Geophysical Research Abstracts
Vol. 14, EGU2012-8300, 2012
EGU General Assembly 2012

Measuring change over time: the use of geotagged photographs to evaluate the weathering of monuments

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Evaluating the condition of weathered stone surfaces on a monument, building or sculpture requires information on how those surfaces have evolved. In a number of cases, the documentation related to a site or object is either not readily available or has been lost (due to war, fire, etc.). Exploring the use of geotagged photographs to supplement the evaluation of surface changes to monuments was tested using two sites: the Mausoleum at the Huntington Library, Art Collections, and Botanical Gardens in San Marino, California and the Duomo in Florence, Italy.

Increasingly, photographs are being geo-located or geotagged, either automatically via GPS/WiFi or manually. Geolocation tags increase the value of a photograph to researchers by providing the geographic location where the image was taken, often along with the date and time the photograph was acquired. Estimates of the number of geolocated photographs posted to the Internet include 148 million on Flickr.com (as of June 3, 2011) increasing to 172 million as of January 15, 2012. On Panarimo.com five million geolocated images were archived as of October 2007. Tools such as auto-geotag and PhotoOverlay are making it easier for users to locate and exactly position existing photographs and historic photographs on sites such as Google Earth (PhotoOverlays are images that are directly embedded in the Google Earth's landscape). 42 photo sharing websites are listed currently on Wikipedia, with seven having Alexa rankings of less than 200, indicating the popularity of photo sharing and the vast nature of this resource.

Preliminary results from the Huntington and the Duomo indicate that geolocated images are indeed a useful tool for aiding in understanding stone weathering patterns and changes over time. However, greater software support and new tools are needed to enable researchers to search, organize and analyze groups of photographs from a single geolocation. Such software would have obvious uses beyond the conservation of monuments. For example, insurance, tourism and real estate companies are also interested in evaluating how buildings and land-use have changed over time.

Context: Central to making decisions concerning the preservation of patrimony is the practical issue of monitoring material change over time. Is an intervention effective? Should a sculpture be moved indoors or a structure sheltered? Efficiently measuring changes in heritage materials is a significant scientific and logistical challenge to preserving our cultural legacy in stone. Conservation professionals in charge of the long-term survival of material cultural heritage need to know how fast and why these materials change. With a baseline in place, decisions regarding resource allocation and conservation interventions can more readily be made from a basis of scientific understanding. Lacking a baseline, it can be difficult, if not impossible, to evaluate the effectiveness of a preservation intervention or treatment.