



**International Association  
of Geodesy**

# Newsletter

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## Contents

<b>General Announcements.....</b>	<b>3</b>
To Ivan I. Mueller for his 90th Birthday .....	3
Advances In Space Research.....	4
<b>Meeting Announcements .....</b>	<b>6</b>
Meetings Calendar .....	6
<b>IAG Sponsored Meetings.....</b>	<b>6</b>
11th IVS General Meeting.....	6
19th International Symposium on Geodynamics and Earth Tides (G-ET Symposium 2020).....	6
IGS Workshop "IGS 2020: Science from Earth to Space" .....	6
43rd COSPAR Scientific Assembly.....	6
2nd International Symposium of Commission 4: Positioning and Applications.....	6
International Workshop on GNSS Ionosphere (IWGI2020) .....	6
International DORIS Service Workshop .....	6
22nd International Workshop on Laser Ranging.....	6
IAG Scientific Assembly .....	6
<b>IAG Related Meetings .....</b>	<b>6</b>
3rd UN GGIM Subcommittee on Geodesy Plenary Meeting .....	6
6th High Level Forum on UN GGIM .....	7
EGU General Assembly 2020 .....	7
FIG Working Week 2020 .....	7
AOGS2020 17th Annual Meeting.....	7
International Symposium on Satellite Navigation (ISSN 2020).....	7
22nd meeting of the Consultative Committee for Time and Frequency (CCTF).....	7
<b>Obituary.....</b>	<b>7</b>
James Alan Slater, 1947–2018.....	7

The *IAG Newsletter* is under the editorial responsibility of the *Communication and Outreach Branch* (COB) of the IAG.

It is an open forum and contributors are welcome to send material (preferably in electronic form) to the IAG COB ([newsletter@iag-aig.org](mailto:newsletter@iag-aig.org)). These contributions should complement information sent by IAG officials or by IAG symposia organizers (reports and announcements). The *IAG Newsletter* is published monthly. It is available in different formats from the IAG new internet site: <http://www.iag-aig.org>

Each *IAG Newsletter* includes several of the following topics:

- I. news from the Bureau Members
- II. general information
- III. reports of IAG symposia
- IV. reports by commissions, special commissions or study groups
- V. symposia announcements
- VI. book reviews
- VII. fast bibliography

## General Announcements

### *To Ivan I. Mueller for his 90th Birthday*



On behalf of the International Association of Geodesy (IAG), namely of President Zuheir Altamimi, of the IAG Executive Committee, and of the entire IAG community, we wish to present to Ivan Mueller cordial wishes for his ninetieth birthday on January 9, 2020, and for the years to come. The undersigned know Ivan Mueller from Post-Doc years and subsequent visits at Ohio State University (OSU), from visits of Ivan Mueller at the Technical University of Munich, and from the creation of the International GNSS (Global Navigation Satellite Systems) Service (IGS).

OSU, IAG, and IGS are *the* key words in Ivan Mueller's scientific career. Having left Hungary after the Hungarian Revolution in 1956, he launched his academic career with a Ph.D. thesis advised by Weikko Heiskanen at OSU. In 1960 he became a faculty member and soon thereafter a very influential professor at the Department of Geodetic Science and Surveying of OSU. Many well-known scientists started their careers in the *slave quarters*, the working room of Ivan's students at OSU. On the international scene the IAG became Ivan Mueller's home. He shaped the transition from classical to space geodesy, to satellite geodesy in particular. He was the founding president of CSTG, the Commission on International Coordination of Space Techniques for Geodesy and Geodynamics, from 1979 to 1981. CSTG was co-sponsored by IAG and COSPAR, the Committee of Space Research, and played an important role for the international coordination of space research during the cold war and afterwards. The MERIT (Monitoring of Earth Rotation and Inter-comparison of Techniques for observation and analysis) campaign was initiated by COSPAR in 1980 and it was chaired by Ivan Mueller. MERIT resulted in 1988 in the creation of the IERS, the International Earth Rotation Service.

With such high-level activities it was only logical that Ivan Mueller became IAG President from 1987 to 1991. He used his "power" to establish and to chair the IAG Planning Committee for the IGS. In Ivan Mueller's words "*the primary motivation in planning the IGS was the recognition that the most demanding users of the GPS satellites, the geophysical community, were purchasing receivers in large numbers and using them as more or less black boxes, using software packages which they did not completely understand, mainly for relative positioning*". The statement illustrates the extraordinary strength of his argumentation. The undersigned are not aware of other colleagues, who might have launched a very successful scientific service, like the IGS, based on such bold words.

Both, the IERS and the IGS are today instrumental for monitoring Earth rotation and for establishing and maintaining the global terrestrial reference frame. They owe their creation to a large extent to Ivan Mueller's leadership and foresight. His merits were widely recognized and very much appreciated by the science community. He was, e.g., the recipient of the Vening Meinesz Medal of the European Geophysical Society (EGS) in the year 2000 and of the Waldo E. Smith Medal of the American Geophysical Union (AGU) in 2003. Also, the AGU issues on an annual basis the Ivan I. Mueller Award for Distinguished Service and Leadership.

Ivan Mueller is the author of an impressive number of scientific articles and books, shaping the generations of geodesists and geophysicists.

Let us conclude by thanking Ivan I. Mueller for his incredibly valuable contributions to IAG and to science in general. For the years to come we suggest Ivan Mueller to use the epilogue (from Alice in Wonderland by Lewis Carroll) of his presentation at the IGS 20<sup>th</sup> Anniversary Workshop in Pasadena in 2014 as guide line: "*Would you tell me please which way I ought to go from here, said Alice. That depends a good deal on where you want to get to, said the Cat. I don't much care where, said Alice. Then it doesn't much matter which way you go, said the Cat.*"

Bern and Munich, January 2020

GERHARD BEUTLER AND REINER RUMMEL

Dear colleagues,

for your information, issue 65(1) of Advances in Space Research (COSPAR official journal), published on January 1, 2020, is now available online and will remain free-of-charge without any paid subscription to this journal for a complete year, courtesy of Elsevier providing promotional OpenAccess, at

<https://www.sciencedirect.com/journal/advances-in-space-research/vol/65/issue/1>

While it is a very large issue (57 papers and 701 pages), the selected articles below could be of scientific interest to the geodetic community.



I remind you that ASR publishes 24 issues per year (2 issues of 20 or more papers each per month), that accepted papers appear online with a DOI in “accepted proofs” only a couple of days after acceptance and that this journal accepts electronic supplements and supports OpenAccess. Review process takes on average about 9 weeks before the first decision is sent back to the authors (4 weeks to find proper reviewers and 5 weeks to get their report and make a first decision). Published articles are referenced in ISI Web of Science, Scopus and many other scientific databases. This journal also accepts Special Issues. Its Impact Factor has been steadily increasing in the past few years and is now 1.746.

Submissions can be done electronically at any time using the EES System (<http://ees.elsevier.com/asr>).

Published articles can be found online at <https://www.sciencedirect.com/journal/advances-in-space-research/issues>

Pascal Willis  
Editor-in-Chief  
Advances in Space Research

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### **EARTH MAGNETOSPHERE AND UPPER ATMOSPHERE**

Patrick Mungufeni, Babatunde A. Rabi, Daniel Okoh, Edward Jurua (2020) Characterisation of Total Electron Content over African region using Radio Occultation observations of COSMIC satellites, *Advances in Space Research*, 65(1), 19-29, DOI:[10.1016/j.asr.2019.08.009](https://doi.org/10.1016/j.asr.2019.08.009)

Peng Chen, Hang Liu, Yongchao Ma, Naiquan Zheng (2020) Accuracy and consistency of different global ionospheric maps released by IGS ionosphere analysis centers, *Advances in Space Research*, 65(1), 163-174, DOI:[10.1016/j.asr.2019.09.042](https://doi.org/10.1016/j.asr.2019.09.042)

Xiaodong Ren, Jun Chen, Xingxing Li, Xiaohong Zhang (2020) Multi-GNSS contributions to differential code biases determination and regional ionospheric modeling in China, *Advances in Space Research*, 65(1), 221-234, DOI:[10.1016/j.asr.2019.10.014](https://doi.org/10.1016/j.asr.2019.10.014)

### **ASTRODYNAMICS AND SPACE DEBRIS**

Lars Prange, Gerhard Beutler, Rolf Dach, Daniel Arnold, Stefan Schaer, Adrian Jäggi (2020) An empirical solar radiation pressure model for satellites moving in the orbit-normal mode, *Advances in Space Research*, 65(1), 235-250, DOI:[10.1016/j.asr.2019.07.031](https://doi.org/10.1016/j.asr.2019.07.031)

Fabian Schiemenz, Jens Utzmann, Hakan Kayal (2020) Accurate estimation of relative atmospheric density error on the example of uncertain geomagnetic activity information, *Advances in Space Research*, 65(1), 251-270, DOI:[10.1016/j.asr.2019.08.023](https://doi.org/10.1016/j.asr.2019.08.023)

### **EARTH SCIENCES**

Rui Tu, Ju Hong, Rui Zhang, Junqiang Han, Lihong Pengfei Zhang, Jinhai Liu, Fan, Xiaochun Lu (2020) GPS and BDS combined PPP model with inter-system differenced observations, *Advances in Space Research*, 65(1), 494-505, DOI:[10.1016/j.asr.2019.09.041](https://doi.org/10.1016/j.asr.2019.09.041)

Shuaimin Wang, Tianhe Xu, Wenfeng Nie, Jian Wang, Guochang Xu (2020) Establishment of atmospheric weighted mean temperature model in the polar regions, *Advances in Space Research*, 65(1), 518-528, DOI:[10.1016/j.asr.2019.10.001](https://doi.org/10.1016/j.asr.2019.10.001)

Nirmala Bai Jadala, Miriyala Sridhar, Nirvikar Dashora, Gopa Dutta (2020) Annual, seasonal and diurnal variations of integrated water vapor using GPS observations over Hyderabad, a tropical station, *Advances in Space Research*, 65(1), 529-540, DOI:[10.1016/j.asr.2019.10.002](https://doi.org/10.1016/j.asr.2019.10.002)

Peiyuan Zhou, Zhixi Nie, Yan Xiang, Jin Wang, Lan Du, Yang Gao (2020) Differential code bias estimation based on uncombined PPP with LEO onboard GPS observations, *Advances in Space Research*, 65(1), 541-551, DOI:[10.1016/j.asr.2019.10.005](https://doi.org/10.1016/j.asr.2019.10.005)

Haojun Li, Jingxin Xiao, Ling Yang (2020) Modeling and application of the time-varying GPS differential code bias between C1 and P1 observations, *Advances in Space Research*, 65(1), 552-559, DOI:[10.1016/j.asr.2019.10.018](https://doi.org/10.1016/j.asr.2019.10.018)

Daqian Lyu, Fangling Zeng, Xiaofeng Ouyang, Haichuan Zhang (2020) Real-time clock comparison and monitoring with multi-GNSS precise point positioning: GPS, GLONASS and Galileo, *Advances in Space Research*, 65(1), 560-571, DOI:[10.1016/j.asr.2019.10.029](https://doi.org/10.1016/j.asr.2019.10.029)

#### **SPACE TECHNOLOGY, POLICY AND EDUCATION**

Yijun Tian, Lifen Sui, Guorui Xiao, Dongqing Zhao, Hongzhou Chai, Chunhe Liu (2020) Estimating inter-system biases for tightly combined Galileo/BDS/GPS RTK, *Advances in Space Research*, 65(1), 572-585, DOI:[10.1016/j.asr.2019.09.003](https://doi.org/10.1016/j.asr.2019.09.003)

Xiao Zhang, Baocheng Zhang, Yunbin Yuan, Jiuping Zha (2020) Extending multipath hemispherical model to account for time-varying receiver code biases, *Advances in Space Research*, 65(1), 650-662, DOI:[10.1016/j.asr.2019.11.003](https://doi.org/10.1016/j.asr.2019.11.003)

#### **SOLAR SYSTEM BODIES**

M. Šprlák, S.-C. Han, W.E. Featherstone (2020) Integral inversion of GRAIL inter-satellite gravitational accelerations for regional recovery of the lunar gravitational field, *Advances in Space Research*, 65(1), 630-649, DOI:[10.1016/j.asr.2019.10.015](https://doi.org/10.1016/j.asr.2019.10.015)

## Meeting Announcements

### *Meetings Calendar*

#### *IAG Sponsored Meetings*

##### 11th IVS General Meeting

March 22 –28, 2020, Annapolis, MD, USA

URL: <https://ivsgm2020.com/>

##### 19th International Symposium on Geodynamics and Earth Tides (G-ET Symposium 2020)

June 7 –11, 2020, Wuhan, China

URL: <http://get2020.csp.escience.cn/dct/page/1>

##### IGS Workshop "IGS 2020: Science from Earth to Space"

August 10 –14, 2020, Boulder, CO, USA

URL: <https://www.igsceb.org/event/>

##### 43rd COSPAR Scientific Assembly

August 15 –22, 2020, Sydney, Australia

URL: <http://www.cospar2020.org/>

##### 2nd International Symposium of Commission 4: Positioning and Applications

September 7 –11, 2020, Potsdam, Germany

URL: <https://www.iag-aig.org/events/17>

##### International Workshop on GNSS Ionosphere (IWGI2020)

October 19 –21, 2020, Shanghai, China

URL: <http://202.127.29.4/geodesy/iwgi2020/index.html>

##### International DORIS Service Workshop

October 19 –21, 2020, Venice, Italy

URL: <http://ostst-altimetry-2020.com/home/>

##### 22nd International Workshop on Laser Ranging

November 2 – 6, 2020, Kunming, China

URL: <https://ilrs.cddis.eosdis.nasa.gov/about/meetings.html>

##### IAG Scientific Assembly

June 28 – July 3, 2021, Beijing, China

URL: <http://www.iugg.org/meetings/assemblies.php>

#### *IAG Related Meetings*

##### 3rd UN GGIM Subcommittee on Geodesy Plenary Meeting

April 20-22, 2020, Windsor, United Kingdom

URL: [http://ggim.un.org/meetings/2020/6th\\_HLF](http://ggim.un.org/meetings/2020/6th_HLF)

### 6th High Level Forum on UN GGIM

April 20-22, 2020, Windsor, United Kingdom

URL: [http://ggim.un.org/meetings/2020/6th\\_HLF](http://ggim.un.org/meetings/2020/6th_HLF)

### EGU General Assembly 2020

May 3-8, 2020, Vienna, Austria

URL: <https://egu2020.eu/>

### FIG Working Week 2020

May 10-14, 2020, Amsterdam, the Netherlands

URL: <http://www.fig.net/fig2020/>

### AOGS2020 17th Annual Meeting

June 28 – July 4, 2020, Gangwon, South Korea

URL: <http://www.asiaoceania.org/aogs2020/public.asp?page=home.html>

### International Symposium on Satellite Navigation (ISSN 2020)

October 21 – 24, 2020, Nanjing, China

URL: <http://issn2020.csp.escience.cn/dct/page/1>

### 22nd meeting of the Consultative Committee for Time and Frequency (CCTF)

October 26 –30, 2020, Sèvres, France

URL: <https://www.iers.org/ IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html>

## Obituary

### *James Alan Slater, 1947–2018*



After a hard-fought battle with leukemia, Jim Slater died on September 7, 2018. Jim was a 1968 graduate of the University of Rochester, USA. A scientist in geodesy and geophysics, Jim devoted most of his career to work at the National Geospatial Intelligence Agency (NGA) and, earlier, at the National Bureau of Standards.

In the 1990s Jim Slater's professional activities started to overlap with the creation of IGS, the International GPS Service, as the service was called at that time. Interestingly, Jim was an enthusiastic supporter of the science community's use of the Russian counterpart to GPS: GLONASS (Globalnaja Nawigazionnaja Sputnikowaja Sistema) and urged the IGS to include GLONASS into the IGS tracking schedule.

The IGS followed Jim Slater's advice and consequently Jim served as IGS Governing Board Member from 1997 to 2005, actively participating to the international GLONASS campaign IGEX-98 and later on in his capacity as Chair of the IGS Pilot Project and Working Group *International GLONASS Service Pilot Project* (IGLOSS-PP). The community continues to benefit from Jim's vision and leadership in this generalization of the IGS portfolio.

Jim Slater is to a large extent responsible that today IGS stands for International GNSS Service (GNSS=Global Navigation Satellite Systems). Jim's international interests and activities resulted in friends in many countries. He will also be remembered for his love of music. Jim was an accomplished clarinetist and an avid hiker – witnessed by the picture taken in the White Mountains of New Hampshire.

After retirement from NGA he served as docent of the National Air and Space Museum in Washington. The first of the undersigned and his wife Ruth enjoyed a private tour through the museum in 2014. We all lost a good friend.

Bern, Washington, and Paris, in January 2020

GERHARD BEUTLER, STEPHEN MALYS, PASCAL WILLIS