana Moudra-Truffer	Dana at polarfield.com	Fairbanks: 907.590.3954
Alaska Construction	Stan Wisneski	stan at polarfield.com	Den:303.984.1450
Sat phones & comms	Roy Stehle	Roy.Stehle at sri.com	Menlo Park: 650.859.2552
Remote Medical (kits & service) and Medical/Dental Clearance (PQ)	Robbie Score	Robbie at polarfield.com	Denver: 303.906.0093

CPS Offices

Denver	Kangerlussuaq	Scotia
Polar Field Services 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: 011.299.841598	Earl Vaughn C/O 109 th Aerial Port Bldg. 20 Stratton Air Base Scotia, NY 12302-9752 Tel: 518.344.2635 Cell: 518.605.0979 Fax: 518.344.2537

Summit Station

Winter	Summer
Polar Field Services 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 109 th 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

Effective January 1, 2010 the Government of Greenland assumed responsibility for the permitting process for research in Greenland. All science teams planning to conduct research in Greenland must complete an **annual application** in order to obtain approval from the Government of Greenland. The application forms are available from the Department of Domestic Affairs, Nature and Environment at <http://www.nanog.gl/expeditions> or by sending an email to [ekspeditioner at gh.gl](mailto:ekspeditioner_at_gh.gl). Applications are submitted directly through the Department of Domestic Affairs, Nature and Environment. Be advised that a new fee of 4000 DKK has been put in place for permits. For assistance with the application process, contact:

Martin Schiøtz
 Head of Section
 Section of Nature
 Department of Domestic Affairs, Nature and Environment P.O. Box 1614
 3900 Nuuk
 Greenland
 e-mail: [ekspeditioner at gh.gl](mailto:ekspeditioner_at_gh.gl)

Medical Clearance

Arctic Program participants traveling into the Greenland field generally must pass a National Science Foundation-mandated physical and dental exam. All field team members should plan to complete their Physical Qualification (medical and dental 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.

RISK ASSESSMENT

See Appendix for Risk Factors and Mitigation.

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
Flux facility operational (including power and communication) and available until July 28. Details outlined in the "other services" table.
Cargo (ozone instrument) arrival at Summit on June 4th. The researchers acknowledge the "Cargo and Custom" requirements as listed above.
Retro cargo shipment from Summit to Kanger on July 29 th and Kanger to NY on July 30 th , in accordance with the details outlined in the "other services" table.

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.

APPENDIX

RISK FACTORS and MITIGATION

Risk Factors and Mitigation

Factor	Mitigation and Control
Heavy lifting/body strains and sprains	-Use proper lifting techniques
Snowmobile Travel	-Participate in a snowmobile training - Review Snowmobile Travel AHA (Activity Hazard Analysis) -Use appropriate Personal Protection Equipment/helmets
Cold Related Injuries-weather	-Wear proper clothing -Appropriate camping gear, insure sleeping bags are adequately rated -Check the forecast before going out of camp/town -Watch the weather while out -Be mindful of hydration, carry sufficient food -Develop and share your travel plans -Have and share an emergency plan for bad weather
Emergency Plan	-Compile a list of emergency contacts for your field team and share it with critical participants including your home institution and CPS.
Foot/ski travel	-Have a communication plan in place (carry a radio) -Have a check out policy in place
Gas Cylinder Handling	- Review Haz Comm - Review MSDS (Material Safety Data Sheet)
Hazardous Materials	-Haz Comm SMS (Safety Management Standard) -Identify items for hazardous material transportation -Review MSDS (Material Safety Data Sheet)
High Altitude	-Participate in high altitude training -Have medical call in service available -Have oxygen available in high altitude camps -Develop plan to acclimatize -Consult with physician on use of medication for acclimatization
Medical fitness for remote work outside ANG flight period	-Follow NSF Physical Qualification process
Power Tools	-Participate in a power tools training -Review current AHA (Activity Hazard Analysis)
Tower Climbing	-Participate in tower climbing training -Use the correct tower climbing equipment at all times -Review Tower Climbing AHA (Activity Hazard Analysis)