

Remarks on the Effort to Preserve the Astronomical Sky

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The challenge to astronomy of interference from optical and radio pollution has been around for a very long time, even before I got into astronomy almost fifty years ago. In its infancy at that time, radio astronomy was already in conflict with rapidly developing commercial communication interests. The deterioration of prime optical sites was also rapidly advancing. I recall observing runs at Mt Wilson in the 1960s, when in the late summer one sometimes had seeing of one-quarter arcsec - at the 100-inch Coudé you could even resolve the two components of Mira! Yet the explosive growth of Los Angeles had already doomed Mt Wilson as a dark-sky site, in spite of the excellent seeing conditions which are present to this very day.

Sometime later, after I had joined the staff of Lick Observatory, we entered a long and sometimes acrimonious debate with the city of San Jose concerning street lights. It was a battle pitting low-pressure sodium (which we wanted since it concentrated the light in narrow, if bright, D lines) versus high-pressure sodium (which the city supported since high-pressure lamps emit over a broad spectrum, more like natural daylight). Besides, high-pressure lamps were manufactured by General Electric, an American company with "connections" in San Jose. But, allowing for some compromises, we won that one. From that experience, lessons were learned. Some of these may help us in developing guidelines as we confront the challenges that now face us. I'll come back to this later.

There isn't time to review the often heroic efforts to preserve radio frequencies and protect the night sky that have surfaced in the intervening forty years, many of them led by delegates to this symposium and especially by chairs and members of your SOC and LOC. You, who have done the work and fought the battles, know the story far better than I. But developments over the past decade, especially in space, have led to new challenges, and discussion of these will take centre stage at this Symposium. General Secretary Johannes Andersen has summarized them succinctly:

... interference at radio frequencies from telecommunications satellites and their ever-increasing demand for frequency space cloud the future of radio astronomy and communication with scientific satellites; space debris is a growing threat to scientific satellites and inter-

¹This paper was delivered by Woody Sullivan.

feres with ground-based observations; and projects to launch highly luminous objects into space for earth illumination, artistic, celebratory or advertising purposes present a growing danger to observational cosmology ...

The solution to these problems lies in the political domain and requires an international scope. It is thus a project for the IAU. The convening of this Symposium is an important step on the way to finding the international solution we all seek. It would be presumptuous of me to engage in remarks about the technical and scientific issues, which you know far better than I and which you will be discussing here. But I can in good conscience offer a few administrative and political comments that might prove useful. These fall under three headings.

- (1) **Follow the "Track".** It will do us little good to wave our hands and gnash our teeth in public displays of dismay. A plan of action is called for that gets to the political heart of the matter. GS Andersen, acting on his considerable knowledge of the United Nations political scene, has developed such a plan and it is outlined in the "Observations and Recommendations of Symposium 196" (see Appendix 1). I call your attention particularly to items 7 and 8, which we hope ultimately will lead to a revision of the UN Space Treaty that will include articles favorable to our concerns. The recognition that a revision of the UN Space Treaty would be needed, and that a direction or "track" had to be developed to engage the right international committees and influential people, is a major contribution of GS Andersen, and I am greatly indebted to him for developing that track in consultation with many of you.
- (2) **Recognize Potential Allies.** Space has come to be regarded by some as just another place to do business, never mind the adverse consequences to matters not only scientific, but cultural and even religious. The potential economic value of space advertising alone could dwarf the substantial budgets currently associated with the space sciences. Thus the forces that might be arrayed against us are formidable. Yet there exist allies. Increasing space debris is a concern not only of astronomers but of the space agencies and the telecommunications industry, who fear damage to valuable satellites from potential collisions. Unrestricted growth of inefficient urban lighting is a matter of concern to environmentalists who point out the need for more efficient use of available electric power. In our relatively primitive battle over San Jose lighting, what turned the City authorities in our favour was not in the end appeals to the grandeur of astronomy, but rather a "dollars and cents" issue: for a given expenditure of electric power, low-pressure sodium (LPS) gave more lumens per square meter on the ground than did high-pressure sodium (HPS). In short, LPS was cheaper to run than HPS. Do not forget that "astronomy" does not loom so large for others as it does for us: it helps to have allies with economic power and parallel, if different, agendas.
- (3) **Persist.** We travel now on a "track" that we hope will take us to our goal: a revised international space treaty that addresses our concerns about the degradation of the astronomical sky. But our train is not the TGV:

getting to the goal will take many years. During the process, member states will have to cooperate via the UN Committee for the Peaceful Uses of Outer Space and its Legal Subcommittee to get the right language into the impending revision of the UN Space Treaties, and the relevant authorities will likely need to be reminded. Personnel may change. Within the IAU, please recall that officers have fixed terms (often three years), and that the Executive Committee also turns over by fifty percent every three years. I have every reason to believe that this matter will remain at or near the top of the agenda at the highest levels of the IAU; nevertheless, continual reminders from activists on the issues will be necessary. Persistence pays. Looking back again over our battle with San Jose, I think the key was that our representatives were present at every hearing, public or private, did their homework on the issues, especially the economic ones, always persisted. Stretching the metaphor a bit more, our train may not be the TGV, but it is a pretty heavy freight train and our momentum is proportional to our persistence. It's a long battle, but we can prevail.