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NEW
Research
INITIATIVES

[Science]

From top:

First Nationwide Carbon Stock Survey/Smithsonian Tropical Research Institute

Carbon stored in tree branches, trunks, and roots is the currency of forest biomass; however, measuring total forest carbon is difficult. The first nationwide survey of carbon stocks recently conducted by the Smithsonian Tropical Research Institute (STRI) and the Carnegie Institute for Science, places the Smithsonian at the vanguard of carbon storage verification. Airborne technology known as LiDAR—Light Detection and Ranging technology—was used to achieve the landscape-level carbon maps across Panama’s lowland and dry tropical forests, cloud forests and mangroves. Project scientists combined LiDAR technology with 30 years of data from the Smithsonian Global Earth Observatory (SIGEO) plots in Panama to verify the accuracy of the carbon measurements. “The Panama maps will be models for many programs, one being the United Nations Framework on Climate Change,” said STRI Director Eldredge Bermingham, “It will also contribute significantly to plans for mitigating global warming by Reducing Emissions from Deforestation and forest Degradation—REDD and REDD+ programs.”

NASA’s Curiosity Rover/National Air and Space Museum

In August 2012, after traveling for many months and millions of miles, the Mars Science Laboratory *Curiosity* landed in Gale crater, a 100-mile diameter depression formed when a meteorite collided with Mars billions of years ago. Smithsonian scientist Dr. John Grant, a geologist in the National Air and Space Museum’s (NASM) Center for Earth and Planetary Studies, has played a leading role in the Curiosity Mars Rover mission. As co-chair of the Mars Landing Site Steering Committee, he coconvened workshops where more than 60 candidate landing sites were considered before finally deciding on Gale crater. Dr. Grant now serves as a Long Term Planner on the rover science team, charged with providing strategic guidance of rover activities and destinations. The goal of the mission is to evaluate the past habitability of Mars through the examination of rocks forming a three-mile-high stack of layered rocks in the crater. One of the major findings of the mission to date has been the discovery of multiple outcroppings of rocks comprised of rounded gravels and pebbles whose origins can be traced to a fan of sediment flanking the northern crater wall. The sediments emanate from a stream valley, indicating that the rounded pebbles at the landing site were transported there by flowing water. Although the water has long since disappeared, evidence left behind points to a much wetter setting in the distant past, with water flowing to depths up to several feet where now only windblown sand and rocks remain.

Digitizing Daguerreotypes/Museum Conservation Institute

Dating from the mid-19th century, daguerreotypes are the earliest successful form of photography. They also are particularly challenging surfaces to image—the highly reflective surface of the metal reacts like a mirror. Museum Conservation Institute (MCI) Research Scientist Ed Vicenzi has used a suite of ion and electron microbeam-based methods to examine mid-19th century daguerreotypes at the submicrometer length scale, yielding clues to the synthesis and history of these objects; he also is developing a new instrumental approach in collaboration with the Smithsonian Astrophysical Observatory at Harvard, using X-ray calorimetry. His research was recently presented at the 2012 Daguerreian Society Symposium in Baltimore, as also was the work of MCI Senior Conservator Mel

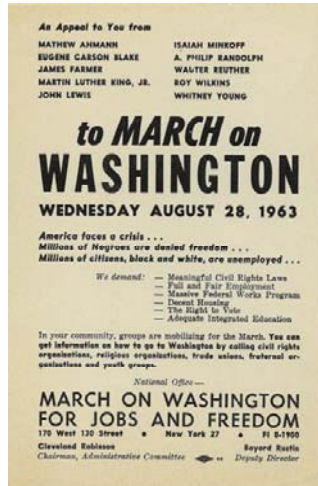
Wachowiak and Digital Imaging Specialist E. Keats Webb, who use scientific and computational imaging techniques to aid in the research and conservation of cultural heritage objects. Wachowiak and Webb described several techniques to document the surface and condition of daguerreotypes for research and conservation, and illustrated the variety of imaging techniques that are used at MCI's Imaging Studio to aid in the research and preservation of the Smithsonian collections.

Relocating Elephants Fails to Decrease Conflict/Smithsonian Conservation Biology Institute

Human-elephant conflict is a major conservation, socioeconomic, and political issue across Asian elephant ranges in Asia and Africa; it is also one of the major threats to the endangered species' survival. Because these conflicts result in more than 70 human and 200 Asian elephant deaths in Sri Lanka each year, elephants are often moved into ranges away from humans, often into national parks. According to a study published in December 2012 in *PLOS ONE* by the Smithsonian Conservation Biology Institute, the Centre for Conservation and Research in Sri Lanka, and the Department of Wildlife Conservation Sri Lanka, moving problem elephants can actually lead to more conflict and deaths of both humans and elephants. Using remote-download GPS collars, researchers monitored 12 translocated adult male elephants and compared their movement and propensity for conflict with 12 males left in their normal home ranges. Before the study, all of the translocated elephants and 10 of the elephants left in their home ranges were considered problem elephants. The study results were surprising, as most of the translocated elephants left relocation areas and ventured back into agricultural lands, causing problems. The authors suggest that rather than focus on translocation, land managers and conservationists need to implement land-use plans that minimize crop raiding and create mixed-use zones that both humans and elephants can use, in addition to zones where only one or the other is allowed.

Determining Sex through DNA and Hormone Analysis/National Zoological Park

Sex determination in monomorphic species, wherein males and females look the same, can be very difficult, and in some species it can be nearly impossible on physical examination. Even with more invasive techniques such as laparoscopy, underdeveloped ovaries and testes in young animals can appear similar on gross examination. National Zoo geneticists, veterinarians, and other scientists have been working to identify non-invasive methods to determine sex using DNA from skin, hair, or, in one instance, quills. Prehensile-tailed porcupines are notoriously difficult to sex, so veterinarians and researchers developed a method to distinguish males from females through DNA analysis of the quills. The technology has enabled gender determination at an early age and facilitated collections management. Similarly, sex determination in giant salamanders is surprisingly difficult, and efforts to use ultrasound, laparoscopy, and even DNA analysis are ineffective. Lacking feasible non-invasive means, veterinarians, herpetologists, and endocrinologists assayed blood samples from these rare animals during and immediately after breeding season to evaluate testosterone and estrogen levels, discovering that half of the salamander population had extremely elevated testosterone levels while the other half had elevated estrogen levels. While this study is still in its infancy, preliminary indications suggest that this could be a suitable method through which the sex of endangered species of salamanders can be identified at much earlier ages.



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[History,
Art, Culture]

From top:

Changing America/National Museum of African American History and Culture

To commemorate two events that changed the course of the nation—the 1863 Emancipation Proclamation and the 1963 March on Washington—the National Museum of African American History and Culture (NMAAHC), in collaboration with the National Museum of American History, is presenting an exhibition that explores the historical context of these two events, their accomplishments and limitations, and their impact on the generations that followed. *Changing America: The Emancipation Proclamation, 1863, and The March on Washington, 1963* will be on view in the NMAAHC Gallery at American History from December 14 through September 15, 2013. Featuring historic photographs, paintings and new film footage, the exhibition is accompanied by a new website and a series of public programs designed to examine the social and political currents that shaped these events.

Analytical Methods in Philately/National Postal Museum

The First International Symposium on Analytical Methods in Philately, organized by the Institute for Analytical Philately, Inc., was hosted by the National Postal Museum in November 2012. More than 50 philatelists from six countries and across the United States attended the symposium. Eighteen papers and panel discussions were presented on subjects ranging from the chemistry of paper and ink to the identification of security measures to statistical analysis. A wide variety of analytical methods, including spectroscopy and colorimetry, were discussed. These included, among many others, various types of chemical and visible light spectroscopy. Speakers focusing on chemical spectroscopy included Thomas Lera, the Winton M. Blount Research Chair at the Postal Museum, and Jennifer Giaccai of the Smithsonian Museum Conservation Institute. Much of the data and results presented were acquired using the Postal Museum's scientific research equipment, and the symposium offered a workshop on the use of the museum's equipment. The Proceedings of the Symposium will be published by the Smithsonian Institution Scholarly Press, with a release date of mid-2013.

Pictorial Space/Freer|Sackler Galleries

Parallels and Convergences: Pictorial Space in the Art of Italy and China, now in the research phase, will be a major international loan exhibition organized by the Freer|Sackler and is expected to travel to the Uffizi Museum in Florence and the National Museum in Beijing. The exhibition will present two different systems for the creation of pictorial space within a painting: the convergent, linear perspective with a single vanishing point and viewing position, developed in Italy in the 15th century, and the non-convergent, parallel projection with an omniscient bird's-eye viewpoint traditionally used by Chinese painters. In the 17th century, Jesuit missionaries introduced convergent perspective to China, which the Chinese selectively incorporated alongside parallel projection. The exhibition focuses on that exchange and its innovative results, raising intriguing questions about the relationship between these two systems of spatial representation and the hegemonic role of convergent perspective in traditional Western art. A primary goal of the exhibition is for visitors to experience for themselves how Italian and Chinese artists created the sense of three-dimensional space. One of the ongoing discussions of the research

team has concerned the best ways to represent certain works, some of which are immovable, in the exhibition. Options include well-known, relatively simple technology, such as actual reconstructions of specific spaces or greatly enlarged wall-size photo murals, to a completely immersive digital recreation. In November 2012, the temporary installation at the Galleries of a digital reconstruction of one of the Magao Grottoes in Dunhuang, China, provided an opportunity for a firsthand look at an immersive digital experience.

Ai Weiwei/Hirshhorn Museum and Sculpture Garden

In fall 2013, the Hirshhorn copublished with the Mori Art Museum, Tokyo, and Prestel Publishing the exhibition catalogue *Ai Weiwei: According to What?* The book accompanies the first North American survey of the work of one of China's most prolific and provocative contemporary artists. Ai is best known for such major projects as his collaboration on the design for the 2008 Beijing Olympic Stadium, as well as his embrace of the internet and social media as an active platform for commentary and as an art form in itself. The catalogue contains revised and updated essays by exhibition curator Mami Kataoka, chief curator at the Mori, and Charles Merewether, Director of the Institute of Contemporary Arts, LASALLE College of the Arts in Singapore, as well as an interview between Hirshhorn Deputy Director and Chief Curator Kerry Brougher and Ai Weiwei. After the Hirshhorn, the exhibition will travel to the Indianapolis Museum of Art, Art Gallery of Ontario, Pérez Art Museum Miami, and Brooklyn Museum.

Handmade Holiday Cards/Archives of American Art

Archives of American Art Collections Specialist Mary Savig recently published *Handmade Holiday Cards from 20th-Century Artists* (Smithsonian Books, 2012). The beautifully designed book shows how artists imagined the holidays through original watercolors, etchings, silk-screen prints, and drawings, all of which are preserved in the Archives of American Art. Rarely seen beyond the eyes of their recipients, the cards confirm the irrepressible creativity of their senders. *Handmade Holiday Cards* offers personal insight into the style and sentiment of artists, including how they summarized the year's events and the world in which they lived.