

FEATURE

3rd Workshop on Inorganic Mass Spectrometry

The 3rd Workshop on Inorganic Mass Spectrometry (III-WIMS) was held between June 18 and 22, 2023, at the Environmental Studies Center (CEA) located at São Paulo State University (UNESP) in Rio Claro, SP, Brazil. The event had 86 participants, nine of whom were international speakers from six international universities (UG in Switzerland; QUB in the United Kingdom; GU in Belgium; TUD in the Netherlands; and MUL and GU in Austria), 21 national speakers from nine Brazilian universities (USP, UNESP, UNICAMP, INB, UFRJ, PUC-RJ, UFSCar, UFPel, and UFSC), one research institute (Technological Research Institute of the State of São Paulo, IPT), and four private companies.



The primary objective of WIMS is to disseminate inorganic mass spectrometry, an area that has not been widely explored, particularly in Brazil. Photo: III-WIMS.

“In this edition, keeping the WIMS tradition, a practical course was offered that covered all quadrupole inductively coupled plasma mass spectrometry (ICP-Q-MS) and high-resolution mass spectrometry (HR-ICP-MS, including the variant MC-HR-ICP-MS), in addition to sample preparation for this technique. The demand for this practical course was very high. It is also interesting to note that, this time, we had the participation of researchers from abroad, such as from Delft University, the Netherlands, which demonstrated the quality of the course and our laboratories”, explained the coordinator of the event, Prof. Dr. Amauri Menegário.

The subjects addressed in III-WIMS can be divided into two main groups: the development of inorganic mass spectrometry (IMS)-based methods and IMS-based applications. The first group consisted of lectures on isotopic determinations, interferences, sample introduction systems (mainly laser ablation), single particles, sample preparation, and methods for determining technology-critical elements (TCE). The second group involves applications in environmental, petroleum, hydrological, geological, industrial, biological, clinical, and food areas. This diverse array of subjects makes WIMS a unique event that enables participants to understand the main demands and applications of IMS.



A lecture discussing methods to determine TCE and their biogeochemical importance.
Photo: III-WIMS.

“I would like to highlight the lecture given by Prof. Dr. Giancarlo Scardia entitled ‘Geochronology and paleoclimate: Application of isotope mass spectrometry to Geosciences’. This lecture was a real lesson in how to understand chronological dating proposed by geologists and the consequences of CO₂ on global warming”, said Prof. Menegário.



WIMS enables researchers and/or users of IMS to come together to present their research work to Brazil and the world Photo: III-WIMS.

The event also featured the 1st Workshop on Technology-Critical Elements (WTCE). The aim of this workshop was to bring together professionals who work with TCE, which have received relatively little research attention, and to discuss the difficulties and techniques commonly used in their determination.

A Brief Interview with Prof. Dr. Amauri Menegário



Prof. Dr. Amauri Menegário, III-WIMS coordinator. Photo: III-WIMS.

Amauri Antonio Menegário is a Researcher Level II at the Centre for Environmental Studies (CEA/UNESP, Rio Claro, SP, Brazil) and a Professor in the postgraduate program in Geosciences and Environment at the Institute of Geosciences and Exact Sciences, São Paulo State University (IGCE–UNESP). Prof. Menegário obtained his PhD in Science at the Center for Nuclear Energy in Agriculture, University of São Paulo (CENA–USP) in 1998, his master's degree in Analytical Chemistry at the University of São Paulo in 1994, and his undergraduate degree in Industrial Chemistry at the University of Ribeirão Preto in 1988.

BrJAC: What was the main objective of III-WIMS?

Prof. Menegário: WIMS has as its primary objective the dissemination of inorganic mass spectrometry (IMS), an area that is little disseminated and explored (particularly in Brazil) and which is usually forgotten or approached in a superficial way (consciously, or not – I couldn't say) at the great congresses of mass spectrometry (an indisputable fact here in Brazil). Since its conception and, consequently, its first edition (also held at CEA/UNESP, Rio Claro), this event has brought together numerous researchers from different areas of knowledge, always striving for multidisciplinary and transdisciplinarity. These characteristics, together with the success of previous editions of the event, would already be enough to justify the realization of a new edition of WIMS at CEA/UNESP, particularly for my research group:

the Group of Studies and Methodological Development in Biogeochemistry (GEMB). However, I must confess that the main motivation for organizing the third edition of WIMS was a recent fact: the almost total lack of knowledge of techniques and approaches based on inorganic mass spectrometry in digital media (understood here podcasts, online debates, and lectures available on the internet). It is even revolting, particularly for me as a researcher in the field, how they [the concepts and principles that guide methods and approaches based on IMS] are disclosed in an erroneous way (I would say dishonestly, if I could be sure) to the general public (mainly about chronological dating). In summary, the main objective for the realization of III-WIMS was to hold a meeting with scientific support for the dissemination, implementation, and discussion of mass spectrometry, maintaining the original format of the event. However, this edition exalts the scientific consensus on the importance, efficiency, and scope of IMS, mainly concerning chronological dates.

BrJAC: How important is this workshop for the field of IMS?

Prof. Menegário: I would say that the most important point of this workshop for IMS is the possibility of bringing together researchers and/or users (at all levels of knowledge) so that they can show their work to Brazil (and also to the world). The result is a multidisciplinary and transdisciplinary discussion that pleases and satisfies nearly all participants, as well as inspiring new methods and supporting research at the frontier of knowledge. Finally, this event provides opportunities for researchers at the start of their careers and disseminates specialized labor of the highest technical level (which is generally lacking in the IMS).



Participants at III-WIMS. Photo: III-WIMS.

BrJAC: What was the first WTCE? What was covered?

Prof. Menegário: The TCE theme is quite recent, both from the point of view of the analytical approach to the determination of these elements and the proposed definition for the term “technology-critical elements”. I understand that the pioneering spirit of holding the first WTCE, which was the first event with this theme held in Brazil, reached all expectations. The lectures discussed methods for determining TCE and the biogeochemical importance of these elements (e.g., rare earths, Ga, Ge, In, Nb, Ta, Te, Ir, Os and Ru, etc.). However, the highlight of this workshop was a question raised in the lecture given by Prof. Dr. Montserrat Filella, titled “Technologically critical elements: Is the need for better analytical methods far from over?”. Dr. Filella, undoubtedly the most active researcher on this topic in the world, posed the following question: “Would the definition of TCE be based on a Eurocentric view?”. This provocation resulted in heated discussions from the beginning to the end of the event. To understand this provocation, we have to imagine the situation, for example, in Brazil, of including some fertilizers such as potassium, as Brazilian agricultural technology demands this element. However, if this is done (assuming potassium is a TCE), other elements would be included by demand from other countries (other than European), causing all elements contained in the periodic table to be considered TCE, which does not make sense. This example clearly shows the need for more discussions on this topic and, consequently, the need for new events. Therefore, I want to take this opportunity to invite all BrJAC readers to apply for the second WTCE next year.

Source: III-WIMS