

# REPORT OF THE 2003 ESF REVIEW PANEL ON THE ESF EXPERT COMMITTEE ON RADIO ASTRONOMY FREQUENCIES (CRAF)

FRANKFURT – 30-31 OCTOBER 2003

## Panel Membership:

Dr M Martinelli <i>Chair</i>	Director, IPCF-CNR, Pisa: member of ESF PESC Committee
Mr Thermod Bøe	Director, European Radiocommunications Office, Copenhagen
Professor Michael Grewing	Director, Institut de Radio Astronomie Millimétrique, Grenoble
Professor Tauno Turunen	Director, Sodankylä Geophysical Observatory, Finland
Professor José Cernicharo <i>Unable to attend</i>	Instituto de Estructura de la Materia, CSIC, Madrid
Dr Michael M Davis	ATA Project Director, SETI Institute, Mountain View, CA, USA
Mr Neil Williams <i>Secretary</i>	ESF-PESC Head of Unit

Appended to this report:

List of Acronyms  
Terms of reference of the Review  
Submission of CRAF to the Review  
Proposed revised CRAF Charter and Terms of Reference

## **1. INTRODUCTION**

The Committee on Radio Astronomy Frequency was established by the ESF Executive Council in 1988. The Council agreed extensions of CRAF's mandate until 1996 when it asked the PESC Committee to undertake a review of CRAF's work and to make recommendations for its future. As a result of the 1996 Review, CRAF's mandate was extended for 5 years, and various recommendations were implemented (see achievements below). A Statutory Review of ESF Standing Committees took place during 2001-2002, and the current review of CRAF was delayed until these Statutory Reviews were completed.

## **2. MODUS OPERANDI OF THE REVIEW**

The following steps were used:

- Member Organisations and Observers within the PESC domain were invited to nominate members of the Review Panel. PESC nominated one of the members. The proposed membership was endorsed by the ESF Executive Board.
- Draft Terms of Reference and the proposed modus operandi of the Review were discussed by PESC and endorsed by the Executive Board.
- CRAF was invited to compile a submission of its most important publications and achievements since the last review. This submission formed the principal information provided to the Review Panel.
- CRAF was invited to make a statement concerning the recommendations and revised CRAF terms of reference agreed at or since the last review. This statement was provided to the Review Panel alongside the report of the 1996 Review and the terms of reference.
- These submissions and statements were offered to the contributing (ie subscription paying) organisations of CRAF, inviting opinion on achievements, progress and value for money. The responses of these organisations were presented to the Review Panel.
- The Chair of CRAF, Dr van Driel, was invited to a session of the Review Panel meeting to provide oral briefing and to respond to questions posed by Panel members.
- The Review Panel will report to the November 2003 meeting of the ESF Executive Board.

## **3. THE REVIEW**

### **3.1 Aims and Objectives of CRAF**

CRAF is a committee of scientific experts on frequency issues for radio astronomy. Its principal operating members are the Chair of CRAF and the CRAF Frequency Manager (FM). At present the FM also acts as secretary to the Committee. CRAF aims to:

- Keep the agreed frequency bands of radio astronomical interest free from interference.
- Ensure access and availability of the radio spectrum for scientific needs.

- Support the scientific community in their needs for passive use of interference free bands of interest.

CRAF delivers these objectives by:

- Coordination of European policy on the protection of frequency bands.
- Promotion of the understanding of the passive uses of frequencies for scientific studies.
- Provision of a discussion forum on interferences in passive uses to increase awareness at the international level.
- Interacting extensively with major bodies at the international level (eg CEPT, IUCAF, WRC, EC) on current and potential issues and maintaining connection with national structures and radiocommunications administrations.

***The Review Panel fully concurred with the views of the 1996 Review in stressing the scientific importance of this activity. In the opinion of the Review Panel these aims and objectives have been achieved to the fullest possible extent and remain fully appropriate for CRAF.***

### 3.2 Reporting and Advisory Activities of CRAF

Within ESF, CRAF now reports on an 18/24-month cycle to PESC by means of a presentation by the CRAF chair to that Committee, and by means of annual reports to the General Assembly. The Newsletters produced by CRAF also receive limited circulation within ESF. The contributing organisations maintain close contact with CRAF through their members and also receive copies of the Newsletters and the major publications, such as the CRAF Handbook for Frequency Management and the CRAF Handbook for Radio Astronomy.

Publication of CRAF documents is handled by the ESF Communications Office and fully follows current ESF practice.

***The Review Panel is of the opinion that CRAF has reported to and advised the ESF appropriately.***

The Review Panel welcomed the intention of CRAF to seek more contact with other passive users of the radio spectrum (eg remote sensing), noted the intention of PESC and CRAF to hold a strategic science workshop with other users, and suggests that CRAF explores with the ESF committees LESC, EMB and EPB the usefulness of exchange of information with these bodies.

***The Review panel supports CRAF in seeking to share the interest in frequency protection with other research communities. In this respect a further edition of the CRAF Frequency Management Handbook extended to other passive uses would be welcome.***

### 3.3 Recommendations of the 1996 Review

The principal recommendation of the 1996 Review recognized the prime importance of the “European Spectrum Manager” to the work of CRAF and frequency protection in general within Europe and recommended that such a position be established full time and put on a sound financial footing. This recommendation was implemented in 1997, with the assistance of the FM’s home institution (ASTRON in the Netherlands) and with the financial cooperation of ASTRON and the JIVE network of observatories.

Following further reflection, the financing and budgeting for the FM was moved into ESF in 2002, and CRAF finances are now operated in the fashion of other *a la carte* funded expert committees. The FM's salary and expenses are covered by an agreement between ASTRON and ESF.

***The Review Panel considers the recommendations of the 1996 Review to have been fulfilled.***

The Review Panel noted that the subscriptions to CRAF only sufficed to cover the FM's salary and costs and did not provide for any support of scientific workshops, publications (presently supported by PESG), or for the significant time and travel costs incurred in representational duties by the CRAF chair in addition to those undertaken by the FM. Individual CRAF members also have duties connected to liaison with national authorities as well as assisting the chair and the FM in representational duties from time to time. It was estimated that the total cost of CRAF-related activity was four or five times the level of the CRAF subscription. The Review Panel noted and welcomed the provision for a summer school and expanded CRAF meetings (with users) which the ESF-CRAF participation in the RadioNET I3 would provide, but considered that attempts to raise, or at the very minimum guarantee, the current level of the subscriptions should be considered. It suggested that an MoU signed by the participating organisations of CRAF would provide a mechanism for this, and in addition would provide a level of recognition of the work of CRAF and its members on the local level (see also 3.4 below on contribution scales).

***The Review Panel recommends the establishment of an MoU for organisations participating in CRAF.***

***The Review Panel also recommended that CRAF's profile would be enhanced by taking a seat on the management board of RadioNET.***

### 3.4 Views of the Contributing Organisations

The Review Panel received eight written statements, of varying detail. They were unanimous in recognizing the importance of frequency protection, their appreciation of CRAF's past activities and in their strong support for the extension of CRAF's mandate.

The Review Panel accepted the view of one organisation that the Terms of Reference for CRAF adopted after the last Review in 1997 had been weakened in the amendments approved by the Board in 2000, and gave less authority to CRAF. This MO stated "Given the key representative role of CRAF, we believe that it is important that its Terms of Reference give it clear authority, endorsed by ESF and the sponsoring Member Organisations (of CRAF), to speak on frequency protection issues". The Review Panel also commented that they found the "Charter with Terms of Reference", to be imprecise, and overlapping with the "CRAF Rules and Procedures".

The Review Panel also accepted the view of another organisation that the contribution scale seemed rather extreme in its operation, with some organisations paying "one share" and others "10 shares" with no intermediate steps. Recognizing that this had been the original agreement for CRAF, the Review Panel suggests that a revised contribution scale with intermediate steps be devised (cf NuPECC's 4 level scale) for inclusion in the proposed MoU (see 3.3)

***The Review Panel recommends that CRAF's "Charter and Terms of Reference" be simplified, and based on the Terms of Reference proposed by the 1996 Review Panel.***

### 3.5 Achievements of CRAF

The achievements of CRAF are in some sense indirect, in that it generates no scientific results. The capability to do future research is guaranteed by CRAF's efforts, and once protection of a frequency

is given up, it can never be recovered. Members of the Review Panel stated that CRAF's work was "globally recognized", had "greatly raised the profile of radio astronomy in telecommunications regulation", "WRC 2003 had been very successful for the radio astronomy community and CRAF's input had been most effective" and that "the ESF/CRAF-Iridium agreement had been seen by the global radio astronomy community as a milestone".

Panel members commented that the independent voice of CRAF was greatly respected, and it was to ESF's credit, and benefit, that this status of CRAF was recognized and maintained in the future.

The NSF had recently informally estimated that their long term investment in radio astronomy had been of the order of \$1bn since 1945. The estimated operational costs of leading facilities in the US and Europe is between \$5-10k per hour. These numbers give an idea of the framework in which CRAF operates.

The Review Panel considered the standard of CRAF publications to be good, providing not only a communication medium through its Newsletters but also important training material in its handbooks. Circulation is moderate (350 for regular newsletters; 2500 for specials; 1000 for handbooks), but these are maintained on the CRAF web site which provides an important resource for the community. CRAF also organises occasional technical workshops, such as the very successful meeting held in Bonn in 2000 which reviewed calculation methods for the coordination of Mobile Earth Stations with radio astronomy stations.

The Review Panel recognized that metrics are important to describe and justify activity to people who do not have an in depth knowledge of the subject and that collecting metrics can be seen as a distraction. However, it suggested that CRAF and the FM consider the collection and presentation of robust data to indicate CRAF's activities and interventions

### 3.6 Frequency Manager position

The Review Panel noted the crucial role played by the FM in delivering the CRAF aims and objectives, and recognised that the enthusiasm and expertise of the present FM, Dr Titus Spoelstra, was a major factor in this success. Effective frequency management is "not learned overnight", and it was noted that Dr Spoelstra will retire in the next few years.

***The Review Panel recommends that CRAF and its contributing organisations begin now on drawing up a strategy for the replacement of Dr Spoelstra.***

## 4. MANDATE RECOMMENDATION

***The Review Panel strongly recommends to the ESF that the mandate of CRAF be extended for a minimum period of 5 years (ie until the end of 2008 at the earliest)***

### **Abbreviations used in the Report**

ASTRON = The Netherlands Foundation for Research in Astronomy

CEPT = Conference of European Post and Telecommunication administrations

EC = European Commission

EMB = ESF's Expert Committee, the ESF Marine Board

EPB = ESF's Expert Committee, the European Polar Board

ERO = European Radiocommunications Office (CEPT)

I3 = a project of the Framework Programme 6 Integrated Infrastructure Initiative

ITU(R) = International Telecommunications Union (Radiocommunication Sector)

IUCAF = UNESCO Inter-Union-Commission on the Allocation of Frequencies

JIVE = Joint Institute for Very Long Baseline Interferometry in Europe

LESC = ESF's Standing Committee for the Life and Environmental Sciences

NSF = National Science Foundation, USA

WRC = World Radiocommunication Conference

PESC = ESF's Standing Committee for the Physical and Engineering Sciences

## **TERMS OF REFERENCE OF THE 2003 ESF REVIEW PANEL ON THE ESF EXPERT COMMITTEE ON RADIO ASTRONOMY FREQUENCIES (CRAF)**

Taking into account the aims and objectives of CRAF,

Taking into account the recommendations of the previous review of 1996,

Taking into account the views of contributing organisations, and

Taking into account the achievements of CRAF, particularly those post-1996.

### **THE REVIEW PANEL WILL:**

Recommend to the ESF whether CRAF should have its mandate renewed for a further 5 years (or longer),

Comment on the achievements of CRAF,

Recommend such changes to the aims, objectives, modus operandi and terms of reference of CRAF as are appropriate,

Report to the ESF Executive Board in November 2003.