CONGRATULATIONS!
The Union Fellows
Selection Committee is proud to
present the 2013 AGU Fellow to Dr. James Russell, III! We would like to con-
gratulate Dr. Russell for his lead-
ership in developing and oper-
ating experiments, for answering
questions about the Earth’s at-
mosphere and for the sustained
impact of his work.

Established in 1962, the Fellows
program recognizes AGU mem-
bers who have attained acknowl-
edged eminence in the Earth
and space sciences as valued by
their peers and vetted by a com-
mittee of Fellows. The primary
criterion for evaluation of scien-
tific eminence is a major break-
through or discovery, paradigm
shift, or sustained impact.

This year 214 nominations were
submitted for review by 17 sec-
tion and focus group Fellows
committees. After careful con-
sideration by the section and
focus group Fellows committees,
103 nominees were submitted
for final consideration and re-
view by the Union Fellows Com-
mittee. AGU bylaws require that
the size of a Fellows class be lim-
ited to no more than 0.1% of the
total AGU membership. As a re-
result, 62 individuals have been
elected into the 2013 class of
AGU Fellows, which includes the
largest number of women elect-
ed in one year.

AGU acknowledges the tenacity
and steadfast work of the volun-
teers who agreed to serve on a
Fellows committee.

The Honors Ceremony and Ban-
quet will be held at the 2013
AGU Fall Meeting in San Francis-
co, CA on Wednesday, Decem-
ber 11.

Dr. Russell joins Dr. M. Patrick
McCormick to this elite group of
scientists. Dr. McCormick was
elected an AGU Fellow in 2008.

DR. JAMES RUSSELL, III 2013 AGU FELLOW

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This newsletter has been created by the Atmospheric & Planetary Sciences department at Hamp-
ton University to share information and updates
pertinent to our research and activities. Please
send your ideas and contributions for future is-
Hampton University's **Department of Atmospheric and Planetary Sciences** offers a course of study leading to Ph.D. and M.S. degrees. Students from a variety of academic disciplines are welcome, and the curriculum maintains flexibility to match individual interests. Research activity and expertise are major strengths of the department and its associated **Center for Atmospheric Sciences (CAS)**, providing opportunities for student participation. The Department also offers an undergraduate minor concentration in **Space, Earth, and Atmospheric Sciences (SEAS) APS Minor** (renamed in Summer 2011). Students taking the APS Minor curriculum have an opportunity to pursue careers in aerospace and aviation with such government agencies as NASA and NOAA.

### RESEARCH AREAS:
- Ozone Trends & Atmospheric Chemistry
- Polar Stratospheric & Mesospheric Clouds
- Lidar and Related Technologies
- Solar Variability & Effects on Earth
- Remote Sensing
- Satellite Data Assimilation in Weather Forecast Models
- Space Weather
- Planetary Magnetospheres & Aurorae

### PHD DEGREE PLANS

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**Total:** 74 Hrs

### MS DEGREE PLANS

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*Atmospheric Science Track

*Planetary Science Track
CONGRATULATIONS
2013 GRADUATING CLASS!

APS Accepts Three New Students

LIQIAO LEI is from China. She received her Bachelors from NingXia University in 2001 and her Masters at Anhui Institute of Optics & Fine Mechanics, Chinese Academy of Science in 2004. Liqiao will be pursuing her Ph.D. in Atmospheric Sciences at Hampton University.

ANDREA KARELITZ is from Pittsburgh, PA. She received her Bachelors in Meteorology from Penn State University in 2013. Andrea will be pursuing her Masters in Planetary Sciences at Hampton University.

JOHN BLALOCK is from Matoaca, VA. He received his Bachelors in Physics from Longwood University in May 2013. John will be pursuing his Ph.D. in Planetary Sciences at Hampton University.

THESIS DEFENSE

ROBERT B. LEE, III (Ph.D.)
July 11, 2013
Tropospheric Temperature Measurements using a Rotational Raman Lidar

YONGXIAO JIAN (Ph.D.) - July 8, 2013
Retrieval of Temperature and Water Vapor from Combined Satellite and Ground Based Ultra-Spectral Measurements

KEVIN LEAVOR (Ph.D.) - April 8, 2013
Noise Reduction in Lidar Signals Using Thresholded Empirical Mode Decomposition: Analysis and Applications
This summer students engaged in CREST fundamental research under the direction of research scientists and faculty from Hampton University’s Center for Atmospheric Sciences. This 8-week session provided research in atmospheric sciences and space sciences using observations from NASA spacecraft and ground-based measurements from optical instrumentation, with a goal of understanding our home planet, Earth.

The students engaged in:
- Researching astronomical and atmospheric observations and measurements
- Explored spacecraft data analysis
- Developed data analysis techniques
- Attended workshops to develop and hone techniques of measurement and analysis using scientific software
- Attended seminars on current issues of climate change, space exploration, and comparative planetology; promoting new perspectives of Earth, our home planet.

The CURE Program mentors were Robert Loughman, John Anderson, John McNabb, Neda Boyouk, Michael Hill, Kunio Sayanagi, Jia Yue, Nicholas Heavens and Kevin Leavor under the leadership of Dr. M. Patrick McCormick, the CREST principal investigator. Each mentor had a group of students that he served as an advisor to in a specific area of research.

The students went on field trips to the National Weather Station Wakefield Office in Wakefield, VA and to Nauticus Maritime in Norfolk, VA. Our program participants came from HU and various universities across the country, including, Washington and Jefferson College, Juniata University, Millersville University, University of Maryland, Baltimore County and Howard University.

As their final project, the students gave a presentation and talk to show their research.

In the upcoming summer of 2014, the department anticipates funding to offer another academically challenging Summer research experiences for undergraduates.

The 8th Annual NOAA CREST Symposium, Climate & Extreme Weather Impacts on Urban Coastal Communities was held on June 5 through 6th 2013 at the CUNY/City College of New York.

This year’s NOAA CREST Symposium assembled government administrators, climatologists, scholars, researchers, economists, social scientists and the media for a 2 day symposium. Participants were able to share research ideas and results and had the opportunity to develop professional networks with other scientists and educators from various agencies and groups including NOAA, NASA and other federal agencies.

PIRT Program Students Welcomed to ARL

A key program for guest researcher students, now in its second summer, falls under the Army Research Office’s Partnership in Research Transition Program, which funds five Centers of Excellence at various Historically Black Colleges and Universities. This summer, 13 PIRT interns were placed at ARL labs, 11 at ALC and 2 at the Engineer Research and Development Center. They were distributed across a variety of projects, from laser systems research for atmospheric sensing to sociolinguistic investigations of conversational style switching.

Christa Cochran, an APS Graduate Student, participated in the program this summer in which she worked closely with Melvin Felton a former Physics student from Hampton University.

The PIRT program is administered through ARO and was established as the second phase of what was previously known as the Battlefield Capability Enhancement, or BCE, Centers of Excellence. A key contrast with that of BCE, PIRT’s principal objective is to enhance programs and capabilities of a select number of high-interest scientific and engineering disciplines through Army-relevant, topic-focused, near-transition-ready innovative research.

Dr. Val Emery, ARL outreach program manager, worked with ARO to conceptualize and initiate this effort, and is an avid supporter of the PIRT program as a way to bring new talent into ARL. He maintains close ties to the students, mentors and institutions. The PIRT program is managed by ARO HBCU/MI program manager, Patricia Huff.

On June 24, PIRT mentors Dr. Michelle Vanni of ARL’s Computational and Information Sciences Directorate's (CISD) Information Science Division and Dr. Melvin Felton of CISD’s Battlefield Environment Division organized a PIRT Guest Researcher Welcome Reception to bring these students together to learn about each other's projects.

"At this stage in their careers," said Felton, "[the students] are usually surrounded by people who are all in the same area of study. We have a great opportunity to get them together so that they can share experiences and broaden their horizons."

"We wanted to give PIRT students the opportunity to compare notes with colleagues, such as other PIRT program students working for the summer at ARL, who are likely to be having similar experiences with academics and internships," commented Vanni.

The PIRT centers and ARL/ERDC Division Sponsors are Howard University-Language and Computer Science, Howard University-Engineering, Delaware State University, Hampton University and North Carolina A&T University.
Christopher Spells, an APS Ph.D. Graduate Student, participated in the 8th Aerosol and Ocean Science Expedition (AEROSE) research cruise aboard the National Oceanic and Atmospheric Administration (NOAA) ship Ronald H. Brown from 8 Jan 2013 to 13 Feb 2013. AEROSE is a trans-Atlantic research mission that seeks to characterize the physical, chemical, and biological evolution of Saharan and sub-Saharan aerosols advected off the coast of Western Africa and transported westward across the tropical Atlantic Ocean. The AEROSE missions involve a suite of in-situ and remote sensing measurements to assess the impact of aerosols on the ocean and atmosphere during transport.

Maritime atmospheres are an under-sampled region because it is difficult and expensive to collect in-situ measurements over the oceans. Approximately 70% of the Earth is covered by water; therefore missions such as AEROSE help fill a void in the atmospheric data record as surface measurements over the oceans are very sparse. While satellite measurements provide global data, the unique thermodynamic and dynamic nature of advected Saharan dust and biomass burning (smoke) aerosols provide a challenge for satellite retrievals. Radiosonde, ozonesonde, and surface radiation measurements collected during AEROSE are particularly important for satellite validation and calibration. Other measurements collected during AEROSE include sun photometer measurements, bulk and size segregated Particulate Matter (PM) 2.5 μm and PM 10 μm aerosol sampling, surface ozone (O₃), carbon monoxide (CO), nitric oxide (NO) and nitrogen dioxide (NO₂) or NOₓ, and sulfur dioxide (SO₂) trace gas sampling.

Christopher also presented weather forecasts during this research mission. The weather forecasts help the AEROSE research team plan sampling cycles for the upcoming days, when to launch ozonesondes during dedicated CrIS overpasses, and what to expect during sun photometer measurements. Aerosol models are used to help forecast different air masses that may be encountered during the upcoming days, e.g. aerosol surface concentration, aerosol AOD, and type of aerosols. Synoptic and mesoscale patterns are also forecasted from the surface to 200 MB, which allows the AEROSE team to plan for precipitation, get an idea of aerosol source regions, and to compare observations to different aerosol models.

Data collected during AEROSE VIII and previous AEROSE missions are being used by Christopher in his Ph.D. work. Christopher is researching how Saharan region aerosols affect the radiation balance over the tropical Atlantic Ocean.
DUST: A Model for Effectively Teaching Global Climate Change Concepts

Hampton University and their partners National Aeronautics and Space Administration (NASA) EDGE, Goddard, Jet Propulsion Laboratory (JPL), Fort Hays State University and S’COOL are engaging Virginia teachers in a climate change teaching and learning community to better understand the effects of African and China mineral dust. The hands-on professional development (PD) project is assisting teachers in furthering their understanding of aerosol properties, behavior, and their effects on local and potentially global climate. Activities include two week-long residential workshops (June 2012 and June 2013) followed by learning team sessions and electronic events conducted during the academic years. The goal is to provide a PD model that advances the understanding of how to effectively teach global climate change concepts by using current research on dust.

Recent studies indicate that dust may play an even greater role in global climate change than previously thought by scientists. Project evaluation indicates that the teachers are developing a greater confidence in their understanding of the science associated with global climate change and they are increasing their knowledge of and their ability to use NASA and other resources for instructional use.

AIM EPO WORKSHOPS

June (2013) - AIM EPO lead instructor, Paul Adams, presented hands on classroom activities at a NASA / Hampton University professional development workshop on climate change in Syria, VA.

June (2013) - AIM lead teacher, P. Jones, presented climate classroom activities to teachers attending a NASA / Hampton University leveraged workshop on climate.

Feb. (2013) - AIM EPO lead instructor, Paul Adams conducted a videoconference on looking at NASA data with teachers from Portsmouth, VA who are participating in a leveraged professional development workshop, directed by Dianne Robinson and funded by the State Council for Higher Education (SCHEV) in VA.
APS at the Movies: Europa Report

Members of the APS faculty (Moore, Sayanagi and McNabb) attended a screening of the independent film Europa Report at the Naro Theater in Norfolk. The film depicts a mission to send six people to Jupiter’s moon Europa in search of alien life. APS Professor William B. Moore gave a brief presentation on the science of Europa exploration before the film and then answered questions afterward to a group of interested moviegoers.

Moon Samples Light Up Planetarium Crowd

Dr. William B. Moore of the Atmospheric and Planetary Science Department treated a crowd of about 30 students and parents to a presentation on the origin of the Moon at the Jones Middle School planetarium on November 13. The attendees also got to check out actual Apollo program samples from the Moon and meteorites obtained from Johnson Space Center by Lawrence “Bird” Taylor of the Virginia Peninsula Astronomy Stargazers. Dr. Moore gave a “tour” of the samples and answered questions from the audience before the monthly (2nd Tuesday) planetarium show.

Teachers Sink Their Teeth into Science at CEE’s “Bite of Science” Event

Over two dozen high school STEM educators took part in the Center for Excellence in Education’s “Bite of Science” event at the Virginia Air and Space Center October 10, and were treated to a presentation by APS’s own Dr. William B. Moore. While the teachers dug into a catered meal in the museum library, Dr. Moore gave a presentation on the exploration of Jupiter’s moon Europa. Afterward, the teachers brainstormed some ways to take the science of Europa exploration back into their classrooms. The second half of the event featured Mike Wallace, an engineer at Newport News Shipbuilding, who wowed the audience with stories of some of the amazing things being built at the shipyard.
**Dr. Tao Li** is an internationally recognized atmospheric scientist from the University of Science and Technology in China with over 15 years of research experience in validating satellite datasets with ground-based measurements (e.g., lidar, radar and airglow imagers) and other satellites. He has conducted numerous research projects on the seasonal, interannual and long-term variability of middle atmosphere temperature, dynamics and composition and has published over 30 peer-reviewed papers in leading journals.

His extensive research experience in both satellite (e.g., TIMED, CALIPSO) and lidar (laser radar) data analysis demonstrates his unique capability to validate the SOFIE ozone product from the AIM satellite with global and ground-based ozone measurements. His expertise and insight in climate change of the middle atmosphere allows him to validate and characterize the SOFIE ozone product especially from a climate point of view, which is one of the most critical scientific questions in this century. Dr. Li has already collaborated with the TIMED SABER team and Dr. James Russell, III to study the El Nino impact on middle atmosphere temperature.

Here at Hampton University, he will work closely with Dr. Russell and Dr. Jia Yue to correlate the change in ozone with El Nino and other climate-related phenomena. He will report his work in a seminar at APS. His international status and recent experience with APS satellite data uniquely qualify him for expanding this work with AIM/SOFIE and HALOE data sets to characterize the ozone changes responding to El Nino, and its impact on global climate.

**Dr. Xiao Liu** is an Associated Professor in College of Mathematics and Information Science at Henan Normal University in China. He is visiting Atmospheric & Planetary Sciences during May 31-August 30, 2013 as a Visiting Scholar. Dr. Liu received his Ph.D. in Space Physics from National Space Science Center at Chinese Academy of Science in Beijing in 2007.

He has developed two- and three- dimensional numerical model to simulate the atmospheric gravity waves propagating from the troposphere/stratosphere to the mesosphere/thermosphere. Using the model he has completed many interesting works related to the gravity waves and their interactions with tides. Moreover, he is doing data analysis of the climatology of thermospheric wind based on the FPI observations in China. Here at Hampton University, Dr. Liu is working with Dr. Jia Yue and Dr. James Russell, III to analyze the SOFIE/AIM temperature data and study gravity waves at polar regions.

**Dr. Yuefeng Zhao** was a Vice Professor in the School of Physics and Electronics at Shandong Normal University. He received his Ph.D. at Anhui Institute of Optics and Fine Mechanics (AIOFM), Chinese Academy of Sciences in 2007. He is visiting Atmospheric & Planetary Sciences department for six months as a Visiting Scholar.

Dr. Zhao research includes all solid state laser, array type laser marking machines, and photoelectric detection. He also built a laser radar prototype, using Raman method to detect the levels of carbon dioxide in the atmosphere.

Dr. Zhao is currently engaged in the research of photoelectric detection and other research projects which include:

- Study on RAMAN gain lidar to detect the tropospheric carbon dioxide concentration.
- Study on the measurement of based on frequency modulation optical fiber.

Here at Hampton University, Dr. Zhao is working with Drs. Su and McCormick on developing techniques on the measurement of aerosol and CO₂ using lidars, including raman techniques.
Visiting Research Scientists and Scholars

Dr. Jiyao Xu, Professor and Vice Director of State Key Lab. of Space Weather, Center for Space Science and Applied Research of Chinese Academy of Science. He is visiting Atmospheric & Planetary Sciences Department at Hampton University during November 17-26, 2013.

He studied tidal waves, planetary waves, effect of aurora heating on the atmospheric structure, effect of variations of thermospheric density on the satellite orbits, modulations of tides and gravity waves on airglow emissions using satellite data, such as TIMED/SABER, AURA/MLS, CHAMP, GRACE, and ground-based observations. He has developed two-dimensional photochemical-dynamical coupling gravity wave numerical model to study the atmospheric gravity waves propagating from the troposphere/stratosphere to the mesosphere/thermosphere and its effect on the photochemistry and airglow emissions and sodium layer.

Welcome New APS Faculty Member

Robert Benjamin Lee, III is a US citizen, born in Norfolk, Virginia. He obtained his Ph.D. in Physics, with a concentration in Atmospheric Sciences, from Hampton University (HU); MS in Engineering Physics from the University of Virginia; and a BS in Physics from Norfolk State University.

He has over 40 years of experience as a research scientist in the use and development of weather and climate ground-based and spacecraft remote sensors, obtained at the National Aeronautics and Space Administration (NASA) Langley Research Center (LaRC), Hampton, VA 23681. At NASA, he served as a co-investigator on several international spacecraft missions/science teams, such as the NASA Earth-Radiation Budget Experiment ERBE), the Clouds and the Earth's Radiant Energy System [CERES], and the Space Shuttle Hitchhiker Program, Belgium SOLCON (Solar Constant) investigation. He is the author/co-author of over 200 technical papers/articles.

In November 2013, he became a HU Postdoctoral Fellow, working with Professor M. Patrick McCormick, in the Atmospheric and Planetary Sciences Department. Dr. Lee is responsible for conducting lidar research related to the measurements of tropospheric aerosols, temperature, water vapor, and wind fields profiles.
Meeting(s) Hosted by APS Department

28th SABER Science Team Meeting
November 19-20, 2013

The 28th SABER Science Team Meeting was hosted by the Atmospheric and Planetary Sciences department at Hampton University. SABER (Sounding of the Atmosphere using Broadband Emission Radiometry) is one of four instruments on NASA’s TIMED (Thermosphere Ionosphere Mesosphere Energetics Dynamics) mission. Its goal is to explore the mesosphere and lower thermosphere globally and achieve a major improvement in our understanding of the fundamental processes governing the energetics, chemistry, dynamics, and transport of the atmospheric region extending from 60km to 80km.

The Atmospheric & Planetary Sciences department held the Partnership & Research Transition (PIRT) meeting at Hampton University. The principal objective of PIRT is to enhance programs and capabilities of a select number of high-interest scientific and engineering disciplines through Army-relevant, topic-focused, near-transition-ready innovative research. Furthering the Army Research Laboratory’s (ARL) policy of advocating and supporting research at Historically Black Colleges and Universities and consistent with the stated mission of the White House Initiative on HBCUs, a secondary objective of PIRT is to strengthen the capacity of HBCUs to provide excellence in education and to conduct research critical to the national security functions of the Department of Defense (DoD).
A monstrous thunderstorm on Saturn has recently taken the term super storm to the next level. A new observation of Saturn made by NASA’s Cassini mission shows the most intense thunderstorm ever observed in the universe. Dr. Kunio Sayanagi, assistant professor in the HU Department of Atmospheric and Planetary Sciences and a Cassini imaging team associate, is the lead author of a new paper in the journal “Icarus” that provides the most detailed view on the life and death of a monstrous thunder-and-lightning storm on Saturn. Sayanagi and the Cassini team are studying the extreme weather events on Saturn with the hope of applying their lessons to weather on Earth.

As a member of the Cassini imaging team, Sayanagi is among the first to receive images from the probe’s two high-resolution visible light cameras. Sayanagi analyzes the dayside of Saturn. The Cassini mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency, and, to date, it is the first and only mission to orbit Saturn. The Cassini spacecraft has been in orbit around Saturn since 2004.

“Similar to how huge storms here on Earth are affected by temperature and moisture distribution, this storm on Saturn was too,” stated Sayanagi, who earned a Ph.D. in Physics from the University of Arizona and held research positions at various institutions including the California Institute of Technology (Caltech), where he became a part of the Cassini team. “This thunder-and-lightning storm on Saturn was a beast. The storm maintained its intensity for an unusually long time.”

The storm, which lasted for 267 days, was the longest running of the massive storms that appear to break out in Saturn’s northern hemisphere once every Saturnian year (30 Earth years).

“We are interested in extreme weather because, if you want to test the limits of your knowledge, you study the most extreme cases,” said Sayanagi. “The same physics that governs the weather on Earth also controls the weather on Saturn.”

Earth’s hurricanes feed off the energy of warm water and leave a cold-water wake. The storm on Saturn also feasted off warm air. The storm was first detected on Dec. 5, 2010. Usually, terrestrial storms encounter topographic features like mountains first and expend themselves. But Saturn has no land to stop its hurricanes. The turbulent storm head was able to chomp all the way around the planet until it ran into the vortex of the storm in June 2011 that the massive storm faded away. Why the encounter would shut down the storm is still a mystery.

At HU, Sayanagi’s research includes his work with Cassini as well as research focused on modeling of jet streams on Jupiter and Saturn, for which he was awarded grants totaling $400,000 from NASA and the National Science Foundation.
The National Science Foundation (NSF) has awarded a research grant to Dr. Nicholas G. Heavens, Research Assistant Professor of Planetary Science at Hampton University in the Department of Atmospheric and Planetary Sciences, to study the dust cycle and its biological impacts during the Earth’s last period of extensive continental ice sheets, roughly 300 million years ago.

Dr. Heavens will collaborate directly with researchers at the University of Oklahoma, Johns Hopkins University, the University of Michigan, and the Smithsonian Institution, among others.

The project will involve using the Community Climate System Model, an important tool for studying modern climate change, to study climate transitions during the Earth’s deep past. The climate model will help organize geologic data into a coherent picture of the role of atmospheric dust in climate and biological evolution.

Preliminary modeling suggests dust storms were common in the deserts of the supercontinent Pangaea on both sides of the Equator 300 million years ago. On present-day Earth, the Southern Hemisphere is much less dusty than the Northern Hemisphere.

Dr. William B. Moore has been awarded a 3-year NSF grant to study the early history of the Earth and how it cooled early in its history. After the Earth’s first solid crust formed, the hot interior continued to cool by producing huge amounts of magma that worked its way to the surface through cracks and fissures acting as vents. These vents function as magmatic heat pipes, transporting hot, molten rock to the surface where it loses its heat to the atmosphere and eventually to space. Jupiter’s volcanic moon Io currently operates this way, and Dr. Moore will be applying his studies of the most volcanically active body in the solar system to understand how the Earth cooled during its first billion or so years.
Dr. James M. Russell, III principal investigator of the AIM Satellite Mission is awarded two more operating years by the Heliophysics Division Science Mission Directorate at NASA Headquarters. AIM had very successful accomplishments in the first 6 years of the mission. The Heliophysics Review Panel was also impressed with the broadening of the original goals of AIM following the successful measurement of several originally unplanned parameters—meteoric smoke, gravity waves, and various gas phase constituents.

In 2013, the noctilucent – or night-shining – cloud season got an early start. NASA’s AIM spacecraft first saw them on May 13. The season started a week earlier than any other season that AIM has observed, and quite possibly earlier than ever before, said Cora Randall of the Laboratory for Atmospheric and Space Physics at the University of Colorado.

The four data images show Earth’s upper atmosphere, centered on the North Pole, as observed by the AIM satellite. The image on the upper right shows noctilucent clouds on May 23, 2013; the upper left image compares the same week from 2012. The two bottom images show the extent of noctilucent clouds in mid-June of each year. The brighter the clouds in each image, the denser the ice particles. Areas with no data appear in black, and coastal outlines are traced in white. You can view a daily composite projection of noctilucent clouds by clicking here during the northern summer months.

Dr. Russell, principal investigator of AIM and professor at Hampton University said:

It turns out that meteoroids play an important role in the formation of noctilucent clouds. Specks of debris from disintegrating meteors act as nucleating points where water molecules can gather and crystallize.

Ash and dust from volcanoes—and even rocket exhaust—also can serve their nuclei.
Dr. John Anderson, Associate Research Professor in Atmospheric Science, has been involved in a project with researchers from NASA JPL and Georgia Tech University called the Global Ozone Chemistry And Related trace gas Data records for the Stratosphere (GOZCARDS). The goal of the GOZCARDS project is to provide commonly-formatted Earth System Data Records (ESDRs) of stratospheric composition, of high relevance to the issue of ozone decline and recovery. The GOZCARDS project is part of the NASA Making Earth Science data records for Use in Research for Earth Science (MEaSUREs) program, aimed on improving the quality and availability of long-term ESDRs. The merged HC1, O3, and H2O data sets are now publicly available.

Dr. Anderson’s main responsibility was the creation of a merged H2O data record. The data records used to construct the merged H2O record are drawn from satellite-derived monthly-zonal-averages from 1991 to the present. The satellite data sets used are from the Halogen Occultation Experiment (HALOE) from 1991 to 2005, the UARS Microwave Limb Sounder (UMLS) from 1991 to 1993, and on-going (since 2004) measurements from the Aura Microwave Limb Sounder (AMLS) and the Atmospheric Chemistry Experiment Fourier Transform Spectrometer (ACE-FTS). The following is a summary of creating this merged record.

**Summary of Iterative Approach to Merging Different Satellite Instruments**

- From the overlap period, Aug-2004 to Nov-2005 (See Figure 1, left panel):
  - **AMLS, ACE-FTS**
    - Ref0 is created from co-located AMLS and ACE-FTS points
    - Offsets are then calculated for both instruments based on Ref0
    - Ref1 is then created from the available Ref0 and adjusted AMLS
  - **AMLS, ACE-FTS, HALOE**
    - Ref2 is then created from a weighted average of co-located Ref1 and HALOE
    - Ref2=(2*Ref1+HALOE)/3.
    - Offsets are then calculated for HALOE and Ref1 based on Ref2
    - Ref3 is then created from the available Ref2 and adjusted Ref1.
    - Offsets are then calculated for all 3 instruments based on Ref3 (this has already been done for HALOE)

AMLS, ACE-FTS, and HALOE are then adjusted using the derived offsets and averaged (at collocated points with other instruments) to create the merged set. UMLS is then merged in by using the adjusted HALOE (Oct. 91 – Apr. 93) as reference. See Figure 1, right panel. Figure 2 shows the tropical tape recorder derived from the merged water vapor measurements.


Michelle Selvans, Smithsonian Air and Space Museum, ‘Relationship between prominent tectonic features and crustal thickness on Mercury’ on November 6, 2013.


Hongyu Liu, National Institute for Aerospace, gave a seminar entitled, ‘Springtime Ozone Enhancements in the Lower Troposphere over Beijing: In Situ Measurements and Model Analysis’ on October 16, 2013.

Andrij Horodysky, HU - Marine and Environmental Sciences, gave a seminar entitled, ‘Linking Form, Function, and Environment for Mechanistic Insights into Fish Behavior’ on October 7, 2013.


Meredith Elrod, National Institute for Aerospace/University of Virginia, gave a seminar entitled, ‘Seasonal and Radial Trends in Saturn’s Magnetospheric Plasma Between the Main Rings and Enceladus’ on September 25, 2013.

Stanislav Kireev, Research Assistant Professor - HU APS Dept., gave a seminar entitled, ‘Development of GOES-R ABI Retrieval Algorithm for Mesoscale Atmospheric Sounding’ on September 18, 2013.


Tao Li, University of Science & Technology in China, gave a seminar entitled, ‘Influence of El Nino-Southern Oscillation on the Middle Atmosphere Temperature and Ozone’ on August 8, 2013.

Alyssa Rhoden, NASA GSFC, gave a seminar entitled, ‘Cracking under the Stress: Europa’s Orbit, Tides, and Fracture Systems’ on April 24, 2013.

John Hair, NASA - LaRC, gave a seminar entitled ‘Overview of Recent (2001-present) NASA LaRC’s Instrument Developments and Measurements using High Spectral Resolution Lidar (HSRL) and Ozone Differential Absorption Lidar (DIAL)’ on April 17, 2013.

Anna DeJong, Christopher Newport University, gave a seminar entitled ‘Models of Earth Magnetospheric Response to Solar Wind Drivers’ on April 10, 2013.

Carlos Salgado, Norfolk State University, gave a seminar entitled ‘NSU’s Rapid Response Robotic Telescope at Fan Mountain’ on April 3, 2013.
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Guillaume Martinat, Old Dominion University, gave a seminar entitled ‘Simulation of Stratified Turbulence Over the Coastal Shelf’ on March 6, 2013.

David Choi, NASA GSFC, gave a seminar entitled ‘Planetary Weather as Revealed by Automated Cloud Feature Tracking’ on February 27, 2013.

JOURNAL CLUB - Spkr #1 Ernest Nyaku - APS PhD Student, gave a seminar entitled ‘SCIAMACHY stratospheric aerosol extinction profile retrieval using the OMPS/LP Algorithm’ and Spkr #2 Stanislav Kireev, Research Assistant Professor - HU APS Dept., gave a seminar entitled ‘Rodgers 1976 Retrieval of Atmospheric Temperature and Composition from Remote Measurements of Thermal Radiation’ on February 13, 2013.


Bruce Wielicki, NASA - LaRC, gave a seminar titled ‘Climate Absolute Radiance and Refractivity Observatory’ on January 30, 2013.

Professor Dr. William Moore co-authored a paper featured in *Nature* that explores a new perspective on the earliest geology of Earth. Early Earth had very different internal dynamics from today, and may have resembled Jupiter’s volcanically active moon, Io, according to the study. The paper “*Heat-pipe Earth*” explores a new hypothesis to investigate what happened between the early magma ocean and the onset of plate tectonics. For more information, visit: [http://ur.hamptonu.edu/publications.cfm](http://ur.hamptonu.edu/publications.cfm)

Just as regions of our planet have monsoon season, or tornado season, so too does Saturn have its own stormy season. Cassini recorded the storm in great detail, both with its cameras and with its Radio and Plasma Wave Science instrument, which detected electrostatic pulses from lightning strikes within the clouds. Kunio Sayanagi, Assistant Professor of Planetary Science at Hampton University, and his colleagues describe those observations in a study that will appear in the journal ‘Icarus.’ For the more information, visit: [www.huffingtonpost.com](http://www.huffingtonpost.com).

Hampton University assistant professor, Kunio Sayanagi shows an image of a storm which raged 267 days on Saturn between 2010 and 2011. Sayanagi authored a paper on Saturn’s super storm and hopes to apply the lessons learned to Earth’s weather. Above, the largest storm to ravage Saturn in decades started as a small spot seen in this image from NASA’s Cassini spacecraft on Dec. 5, 2010, the same day Cassini also detected frequent lightning signals. For more information: visit: [www.dailypress.com](http://www.dailypress.com).
AN EARLY START FOR NOCTILUCENT CLOUDS

Glowing electric-blue at the edge of space, noctilucent clouds have surprised researchers by appearing early this year. The unexpected apparition hints at charge in the “teleconnections” of Earth’s atmosphere. NLCs are being studied by the Aeronomy of Ice in the Mesosphere (AIM) satellite mission led by HU Professor Dr. James Russell. For more information, visit: http://science.nasa.gov/science-news/sciencecasts/

HOLE PUNCH CLOUD IMAGE CAPTURED MIMICS AIM’S NOCTILUCENT CLOUDS

Hampton University summer session student Kyle Elliot captured an image of a low altitude cloud feature that mimics those seen in Noctilucent (NLCs) or “night shining” clouds on June 24. This usually occurs some 40 miles higher in the atmosphere. NLCs are being studied by the Aeronomy of Ice in the Mesosphere (AIM) satellite mission led by HU Professor Dr. James Russell. For more information, visit: http://ur.hamptonu.edu/publications.cfm

CASSINI EYES SATURN HURRICANE

The international Cassini spacecraft has found a powerful hurricane at Saturn’s north pole, surrounded by the curious rotating hexagonal band of clouds. The images were taken by Cassini’s camera on 27 November 2012 and are the first close-up views of this storm, which has been churning since at least 2006. For more information, visit: http://www.esa.int/Our_Activities/Space_Science/Cassini_eyes_Saturn_hurricane

NASA PROBE GETS CLOSE-UP VIEWS OF LARGER HURRICANE ON SATURN

The spinning vortex of Saturn’s north polar storm resembles a deep red rose of giant proportions surrounded by green foliage in this false-color image from NASA’s Cassini spacecraft. Measurements have sized the eye at a staggering 1,250 miles (2,000 kilometers) across with cloud speeds as fast as 330 miles per hour (150 meters per second). For more information about the Cassini-Huygens mission, visit: http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov.
The AGU Fall Meeting showcases current scientific theories that focuses on discoveries that will benefit humanity and ensure a sustainable future for our planet. This meeting is the largest world-wide conference in the geophysical sciences, attracting nearly 20,000 Earth and space scientists, educators, students, and policy makers.

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