

## Project Details

**ROSES ID:** NRA-02-OSS-01

**Selection Year:** 2003

**Program Element:** Independent Investigation: LWS

**Project Title:**

Mt. Wilson Solar Photographic Archive Digitization Project

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**Project Member(s):**

- Bailey, Miesha ; Authorizing Official; University of California Los Angeles

**Summary:**

The Mt. Wilson Solar Photographic Archive Digitization Project (Mt. Wilson SPADIP) will make available to the scientific community in digital form a selection of the solar images in the archives of the Carnegie Observatories. These images date from 1894 and include many which can be judged to be of superb quality by modern standards. The digitization will use commercial scanning technology with a prepress scanner having 16-bit precision and up to 3000 by 3000 dots per inch spatial resolution. These images will permit a variety of retrospective analyses of the state of solar magnetism and provide a temporal baseline of about 100 years for many solar properties. The 20th Century was a period of increased anthropogenic production of greenhouse gases which might contribute to global climate change. The sun could also be a factor in global climate change and the data provide by this digitization will allow the scientific community to freely examine some properties of solar magnetism over the 20th century. This project will take place at UCLA under the direction of P.I. Roger K. Ulrich. The observing personnel of the synoptic program at the 150-foot solar tower telescope on Mt. Wilson will participate in the project and help interpret the observing and photographic log books which give technical details concerning the photographic procedures. The digitized images will be made freely available through world-wide web procedures implemented at UCLA and through other virtual solar observatory data archives as they are implemented. Raw images as well as images subjected to partial processing will be included. The total number of images available is approximately 150,000. These include a significant fraction of duplicate exposures taken at closely spaced times. The 5-year project described here will digitize and make available on-line approximately 30,000 of the images concentrating on those of the best quality taken in the light of the Calcium K line and in broadband light. The full time period will be covered uniformly by the selected images. The primary scientific output will come from the utilization of the data by the general scientific community. Many of these results will take a form that cannot be anticipated. In addition three specific topics are recognized: The group at UCLA will carry out two analyses:- The strength of the widely distributed weak solar magnetic fields will be studied through examination of the brightness of the Calcium K line emission over regions of the solar surface not directly associated with sunspots.- The rate of solar rotation over the whole solar surface will be determined as a function of time using the day-to-day motions of features on the Calcium K images. A separately funded effort by a group under the direction of J. Pap at Goddard Space Flight Center in Maryland will carry out the following analysis:- The time dependence of sunspot and plage areas using the broadband images will be determined and the influence of these variations on the Total Solar Irradiance (TSI, sometimes known as the solar "Constant") will be estimated in order to reconstruct an improved history of the solar output of energy. The analyses to be carried out at UCLA are presented in detail in this proposal. The digitization effort at UCLA includes a routine component of mounting the photographic material in the scanner, recording log-book information and carrying out the actual scans. Although care will be required in handling the photographic material, this task is suited for well supervised, non-specialist, undergraduate students. The opportunity to participate in the study of century-old images of the sun will be used to bring a sense of excitement about solar physics to young students at UCLA.

## Publication References:

**Summary:** "

**Reference:** Ulrich, Roger K. UCLA - Mt. Wilson Solar Photographic Archive Digitization Project

**Summary:** no summary

**Reference:** Singh, Nagendra; (2006), Mapping of Poynting flux and widths of inertial Alfvén wave structures in high-latitude plasmas, Journal of Geophysical Research: Space Physics, Volume 111, Issue A6, CiteID A06215, doi: 10.1029/2005JA011571

**Summary:** no summary

**Reference:** Singh, Nagendra; Khazanov, Igor; (2007), Scattering of long wavelength shear Alfvén waves by a localized density cavity, Geophysical Research Letters, Volume 34, Issue 5, CiteID L05102, doi: 10.1029/2006GL028831