

50. IDENTIFICATION AND PROTECTION OF EXISTING AND POTENTIAL OBSERVATORY SITES
(PROTECTION DES SITES D'OBSERVATOIRES EXISTANTS ET POTENTIELS)
(Committee of the Executive Committee)

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1. Joint IAU/CLE Report

The most noteworthy action by this Commission is the issue in 1980 of "Guidelines for minimizing Urban Sky Glow near Astronomical Observatories" (Cayrel and Smith, 1980). This is a joint publication of IAU and CIE (Commission Internationale de l'Eclairage). It represents a practical approach to the most serious problem facing all observatories: the increase of light pollution from urban areas. Taking the previous recommendations of Commission 50 into account, the report shows how natural and artificial sky glow affects astronomical observations, describes methods of avoiding excessive artificial sky glow, and shows how public regulations have been successfully applied to protect individual observatories.

2. Identification of Observatory Sites

Some of the qualities required of an observatory site are easy to assess: freedom from cloud, freedom from sky glow, ease of access. Others may require extensive measurement: seeing, sky transparency, water vapour content. Although simple methods may be available for their measurement, little is known about the relative merits of good sites in these latter respects. The Commission is therefore studying techniques of measurement and assessing the results of all available measurements. In particular, the growing importance of infra-red observations has emphasised the need for water vapour measurements at high altitude sites.

Sites for solar observations have been surveyed by the Joint Organisation for Solar Observations (Brandt and Wöhl, 1971); favourable daytime conditions have been found at Roque de los Muchachos Observatory on La Palma.

There is justifiable anxiety about the availability of sufficient first-class sites with a reasonable geographic distribution. A wide distribution is obviously desirable so that all observers can have reasonably easy access to first-class instruments: there is, however, a vital observational need for a spread in longitude for the study of variability in astronomical objects. The location of suitable sites will require many observations and a deeper understanding of the atmosphere.

3. Monitoring existing sites

Working observatories are busy places, and regular objective measurements of sky conditions are seldom made and recorded. The Commission emphasises the value of such measurements, not only to the work of each observatory but to atmospheric physics.

Seeing conditions are sometimes determined by local circumstances, such as poor dome design or local topography (Hartley et al. 1981), but there is always a component of seeing originating in the atmosphere which at some sites and on some occasions reduces to the order of $\frac{1}{2}$ arc sec. A radio-sonde investigation

by Barletti et al. (1977) suggests that sub-arc second seeing might often be available at good sites. If such conditions can be sufficiently relied upon, the next generation of optical telescopes should be designed to take advantage of them.

Sky transparency has a particular interest. Dr. P.J. Edwards (Physics Department, University of Otago, Dunedin, New Zealand) suggests that extensive measurements of atmospheric extinction at existing high altitude observatories might be of benefit in atmospheric studies. He already has a network of five observatories in New Zealand to produce data on a routine basis, and he would welcome collaborators from other countries.

Night sky brightness is known to vary through geographical factors and solar activity. A systematic observational study would be of great interest in the choice of astronomical sites. The Commission would be glad to receive proposals for such a study.

4. Recent site-testing campaigns

The National Centre for Science and Technology in Saudi Arabia has commissioned the National Research Council Canada to test sites for optical telescopes. The testing is organised by Dr. Elmar Brosterhus, who recently published test results for Mt Kobau in British Columbia (Brosterhus et al. 1972). A summary of the results of the British tests on La Palma, Hawaii and Maderia has been published by McInnes (1981). Yunnan Observatory, of Academia Sinica, tested three sites in Binchuan in 1979 and 1980 (Huang Yin-Liang et al. 1981).

A search using satellite infra-red photographs has led to the choice of an observatory site at Laguna de Otun, 3,950 m altitude, in Columbia (reported by Dr. Jonge Arias de Greiff, Director, Observatorio Astronomico Nacional, Bogotá).

A new site survey at Mauna Kea and other sites in USA, organised by Dr. Crawford of Kitt Peak National Observatory, includes measurements of absorption by water vapour. The results will be valuable both for infra-red and millimetre wave astronomy.

5. Satellite Power System

A proposal to place a network of very large solar power collectors in orbit round the earth (the SPS system) has disastrous implications both for optical and for radio astronomy. If the system at present under study were eventually to be put into operation, reflected sunlight from the satellites, each of which might have 55 km² of solar cells, would remove all possibility of dark sky observations over a large proportion of the sky (Boyce, 1980).

The Commission brings this to the attention of the General Assembly of the IAU.

References

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