Level 3: Be attractive.

These are future contacts.
(Future employers?)
LEVEL 3:
BE ATTRACTIVE.

These are Future Contacts.
(Future Employers?)

Quite simply, they want to be “wowed.”
LEVEL 3: BE ATTRACTIVE.
LEVEL 3: BE ATTRACTIVE.

1. LET IT BREATHE!
2. CUSTOMIZE COLORS/Fonts
3. GO BIG OR GO HOME.
LEVEL 3: BE ATTRACTIVE.

1. LET IT BREATHE!
Investigating mesospheric gravity wave dynamics over McMurdo Station, Antarctica (77° S)
Jonathan R. Pugmire, Mike J. Taylor, Yucheng Zhao, P.-Dominique Pautet
Center for Atmospheric and Space Sciences, Utah State University

Introduction
The Antarctic Gravity Wave Instrument Network (ANGWIN) is an NSF sponsored international program designed to develop and utilize a network of gravity wave observatories using existing and new instrumentation at several established research stations around the continent. Utah State University's Atmospheric Imaging Lab operates all-sky infrared imagers at several research stations. Here we present new measurements of short-period and longer-scale mesospheric gravity waves imaged during 2012 from McMurdo Station (77°8', 166°7') on Ross Island. This IR camera has operated at Arrival Heights alongside the University of Colorado Fe Lidar during the past three winter seasons (March-September 2012-2014). Two initial primary goals are:

- Quantify the properties of small- and medium-scale mesospheric gravity wave climatology over this region of Antarctica.
- Combine results with similar measurements from other ANGWIN stations to investigate continental-wide gravity wave dynamics (see SA318-4100).

IR Imaging
All-sky observations of the OH emission layer (~87 km) were made using an infrared (0.9-1.7 µm) cooled InSb camera. The OH airglow emissions are much stronger in the infrared region (>1 µm), as shown in blue in the figure to the right, and we use new InSb cameras to obtain high-quality short-exposure images of gravity waves under auroral and full moon observing conditions.

<table>
<thead>
<tr>
<th>Day</th>
<th>Wave Frequency (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>0.05</td>
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<tr>
<td>28</td>
<td>0.06</td>
</tr>
<tr>
<td>29</td>
<td>0.07</td>
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<tr>
<td>30</td>
<td>0.08</td>
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<tr>
<td>31</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Three Continuous Days in June
In mid-winter there is continuous darkness at McMurdo. From June 23-26, 2012 (day 175-178) over 40 small-scale gravity wave events were observed during 73 continuous hours of observations. Their properties are shown in the figures below.

<table>
<thead>
<tr>
<th>Wave Number</th>
<th>Observed Period (min)</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.1, 8.4, 11.2, 16.4</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>6.1, 7.3, 9.7, 16.4</td>
<td>10</td>
</tr>
</tbody>
</table>

Two Awesome Weeks in August
On August 2-18, 2012 (UT day 214-230) over 180 small-scale gravity wave events were observed. Their characteristics are similar to the full season results except their average phase speeds (50 m/s) were significantly higher. These wave events dominated the end of season results. The phase speed distribution is consistent with critical level wind-filtering (Nielson, et al, 2012) with much higher eastward phase speeds.

Summary: 2012 Wave Parameters
A total of 419 events were analyzed. Their average values were λ = 22 km, ν = 42 m/s, T = 12 min. These mean values and their ranges are typical for short-period gravity waves observed at several sites around Antarctica as part of ANGWIN.

Summary: 2013 Wave Parameters
We have analyzed one year of data to date from McMurdo Station, Antarctica. The results are as follows:

- A large number (>400) of short-period gravity waves observed over McMurdo, Antarctica enabling the wintertime mesosphere wave climatology to be investigated for the first time.
- McMurdo waves exhibit a large spread of phase speeds with a tendency for high phase speeds up to ~120 m/s.
- New keogram analysis enables the investigation of larger period gravity waves and tidal perturbations in the mesosphere revealing 6, 8, 12, and 24 hr tides and harmonics.
- The sources of the wave events from McMurdo are probably associated with strong localized weather systems associated with the polar vortex.
- Small-scale wave event analysis results are comparable using FFT and keograms.

Future Work
- Ongoing measurements from the South Pole station in combination with other ANGWIN sites will be used to investigate pan-Antarctic anisotropy and wave parameters.
- New analysis of McMurdo data from 2013 and 2014 data will further clarify the asymmetries in the wave propagation at this site for understanding the climatology of gravity waves observed at McMurdo.
- Comparison with satellite observations can be conducted to further clarify the asymmetries.

Acknowledgments
This work was supported by NSF grant ATM-1035358.

Michelle Lynn Pyle¹-², Dr. Ryan Davidson¹, Dr. Erik Syrstad², Dr. Charles Swenson¹

¹Utah State University Department of Electrical and Computer Engineering, ²Space Dynamics Laboratory

Time-of-Flight Mass Spectrometry (TOFMS) is a technique for determining particle mass using a temporal data spectrum. Charged particles are accelerated through an electric potential, with higher resulting particle speeds corresponding to particles with lower mass. A particle’s time of arrival is measured and used to determine the particle mass.

**Mission:** Data from density and composition studies of Earth’s upper atmosphere are used to improve atmospheric models. The Miniaturized Time-of-Flight Mass Spectrometer will be designed for a CubeSat bus and will be capable of providing data with better temporal and spatial resolution than previous instruments flown on larger satellites. This design aims to leverage full-scale TOF resolution techniques to achieve mass resolution comparable to larger instruments.

**Entrance:** Aperture, Ionizer, and Bradbury-Nielsen Gate (BNG) (signal modulation)

**Accelerators:** Charged grids to create acceleration fields

**Drift Tubes:** Field-free regions, particles separate by mass.

**Gradient Reflectron:** Parabolic field to reflect particles

**Detector:** Miniaturized Micro-channel Plate (MCP) detector

**Search for Optimal Dimensions:** Optimization functions written in MATLAB calculated maximum drift region lengths given a set of dimensions [reflectron depth, spacing between accelerators, accelerator voltages], calculated flight times for 60 AMU, and evaluated each dimension set based on a spacing parameter.

\[
\text{spacing} = \frac{\text{width of 60 AMU peak [seconds]}}{\text{distance between 59 and 60 AMU peaks [seconds]}}
\]

Outcomes of the dimension search suggested larger dimensions for the reflectron depth [55 mm reflectron design pictured].

**BNG Driver Design:** Alternating wires of the BNG may be driven using a high-speed high-side/low-side boost driver and high voltage, high speed MOSFET switches. Electrical parameters from a previously fabricated BNG were used to simulate the BNG and evaluate the driver performance.

**SPICE simulations of the BNG driver show ion pulse widths less than 35 nanoseconds. Power consumption will be evaluated and further improvements in rise time and pulse width may be possible.**

**MCP Signal Collector Design:** Storage of data from a Constant Fraction Discriminator (CFD) or Analog-to-Digital Converter (ADC) in a high-speed register to be transferred at larger intervals to an onboard computer will balance timing requirements for signal sampling and power consumption of onboard computers.

**Electronics plan for the TOF-MS:** High voltage drivers for the reflectron, detector, and accelerators; High-speed switching drivers for the BNG; High-speed pulse detection for the MCP signal.

**SIMION was used to evaluate reflectron electrode potential sets and electrode shapes.**

Flight time estimations and SIMION simulation results show similar resolving power. Flight time estimation was run using a 30 nanosecond Time of Birth (TOB) range. SIMION simulations were run for a 30 nanosecond TOB range and a 0.42 mm starting position range (based on a 50 nanosecond gate pulse and thermal velocity distribution of the particles).

**SIMION Simulated Flight Times vs. Flight Time Estimation**

**Search for Optimal Dimensions:** Optimization functions written in MATLAB calculated maximum drift region lengths given a set of dimensions [reflectron depth, spacing between accelerators, accelerator voltages], calculated flight times for 60 AMU, and evaluated each dimension set based on a spacing parameter.

\[
\text{spacing} = \frac{\text{width of 60 AMU peak [seconds]}}{\text{distance between 59 and 60 AMU peaks [seconds]}}
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Summary

We have analyzed one year of data to determine the wave event properties. The results are as follows:

- A large number (400+) of short-period gravity waves observed over McMurdo, Antarctica, enabling the wintertime mesosphere gravity wave climatology to be investigated for the first time.
- McMurdo waves exhibits a large spread of observed phase speeds with a tendency for high phase speeds to ~120 m/s.
- New keogram analysis enables the detection of larger period gravity waves and tides in the mesosphere revealing 6, 8, 11 and 14 tide frequencies.
- The sources of the wave events observed are associated with strong localized weather systems.
- Small-scale wave event analysis resulted in high phase speeds.

Future

- Ongoing measurements from the SAA-ANGWIN sites will be used to investigate wave event parameters.
- New analysis of McMurdo data for systematic gravity wave asymmetries in the wave propagating directions will be performed.
- Comparison with onsite Fe Boltzmann hot electron measurements.

Entrance: Aperture, Ionizer, and Bradbury-Nielsen Gate (BNG) (signal entrance)

Accelerators: Charged grids to create acceleration fields

Drift Tubes: Field-free regions, particles separate by mass

Gradient Reflectron: Parabolic field to reflect particles

Detector: Miniaturized Micro-channel Plate (MCP) detector

Mission: Data from density and composition studies of Earth’s upper atmosphere will be used to improve atmospheric models. The Miniaturized Time-of-Flight Mass Spectrometer will be designed for a CubeSat bus and will be capable of capturing essential data with better temporal and spatial resolution than previous instruments on larger satellites. This design aims to leverage full-scale TOF resolution techniques to achieve mass resolution comparable to larger instruments.

Note: The illustrations depict the instrument layout and key components.

Acknowledgements: This research was supported by NSF grant ANT-1204741.
I. Introduction


II. Methods

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III. Results

Figure 1 – Make these visuals your focal points

![Graph showing data over time](image)

Study conducted with funding from a USU Undergraduate Research and Creative Opportunity Grant and lab assistance from the USU Department of Biology.
Four-column format utilizing boxed text and integrated color scheme

I. Introduction

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II. Methods

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III. Results

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IV. Conclusions

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unt.
Level 3: Be attractive.

1. Let it breathe!

2. Customize colors/fonts
Self-Advocacy in children with hearing loss

Hearing Technology Management
- wears technology
- takes technology on/off independently
- checks and replaces batteries
- notifies teacher of technology trouble
- performs visual inspection of technology
- engages in Ling 6 sound test

Proactive Listening
- seeks to improve listening environment
- seats him/herself for best listening

Social and Academic
- seeks clarification from peers and adults
- engages in class discussions and peer interactions
- can explain hearing loss and technology

Recommendations

Skill levels

Introduction

Self-advocacy is an essential component of social-emotional skill development. For children who are deaf or hard of hearing (DHH), self-advocacy is considered especially critical, as the broader population is not always understanding of their needs. Regardless of the severity of loss, all children who are DHH need to demonstrate the ability to self-advocate across settings and may require additional support in developing these skills. Age-appropriate self-advocacy skills can and should be introduced within early intervention home-based programs and within the preschool classroom to establish the foundation for future growth and development.

Methods

A self-advocacy ratings questionnaire for young children who are DHH was developed and distributed to preschool through third-grade listening & spoken language teachers.

Participants included 12 teachers who offered their perceptions on the self-advocacy skills of their students with hearing loss (n = 64).

Teachers completed both quantitative and qualitative survey components that revealed information on:
- student skill level in hearing technology management, social and academic self-advocacy skills and proactive listening.
- frequency and type of self-advocacy goals listed in student Individualized Education Programs (IEPs)
- self-advocacy skills taught within the classroom
- impact of self-advocacy skill level on academic and social/emotional development
- teacher recommendations for fostering self-advocacy skill development.

Results

Teacher perceptions of skill level increased from preschool to kindergarten across all three self-advocacy priority areas (see inset).

Skill level was generally higher in areas of self-advocacy that required a lower level of skill. Skills that required higher levels of responsibility, greater expressive communication or interaction with others were identified as general areas of weakness.

For teachers who incorporated self-advocacy skills into their classroom instruction, a majority indicated that they focused on skills that required a lower level of responsibility or technical skill (e.g., consistent wearing of hearing technology, taking technology on/off), while very few identified more difficult skills as part of their curriculum (e.g., FM system responsibility, visual inspection of technology).

Children benefit when teachers utilize proper tools to identify areas of weakness in their students’ level of self-advocacy skills and consciously incorporate them into IEP goal development and classroom instruction.
LEVEL 3: BE ATTRACTIVE.

1. LET IT BREATHE!
2. CUSTOMIZE COLORS/Fonts
3. GO BIG OR GO HOME.
DATA FLOW ANALYSIS IN THE PRESENCE OF CORrelated CALLS

Marianna Rapoport, Ondřej Lhoták, Frank Tip
University of Waterloo

problem
IMPROVING THE PRECISION OF IFDS
We focus on the DFA problems that can be solved with the IFDS* (Reps et al., 1995) algorithm: IFDS works by converting a DFA problem to a graph reachability problem on an exploded supergraph (see figure →). However, it can only solve binary decision problems (e.g. “is a variable secret?”), and is not powerful enough to keep track of correlated calls.

method
A TRANSFORMATION FROM IFDS TO IDE
The IDE ** (Reps et al., 1996) algorithm can solve a larger set of problems than IFDS. IDE encodes a DFA problem with a labeled exploded supergraph. The graph edges are labeled with flow functions. We convert an IFDS problem to an IDE problem that uses flow functions to keep track of correlated calls. The flow functions serve to “remember” the enclosing classes of dispatched methods.

summary
THE PRECISION OF DATA-FLOW ANALYSES CAN BE IMPROVED IN THE PRESENCE OF CORRELATED CALLS.

into
IS YOUR DATA REALLY SECRET?
Data-flow analysis (DFA) approximates properties of programs without running them. For instance, in a taint analysis, we find out which variables are secret, e.g. to discover confidential information leaks. However, infeasible paths in a program’s control-flow graph can affect the accuracy of an analysis.

goal
ELIMINATE INFEASIBLE PATHS
An infeasible path is one that cannot occur during program execution. In an object-oriented language, two method calls are correlated if they dispatch to multiple targets. The goal of this work is to eliminate the infeasible paths caused by correlated calls.

result
CORRELATED CALLS ANALYSIS
The correlated calls analysis improves the precision of IFDS results that contain correlated calls. Infeasible paths caused by correlated calls are removed by transforming an IFDS problem into a special type of IDE problem and solving the latter.

FIND OUT MORE
- How do IFDS and IDE work?
- How are flow functions represented?
- How can we implement the correlated-calls analysis?
- How do we know the analysis is correct?

cs.uwaterloo.ca/~mrpopor
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1. An occluded front forms as a faster-moving cold front catches up to a warm front. TRUE OR FALSE?</td>
<td>2. Due to the T-bone in a Shapiro–Keyser cyclone (warm front perpendicular to the cold front), the occlusion process cannot occur. TRUE OR FALSE?</td>
<td>3. A warm-type occlusion forms if the air ahead of the warm front is colder than the air behind the cold front, whereas a cold-type occlusion forms if the air ahead of the warm front is warmer than the air behind the cold front. TRUE OR FALSE?</td>
<td>5. The formation of the occluded front signifies an end to the deepening phase of the cyclone. TRUE OR FALSE?</td>
<td>6. An occluded front has the prefrontal weather of a warm front (widespread clouds and precipitation) followed by the postfrontal weather of a cold front (clear skies). TRUE OR FALSE?</td>
</tr>
<tr>
<td>Implications for a New Paradigm:</td>
<td></td>
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<td>A better definition of the occlusion process is the wrap up of the thermal wave, narrowing of the warm sector, and the increasing separation between the warm sector and the low center.</td>
<td>The occlusion process can be generalized to the life cycles of other cyclones.</td>
<td>The Norwegian cyclone model cannot explain the vertical structure of occluded fronts and the predominance of warm-type occluded fronts.</td>
<td>The merger of the cold front and the warm front is not the moment when the brakes of development are applied. Instead, an occluded front is the byproduct of the wrap-up of the thermal wave by differential rotation around the cyclone.</td>
<td>Be careful when analyzing fronts based on satellite imagery alone. Occluded fronts are regions of active frontogenesis and can be associated with heavy precipitation, particularly to the northwest of the low center.</td>
</tr>
</tbody>
</table>
LOOK AT ALL THE ATTENTION MY POSTER IS GETTING!

PROF. CHRIS WEISS, TEXAS TECH UNIVERSITY

DR. BRAD SMULL, NATIONAL SCIENCE FOUNDATION

DOYLE RICE, WEATHER EDITOR USA TODAY
GOLGI APPARATUS

Golgi apparatus from human lens cells imaged using TEM (A) and in *Chlamydomonas* using FIBSEM (B). Stereo-pair image (C) of the surface model of Golgi shown in B. Scale bars are approximately 100 nm.

The Golgi apparatus is a familiar organelle in eukaryotic cells, part of the endomembrane system and involved in packaging proteins. Characteristic views of the Golgi are shown above, stacks of membranes surrounded by vesicles. Both the TEM (70nm thick section) and FIBSEM data (100nm thick slices) show both stacks and vesicles. When the data was reconstructed the vesicles appeared to be connected to the inter-connected membrane stacks. The 3D stereos image above shows some of this surface detail, as does the 3D model (left).

Data generated in collaboration with Chris Owen, Oxford Brookes University.
Some genes arrive to the data set expected from simulations. This may be expected from population structure inside the dataset. Nevertheless, the size of the population can reflect the size of the dataset. This means that the haplotypes might vary from one gene to another. Significant differences among genes can be found. The ZFPM2 gene is found to have a strong effect on the variability of the haplotypes bridge between the two populations.

**fig. 2:** Distribution of Genotype Network properties for the genes analyzed.

---

**What are people saying about this poster?**

If you like, you can take a post-it and leave a comment in the space on the right.

Thank you!

email: djs@upf.edu

- Things that are not explained clearly in the poster
- How to improve the method?
- Other comments

***Post-it Notes***

- Do we have a wide range of data? How was it chosen to be examined? Could we guess if the network is not working?

---

*No Title*

- Box 1 is not very clear (use images)
- No references
Level 1: Be Understandable

Level 2: Be Interesting

Level 3: Be Attractive
NOW

YOU HAVE YOUR POSTER
SUPER POWERS.
Anna McEntire
Director of Project Management and Communications
USU Office of Research and Graduate Studies
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HOW TO DESIGN STUNNING POSTERS