

THE INTERNATIONAL SPACE SCIENCE INSTITUTE (ISSI)
– AN INTERVIEW WITH ROGER M. BONNET

Abstract. In this interview, Roger M. Bonnet¹ recalls the history and describes the activities of the “International Space Science Institute” (ISSI²) founded in 1995 and devoted to achieving a deeper understanding from space research missions, ground-based observations and laboratory experiments.

Editor (Ed.): Professor Bonnet, we should probably start with a bit of history and recall ISSI’s purpose?

Roger M. Bonnet (RMB): ISSI was founded in 1995, under Swiss law as a not-for-profit organization and with an initial endowment by the leading Swiss company Contraves Space AG. ISSI’s main task is to contribute to the achievement of a deeper understanding of the results of space research missions.

Ed.: Could we say that ISSI is a research institution?

RMB: Not exactly. The best definition for ISSI is that of an institute for advanced studies in space sciences where scientists from all over the world meet in a multi- and inter-disciplinary context. In other words, ISSI’s main function is to achieve a deeper understanding from different space research missions, ground-based observations and laboratory experiments (Fig. 2). It adds value to those results in an atmosphere of international cooperation. It is a catalyzer of science.

Ed.: How are you operating?

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²<http://www.issi.unibe.ch/>

RMB: Three statutory bodies³ and a supporting association (cf. Fig. 3) interact regularly in matters of strategy, operations, finances and public relations. We also use to say that ISSI's role is basically to be seen as recycling and accumulating knowledge and that more science is created and extracted with little additional expenditure.

Ed.: In other words, you are not developing your own spacecraft, hardware, nor data collecting experiments?

RMB: This is the point. ISSI is *not* operating instruments nor facilities. We are not fulfilling the rôle of a space agency. We increase and amplify the scientific output from space missions through interdisciplinary analysis of the disparate datasets they provide (cf. Fig. 4).

Ed.: This makes ISSI unique in the world.

RMB: Exactly. ISSI's approach could be characterized by a few keywords:

- *international*, as, since its opening, ISSI has hosted scientists from all parts of the world featuring 36 countries with the two largest contributors (cf. Fig. 5) being Europe (56%) and the US (32%);
- *interdisciplinary approach*, in the sense that ISSI is at best when bringing together people from communities that otherwise would not talk to each other, and when addressing themes that are not yet addressed through monodisciplinary analysis;
- *integrative policy*, since ISSI provides fora for addressing and resolving controversies;
- *academic environment*, via relative seclusion together with high-level state-of-the-art support in a continuously updated infrastructure;
- *quality label*, as testified by ISSI's publications recording the institution added value;
- and again *catalyzing* and *enabling* science rather than just doing it.

Ed.: Over ten years of activity, ISSI has grown from newborn to fully mature institution. What are the major trends you would retain?

RMB: Originally the scientific programme was predominantly focussed on solar-system science: Sun, solar wind, solar-terrestrial physics, heliosphere, cosmic rays, terrestrial planets, including connections with astrophysics, cosmology and our planet Earth. More recently the Earth sciences as such,

³<http://www.issi.unibe.ch/bodies.html>

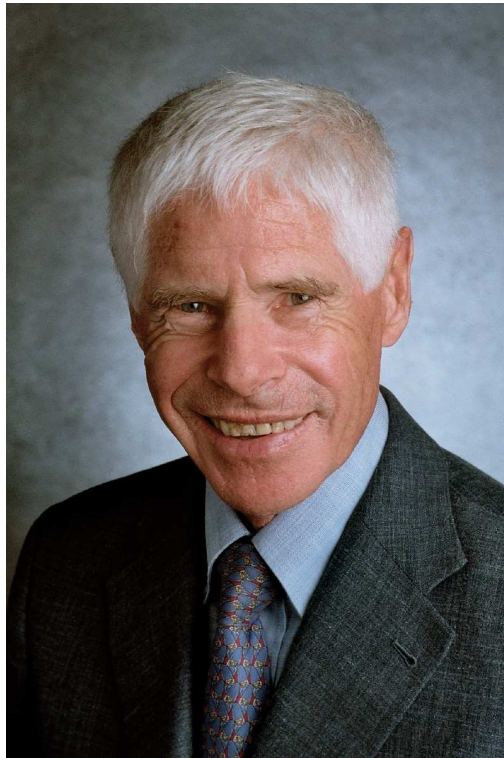


Figure 1. R.M. Bonnet. (Courtesy ISSI)

as well as astrobiology and space instrumentation have integrated the fields tackled.

Ed.: The 2004-2005 Annual Report (ISSI 2005) has been released not so long ago. It is gathering together an impressive list of items.

RMB: Our range of activities is quite varied: workshops, working groups, international teams, fora, ...

Ed.: Could you please briefly describe them for our readers?

RMB: In our *Workshops*, up to fifty invited scientists work during a week, possible two, on a specific theme that has been defined by ISSI in consultation with the Science Committee that has an effective approval rôle; the outcome is published in ISSI's refereed *Space Sciences Series* (Springer) and in *Space Science Reviews*; we have yearly three or four workshops. The *Working Groups* are of a smaller size (some 10 to 20 participants) and are

devoted to more technical themes, also defined by ISSI in consultation with the Science Committee; the working groups typically meet several times for about one week each; the output is published in ISSI's *Scientific Reports Series* (ESA). The *International Teams* gather together from 3 to 15 participants with a flexible schedule such as, for instance, two periods of one week separated by several months; their topics are proposed by the community following an open Announcement of Opportunity and are recommended by the Science Committee to ISSI for selection; the output goes into scientific journals; there were twenty such teams in 2005. Finally the *Fora* assemble up to 20 participants for a couple of days to debate or review science topics or science policy matters.

Ed.: Is ISSI covering all the expenses?

RMB: Largely so indeed. ISSI covers local expenses for all participants, beyond providing meeting and working facilities. Travel expenses are also covered in some cases: organizers, fora participants, ...

Ed.: Actually, who in turn is funding ISSI?

RMB: The European Space Agency (ESA) is the major contributor (some 60%) with 1 MEuros/year from the Science Programme Committee (SPC budget). Several Swiss sources contribute to the remaining 40%: the Swiss Confederation, the University of Bern and the Swiss National Science Foundation. There are/have been also contributions in "kind" from Contraves Space AG, from the University of Bern, as well as indirect ones from the major space agencies such as NASA and JAXA.

Ed.: You had an interesting comment about the effective rôle of the Science Committee. Could you be more specific on this?

RMB: The Science Committee's responsibilities are:

- to render scientific advice to the directorate, *e.g.* on the selection of future workshops;
- to evaluate the proposals for scientific teams and to issue recommendations for selection;
- to render scientific advice to the Board of Trustees, *e.g.* on the appointment of directors.

Ed.: Who were ...

RMB: Prof. Johannes Geiss was ISSI's founding father, nominated Execu-

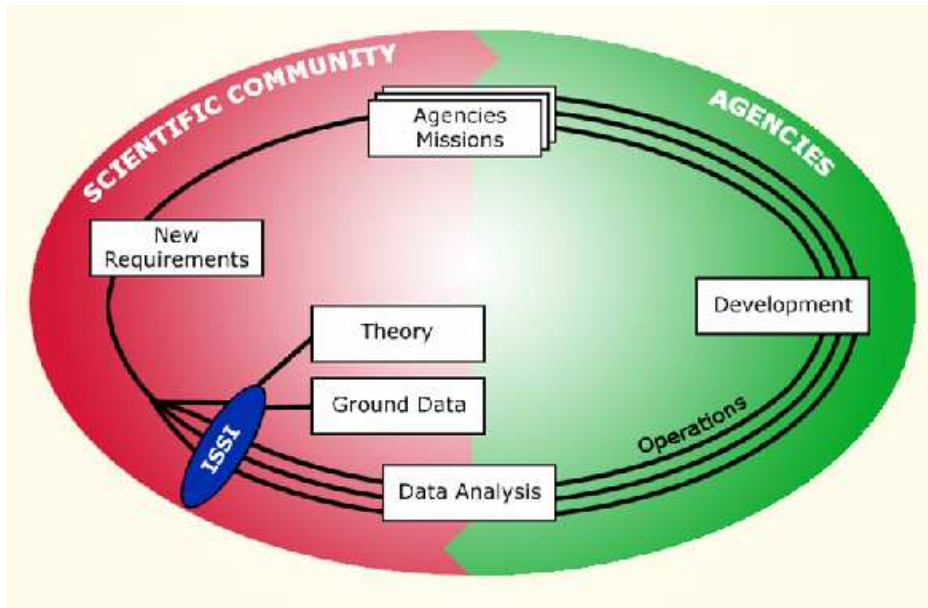


Figure 2. The place of ISSI in recycling and accumulating knowledge. (Courtesy ISSI)

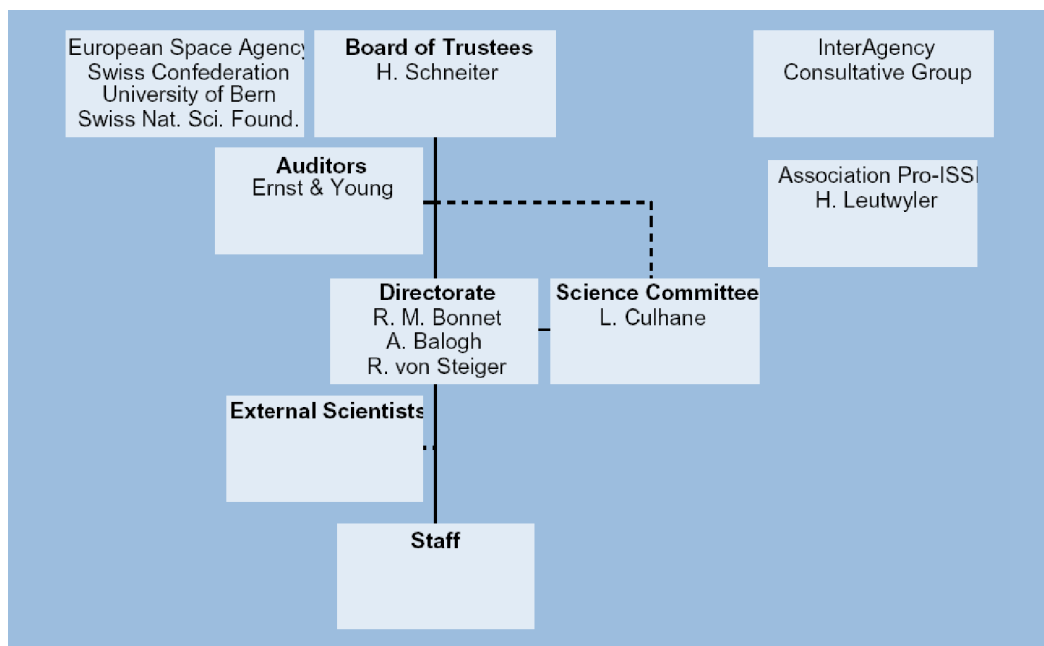


Figure 3. The structure of ISSI. (Courtesy ISSI)

tive Director in 1995. He is Honorary Director since January 2003 when I succeeded him. Our directorate presently includes also André Balogh and Rudolf von Steiger as Directors.

Ed.: Actually how large is your staff?

RMB: Only a dozen people, from the managers to the supporting staff via the discipline scientists, are handling the complexities of an annual programme which sees some 300 external scientists giving life to the activities just described. For instance a Workshop typically calls for one year and half of hard work from conception to end.

Ed.: Can we give an estimate of the total number of external people who have been involved in ISSI's activities to date?

RMB: Roughly some 1400 people from 36 countries have participated in ISSI's activities so far (cf. Fig. 5).

Ed.: ISSI's web site is quite informative and lists the various scientific themes.

RMB: Three Workshops have been selected for 2006, on strategies for life detection, on Mercury, on comet science, and an additional one on NASA's ACE mission, mostly funded by the US which want the ISSI label on the meeting. In 2005, our three Workshops were dealing with solar dynamics and its effects on the heliosphere and the Earth, solar variability and planetary climates, as well as geology and habitability of terrestrial planets. There was also in 2005 a Working Group on the composition of comets in preparation for the Rosetta mission. A noticeable Forum has been devoted to the relationships between science and the media in March 2005.

Ed.: Most of the International Teams have even their own homepages.

RMB: The full list is available from ISSI's web site, with indeed links to dedicated web pages. As examples, I would just mention the last themes selected for International Teams: impulsive solar energetic particles events, investigation of the Pioneer anomaly, observing the early universe, transiting extra-solar planets, etc.

Ed.: ISSI publications were already mentioned earlier when you were talking of the various activities. Can we come back to them in more details?

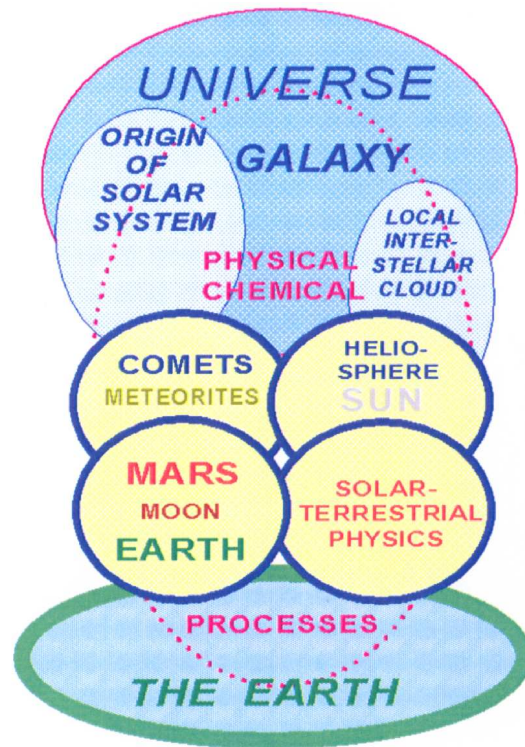


Figure 4. ISSI's interdisciplinary approach. (Courtesy ISSI)

RMB: Certainly (cf. Fig. 6):

- The *Space Sciences Series of ISSI* is made of topical volumes resulting from the Workshops, published by Springer as hard-cover books and as issues of *Space Science Reviews*. To date, twenty two volumes are available, and three are in press or in preparation.
- The *ISSI's Scientific Reports* gather together volumes of a more technical nature, published by ESA's Publications Division. Two volumes are currently available and three are in preparation.
- *Spatium* offer popular articles, published by the Association Pro-ISSI. Thirteen issues are currently available.
- *Scientific papers*, mostly by Teams and individual visitors, are issued in international, peer-reviewed journals, published together with ISSI affiliation or with acknowledgements to ISSI.

Ed.: To wrap up this interview, what would you say about the future?

RMB: As mentioned earlier, ISSI's staff is small, as are its facilities and

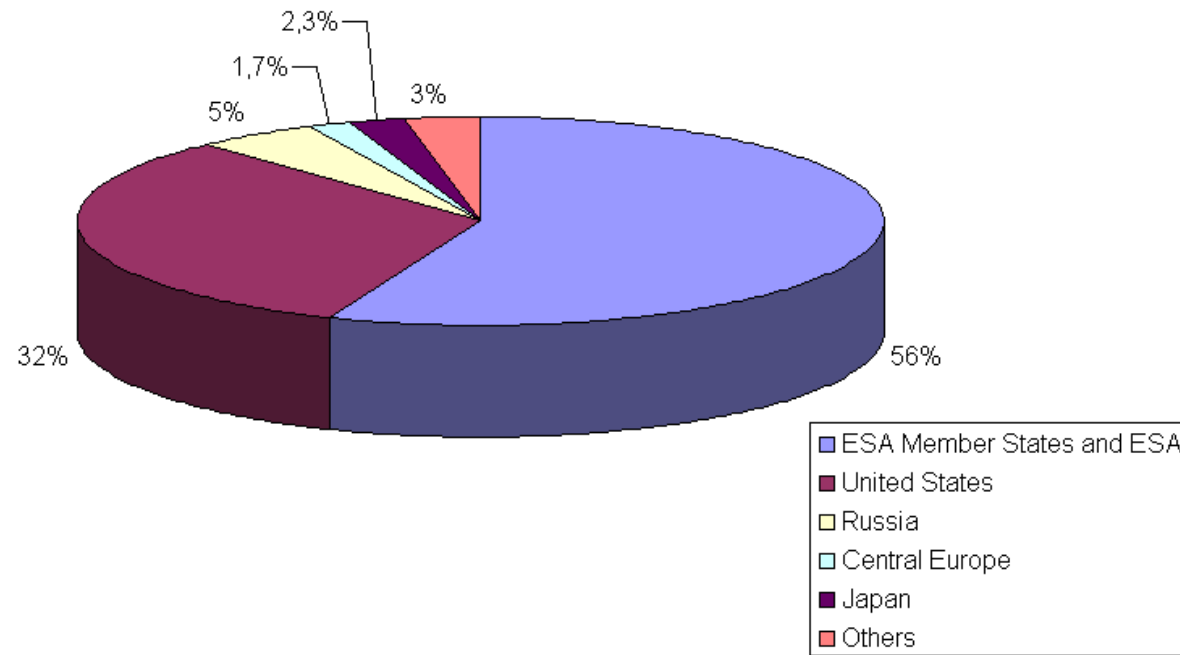


Figure 5. International participation in ISSI activities (~1400 people from 36 countries). (Courtesy ISSI)

budget, but its efficiency is at the level of the wide horizons tackled through an intricated network of activities. Following discussions held at the last ISSI Forum on Earth Sciences, it is envisaged to offer to the Earth Sciences community a service similar to what we are offering to space scientists. This is a new challenge and we are looking forward to implementing this new and important program. After ten years of existence, it is normal that we look at ourselves, critically analyzing what we have been good at and investigating which new tools should be developed to accomplish our mission. It is expected that the future rôle of ISSI in the area of Earth Sciences will lead to major progress in a field where the two most obvious assets of ISSI – internationalization and interdisciplinarity – are essential to permit that progress.

References

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2. ISSI 2004, International Space Science Institute Annual Report 2003-2004, Bern, 52 pp.
3. ISSI 2005, International Space Science Institute Annual Report 2004-2005, Bern, 52 pp.
4. ISSI Brochure⁴

⁴http://www.issi.unibe.ch/PDF-Files/ISSI_Brochure.pdf