RADIO ASTRONOMY

Astronomers Protect Endangered Bands

Relegation to a footnote in a document is not usually anything to boast about. But radio astronomers are treating a handful of footnotes in a paper produced at the World Radio Conference held last month in Geneva, Switzerland, as a major achievement. The footnotes ask governments to protect certain bands—especially the methanol line at 6668 megahertz—for exclusive use by astronomers. In a world where the radio spectrum is ever more crowded by broadcasting, satellite, and telecommunications companies and navigation services, this is no small issue.

Researchers had gone to the conference, sponsored by the United Nations' International Telecommunication Union (ITU) to coordinate the allocation of radio frequencies, to fight for their rights to the methanol band. They use the line, discovered in 1991, to observe newly forming stars in gas clouds deep in space: The stars excite methanol molecules, which amplify radio waves. And the *Radio Regulations* document, produced at the Geneva conference and signed by representatives of 140 countries, contained in Section 5 that all-important footnote. "The single most important achievement was the protection of the methanol line," says Klaus Ruf of the Max Planck Institute for Radio Astronomy in Bonn, Germany. "These footnotes are not strongly worded," says Willem Baan of Arecibo Observatory in Puerto Rico, who led the astronomical delegation, "but generally they are respected, although they are not legally enforceable."

The fight for bandwidth is an ongoing struggle. Only one band is formally reserved for astronomers: the hydrogen line at 1420 megahertz, which is used for detailed study of galactic structures and redshifts. "We have to be vigilant in order to protect what we have," says Baan. "It is a continuous battle, and it seems that we are slowly losing." For instance, astronomers are often asked to share bands with telecommunications companies, but the two uses are incompatible, says Hans Kahlmann, director of the Westerbork Radio Observatory in the Netherlands. Telecoms "are used to signal-to-noise rates of 20 dB, while we deal with incredibly weak radio sources and incredibly sensitive receiving systems with signal-to-noise rates of –60 or –80 dB. We can't even think of sharing frequencies," he says.

Frequency overlap has already caused trouble with the methanol line, says Ruf. German telephone services have begun to use the methanol band for ground-based microwave links. "Every time we want to observe in it with our radio telescope in Effelsberg, I have to write or call the German PTT and ask them to close down fixed links close to the telescope, and usually they comply."

The ITU meetings are the place where astronomers have to make their case. And in Geneva, "we lost less ground than we expected," says Kahlmann. In addition to the methanol line, they also obtained footnotes urging governments to protect certain bands below 1 gigahertz, the 4990 to 5000 megahertz band, and the 1535 to 1540 megahertz band, all of which are currently subject to interference from satellite downlinks. The footnotes are important, Kahlmann, says, but it is up to communications authorities in each country to implement the recommendations, and astronomers would like stronger protection. "We hope to get ... exclusive rights for all these bands, like we have now for the hydrogen line, but we will have to fight for it," he says.

And going head-to-head against firms that might use these bands to make money isn't going to be easy. Astronomers would have a stronger position if they had applied for licenses for particular bands when the World Administrative Radio Conference in 1959 accepted radio astronomy as a communication service. But they didn't, and Kahlmann says that was a big mistake. Licenses—and their attendant rights—"would give us more clout in the negotiations," he says.

–Alexander Hellemans

Alexander Hellemans is a science writer in Amsterdam, the Netherlands.

U.K. BUDGET

Equipment Funds Suffer Heavy Cut

LONDON—The British government dealt a cruel blow to researchers last week following the annual budget statement to Parliament by Chancellor of the Exchequer Kenneth Clarke. Clarke's statement indicated that the six research councils will get a small increase, although much less than the rate of inflation. But when details were released later, they revealed that money for capital projects in universities would receive a huge cut. "Funding through the universities is the essential second leg of the dual support for research, which has been completely knocked away by these cuts," says physicist John Mulvey of the pressure group Save British Science.

Scientists had not expected a generous handout this year. All ministries are under severe pressure to cut spending as the Conservative government, deeply unpopular in the opinion polls, focuses on vote-winning measures before the next general election due within 15 months. There was also the ill omen of the Office of Science and Technology's (OST's) surprise move from the Cabinet Office to the Department of Trade and Industry last summer—seen as a sign of the government's waning commitment to basic research.

But, as budget details emerged, initial reactions were of relief. The OST announced that funding for science would rise by $45 million to $1.97 billion for 1996–97. Although this "increase" would mean a $7.5 million cut in real terms, many researchers were bracing for worse, says Mulvey. Their fears were realized, however, when Education Secretary Gillian Shephard announced budget changes in her department: They included a massive $160 million drop, to $365 million, for university buildings and equipment next year. This 30% cut will grow to 52% over 3 years as part of a larger package of higher education cuts. Science departments will be hit hard, as the money is a key source of funds for large items of equipment and for maintaining laboratories, says an official of the Committee of Vice Chancellors and Principals (CVCP).

The universities were quick to condemn Shephard's announcement. "With the level of capital investment in the universities in decline over the past decade, a 30% cut in one year is potentially extremely serious," says Derek Roberts, provost of University College London.

Shephard said that institutions would be expected to make up for capital losses by raising extra money from the private sector under a new scheme, the Private Finance Initiative (PFI), applied to many areas of government and extended to the higher education sector 8 months ago. But this only rubbed salt into the wounds inflicted by the funding cuts. The CVCP said that the PFI was still experimental and "neither robust nor streamlined enough to replace in time the capital which has been lost."

Roberts, whose college has received the largest investment by a company of any university in the U.K.—$75 million from the Japanese pharmaceutical company Eisai—believes the initiative may be inappropriate for universities. "The PFI may be sensible for schemes like road-building where investors can get a return through tolls or other charges, but universities are not a place to make money in this way," he says.

Trade and Industry Secretary Ian Lang, now responsible for science, told a Save British Science delegation last month that he would be a strong advocate for science and technology. "But the budget shows that he has failed the research base," says Mulvey.

–Nigel Williams