

Monterey Institute for Research in Astronomy

Monterey, California 93942

1. INTRODUCTION

MIRA is an independent professional observatory devoted to research and education in astronomy. The Oliver Observing Station is located on Chews Ridge in the Santa Lucia Mountains of Monterey County; offices and shops are in the city of Monterey. This report covers the two year period 1 October 1993 to 30 September 1995.

2. PERSONNEL

Dr. Whitney Shane joined the Institute in 1994. Dr. Weaver assumed the position of Director during the reporting period.

3. FACILITIES

Wayne Rosing is refurbishing the 36-inch telescope control system. The old system, originally installed when the telescope was completed in 1978, was based on custom-built, single-board microprocessors. The new system, based on personal computers, is expected to be easier to repair and maintain. Telescope encoders and tracking motors are also being replaced. Ray Cyr, a physics professor at the Monterey Community College, spent the summer of 1995 at the Oliver Observing Station upgrading the facility and assisting Rosing in upgrading the telescope control system.

Because of the closure of Ft. Ord in the Monterey area, a cluster of buildings has become available for transfer to MIRA through the U.S. Department of Education. This site is contiguous with the newly formed California State University at Monterey Bay. When fully renovated, these buildings will provide nearly 11,000 square feet of office, library, and shop space. In addition, we hope to convert a small building into a student observatory. This will consolidate the two facilities we currently maintain in Monterey.

4. RESEARCH

Torres-Dodgen and Weaver continued their development of the near-infrared stellar classification system optimized for silicon-based detectors. Torres-Dodgen presented a detailed examination of the A Stars in this system (*Near Infrared Spectra of A-Type Stars* in The MK Process at 50 Years, 1994, San Francisco:ASP). Weaver showed that artificial neural networks was suitable for classification of Wolf-Rayet stars and normal stars on the NIR system (*Neural-Network Classification of Normal, WN, and A-Type Stars* also in The MK Process at 50 Years).

Weaver and Torres-Dodgen applied ANNs to the NIR A star spectra (*Neural Network Classification of the Near-*

Infrared Spectra of A-Type Stars 1995, ApJ 446, 300) and showed that ANNs could classify these spectra to 0.4 subclasses in temperature and 0.15 classes in luminosity while simultaneously determining the E(B-V) to 0.05. These results, based on 15 Å resolution spectra, are comparable to the results of human classifiers using 2 Å resolution spectra. This work has now been extended to the entire MK temperature and luminosity range with comparable results.

During the period, Weaver and Gordon Jones published *A Catalog of Co-Added IRAS Fluxes of Orion Population Stars* in the AAS CD-ROM series, 1994, Volume II.

Shane and Weaver have started a study of the photometric changes in gravitational lenses. This work will take advantage of the large number of sub-arc second seeing, photometric nights at Chews Ridge. Initial results seem promising and the software for extracting the magnitudes from the overlapping images is nearly complete. In support of the required high-quality imaging, Shane has been working with Rosing to fine-tune the optical collimation to take advantage of the best (0.5 arcsecond or better) seeing.

Guest astronomers during the period included Rainer Kushing from Vienna, Austria (near infrared spectrophotometry of P Cygni-type stars), William Smith from Washington University, St. Louis (imaging polarimetry of Jupiter's disk during the Shoemaker-Levy 9 impact), and Steven Naftilan, Clairmont College (spectrophotometric investigations of lithium abundances in late-type stars).

5. EDUCATION

MIRA is an initial member of the Monterey Bay Region Educational Futures Consortium. Our purpose is to use the local K - 16 educational network to leverage our education program. This program, FIELD TRIPS TO THE STARS, will include a Virtual Telescope, access to student-directed observing, and an astronomical education element which conforms to the student's knowledge level and learning characteristics.

Our public lecture series presents four to five invited astronomers each year to a typical audience of 100 to 300 members of the general public and the Friends of MIRA. The largest event, with over 700 attendees, occurred on the first night of the Comet Shoemaker-Levy 9 impacts into Jupiter and included theater-sized projection of Internet images and several invited lectures. Summer public tours of the Oliver Observing station have been well attended.

Wm. Bruce Weaver