

**PROPOSAL FOR THE HOSTING OF THE INTERNATIONAL CENTER FOR  
EARTH TIDES (ICET) AT THE UNIVERSITY OF FRENCH POLYNESIA (TAHITI)**

**submitted to the International Association of Geodesy (IAG)  
and to the Federation of Astronomical and Geophysical Services (FAGS)**



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## **1. Introduction**

French Polynesia is both a very large and a very small country, with a total land area of 4,167 km<sup>2</sup> scattered (118 islands) over 5,000,000 km<sup>2</sup> of ocean. The total number of inhabitants is 250,000. The city of Papeete, in the main island, Tahiti, regroups around 130,000 persons. This country is under the French flag, but with a very large internal autonomy and its own government.

The University of French Polynesia is a small but fast growing university, with around 3000 students. It offers several courses, ranging from laws and economics to geophysics. It has also a doctoral school (« Milieux Insulaires Ultra-Marins », overseas insular systems), with currently 30 PhD students.

The University of French Polynesia manage several laboratories, the main ones being the GAATI (Algebraic Geometry), IRIDIP (Insular Development), the Biology laboratory, the Natural Substances laboratory, and our Geosciences Laboratory (GEPASUD, Géosciences du Pacifique Sud), coupled with the Geodesy Observatory of Tahiti (OGT).

## **2. The Geodesy Observatory of Tahiti and the Geosciences Laboratory**

The Geodesy Observatory of Tahiti hosts several instruments, the main one being a laser tracking station pertaining to the ILRS network, a DORIS Station, two permanent GPS, and a tide gauge in the Papeete harbor. Four additional tides gauges / permanent GPS are being set up in the other archipelagos to monitor sea level variations. A director and three full time technicians staff the observatory. All the data produced are freely distributed to scientists through several databases located in the US and European countries.

The Geosciences laboratory currently gathers six scientists (one professor, five assistant professors), working in the frame of geophysics, physics of the atmosphere, oceanography, remote sensing, and geographical information systems. Two additional persons have been hired in May 2007: a professor in computer sciences (databases) and an assistant professor in remote sensing. They will take charge in September 2007. The arrival of a professor in physics and data processing is scheduled and funded for September 2008. We have currently one PhD student, and a post-doc in GPS /gravimetry will join in September 2007. We also have two PhD/post-doc grants under review by funding agencies.

The Geosciences laboratory as strong ties with the Geophysics Laboratory of Pamatai (LGP, 9 persons), that is close to the site of the OGT (a few kilometers). LGP maintains a network of seismometers / tsunami meters and infra sounds monitoring for public safety and enforcement of the nuclear ban treaty. We also have links with the Institute for Research and

Development (IRD) in Arue (Tahiti island) and Noumea (New-Caledonia) in the frame of Geographical Information Systems.

### **3. The Proposal**

The Geosciences laboratory, in order to expand its activities is willing to host the International Center for Earth Tides as a World Data Center. The diffusion of information and software, the data processing, the organization of schools, the training of young scientists and the welcome of visiting scientists will achieve the core objectives of ICET in our laboratory. We have strong support from the University for this endeavor. We propose to implement all the aspects and duties cited in the Announcement of Opportunity issued by IAG on April 4<sup>th</sup>, 2007, and in particular the ICET terms of references.

Besides, Tahiti is sought to be an important node of the Global Geodynamics Project (GGP), with a superconducting gravimeter to be implemented in a low noise cave of the LGP (under funding review by the French Institute for Sciences of the Universe (INSU), with a contribution from OGT).

#### **3.1 Direction of ICET**

The direction of ICET, in this proposal, will be under the responsibility of the professor Jean-Pierre Barriot, former director of the International Gravimetric Bureau (BGI) for height years, and new head of the Geodesy Observatory / Geosciences Laboratory of Tahiti. This will insure a good working knowledge of all the administrative intricacies of such an IAG and FAGS service, as well as expertise in gravimetry. ICET is considered by the Earth-Tides sub-commission of the IAG to be its executive office. A particular attention will be given to fully integrate ICET under the flagship of the International Gravity Field Service (IGFS) service, with respect to the objectives of The Global Geodetic Observing System (GGOS). Ties between ICET and the GGP network (IAG inter-commission) are planned to be re-discussed at the next IUGG Assembly in Perugia in July 2007. We also plan to develop a close collaboration with the Global Geophysical Fluid Center (GGFC) hosted at the European Center for Geodynamics and Seismology (ECGS) in Luxembourg, and of course to continue our privileged relationship with BGI.

The direction of all the technical aspects of the database will be under the responsibility of professor Alban Gabillon, a leading expert in online databases, who will join our team next September.

Directing boards of ICET and other business meetings will be systematically organized during major international meetings, like AGU, EGU, IUGG or Earth Tides Symposia, in order to reduce costs both for ICET and for board members.

#### **3.2 Database technical aspects**

The current database will be completely rebuilt by using the latest technologies available (online transactional geospatial database accessible through secure web services), taking extreme care to preserve all the contents of the current ICET database, with the technical help of the Computer and Information Service of the university (6 persons). We will use a powerful Linux server with backup disks to insure data integrity. Particular attention will be exercised to minimize human intervention, especially for data uploading and



downloading, and routine processing / preprocessing. This is particularly true for data coming routinely from the GGP network that will be handled in coordination with the GeoForschungszentrum (GFZ) in Potsdam. Internet connections are good in Tahiti, through satellite links, albeit they do not offer capacities similar of the ones found in the US or in Europe, but data flow is not expected to be large. The bibliographic data of ICET will also be taken into account. To insure flawless availability of the service, we will work to implement a database mirror in Europe, probably in connection with the BGI database in Toulouse. We plan that the switch with the current ICET database at the Royal Observatory of Belgium will span a six months period, from September 2007 to February 2008.

### **3.3 The Bulletin International des Marées (BIM)**

The Geosciences laboratory will offer a full continuity for the BIM (one issue per year), thanks to the support of the University, in the form of editing and duplication services. Full reviewing will be implemented, under the responsibility of the director of ICET and of the IGFS and GGP boards (to be confirmed). Care will be taken to accept technical or methodological papers. In order to reduce costs, the normal mode of distribution will be online downloading, and printed copies will be kept to a strict minimum. These print (or CD) copies will be available for a small subscription fee, essentially for developing countries and for legal reasons. This is the model developed by the author of this proposal for the previous issues of the Newton's joint journal of BGI and IgeS (International Geoid Service). This model worked very well. We plan in the future to merge the Newton's and BIM bulletin, i.e. to have an all-in-one publication, to further reduce costs. Discussions will be undertaken with IGFS for this purpose.

### **3.4 Research linked with ICET at the Geosciences laboratory**

Research is not the purpose of an IAG service, but research in Earth tides will be of course done at the Geosciences laboratory, in particular in the frame of gravity ocean tide loading computations in the South Pacific (near and far field around islands), and in the related frame of the determination of the islands rate of subsidence from gravimetric and GPS measurements. We plan to join the South Pacific and Sea Level and Climate Monitoring Program (SPSMCMP) and the Pacific Islands Applied Geosciences Commission (SOPAC). Funding is already granted for this research. We are also planning to undertake research on Geographical Information Systems (GIS), to help us provide ICET users with highly interactive added value services. All these research activities will maintain and develop the scientific expertise needed to successfully host ICET at the Geosciences laboratory.

### **3.5 Summer Schools and Earth Tides Symposia**

ICET will participate with the relevant commissions and sub-commissions of the IAG toward the organization of Earth Tides Symposia on a regular or exceptional basis. Summer schools will be organized on a regular basis (typically each two or three years), such as the joint ICET/BGI summer schools held in Louvain-la-Neuve in 2002 or in Lanzarote in 2005.

### **3.6 Funding of ICET**

Analysis of the financial reports of ICET clearly shows that the main source of spending is the publication of the BIM, up to 3,000 USD / year. As already explained, we will switch to an electronic format. From our previous experience, this will slash costs by a factor up to 80 %.

Funding of ICET will be provided through two different sources:

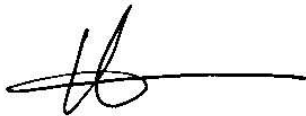
A/ The main source of funding will come from a direct help from our university, in the form of access to university resources: a part-time secretary for editing and setting up the BIM and the bibliographic database, and the printing of the BIM bulletin (a few tens of issues). Routine processing of the GGP and other Earth Tides data will be supervised by the technicians of the laser station during their tracking time. This will not harm their main activity, as this processing will be fully automated. The prospective director of ICET and the prospective technical director, as well as all the other persons implied hold permanent positions (with the exception of one technician) at the university.

B/ We expect a small funding from FAGS, at the level of 2,000 to 3,000 USD / year, mainly to cover mailing costs and other small office expenses.

No travel expenses will be linked to ICET. As already stated, directing boards and other business meetings will be systematically organized during major scientific events.

#### 4. Conclusion

We hope that this proposal, under the joint flags of French Polynesia and France, is scientifically and financially sound. Any clarification can be obtained by directly contacting the proposer by email at [barriot@upf.pf](mailto:barriot@upf.pf).



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