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The IEEE GRSS Brazil Chapter: Status and Activities in 2019

The IEEE Geoscience and Remote Sensing Society (GRSS) Brazil Chapter started its activities in 2015 when it was officially founded through the efforts of enthusiastic professionals and young members from different Brazilian universities, industries, and research institutes. This group had already taken part in other cosponsored GRSS conferences regularly and decided to establish the first IEEE/GRSS Chapter in Brazil. The motivation came from seeing how professionals, researchers, and students from other countries conducted their scientific activities and outreach programs and successfully established networking under a GRSS Chapter framework. However, the number of active members at that time was small, and those members were from different regions in the fifth largest country in the world.

THE SBSR IS A BIENNIAL EVENT WITH A LONG-STANDING TRADITION OF MORE THAN 40 YEARS IN THE LOCAL REMOTE SENSING COMMUNITY.

By promoting the first GRSS Young Professionals (YPs) and International Society for Photogrammetry and Remote Sensing (ISPRS) Summer School (YP&SS) in Curitiba (Paraná state) at the end of 2015, the GRSS Brazil Chapter attracted 30 members in 2016 (Table 1). With partial support from the ISPRS, this event has been held yearly in different regions of the country, specifically, Presidente Prudente (the São Paulo state) in 2015, Lages (the Santa Catarina state) in 2017, Campo Grande (the Mato Grosso do Sul state) in 2018, and Sorocaba (the São Paulo state) in 2019. The number of members reached its historical maximum in 2019, which motivated this report of the main activities of the Chapter, carried out during 2019.

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A significant percentage of new memberships resulted from local initiatives promoted voluntarily by board members of the GRSS Brazil Chapter in different parts of the country. As a result, we increased the number of members from other Brazilian states (i.e., the Distrito Federal, Bahia, Pará, Rio Grande do Sul, and Mato Grosso do Sul states) as well as the numbers of women members (Table 1), which grew from two in 2016, when the GRSS Brazil Chapter was founded, to 26 in 2019 (Table 1). The number of student members also followed this trend, with the establishment of new GRSS student Chapters.

Several activities (see the "Technical Activities" section) in the form of technical seminars were organized and conducted by GRSS Brazil Chapter members during 2019. The challenges and actions designed to increase the number of members are highlighted in the following sections.

TECHNICAL ACTIVITIES

The Chapter conducted 11 significant activities in 2019, which we report here in chronological order.

GRSS BRAZIL CHAPTER INITIATIVES FOR YPS

On 27 February 2019, the head of the Amazon Regional Center/Brazilian National Institute for Space Research (INPE), Dr. Alessandra Rodrigues Gomes (see Figure 1), delivered the talk "Forest Monitoring Initiatives, and Research Opportunities." It was dedicated to both graduate and undergraduate student YPs in the forest engineering program at the Santa Catarina State University (UDESC) in Lages. The major idea behind this event was to foster networking within a student Chapter framework.

THE GRSS AND ISPRS SOCIETIES AND CAREER OPPORTUNITIES

On 27 March 2019, members of the GRSS Brazil Chapter board, Prof. Rafael Lemos Paes from the Institute

for Advanced Studies (IEAv) and Prof. Veraldo Liesenberg (UDESC), talked about the GRSS and ISPRS and the benefits of being a member of a scientific Society at the Sorocaba Engineering College (FACENS) (Figure 2). In the audience, there were rectors and directors of the local universities from the Sorocaba region, such as FACENS, São Paulo State University, the Federal University of São Carlos, and the University of Sorocaba. The existence of exceptional tutoring programs and the frequent competitions in the field of robotics and rockets at these universities motivated discussions aiming at the establishment of a new student Chapter. Short lectures and courses were also proposed to attract YPs to the next YP&SS that would take place in November of that year in Sorocaba. The YP&SS meeting was held jointly with the Symposium on Remote Sensing for Defense Applications (SERFA) and was promoted by the Brazilian Air Force.

DEEP LEARNING APPLICATIONS AND RESEARCH OPPORTUNITIES

Prof. Hemerson Pistori (Figure 3) from the Dom Bosco Catholic University (UCDB) delivered an invited talk to a group of GRSS student members at the Pontifical Catholic University of Rio de Janeiro in 2019. Prof. Pistori took the opportunity to report some of the latest results achieved by his research group at UCDB and the Federal University of Mato Grosso do Sul (UFMS) on deep learning for computer vision. The group consisted of 15 graduate and undergraduate students. This initiative eventually evolved into monthly webinars offered by the UCDB research group, led by Prof. Pistori, which are open for the general community.

THE XIX BRAZILIAN SYMPOSIUM ON REMOTE SENSING

Several technical activities were conducted during the XIX Brazilian Symposium on Remote Sensing (SBSR2019) from 14 to 17 April. First, Prof. Paolo Gamba from the University of Pavia, Italy, currently the president of the GRSS, delivered a talk during the opening ceremony of the event that took place in Santos (Figure 4). The SBSR is a biennial event with a long-standing tradition of more than 40 years in the local remote sensing community. It is organized by the INPE and the Latin American Society for Remote Sensing.

During SBSR2019, the GRSS Brazil Chapter organized two thematic sessions. The first, under the motto "Advances in SAR: Sensors, Methodologies, and Applications," began with a lecture by Dr. João Roberto Moreira Neto from Embraer Defense [Figure 5(a)] and was followed by Prof. Yang Du from the Zhejiang University, China [Figure 5(b)]. Recent advances in this field were the subject of lectures given first by Prof. Paes [Figure 5(c)] and then by Prof. Alejandro C. Frery from the Federal University of Alagoas [Figure 5(d)].

The theme of the second thematic session organized by the Chapter during the SBSR2019 was "Challenges and

TABLE 1. THE HISTORICAL MEMBERSHIP EVOLUTION AND GENDER DISTRIBUTION OF GRSS BRAZIL CHAPTER MEMBERS.

HISTORICAL MEMBERSHIP	2016	2017	2018	2019
Regular member	24	14	41	66
Student member	6	15	20	59
Total	30	29	61	125

GENDER DISTRIBUTION	2016		2017		2018		2019	
	M	F	M	F	M	F	M	F
Regular member	23	1	14	2	38	3	60	11
Student member	5	1	15	12	13	7	39	15
Partial member	28	2	15	14	51	10	99	26
–	–		–		–		–	
Total	30		29		61		125	

F: female; M: male.

FIGURE 1. Dr. Alessandra Rodrigues Gomes during the Brazilian Initiatives for YPs event.

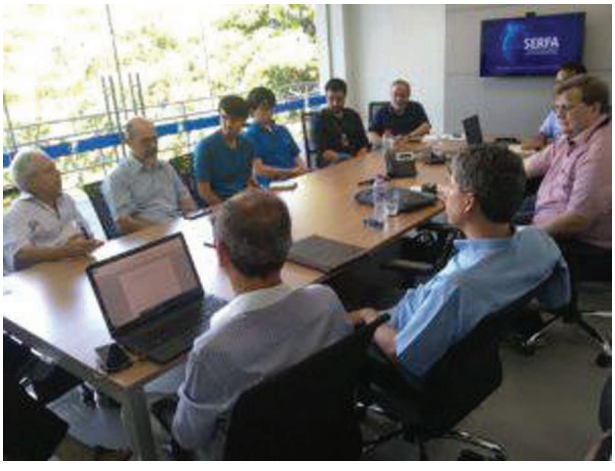


FIGURE 2. The task force group led by Prof. Rafael Lemos Paes and Prof. Veraldo Liesenberg during the Brazilian Initiatives for YPs event.

Opportunities on UAV Data Analysis: From Data Fusion to Deep Learning Applications." The session highlighted the recent increase in the use of unmanned aerial vehicles (UAVs) and associated remote sensing technologies, which have opened a broad range of opportunities for Earth observation applications. Furthermore, the cost-effectiveness

FIGURE 3. Dr. Hemerson Pistori during the Brazilian Initiatives for YPs event at the Pontifical Catholic University of Rio de Janeiro.

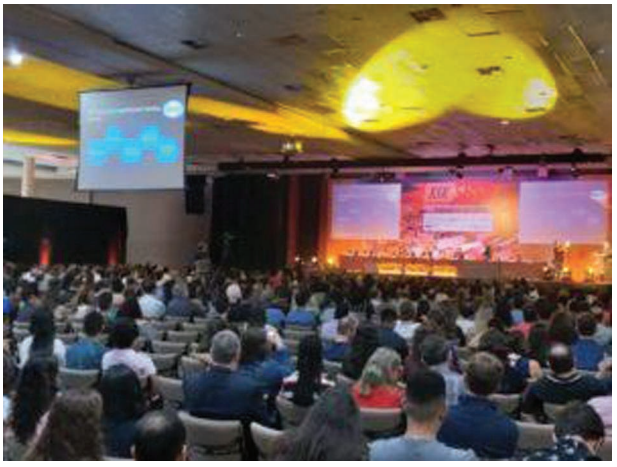


FIGURE 4. Prof. Paolo Gamba speaks at the opening ceremony of the XIX SBSR2019 in Santos.

(a) (b) (c) (d)

FIGURE 5. Speakers at the "Advances in SAR: Sensors, Methodologies, and Applications" thematic session during SBSR2019. (a) Dr. João Roberto Moreira Neto, (b) Prof. Yang Du, (c) Prof. Rafael Lemos Paes,and (d) Prof. Alejandro C. Frery.

FIGURE 6. Presenters at the "Challenges and Opportunities on UAV Data Analysis: From Data Fusion to Deep Learning Applications" thematic session during SBSR2019. (a) Prof. Paolo Gamba, (b) Prof. Hemerson Pistori, and (c) Prof. Ricardo Torres. (d) A roundtable discussion with audience members.

of these instruments, compared to orbital and airborne counterparts, was the theme of Prof. Gamba's [Figure 6(a)] opening talk. Prof. Pistori [Figure 6(b)] then spoke about applications as well as the scientific and technical perspectives of this technology.

The subject of the next talk, given by Prof. Ricardo Torres from the State University of Campinas [Figure 6(c)], approached some issues related to the huge amount of data provided by UAVs. The thematic session closed with a roundtable on the solutions and opportunities brought by this technology (Figure 6(d)].

Several other sessions were also conducted during the event by members of the Brazil Chapter. The Chapter also organized a meeting with different authorities from academia and industry and representatives of both the GRSS and ISPRS. Cooperation and research perspectives were a central discussion theme. The GRSS Brazil Chapter presented statistics and plans, including the official announcement of forthcoming YP&SSs as part of the SERFA'19 event in Sorocaba. Approximately 20 GRSS members took part in the meeting on the evening of 15 April 2019.

THE ENVIRONMENTAL SCIENCE AND POLICY IMPACTS OF REMOTE SENSING ON GOVERNANCE AND LAND USE OF TROPICAL FORESTS

A series of seminars and workshops on climate change and the conservation of tropical forests was held from 13 to 14 April at Boston University, Massachusetts. Members of the GRSS Brazil Chapter board (Prof. Liesenberg and Dr. Gomes) presented the status of current research in Brazil, seeking scientific collaborations.

BRAZILIAN INITIATIVES FOR YPS

On 30 August, Prof. Liesenberg held a talk under the topic "How a Young Engineer Can Benefit From Remote Sensing and GIS Technologies" (Figure 7). Among other issues, he stressed the benefits for students when becoming members of a scientific society. He took the opportunity to talk about the benefits of joining a scientific society while being a student as well as opportunities for webinars, online lectures, networking possibilities, and travel grants for both graduate and undergraduate students.

THE XXV INTERNATIONAL UNION OF FOREST RESEARCH ORGANIZATIONS WORLD CONGRESS THEMATIC SESSION

Members of the GRSS Brazil Chapter board also took part in the XXV International Union of Forest Research Organizations World Congress and proposed thematic sessions. This event occurred for the first time in Latin America, in Curitiba. The event featured a series of topical plenary lectures delivered by internationally renowned speakers, high-level panel discussions with stakeholders, training workshops, networking events, social gatherings, and fascinating study tours. In addition to the sessions conducted by members of the GRSS, Prof. Liesenberg publicly congratulated student member David di Martini (UFMS), for having been among the finalists of the first GRSS Student Grand Challenge. He took the opportunity to distribute flyers to promote the activities of the GRSS Brazil Chapter supported by both the GRSS and ISPRS.

MEMBERS OF THE GRSS BRAZIL CHAPTER BOARD ALSO TOOK PART IN THE XXV INTERNATIONAL UNION OF FOREST RESEARCH ORGANIZATIONS WORLD CONGRESS AND PROPOSED THEMATIC SESSIONS.

FIGURE 7. Prof. Veraldo Liesenberg delivers his presentation during the Brazilian Initiatives for YPs event at the Regional University of Blumenau.

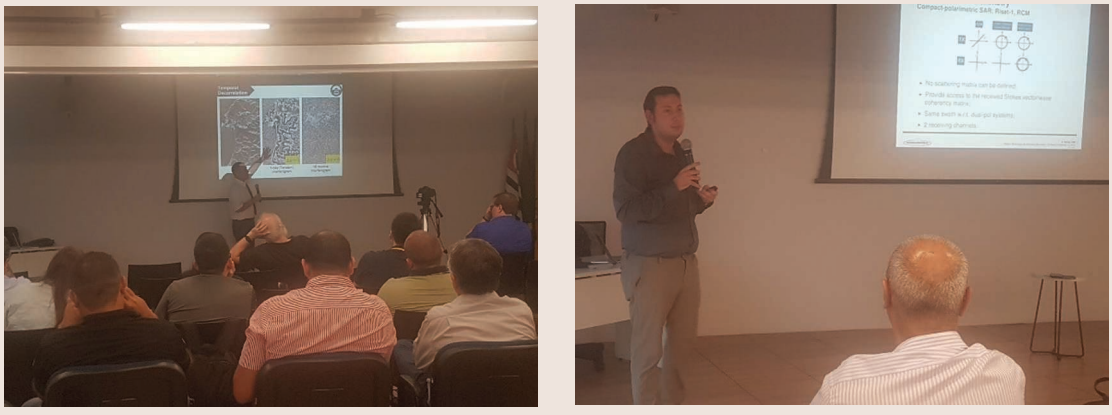
THE XVI SILVILASER THEMATIC SESSION

GRSS Brazil Chapter board members also took part in the XVI Silvilaser International Conference on LiDAR Applications for Assessing Forest Ecosystems and supported thematic sessions. This event also occurred for the first time in Latin America and took place in Foz do Iguaçu. The event focused on the application of lidar and related technologies for assessing and managing forest ecosystems. Flyers announcing activities of the Brazil Chapter and explaining the benefits of becoming a member of both the GRSS and ISPRS were distributed among the participants.

THE FIFTH ISPRS STUDENT CONSORTIUM SUMMER SCHOOL

On 10 November, the Chapter held for the fifth consecutive year a summer school in partnership with the ISPRS Student Consortium (ISPRS SC)—this time jointly with the SERFA—on synthetic aperture radar (SAR) technology. Chapter members belonging to the Brazilian Air Force organized the summer school in a format different from what had been adopted in previous years. Instead of a single module, this year, the summer school was divided into basic and advanced modules. The basic module, jointly conducted by Dr. Rafael Rosa and Dr. João Moreira, both from Visiona Space Technology, addressed topics such as SAR geometry, data acquisition, sensors, missions, payloads, and data processing techniques. Sixty participants, with different backgrounds and from different regions of the country, attended this module.

The second module was aimed at people with some knowledge of SAR technology. The module concentrated on



(a) (b)

FIGURE 8. (a) Prof. Timo Balz and (b) Dr. Andrea Buono.

advanced SAR remote sensing and applications. Prof. Timo Balz from Wuhan University, China [Figure 8(a)] started the lectures with a comprehensive review of the fundamental concepts of interferometry, differential interferometry, and persistent scatterer interferometry. Prof. Frery introduced statistical tools for analyzing and processing SAR images. Dr. Andrea Buono from the University of Naples Parthenope, Italy [Figure 8(b)] explained the current trends on ocean SAR polarimetry as well as future applications and research perspectives. A total of 40 participants attended the second module.

THE FIFTH IEEE/GRSS YPS

The fifth edition of the IEEE/GRSS YPs meeting also took place jointly with SERFA. The event comprised technical lectures on the following topics:

- "Forest Remote Sensing," by Prof. Veraldo Liesenberg
- "SAR Polarimetric Data Physical Processing to Generate Value-Added Products," by Prof. Timo Balz
- "Surface Motion Estimation of Synthetic Aperture Radar," by Dr. Andrea Buono
- "Repeatability and Reproducibility," by Prof. Alejandro C. Frery.

Sheryl Rose Reyes (Figure 9), chair of the ISPRS SC, presented a highly informative talk, "The Importance of International Organizations: Lessons Learned From ISPRS and the ISPRS Student Consortium," which included an introduction of the ISPRS and ISPRS SC and the groups' activities and contributions in the fields of remote sensing, photogrammetry, and spatial information science.

Keynote presentations during the event included "Current Research and Trends in Science, Technology, and Innovation for Brazil," by Dr. Darcton Policarpo Damião [Figure 10(a)], director of the INPE. Additionally, Jon Maddog Hall [Figure 10(b)], board chair of the Linux Professional Institute, gave the lecture "Internet of Things, Security, Privacy, and Longevity." The event showcased the current work at the IEAv as well as R&D from various organizations and academia. The industry and business sectors also presented state-of-the-art technologies for data and image acquisition, image processing and analysis, and optimization algorithms. A total of 45 speeches and talks were presented for a large audience. The event webpage containing the full program is available at www.serfa.com.br.

DR. ANDREA BUONO FROM THE UNIVERSITY OF NAPLES PARTHENOPE, ITALY, EXPLAINED THE CURRENT TRENDS ON OCEAN SAR POLARIMETRY AS WELL AS FUTURE APPLICATIONS AND RESEARCH PERSPECTIVES.

SERFA'19

SERFA'19, the ninth edition of the biennial symposium, was organized by the IEAv, an institute of the Department of Science and Aerospace Technology. It was held 10–14 November 2019 in Sorocaba, under the theme "Space Technology, Markets, and Building the New Brazilian Space Age" and followed YP&SS. The SERFA'19 venue was at the Sorocaba

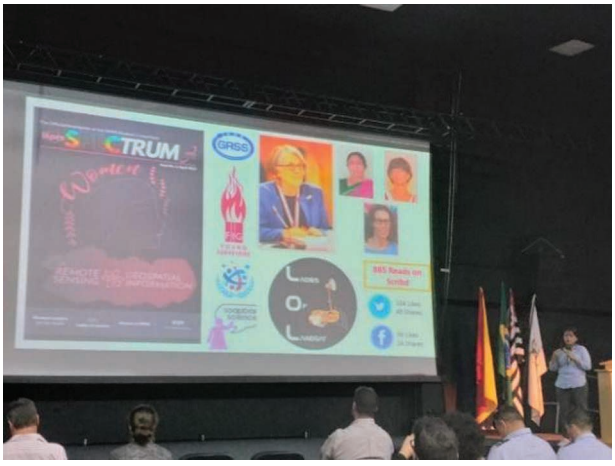


FIGURE 9. Sheryl Rose Reyes' talk during the YP event in Sorocaba, Brazil.

(a) (b)

FIGURE 10. (a) Dr. Darcton Policarpo Damião, director of the INPE, delivering his keynote speech during the official opening of SERFA'19. (b) Jon Maddog Hall of the Linux Professional Institute lecturing on the Internet of Things.

Technological Park, where several start-ups have been established. Booths were available for different companies, and both local and international participants attended the event.

Aside from the fifth edition of YP&SS, SERFA hosted a pitch battle as well as a hackathon: the Amazon 4.0 Challenge. Participants (Figure 11) were challenged to think beyond the current trends in technology and focus on creating a smart forest—one that protects, monitors, and defends the world's biggest tropical rainforest and its biodiversity.

In summary, the pitch battle involved YPs interested predominantly in either creating or adding to the success of already-created start-ups. The groups were mentored by senior professionals from the IEAv and from industry. The mentors' task also included supporting the participants

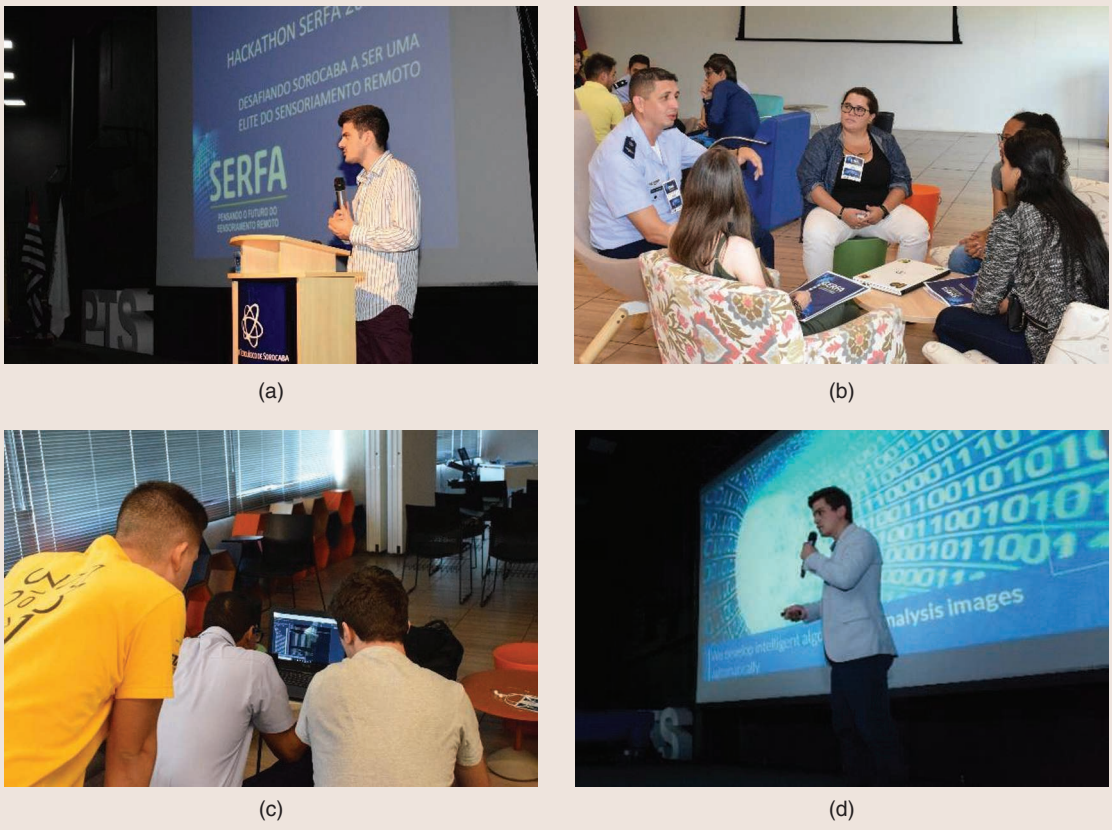


FIGURE 11. (a) The hackathon's opening, (b) the brainstorming session, (c) participants in the pitch battle being mentored by IEAv advisors, and (d) a start-up representative presenting innovative ideas for the Amazon 4.0 Challenge.

FIGURE 12. (a) A roundtable discussion of equitable gender representation and (b) another roundtable discussion concerning the relationship among university, government, and industry; both took place during SERFA'19.

regarding emotional stress during the different phases of the pitch battle. Each student group presented its results, shared perceptions about the challenges facing the Amazon biome, and proposed innovative and creative solutions for the proposed start-up companies.

During the hackathon, images of selected Amazonian sites were given to the students, who were challenged to answer specific questions within a 24-h time frame. This activity was organized based on the Data Fusion Contest promoted by the GRSS. The hackathon audience consisted mainly of students ranging from high secondary school to graduate students with intermediate to advanced knowledge of digital image processing.

Frequent brainstorming sessions were proposed on topics related to science, mathematics, basic knowledge, and remote sensing. The interdisciplinary background brought an interesting opportunity for discussion and seeing different points of view for solving practical challenges.

Several small roundtable discussions featured leadership initiatives in science and technology and advances in the agribusiness sector (Figure 12). These discussions provided a dynamic interaction with the speakers, and questions were welcomed from both the audience and moderator, offering insights to issues and potential solutions for this vital sector in Brazil. Particular attention was also given to improving the gender equality representation from universities and industry [Figure 12(a)] and the relationship among university, government, and industry [Figure 12(b)].

GENERAL REMARKS

Since its founding in 2015, the GRSS Brazil Chapter has seen significant growth, culminating in 2019 with a total of 125 members, with increasing participation of students and women. Particularly worth mentioning is the foundation of two student Chapters in 2019.

We believe that this success stems directly from the Chapter's close interaction with academia, government agencies, and private sector enterprises, with members directly involved in their professional careers. Additionally, initiatives allowing participation and support in the main technical and scientific events related to geosciences and remote sensing held in the region promoted positive feedback. Such initiatives shall continue.

Comparable importance was given to independent events organized by Chapter members in many regions of the country, promoting both the GRSS and ISPRS. The flagship of such events is YP&SS, which has been successfully held yearly since the Chapter's founding in 2015.

Innovative student-oriented activities carried out in 2019 produced encouraging results that will influence the Chapter's plans for years to come. However, given the geographic dimension of Brazil, the current number of members, and how they are spread across the country, the creation of the country's second GRSS Chapter may be close at hand to facilitate regular activities and increase the total number of members.

THE SERFA'19 VENUE WAS AT THE SOROCABA TECHNOLOGICAL PARK, WHERE SEVERAL START-UPS HAVE BEEN ESTABLISHED.

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