

**Response of the
Observatoire Aquitain des Sciences de l'Univers
and of the Laboratoire d'Astrodynamique, d'Astrophysique and
d'Aéronomie de Bordeaux
to the public consultation on RSPG Opinion
« A coordinated EU Spectrum approach for scientific use of radio
spectrum »**

The Observatoire Aquitain des Sciences de l'Univers (OASU) and particularly the Laboratoire d'Astrodynamique, d'Astrophysique et d'Aéronomie de Bordeaux (L3AB), at Floirac, France, welcome the opportunity to respond to the public consultation on the report of the RSPG OPINION on “A coordinate EU Spectrum approach for scientific use of radio spectrum”.

The current European regulatory framework for frequency management results from a long and complex working process involving most National administrations. The existing framework can be considered as satisfactory. It is remarkable that such a framework has permitted the development of a wide range of high quality wireless applications, as well as outstanding astrophysical observations with very high sensitivity radio telescopes, thanks to the allocation of harmonised frequency bands including those required by Radio Astronomy.

Main text :

2.4 Radio Astronomy

We suggest to modify the first paragraph as follows (modifications are given between “...”): Astronomy provides knowledge of our planet “Earth, other planets of the Solar System, our own Galaxy as external galaxies revealing” our place in the Universe. Radio Astronomy is a “significant” part of the astronomical science which “permits to reach the extreme limits of” the Universe. New discoveries are “regularly” made.

Footnote 4: please add: “middle atmosphere chemistry” after ozone depletion.

Footnote 5:

Change “atom” into “molecule”, and “physically “ into “by the physical structure of the molecule”.

2.4 Radiolocation

We suggest the following modifications: (“Surface of” planets, “tectonic” plates).

3.2 Passive techniques

Second paragraph: change specific chemicals into “specific molecular species”.

4.5 Benefits from Radio Astronomy

We strongly support the whole paragraph which reveals the outstanding technological developments made by radio astronomers and the technical teams, which correspond to expensive investments by national Research and Development investments.

5.3 iv Sharing in radioastronomy bands

We strongly disagree with this chapter as the conclusion is completely erroneous. We suggest the following draft with modifications into "...":

Sharing scenarios have been investigated for radio astronomy operations but have only been implemented on an ad-hoc basis. "In some observatories" the most sensitive observations are done during early morning hours when many of the terrestrial transmitters are off the air. However this type of time sharing "is not a common practice because radio-observations are effectively done days and nights. The operating cost of the radiotelescopes is such expensive that they absolutely need to perform observations the whole time as soon as weather conditions are acceptable."

6 : Analysis of responses from administrations

We support this paragraph.

8. Conclusions

We strongly support this chapter and particularly the 6th paragraph (ALMA) as our laboratory teams are deeply involved in the design, qualification and production of several electronic subsystems for the development of the world-wide (Europe, North America, Japan and Chile) radio astronomy project ALMA (Atacama Large Millimeter Array). The ALMA lower receiver band is 30 GHz this band (highest sensitivity) must be protected with the most interest. In addition, ALMA will allow us to investigate many bands in the millimeter domain from 50 GHz to about 280 GHz. The latter domain must be strictly protected in order not to ruin a several years, multi-national effort devoted to passive observations of the Universe in which our teams are strongly contributing.

9 Draft elements

We strongly support this chapter but we are reluctant about paragraph 9.7 which introduces processes involving that an individual struggling against authorities cannot hope to win. This will be the case when a passive scientific long term use will be confronted to commercial active short term interests. We guess that the paragraph 9.7 could not be suppressed. In this case we suggest the following modifications :

- 1- Words in bold should be written as the rest of the draft.
- 2- In paragraph 7., the sentence "This assessment should, in a proportionate manner:" should be replaced by :
"This assessment should, if compliant with the R-R :"
- 3- The sentence "identify the **impact of the various options** on the interests of the particular groups of stakeholders;" should be replaced by:
"identify the social and economical impact of the various options on the interests of stakeholders;"
- 4- The sentence "take into account **commitments/obligations** in international initiatives/agreements; should be replaced by:
"take into account commitments/obligations in international agreements in accordance with the R-R;"
- 5- "Assess the **risks** associated with each option" is nonsense and must be suppressed.

Annex 1 : Earth observation

We strongly support this chapter and suggest to add in the 4th paragraph, the “Odin satellite, a Swedish, French, Finnish and Canadian project”.

Annex 2 : Radio astronomy :

We agree with the text adapted from Dave Finley.

Technological Contributions from Radio Astronomy

(a) 10 K can even be changed into “4 K” since such cooled down receivers are now commonly used.

Trends in Radio Astronomy

We suggest the following corrections:

1. « Trends in radio astronomy are towards higher sensitivity, and higher frequencies » to be replaced by « at all frequencies ». Please consider SKA and LOFAR, at least till 2020.
2. « Examples are the SKA project which seeks to build a single telescope with a square kilometre surface at 1400 MHz » is false. On the contrary, SKA has a very high frequency dynamic. This is to be replaced by « which seeks to build a giant interferometer of radio telescope stations, with baseline 3000 km, in a frequency range between 150 MHz and 25 GHz
3. « LOFAR further opening ... ». LOFAR uses reduced frequency bandwidth and surface. This sentence may be replaced with « LOFAR which will be a precursor of SKA at low frequency, between 30 MHz and 250 MHz »
4. We consider the fundamental importance of frequency lines like 21 cm and 2,6 mm, to observe very far galaxies at very high redshift. To the text « The existing bands . . . signals of interest » it could be added « The increased sensitivity allows exploring more remote galaxies and looking back in time towards the early universe. The signal coming from the spectral lines is then red-shifted by large factors, towards more than ten times lower frequencies »
5. In addition to LOFAR and SKA, we can add other future international projects such FASR (USA, Sun observation 30 MHz-30 GHz), MILEURA widefield array (Australia at frequencies lower than 1.6 GHz) and many other ones.
6. Moreover some new developments in term of Martian Radars (such as Ground Penetrating Radar) are now under responsibility of Radio Astronomy observatories. Such radars are wide bandwidth (0.5-3 GHz, for example, the ESA/ExoMarsRover) and need to be fully tested in laboratory and on special sites (Sand dunes in Europe and Africa, or icy North Poles).
7. At the present time, the Very Long Baseline Interferometry (VLBI) technique is used at 2.3 GHz for improving reference systems used in aeronautic and space navigations. Data are more and more polluted by RFI's. New systems are being design and built at higher frequency bands which have to protected against other uses, to preserve the tremendously costly investments made not only at the European but also at the international level.

List of typos to be corrected

2.4 Radiolocation

Change: Teutonic into “tectonic” plates.

4.5 Benefits from Radio Astronomy

Change has into “have” in the 2nd line of the 2nd paragraph: radioastronomers “have” been forced...

3rd line change area into “areas”.

6 : Analysis of responses from administrations

Correct sometime into “sometimes” in the 6th line of 1st paragraph of 6.1.

Annex 1 : Earth observation

Line 2 of the 1st paragraph, change warning into “warming”.

Annex 2 : Radio astronomy :

1st paragraph: change Hipparchus (Latin) into Hipparchos (Greek).

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