The NSERC CREATE Training Program in Arctic Atmospheric Science presents:

2013 Summer School Jamboree

Photos courtesy of Dan Weaver and Zen Mariani.
2013 Summer School Participants

Organizers
Kimberly Strong and Ashley Kilgour

Invited Speakers
Ed Eloranta, Udo Friess, Glen Lesins, Noel McDermott, Tom McElroy, and Ray Nassar

Kim Strong will introduce absent speakers:
Thomas Davis, James R. Drummond, Craig Haley, Sarah King, Ruth Louden, Jennifer Murphy, Ivan Semeniuk, and Sheryl Stevenson
Students

Christian Akpanya, Peter Argall, Jennifer Beale, Eric Boone, Orfeo Colebatch, Jonathan Franklin, Paul Godin, Kostya Golovan, Debora Griffin, Sean Hartery, Shannon Hicks, Angela Hong, Liviu Ivanescu, Ali Jalali, Magnus Joelsson, Mathilde Jutras, Tony Kang, Bradley Kloostra, Felicia Kolonjari, Stefan Kowalewski, Sam Kristoffersen, Jeffery Langille, Valérie Losier, Erik Lutsch, Marlene Machemy, Zen Mariani, Emily McCullough, Joseph Mendonca, Omid Moeini, Jan-Marcus Nasse, Melissa Olsthoorn, Kevin Olsen, Onaizah Onaizah, Christopher Perro, Anthony Pugliese, Meike Rotermund, Niall Ryan, Ilya Stanevich, Christopher Vail, Jeffrey VanKerkhove, Zahra Vaziri, Camille Viatte, Chen Wang, Dan Weaver, and Xiaoyi Zhao
Jamboree Requests

The slides are in alphabetical order by last name beginning with speakers followed by students. Please refer to the program to find your presentation slot and be prepared to begin when the person before you finishes.

You will be given two minutes to introduce yourself. Please be courteous to the next speaker and wrap-up promptly when requested.

Please excuse any formatting errors that may have occurred in compiling the slides into one presentation.
Let’s Start!
Kimberly Strong  
Dept of Physics, U Toronto  
Director, School of the Environment  
Remote sounding of atmospheric composition from the ground, balloons, and satellites using UV-VIS-IR spectroscopy

- Leader of the PEARL PAHA Composition Measurements theme
- Four instruments at PEARL
- U of Toronto Atmospheric Observatory
- ACE and Odin satellite missions
- Laboratory spectroscopy
- Mars studies
Ashley Kilgour
CREATE Training Program Coordinator
CANDAC Education/Outreach Facilitator
Department of Physics, University of Toronto
Ed Eloranta

- Senior Scientist at the University of Wisconsin.
- Received a BSc in Physics and a PhD in Meteorology from the University of Wisconsin.
- Research involves the design, construction of innovative lidars for use in atmospheric research.
- Most recently he has led the development of High Spectral Resolution Lidars for untended operation in remote locations.
Research Interests:
• Atmospheric Chemistry
• Composition of the polar atmosphere
• Tropospheric halogen chemistry
• UV/Vis remote sensing of the atmosphere

Research and Field Campaigns:
• Responsible for a global network of DOAS instruments for the measurement of atmospheric trace gases.
• Involved in numerous field campaigns in the Arctic (Norway, Sweden, Alaska, Northern Canada, Amundsen Ice Breaker) and Antarctic (Neumayer Station, Scott Base, Polarstern Research Vessel)
Glen Lesins

Faculty in Dept. of Physics & Atmospheric Science, Dalhousie University, Halifax
Member of CANDAC → PAHA team

Current Research Interests:
Arctic Amplification and Stable Boundary Layers
Global Warming (science – energy – economics – policy)
Microwave Satellite Retrievals of Column Water Vapour
Noel McDermott

- Lived and taught in Nunavut for 35 years.
- Former principal of Nunavut Arctic College where he also taught courses in Inuit literature, mythology and language.
- Currently teaches Inuit language (Inuktitut) and history at Queen's University in Kingston where he is a Teaching Fellow.
Tom McElroy

- Holds the CSA/ABB/NSERC/York U Industrial Research Chair in Atmospheric Remote Sounding at York University.
- Very active nationally and internationally in science issues related to ozone.
- Has led satellite instrument projects (MAESTRO on ACE) and is active in ozone measurements and trend studies.
Ray Nassar
Environment Canada

- PhD University of Waterloo, 2006: various aspects of ACE mission
- Postdoc at Harvard University, 2006-2008: GEOS-Chem and TES
- Postdoc at University of Toronto, 2008-2010: TES/GEOS-Chem CO₂
- Research Scientist at Environment Canada since 2010: CO₂ modeling, GOSAT, OCO-2, future satellites
- CREATE Lectures: 1) Carbon Cycle, 2) CO₂ and CH₄ measurements, 3) CO₂ flux estimation
• Holds a BSc in Geology and a PhD in Environmental Geochemistry and Chemical Engineering from McGill University.

• Began working with Environment Canada in 2007 where he coordinated Nanotechnology, Biotechnology and Chemicals research to support the Regulatory and Policy oversight of toxic substances in Canada.

• In 2010 he joined the Canadian Space Agency's Government Liaison Office as Senior Advisor for Science & Technology.
Jim Drummond

- Professor at Dalhousie University, Fellow of the Royal Society of Canada, and Canada Research Chair in remote sounding of atmospheres.
- PI of the MOPITT satellite experiment, Co-I on the ACE mission, and PI for CANDAC and PEARL.
Craig Haley

- Member of the Systems Engineering group at COM DEV.
- Completed his PhD on the OSIRIS satellite instrument.
- Currently supporting the development of the Fine Guidance Sensor.
From Ad to Interview: Strategies for Scientists on the Job Market

Ruth Louden, Assistant Director of the Academic Advising & Career Centre at the University of Toronto Scarborough (UTSC), has facilitated workshops for students and mid-career professionals on all aspects of job search. Prior to joining UTSC, Ruth worked for 15 years in human resources consulting with an emphasis on recruitment. Sarah King is the Coordinator of The Writing Centre at the University of Toronto Scarborough. She has sat on both academic and non-academic hiring committees, has taught workshops for graduate students and faculty, and has worked individually with hundreds of students on their resumes and CVs. Sheryl Stevenson coordinates programs that support graduate students’ professional development at the University of Toronto Scarborough. Before coming to U of T, she was a university professor and department chair in the US, mentoring graduate students and serving on many hiring committees for new faculty at the assistant professor level.
Jennifer Murphy

PhD at UC Berkeley, 2000 - 2005
Postdoc at University of East Anglia, 2005 - 2006
Professor at University of Toronto, 2007 - now

- Representative for academia on career panel
- Lecture on tropospheric nitrogen oxide chemistry

jmurphy@chem.utoronto.ca  http://www.chem.utoronto.ca/wp/murphygroup/
Ivan Semeniuk

- Science journalist, broadcaster, and the Globe and Mail's national science reporter, based in Toronto.
- Host of OASIS channel's Cosmic Vistas and has previously been the US news editor for Nature, a bureau chief for New Scientist magazine in Boston and a producer and columnist with Discovery Channel's Daily Planet.
I come from Ghana, West Africa. My supervisor is Professor W. Ward of Department of Physics UNB. For hobby, I love playing the piano (Classical music and Hymns).
Peter Argall
CREATE-Funded Undergraduate Intern
Institution: University of Western Ontario
Studying: Software Engineering
Summer Project: Data Analysis with the Purple Crow LIDAR
Jennifer Beale

- 00-06 B. Sc. Physics, Math (UVic)
- 06-08 M. Sc. Phy. Ocean. (MUN)
  A First Look At Skewness in the Labrador Sea Water Masses
- 08-14 Ph. D. Candidate (York U.)
  Aerosol Radiative Effects in the Earth and Martian Atmospheres

Ph. D. Research

- Part 1: Effects of Dust Aerosol Radiative Heating in the Martian Atmosphere (finished and written)
- Part 2: Effects of Aerosol Radiative Heating in GEM-AC
- Connected aerosol heating to new aerosol microphysics in GEM-AC (formerly GEM-AQ)
- Validating new aerosol optical properties and radiative forcing
- Re-run a simulation of the 2009 Kilmore East wildfire plume
- Also plume from the June 2011 Nabro eruption
- BORTAS period
Eric Boone
Ph.D Candidate, University of Michigan
B.S Purdue University, Chemistry 2013

Research Interests
Applications of Mass Spectrometry
Arctic Snowpack Chemistry

Paperspray ionization of Snow
Orfeo Colebatch

- BSc. Majoring Atmospheric Science, Macquarie University (2007)
- Science Officer – Macquarie University 2010-12
- Research Officer – University of Toronto 2012-present
- Working on technical equipment issues, FTIR, vacuum pumps, suntrackers, weather stations
- Interested: Mountain biking and babies 😊
Jonathan Franklin

Ph.D. Candidate, Dalhousie Univ, Halifax
M.Sc., Univ Massachusetts, Amherst
B.Sc., Marlboro College, Vermont

* Fourier transform spectrometry
* Solar tracker development
* Transport and chemical evolution of biomass burning plumes
• Short cell for cross-section measurements of strong absorbers:
  • Determination of global warming potentials.
• Long-path White cell for measurements of weak absorbers:
  • Improvement of retrievals.
  • $\text{CO}_2$ broadening coefficients for exoplanet studies.
Kostya Golovan

- Study engineering at U of T
- Love sports (not baseball) and the outdoors
- Undergraduate CREATE Intern
Debora Griffin
Supervisor: Kaley Walker
PhD candidate at UofT

Remote sensing of the atmosphere (with PARIS-IR)
- Stratospheric ozone depletion
- Arctic polar vortex
- Impact of boreal fires on tropospheric composition
- Balloon-borne campaign
The Purple Crow LIDAR

Fig: A flick of the wrist captures a few pulses of the Litron laser used at the PCL.

Sean Hartery
Shannon Hicks
M.Sc. Student in Astronomy/Planetary Sc. - U. Western Ontario
Research Intern at SETI Institute studying Saturn’s F ring
Angela Hong

Simultaneously monitor air-snow/ice interface and overlying air to elucidate physical underpinnings and mechanisms that govern the chemistry at frozen media halogens, carbonyls, OH, NO$_2$, NO, HONO
Star-photometry of arctic thin ice clouds

Liviu Ivanescu
Université de Sherbrooke
Ali Jalali

- **Background:** B.Sc. in Physics and M.Sc. in Meteorology

- **Currently:** Graduate student in Physics at University of Western Ontario

- **Purple Crow Lidar (Prof. Bob Sica)**

- **Lidar measurements of temperature in the stratosphere**
Lars Magnus Joelsson

Topics

• Clumped isotope effect
• Mass independent fractionation of isotopes

The photoreactor at the Copenhagen Center for Atmospheric Research
Mathilde Jutras
Dalhousie University - undergraduate student in physics at Université de Montréal

Undergraduate summer intern - CREATE training program

Research experience:
- Dark matter research with the Picasso Experiment

This summer: working with Prof. James Drummond
- Build a PID controller for the rotating shutter of the Arctic Ozone DIAL system
- Retrieve data from weather stations in Halifax and Eureka
Tony Kang
Institution: University of Toronto
Programme: Astronomy and Physics
Supervisors: Dr. Pierre Fogal and Dr. Kaley A. Walker
Research: **Refurbishment of the DU DA2 FTS for the stratospheric balloon flight PARABLE**
Brad Kloostra

Background

- Studying Engineering at University of Toronto: BASc in Engineering Science (2015)
- NSERC CREATE Summer Intern

Project

- With Niall Ryan & Kaley Walker
- Instrument control, data processing system and user interface for SPÉIR
Observing the ozone story from space: Measuring CFC and HCFC species using ACE-FTS

Are the measurements of CFCs and HCFCs from the ACE-FTS comparable to other coincident satellite, ground-based, and air-borne measurements?

What causes the differences between model predictions of the concentrations of CFCs and HCFCs compared to the concentrations observed by the ACE-FTS?

What can we learn about the chemistry of these species from the ACE-FTS measurements?
STEFAN KOWALEWSKI
Ph.D. student, University of Bremen
Supervisor - Prof. Justus Notholt

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working on:

- Establishing **mesospheric OH* airglow layer** measurements via **Fourier-Transform-Spectroscopy**

- Observation of mesospheric temperatures and dynamical variability

- Investigating the vertical **OH* layer structure** via mesospheric models
ERWIN-II
Samuel Kristoffersen (UNB)
Jeff Langille
PhD Candidate, University of New Brunswick

Research focus: Development and implementation of Doppler wind imaging interferometers to study atmospheric dynamics

1. Michelson Interferometer for Airglow Dynamics Imaging (MIADI)

2. Birefringent Imaging Doppler Wind INterferometer (BIDWIN)

General research interests: optical instrument development, coherence theory, space physics
Valérie Losier

- CREATE-funded undergraduate intern
- Going into 3rd year of physics and computer science at McGill University
- Summer project: Waves Michelson Interferometer (WaMI): Design Principles and Validation
- At the University of New Brunswick with professor William Ward
Erik Lutsch

Academic Background
- BSc Honours Physics, University of Waterloo (2012)
- MSc Physics, University of Toronto (Starting Sept. 2013)

Research
- Properties of polar stratospheric clouds by ACE-FTS extinction measurements
CanSISE: Canadian Sea Ice and Snow Evolution Network

Marlene Machemy
Department of Physics
University of Victoria

• NSERC USRA with Paul Kushner (University of Toronto) and John Fyfe (CCCma), working on the decline of Arctic sea ice loss rate

• Canadian Satellite Design Challenge (radiative transfer and testing)

• Past involvement with UVic Climate Modeling Group, working on mesoscale winds
Radiance and Trace Gas Variability in the High Arctic

- E-AERI: Infrared Fourier Transform Spectrometer
- Measurements of infrared emission from the atmosphere every 7 minutes, 365 days/year
- Radiative Studies:
  - Impact of ice crystals, water vapour, clouds, etc. on radiative budget
- Trace Gas Measurements of O₃, CO, CH₄, and N₂O

Supervisor: Kimberly Strong
Emily McCullough
PhD candidate in Astronomy
Specialization in Planetary Science

PCL Lidar
(London, Ontario)
Prof. Bob Sica

CRL Lidar
(Eureka, Nunavut)

Research:
Depolarization in Arctic Clouds
Background Information

• H.BSc from the University of Toronto.
• Science Horizon Youth Internship.
• M.Sc 2011.
• Ph.D.

Introduction to Ph.D Work

• Solar Absorption Spectra.
• Bruker IFS 125HR FTIR at PEARL.
• Retrieval of CO$_2$ and CH$_4$.
• Satellite validation.
• Carbon Cycle.
Omid Moeini

• **Background**
  - Ph.D. Candidate in Earth and Space Science, York University
    Supervisors: Prof. Tom McElroy and Prof. David Tarasick
  - M.Sc. Photonics, IUST, Iran
  - B.Sc. Physics, Isfahan Univ., Iran

• **Research interests**
  - Remote sensing measurements
  - Numerical modeling

Brewer #160 Calibration, 2008, Isfahan, Iran
Jan-Marcus Nasse
MSc. Candidate in Physics
Specialization: Environmental Physics

About me:
from Heidelberg/Germany
BSc. Heidelberg U./Institute of Environmental Physics with 1 year at the Université Paris XI/Orsay

Project:
Supervised by Udo Frieß
Study of polar tropospheric halogen radical chemistry in Antarctica during 2 months campaign on RV Polarstern
Retrieval of vertical trace gas profiles from helicopter- and ship based MAX-DOAS measurements
Melissa Olsthoorn

- BSc in Physical Science from University of Guelph (June 2011)
- Beginning MSc in Atmospheric Physics at York University (September 2013)
- Research Interests: solar-terrestrial physics, astrophysics
- Personal Interests: cooking, video games, psychology
Kevin Olsen
PhD Candidate in Atmospheric Physics at the UofT
Working on analysis methods for trace gas retrievals at Mars using a high-resolution solar-occultation FTS

I'm From Edmonton
With a BSc & MSc from The University of Alberta
Validation of ACE-FTS satellite data using ozonesonde measurements

▪ ACE-FTS – high resolution infrared Fourier transform spectrometer on board satellite SCISAT
▪ Ozonesondes – balloon instruments launched at Eureka (everyday during the campaign period)
▪ Validation comparisons between the two instruments were done to assess the quality of the data
▪ Next steps: continue validation with ground based FTIRs
Chris Perro - PhD Student
Tom Duck - Supervisor

CANDAC RMR LIDAR

Arcade Cabinet
Education:
• Summer Internship funded under CAFTON at University of Toronto
• BSc at the University of Toronto
• Entering MSc at University of Toronto in September

Current Work:
• Working on TAO at UofT
• Installation of a new suntracker at the PEARL Ridge Lab in Eureka, Nunavut
Meike Rotermund

- BSc - Honors Physics (4th yr)
- Dalhousie University, Halifax

- CREATE Summer Intern with Tom Duck
- Arctic Lidar + surface temperature analysis

CANDAC RMR Lidar

(Photo credit: Graeme Nott)
Niall Ryan

PhD student in atmospheric physics: remote sounding

University of Toronto
BACKGROUND: BSc, MSc in Applied Physics and Math from Moscow Institute of Physics and Technology, Moscow, Russia

CURRENT POSITION: PhD in Physics at University of Toronto, Toronto, Canada

SUPERVISORS: Kim Strong, Dylan Jones

CURRENT RESEARCH:

- Retriving Weakly Absorbing Tropospheric Species at Toronto Atmospheric Observatory
- Modelling Transport and Deriving Upstream Influence Regions for Gas Measurements
Background
• Completed BSc (Physics) and BCS (Hardware Systems) from UNB in 2012
• Undergrad thesis involved looking at the variation of small scale gravity waves from PEARL.
• Started MSc (Physics) at UNB in 2012
• Masters work involves detection of mesospheric gravity waves and determination of their parameters.
Supervisor: Prof. William Ward

Large Gravity Waves above UNB Campus
Jeff van Kerkhove

• University of Rochester (B.Sc. May 2013)
• Starting M.Sc. at Western in September
• Previous research: studying dust processing in protoplanetary disks
• Future: working with Professor Sica
Zahra Vaziri  
PhD at York University  
Supervisor:  
Dr. Tom McElroy

Previous:  
• BSc in Physics at Tehran Polytechnic  
• MSc in Space Engineering at Lulea University of Technology  
• Data Analysis for the PRIMA instrument

Current:  
• A New Calibration Procedure which Accounts for Non-linearity in Single-monochromator Brewer Ozone Spectrophotometers  
• A New Pointing System for the SPS Instrument
Camille Viatte PDF with Kim Strong

- PhD in Paris: installation of FTIR
- Optimization of measurements of tropospheric species at PEARL
- Study of biomass burning events transported from mid-latitudes
Chen Wang
Ph.D. Candidate at Department of Chemistry
University of Toronto

* Background:
  o M.Sc. at Peking University, China
  o B.Sc. at Nankai University, China

* Ph.D. Supervisor: Frank Wania

* Research project:
  o Salt effect on air-water partition
  o Phase distribution equilibrium of Secondary organic aerosols
Dan Weaver

- Ph.D. Student at University of Toronto
- Supervised by Prof. Kim Strong, working on water vapour measurements and ozone depletion at PEARL.
- Travelled to Eureka in 2012 & 2013 with ACE validation team.
- CREATE TAC member & social media coordinator
Xiaoyi Zhao
Ph.D. Candidate at Univ. of Toronto
UV-visible DOAS/MAX-DOAS measurements