

# Levallois Medal Laudation for Georges Balmino

## Gerhard Beutler

The Levallois Medal was established in 1979 to honor Jean-Jacques Levallois (1911-2001) for his long service from 1960 to 1975 as Secretary General of the International Association of Geodesy (IAG). The medal is usually awarded every four years at the IAG General Assemblies, and is presented *in recognition of distinguished service to the association and/or to the science of geodesy in general*.

A committee of eight past Presidents of the IAG, namely Harald Schuh (Committee President), Chris Rizos, Michael Sideris, Gerhard Beutler, Fernando Sanso, Wolfgang Torge, Ivan Mueller, and Helmut Moritz, recommended in 2022 to award two medals at the General Assembly 2023 in Berlin, one to *Hermann Drewes* and one to *Georges Balmino*. Both medalists served as Secretaries General, the former of the IAG, the latter of IUGG, the International Union of Geodesy and Geophysics.

Georges Balmino, born on February 9, 1945, attended the *Ecole Normale Supérieure* in St. Cloud, a suburb of Paris, between 1963 and 1967, from where he graduated in Mathematics. From the same institution he holds a post-graduate degree in Celestial Mechanics & Relativity and a Master Degree in Astronomy. From Paris University he received his doctoral degree in 1969 with a thesis titled *Contribution à la connaissance du potentiel terrestre. Choix d'une représentation. Techniques nouvelles de détermination*, which indicates his interests and the direction of his future career. He rounded up his academic education at Paris University with a state doctorate in Physics, in particular in Potential Theory and Applications in 1973.

In parallel, Georges worked as a trainee at Meudon Observatory, where he got in contact with visual and photographic satellite observations, and their reduction. Photographic astrometry was the dominating observation technique in satellite geodesy at that time. In 1967 he became a staff member of Meudon Observatory, in the frame of the CNRS (*Centre National de la Recherche Scientifique*). After a research stay at the Smithsonian Astrophysical Observatory (SAO) in 1968, he worked in Meudon as a research assistant between 1969 and 1972. Since 1973 Georges is a scientist of the *Centre National d'Etudes Spatiales* (CNES), the French Space Agency. From 1984 to 1994 Georges was the head of the Department of Terrestrial and Planetary Geodesy of CNES, from 1995 to 2004 of the CNES Division of Satellite Geodesy, and from 2004 to 2005 of the CNES Satellite Geodesy team. Since 2006 he is Scientist Emeritus at CNES.

In addition to his career at CNES, Georges Balmino held many “external” obligations: between 1979 and 1999 he was the Director of the Bureau Gravimétrique International (BGI), between 1991 and 1999 the Secretary General of IUGG. His election in 1991 as IUGG Secretary General at the 20<sup>th</sup> IUGG General Assembly in Vienna came as a surprise, because Georges directly applied for the position, without having served as a high-ranking officer in

one of the IUGG Associations before. He owed his election to his outstanding international and scientific profile already in 1991. Between 1997 and 2004 he also acted as Executive Director of the GRGS, the *Groupe de Recherche de Géodésie Spatiale* in France. On top of all these responsibilities he had numerous teaching obligations at French Universities, in particular in Toulouse and Paris.

Georges Balmino is highly respected, nationally and internationally: Already in 1976 he received NASA's GEOS-3 Special Achievement Award, in 1977 the CNES Bronze Medal, in 1983 the Prix Gustave Roux of the French Academy of Science, in 1996 the CNRS Silver medal, in 1998 the Ordre National du Mérite, and in 2002 the Vening-Meinesz Medal of the European Geophysical Union (EGU). In 1996 he was promoted to *Doctor Honoris Causa* by the Technical University of Graz.

Georges Balmino is a member of numerous scientific committees. He became in particular member of the Academia Europaea in 1999, of the Academy of Air and Space in 2003, and corresponding member of the Académie des Sciences, Inscriptions, et Belles Lettres in Toulouse in 2010. Georges is member of the American Geophysical Union (AGU), of IAG, of IUGG, of the American Astronomical Society (AAS), and of the *Société Astronomique de France* (SAF). In 2005 he became Fellow of the AGU, in 2015 Fellow of IUGG.

Georges Balmino's fields of interest are satellite geodesy, physical-mathematical geodesy, celestial mechanics, and astronomy. Mainly he worked on to the determination of the Earth's, the Moon's, and other planets' gravity fields. The GRIM Earth models originate from him and were steadily improved in collaboration with the DGFI, the *Deutsches Geodätisches ForschungsInstitut* in Munich, later on with the GFZ (*GeoForschungsZentrum* in Potsdam). According to Georges, the acronym GRIM unofficially stands for **G**roupe de **R**echerche **I**nstitute **M**unich and documents this fruitful collaboration. In the 1980s and 1990s Georges played a key role in the planning phase of the dedicated Earth's gravity field mission GOCE. Georges Balmino contributed substantially to establish and consolidate the French-German friendship in the frame of very successful scientific collaboration.

Georges Balmino's bibliography lists more than 150 publications, more than 80 with him as first author, more than 100 in refereed journals. Many of his articles deserve the labels *innovative* and *influential*, at times even *visionary*. This is not the place to give even a superficial overview of his written oeuvre. I cannot resist the temptation, however, to mention the very first entry in the bibliography of Georges, titled *Animal Tracking from Satellites*, which was published as a SAO Special Report: it is close to a miracle, that a French student at the age of 23 years became the first author of a SAO Special Report in 1968. The report deserves the label *visionary* – animal tracking from satellites became an important issue much later on, using modern satellite navigation systems like GPS, Galileo, etc. Many of Georges Balmino's publications are related to what René Descartes called in 1637 *Discours de la méthode*: Numerous and substantial were in particular his mathematical contributions to global gravity modelling in general and to the significant improvement of efficiency and precision in the mathematical procedures.

Cher Georges, I learned a lot from writing this laudation and I was impressed very much by the depth and originality of your work. I thank you and the IAG office for giving me the opportunity to illuminate your career and oeuvre at the opening ceremony of the IAG General Assembly to a large audience on July 12, 2023, in Berlin.