Space Science and Engineering Center

University of Wisconsin-Madison

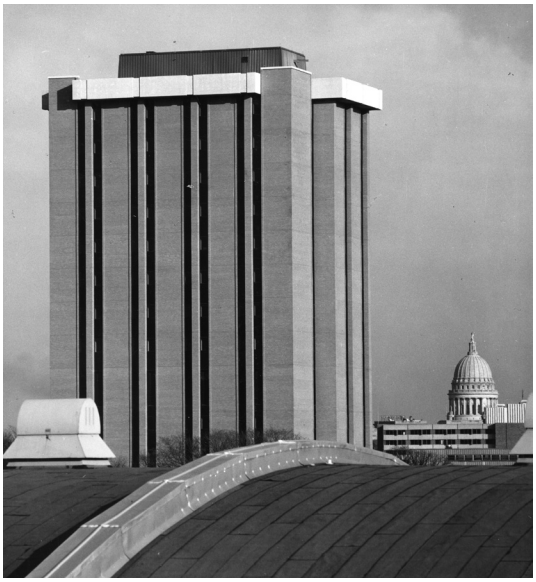
A Brief Summary of Mission and Strengths

SSEC

MISSION

Located in the heart of the capitol city of Wisconsin, the Space Science and Engineering Center (SSEC) is one of the largest research and development centers at the University of Wisconsin-Madison. Under the leadership of Director Henry Revercomb, SSEC receives additional support and oversight through the university's Office of the Vice Chancellor for Research and Graduate Education. Housed within SSEC is the Cooperative Institute for Meteorological Satellite Studies (CIMSS), a world renowned satellite meteorology research center.

As highlighted in its mission statement, SSEC is dedicated to:



- Leading development of advanced space-based instrumentation for observing the Earth's atmosphere, oceans and land surface, other planetary atmospheres, and astrophysical phenomena;
- Leading and conducting research programs that improve our understanding of atmospheric, oceanic, environmental and astronomical sciences;
- Facilitating the transfer of knowledge to operational observing and forecast systems;
- Supporting campus research initiatives with technical, administrative and management expertise; and
- Supporting the university's educational mission by involving undergraduate and graduate students in the research process.

Throughout its nearly 50-year history, SSEC has built key partnerships with government research and operational centers, research centers at other universities, and industry. Such cooperation has been instrumental in the advances we have made in the field of remote sensing.

Cover: Hurricane Edouard, the fourth hurricane of the 2014 Atlantic season, as seen from the International Space Station. SSEC's Scanning High-resolution Interferometer Sounder (S-HIS) helped collect atmospheric data on Edouard as part of the HS3 field campaign. Photo Credit: NASA's Johnson Space Center.

Top right: Space Science and Engineering Center, October 2014. Photo Credit: Bill Bellon, SSEC.

Middle right: A pre-1974 photo of Space Science and Engineering Center. Photo Credit: UW-Madison Archives.

Some measures of the mission success and intellectual vitality of a research center include spending and national rankings, staffing levels, collaborations, current and historical research strengths, professional awards, the number and quality of scientific articles published in peer-reviewed journals, editorships, infrastructure support, the media coverage we and outside news outlets bring to our work, and efforts to engage the public. As detailed on the following pages, these metrics briefly describe the quality and viability of programs and services over time.

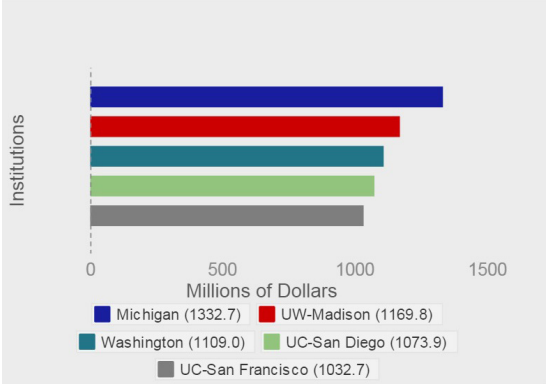
UNIVERSITY ECONOMIC IMPACT AND SPENDING

Due to their continued success in procuring funding, the university's principal investigators, including those at its research and development centers, play a significant role in the economy.

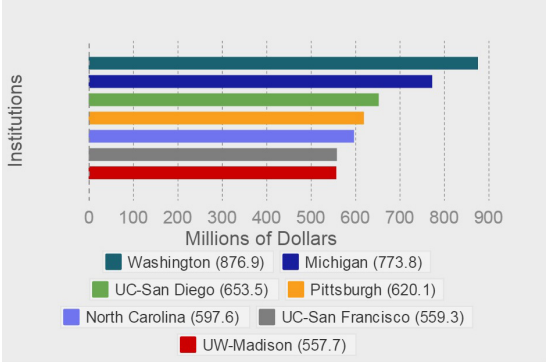
The 2011 economic impact study of the University of Wisconsin-Madison showed research awards to the university growing to about $1 billion during the period 2003-2011.

The University of Wisconsin-Madison, along with its affiliated organizations and start-up companies, support more than 100,000 Wisconsin jobs and generate more than $600 million in state tax revenue – significant and on-going contributions to the state economy.

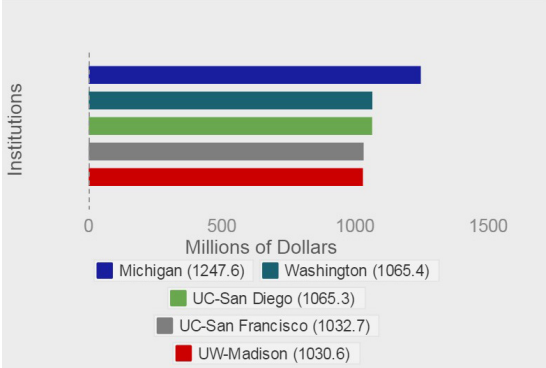
The university has consistently ranked among the top five research universities in the United States for total research and development expenditures, federal science and engineering expenditures, and total science and engineering expenditures. The graphics at right illustrate the university's ranking in terms of research expenditures compared to peer institutions.



2012 Total R&D Expenditures: Top 5 Public Institutions



2012 Fed S&E R&D Expenditures: Top Seven Public Institutions



2012 S&E R&D Expenditures: Top Five Public Institutions

At left: An iconic "W" banner hangs between the columns of Bascom Hall at the University of Wisconsin-Madison on Nov. 9, 2007. In the foreground, tree leaves on Bascom Hill begin to change colors during autumn. Photo Credit: UW-Madison Communications.

SSEC SPENDING

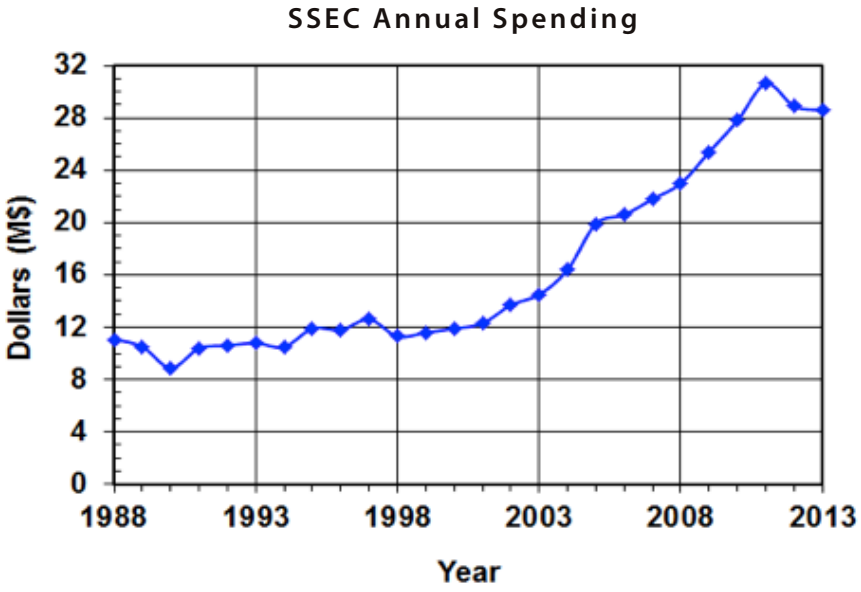
The Space Science and Engineering Center maintains a robust $30 million annual spending profile characterized by steady growth that is balanced by diverse funding sources.

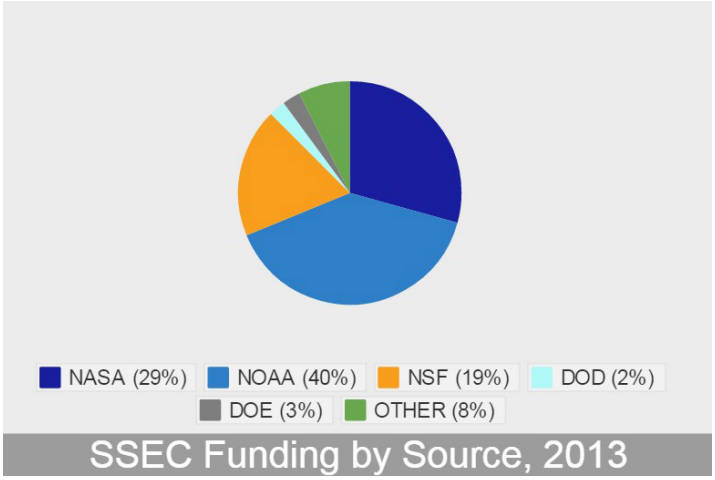
PROJECT PORTFOLIO

Formally established in 1965 by the University of Wisconsin Board of Regents, SSEC has a 50-year history of managing projects, programs, and field campaigns of all scales. Since the 1970s, SSEC has successfully managed the awards for more than 900 contracts and grants, with a current portfolio of about 150 projects and programs.

COLLABORATORS

Our network continues to grow -- SSEC scientists collaborate with investigators from United States and foreign government agencies and universities, national laboratories, international organizations, industry, and departments and centers within the UW System.





At left: The central UW-Madison campus is pictured in an aerial view during autumn of 2013. The building housing the Space Science and Engineering Center is pictured left of center. Photo Credit: UW-Madison Communications.

INFRASTRUCTURE

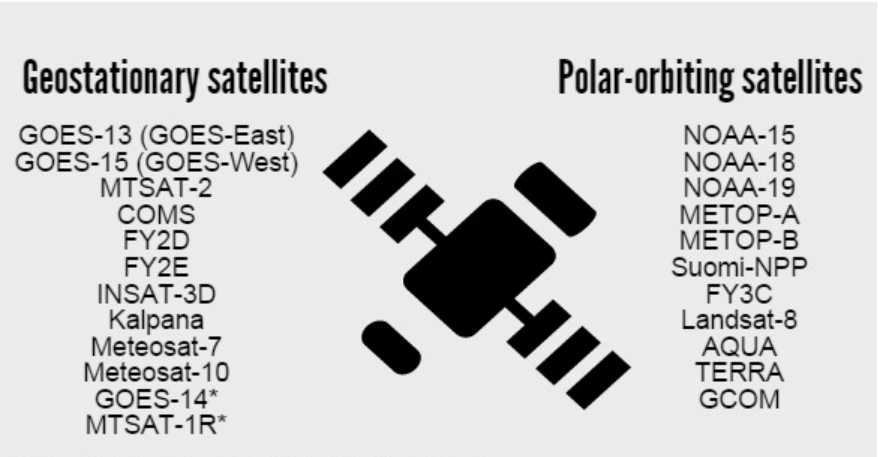
With consistent support from the University of Wisconsin-Madison, SSEC maintains strong fiscal and physical infrastructures to provide the necessary facilities and technical expertise for our scientists and their programs.

For example, SSEC operates a state-of-the-art data center that routinely receives, processes and archives data from 11 polar-orbiting and 10 geostationary satellites. In addition, the Center is home to the largest, most powerful supercomputer on the UW-Madison campus, supporting the growing computing requirements of NOAA and SSEC scientists.

For data visualization and analysis, SSEC has developed and supported the Man-computer Interactive Data Access System for four decades and now meets the needs of the global environmental satellite community with the Community Satellite Processing Package -- packaging and distributing open source science software to users around the world.

Above: Supercomputing array in the SSEC Data Center. Photo Credit: Bill Bellon, SSEC.

SSEC Data Center Statistics, 2013	
TB archived from geostationary satellites (per day)	94.37GB
TB of real-time data served via ADDE	~2.05 TB/day
TB of archived data served via ADDE	~271 GB/day
Total bytes ingested each day (not including Suomi NPP)	~272 GB/day
Total bytes ingested by Suomi NPP	~1,700 GB/day
Accesses to real-time and archive data via ADDE	~1,067,232



Satellites Received and Served by the SSEC Data Center

Other critical SSEC infrastructure includes a class 1000 clean room, a first rate machine shop, and a research library. Service centers within SSEC include professional staff in human resources, grants and financial management, accounting, purchasing, technical computing, software development, safety and quality assurance, instrument fabrication, library science, communications, and outreach. All of these team members provide exceptional support to principal investigators, scientists, and engineers.

SATELLITE METEOROLOGY AND INSTRUMENT DEVELOPMENT

Instrument development and satellite meteorology (and its advances) are closely connected, and at the Space Science and Engineering Center that is no exception.

In 1959, Verner E. Suomi, SSEC founder and 'father of satellite meteorology' along with engineering professor, Robert Parent, designed and carried out the first successful space-based weather experiment, which studied the radiation budget of the Earth. Suomi is largely credited with envisioning and developing satellite meteorology; a program that now boasts a 50-year history of innovation at UW-Madison.

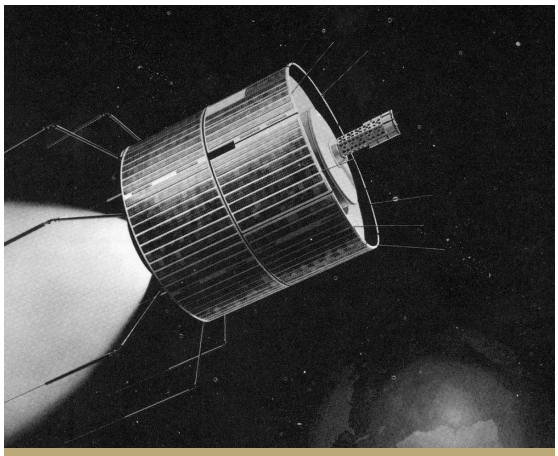
Since the 1960s, SSEC scientists and engineers have successfully designed and built spaceflight, airborne, and ground-based instruments to conduct atmospheric, oceanic, environmental and astronomical research, leading to better understanding of our planet and yielding direct benefits to society.

Suomi (second from right) studies the heat budget of a cornfield.

1953

Suomi and Parent conduct the first Earth radiation experiment from Explorer 7.

1959

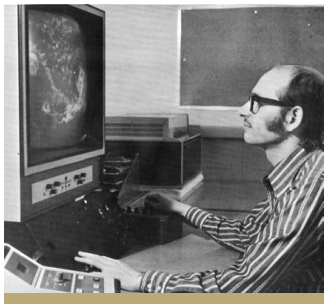


First color pictures of Earth taken by Suomi's Multicolor Spin-Scan Cloud Camera from ATS-III spacecraft .

1967

Atmospheric Emitted Radiance Interferometer (AERI), an advanced, ground-based version of the high-spectral resolution interferometer sounder.

1990



WINDCO, precursor to McIDAS, demonstrates visualization capabilities.

1972

In 1980, the Cooperative Institute for Meteorological Satellite Studies (CIMSS) was established at Wisconsin. Its presence, under the SSEC umbrella, has bolstered satellite meteorology research by establishing a more formal working relationship with NOAA and NASA.

Over the past 30+ years, SSEC and CIMSS scientists have developed or made significant contributions to a range of meteorological and environmental satellite sensors, developed or contributed to more than 50 scientific algorithms, and developed numerous imager and sounder products now operational within NOAA.

In January 2012, the National Preparatory Project (NPP) spacecraft was renamed for Professor Suomi as a tribute to the pioneer who championed the importance of the weather satellite.

Looking ahead, SSEC and CIMSS scientists are actively engaged in research and discussions that will shape the instruments and products for the next generation of geostationary and polar-orbiting satellites: GOES-R (launching in 2016) and the NOAA/NASA Joint Polar Satellite System (JPSS) (launching in 2017).

For more information: Satellite meteorology timeline: *http://library.ssec.wisc.edu/timeline/*
Engineering and research development timeline: *http://library.ssec.wisc.edu/engineering/SSEC_Eng_4x8_reducedSize.pdf*

Direct broadcast begins at SSEC with MODIS tower installation.

SSEC and CIMSS scientists contribute to JPSS launch readiness.

Scanning High-resolution Interferometer Sounder (S-HIS), SSEC's airborne instrument measuring temperature and water vapor profiles.

NASA renames National Polar-orbiting Partnership (NPP) satellite the Suomi NPP.

SSEC and CIMSS scientists prepare for GOES-R launch.

1994 1999 2012 2016 2017

PUBLICATIONS

Since 2000, SSEC authors have published nearly 900 peer reviewed papers -- with the number more than tripling during the period 2000-2013.

Peer review is a rigorous process in which experts in the same field as the author scrutinize the author's scholarly work before a paper describing that work is published in a journal.

Beyond peer review, other important scientific literature includes conference papers and presentations, institutional reports, technical reports and the like.

During the same 14-year period, SSEC scientists and engineers have contributed nearly 2200 conference papers and presentations to the fields of atmospheric science and remote sensing.

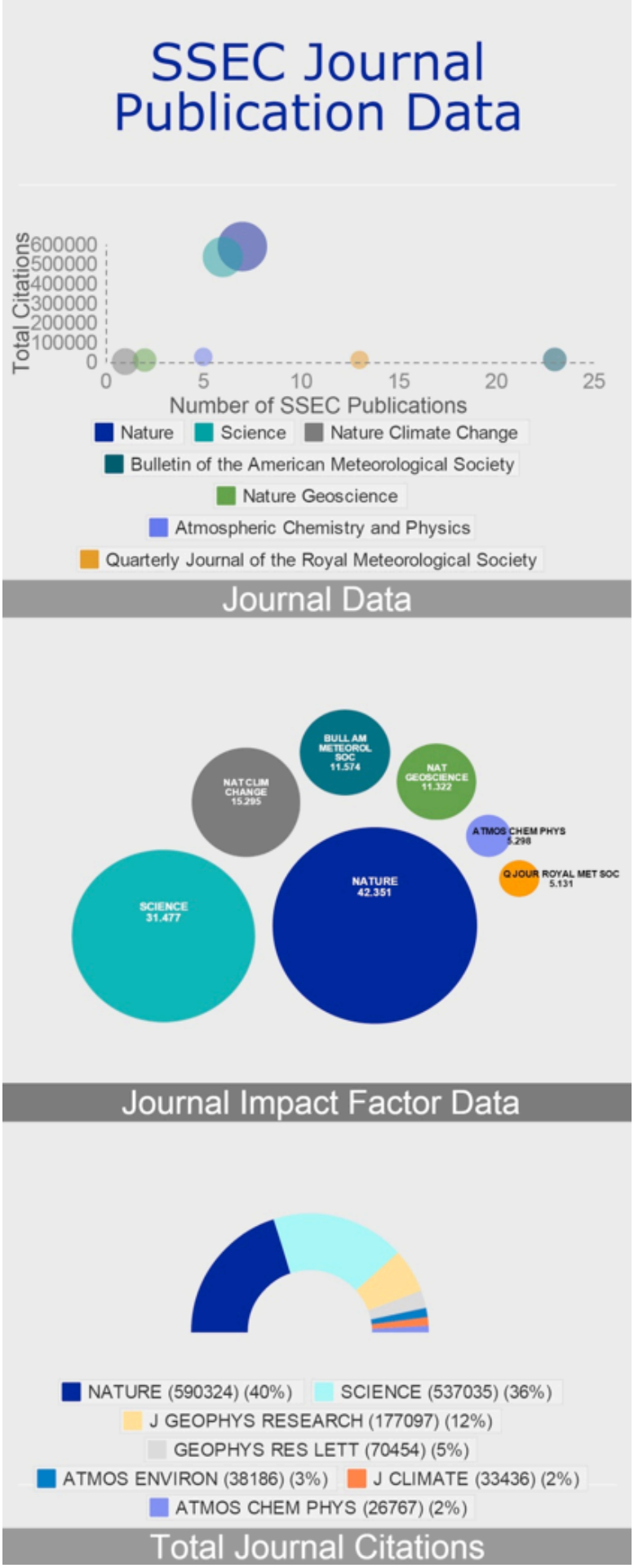
JOURNAL DATA

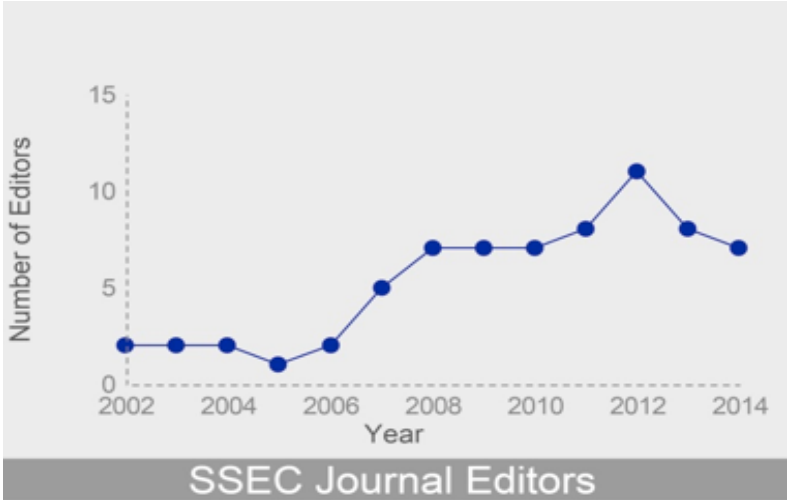
SSEC scientists publish the results of their scholarly work in journals recognized as the top-tier journals in their fields. Impact factor and total cites are two of a number of recognized benchmarks of journal quality.

The graphic to the right describes the journal impact factor for a subset of articles published by SSEC researchers along with total citations to those journals for the year 2013.*

*Note: According to Journal Citation Reports (JCR) published by Thomson Reuters, the journal impact factor is the average number of times articles from the journal published in the past two years have been cited in the JCR year (2013). Total journal citations is the total number of citations to the journal in the JCR year.

The SSEC Library is the repository for the intellectual products of SSEC scientists, providing free and open access to their scholarship. For more information, visit: *http://library.ssec.wisc.edu/.*





EDITORSHIPS

SSEC scientists with recognized expertise in the atmospheric sciences and remote sensing serve as journal and monographic editors. Over the past decade, our scientists have served on the editorial boards of many journals in their field, including: *Journal of Geophysical Research, Journal of Applied Remote Sensing, Monthly Weather Review, Nature-Scientific Reports, IEEE Journal of Applied Earth Observations and Remote Sensing, Journal of Applied Meteorology and Climatology*, and the *Journal of Atmospheric and Oceanic Technology.*

AWARDS

Since 2010, seventy SSEC scientists and students have been honored for their contributions to the atmospheric sciences and remote sensing.

These awards are regional, national, and international in scope and include: NASA and NOAA Group Achievement Awards, Chancellor's Awards for Excellence in Research, National Academies Awards, University Outstanding Alumni Awards, Best Poster Awards for ITOVS or NWA Conferences, American Meteorological Society, and SPIE Fellow Appointments, to name a few.


感 謝 状

Space Science and Engineering Center,
University of Wisconsin

貴校は温室効果ガス観測技術衛星「いぶき」において データ
利用・校正・検証にご協力頂き その成果の普及に尽力されました
ここに多大なる貢献に対し感謝の意を表します

平成26年2月14日

独立行政法人 宇宙航空研究開発機構
理事長 奥 村 直 樹

Above, top: Certificate of appreciation from the Japan Aerospace Exploration Agency for SSEC's "data, calibration, and verification" contributions to the Greenhouse Gases Observing Satellite "Ibuki" (GOSAT), February 2014.

Above, bottom: A Space Shuttle Program certificate and patch awarded to the Space Science and Engineering Center and its Cooperative Institute for Meteorological Satellite Studies, 2011.

EDUCATION AND PUBLIC OUTREACH

Education and outreach are key elements of SSEC's mission and founding principles of the Wisconsin Idea, which encourages the university to spread its influence and message beyond the boundaries of campus.

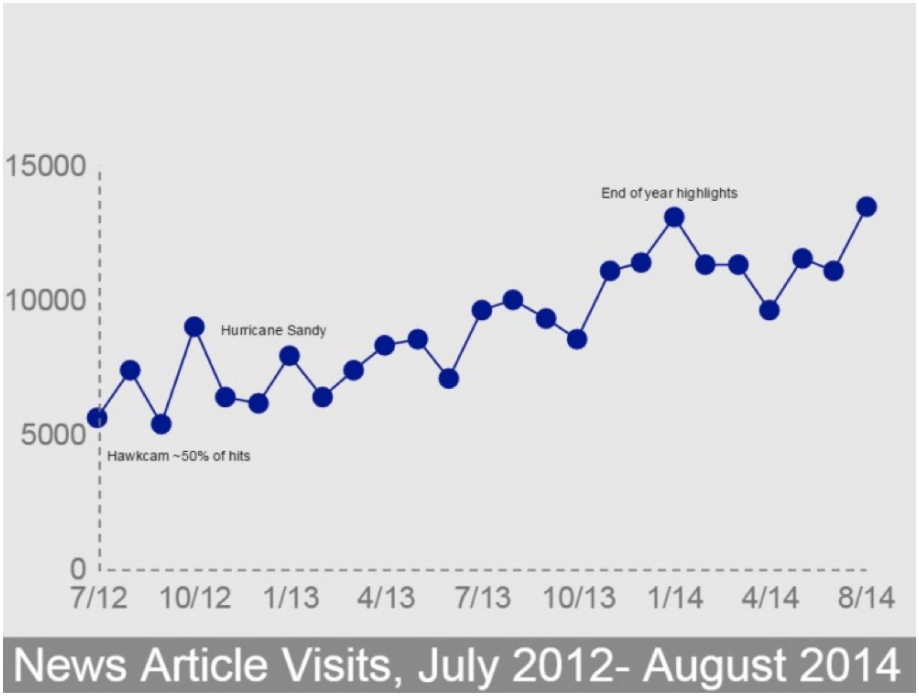
Central to encouraging students to pursue careers in science, technology, engineering, and mathematics (STEM) fields is sharing the excitement of earth remote sensing research and space exploration.

Above: Grandparents University participants in the meteorology major, July 2014. Photo Credit: UW CIMSS.

The Office of Education and Public Outreach within CIMSS and SSEC's Office of Space Science Education are involved in a variety of formal and informal education programs, ranging from classes and workshops at the University of Wisconsin for students and high school teachers to presentations at conferences, museums, and schools to the Weather Guys monthly radio program on Wisconsin Public Radio.

SSEC and CIMSS educational programs reach nearly 240,000 people each year. In addition, CIMSS has been on the forefront of educational software design for more than two decades.

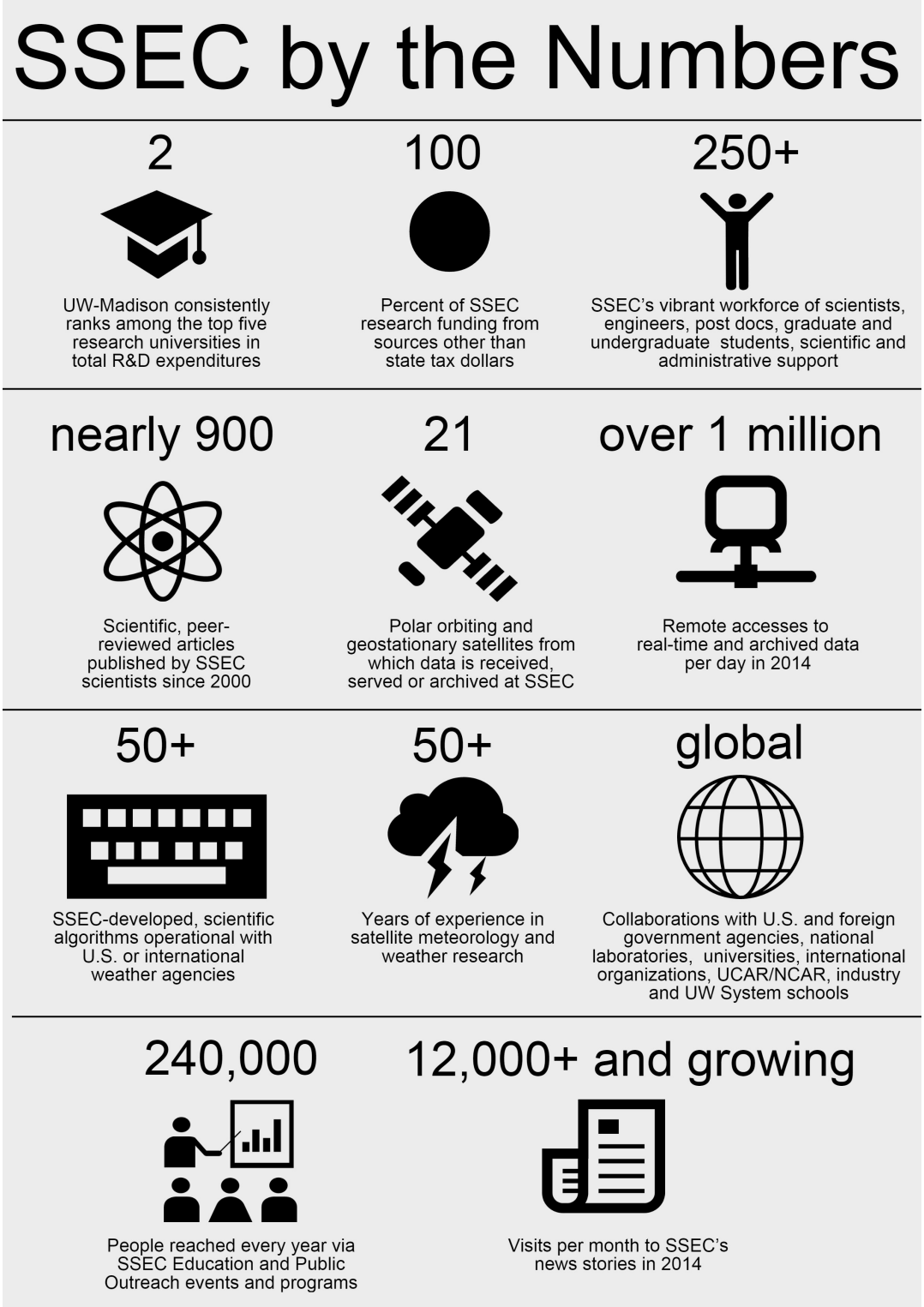
COMMUNICATIONS



SSEC's strategic communications initiatives effectively promote our organization's purpose, accomplishments, and impact to stakeholders.

Sharing our stories while adhering to a clearly defined message takes many forms, including: press releases, news stories, social media posts, internal and external newsletters and magazines, position statements, town hall meetings, and research profiles. Of note, visits to the SSEC news channel (*www.ssec.wisc.edu*) have nearly tripled since July 2012.

BY THE NUMBERS: SCIENTIFIC AND ORGANIZATIONAL STRENGTHS



The Space Science and Engineering Center is a leader in creating ways to view our planet through the eye of a satellite. With partners across the globe, our scientists are at the forefront of developing the satellite technology that makes it possible to see and study the intricacies of Earth's atmosphere from space.

Our mission today is consistent with founder Verner E. Suomi's vision of 50 years ago: exploring and understanding the atmosphere for the benefit of all.

For more information about the Space Science and Engineering Center, please visit: *www.ssec.wisc.edu.*

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