

EDUCATION AND RESEARCH IN ASTRONOMY IN CENTRAL AMERICA

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1. Introduction

Recently, important efforts have been made to organize and consolidate the *Assembly of Central American Astronomers (AAAC)*, an organization created to contribute to the development of astronomy and astrophysics in Central America, with the help of international cooperation; the *Central American Courses in Astronomy and Astrophysics*, have been hosted each year by a different national university in Central America (1995: Universidad Nacional Autonoma de Honduras, 1996: Universidad de El Salvador, 1997: Universidad de San Carlos de Guatemala, and 1998: Universidad de Panama). These courses aimed to provide an exchange of knowledge and experience among university staff and students interested in continuing studies in Astronomy and Astrophysics. *Regional Observational Campaigns* have been organized to train young astronomers in the use of astronomical equipment and observational techniques. It seems that the broad development of astronomy and astrophysics in Central American as a whole, will be possible only when nuclei of astronomers in each of the countries concerned begin to develop many more activities. countries As part of the *III Central American Course on Astronomy and Astrophysics (III-CURCAA*, April 1997, Guatemala), in a forum about *Education and Research in Astronomy in Central America*, several important conclusions were stated. In this paper we present the six most relevant conclusions discussed there.

2. Projects, Programs and Activities

During the *III-CURCAA*, the Central American community of astronomers, in a forum held at the Universidad de San Carlos de Guatemala, with staff and students of the Central American national universities and representatives of the International Astronomical Union present, the following six main conclusions were stated:

2.1. A CENTRAL AMERICAN ASTRONOMICAL OBSERVATORY

The enormous efforts of the National Autonomous University of Honduras (UNAH) to convert the *Honduras Astronomical Observatory* (inaugurated in July, 1994), into a regional astronomical and research center were recognized. The Astronomical Observatory of the National Autonomous University of Honduras (OAUNAH) has been equipped with a computerized 42 cm telescope, a CCD camera, a photoelectric photometer and other accessories. This center, which is located at the main campus of UNAH, is functioning in its own building, where there are several offices, a library (with scientific journals and specialized books and magazines for the use of students and staff), a computer center, a conference room, and other facilities. Teaching of astronomy courses at university levels, development of research projects, and visits to the Astronomical Observatory are the main activities of this center.

2.2. TRAINING OF ASTRONOMERS AND A NETWORK OF SMALL OBSERVATORIES

Because activities in Astronomy and Astrophysics have been organized at university level only in Costa Rica and Honduras, the next step for the Central American Astronomical Observatory is to ensure that students from each of the Central American countries can pursue graduate studies in astronomy and astrophysics in Honduras. This is why UNAH has approved a course leading to the master's degree in astronomy and astrophysics, to be developed with international cooperation, as part of a Regional Project for Training of Astronomers and Astrophysicists. Another step could be the establishment of small astronomical observatories in each country, in order to form an observational network that could serve to consolidate the projects and programs already initiated at this Central American Astronomical Observatory, but also to support small nuclei of astronomers in each of the countries, thus helping the university staff to gain understanding and experience in this science.

2.3. TEACHING OF ASTRONOMY AT DIFFERENT LEVELS

Only recently in Central American universities have astronomy and astrophysics been considered formal academic activities. Teaching introductory or intermediate astronomy and astrophysics courses, as part of the curricula of other degrees, specially those in physics and mathematics, has proved very successful in the universities of Honduras, Costa Rica and El Salvador. Therefore, this type of activity should be undertaken in the other universities (Guatemala, Nicaragua and Panama) and the courses should be offered not only to physics or engineering students, but to all students, whatever their intended career. At elementary or secondary levels, very few topics of astronomy are included as part of the Natural Sciences and Social Studies courses. Most of these topics are first taught in the fourth grade and continue to the second year of secondary school. Because most of the schools are not equipped with bibliographical material related to astronomy, nor with slide projectors or posters to present astronomical images, neither do they have even small computers, teachers do not feel confident in handling up-to-date knowledge, material or data in their classes. As a consequence, on average, students are not well trained to understand basic astronomy topics, e.g. the Moon's phases, apparent motions of the Sun and the four seasons of the year, or solar and lunar eclipses. In Honduras, specially in Tegucigalpa, students have the opportunity to visit the Astronomical Observatory; during their visit they enjoy a program that includes three types of activities: lectures with up-to-date images (such as those obtained with the Hubble Space Telescope or other current space missions), practical and laboratory activities (such as modeling the Solar System, construction of a comet, or modeling the sky with computers), and of course, learning about how an astronomer makes an observation with a computerized telescope equipped with a CCD camera.

2.4. AMATEUR ASTRONOMICAL SOCIETIES

In all of the Central American countries there are now functioning amateur astronomical organizations. In El Salvador the *Asociacion Salvadorena de Astronomia* with their own funds has constructed a small astronomical observatory, with its own funds. There are very active associations in Guatemala and Honduras; those in Costa Rica and Panama are growing, and recently an astronomical association has been organized in Nicaragua. All these amateur astronomical organizations attract public attention specially when there are solar or lunar eclipses, or when it is possible to observe comets with the naked eye. Most of them own small telescopes (4, 5, 8, 10 or 12 inches in aperture), books and magazines (like those published by *Sky and Telescope*), and other bibliographical material. Sometimes members of these associations work together on observational projects with staff and university students. Therefore it is also convenient to continue developing joint projects with the amateur astronomical organizations, specially those devoted to elementary and high school teachers interested in astronomy. Academic and scientific knowledge, joined to expertise and skills may be very useful in contributing to the raising of the cultural and scientific levels of our citizens.

2.5. OBSERVATIONAL AND THEORETICAL PROJECTS

Research projects have developed mainly in Costa Rica, Honduras and Guatemala; it is expected that very soon, colleagues from El Salvador, Panama and Nicaragua will become involved in these activities. Considering the facilities already installed at the Central American Observatory, projects for reasearch on Near Earth Objects and Variable Stars seem to offer the most potential for Central Americans to contribute effectively, in the short or medium term, to the development of astronomy. Magnetic fields, stellar compact entities, planetary atmospheres, relativistic astrometry and cosmology are the theoretical fields in which we should continue doing research. It should not be forgotten that, because of the Mayan heritage of Central Americans, Archaeoastronomy is also a historical challenge.

2.6. DEVELOPMENT OF RELATED FIELDS AT THE UNIVERSITIES

The establishment of astronomy and astrophysics as academic fields is also a clever strategy to develop other sciences and technologies at our universities, and a way to help the region to become part of the space and communications era. Therefore, joint activities with physics, mathematics, engineering and other departments of the national universities should be encouraged.

3. Final Comments

Further general and particular discussion of these topics was presented by the Central American representatives at the *Seventh United Nations-European Space Agency Workshop on Basic Space Sciences*, held in Tegucigalpa, Honduras, June 16-20, 1997. As part of the workshop, individual presentations about the current situation of each country were made. Also, within the frame of this international event, where 80 representatives of 30 countries were present, the *Central American Astronomical Observatory of Suyapa* was inaugurated.

References

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