International Association of Geodesy

Newsletter
December 2018

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Contents

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). 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

27th IUGG General Assembly, Montreal, Canada, July 8 – 18, 2019

The International Union of Geodesy and Geophysics (IUGG) holds its 27th General Assembly from July 8 to 18, 2019 in Montreal, Canada. The general assembly theme is the celebration of the centennial of the IUGG establishment in Brussels, Belgium, in 1919.

IUGG holds its General Assemblies every four years. Traditionally, the eight constituent associations of IUGG (Cryospheric Sciences, IACS; Geodesy, IAG; Geomagnetism and Aeronomy, IAGA; Hydrological Sciences, IAHS; Meteorology and Atmospheric Sciences, IAMAS; Physical Sciences of the Ocean, IAPSO; Seismology and Physics of the Earth's Interior, IASPEI; and Volcanology and Chemistry of the Earth's Interior, IAVCEI) arrange their General Assemblies in parallel with the IUGG. This enables to hold joint inter-association symposia besides the specific association symposia and a greater involvement in the IUGG symposia.

There will be nine Union Symposia organized by IUGG and each of the associations in cooperation with the IUGG Commissions (Climatic and Environmental Changes, CCEC; Mathematical Geophysics, CMG; Geophysical Risk and Sustainability, GRC; Study of the Earth's Deep Interior, SEDI; Data and Information, UCDI; Planetary Sciences, UCPS), the IUGG Working Group on History (WGH), and the Global Geodetic Observing System (GGOS).

- U1 - Achieving Sustainable Development: The Role for Earth Sciences (IACS, CCEC),
- U2 - Georisk Reduction: Science, Resources, and Governmental Action (IAVCEI, GRC),
- U3 - Mathematics of Planet Earth: The Science of Data (IASPEI, CMG),
- U4 - Data-driven Science for Earth and Space Exploration (IAPSO, UCDI),
- U5 - New Discoveries in Earth Deep Interior (IAGA, SEDI),
- U6 - Recent Advances and Discoveries in Planetary Science and Comparative Planetology (IAMAS, UCPS),
- U7 - Centennial of the International Cooperation in Earth Sciences (IAHS, WGH),
- U8 - Earth and Space Observations (IAG, GGOS),
- U9 - Celebrating Early Career Scientists (IUGG).

In addition, there will be nine Union Lectures given in three special sessions by representatives of the IUGG and associations:

- David Grimes (IUGG): Earth Sciences as the Underlying Pillars to Meet Societal Challenges in the next Century;
- Waleed Abdalati (IACS): Exploring and Understanding Earth from Space: The Power of Perspective;
- Kosuke Heki (IAG): No geodesy, no geophysics;
- Lisa Tauxe (IAGA): Hunting the magnetic field;
- Veena Srinivasan (IAHS): Understanding and transforming water conflicts in the Anthropocene;
- Ed Hawkins (IAMAS): The value of rescuing millions of lost historical weather observations using volunteer citizen scientists;
- Karen Kohfeld (IAPSO): The Ocean's Role in Atmospheric Carbon Dioxide Changes During Ice Age Cycles;
- Vera Schlindwein (IASPEI): Singing seismograms – harmonic tremor signals in seismological records;
- Paolo Papele (IAVCEI): Volcanic giants - what we know, what we think we know, what we can't know about cataclysmic super-eruptions.

The joint symposia are always led by an association with co-conveners from other associations. IAG has the lead of the following Inter-Association Symposia:

- JG01 - Interactions of Solid Earth, Ice Sheets and Oceans;
- JG02 - Theory and Methods of Potential Fields;
- JG03 - Near-Real Time Monitoring of Regional to Global Scale Water Mass Changes;
- JG04 - Geodesy for Atmospheric and Hydrospheric Climate Research;
- JG05 - Remote Sensing and Modelling of the Atmosphere;
- JG06 - Monitoring Sea Level Changes by Satellite and In-Situ Measurements;
- JG07 - Monitoring, Imaging and Mapping of Volcanic Belts;
- JG08 - Earth Systems Literacy: Geophysics in K-16 Class Rooms, Outreach Projects, and Citizen Science Research Projects;

and IAG is sponsoring (with IAG co-conveners) the following Inter-Association Symposia led by other associations:

- JA01 - Geophysical Constraints on the Earth's Core and Its Relation to the Mantle;
- JA02 - Geophysical Data Assimilation;
- JA03 - Geophysical Records of Tectonic and Geodynamic Processes;
- JA06 - Space Weather Throughout the Solar System: Bringing Data and Models Together;
- JA07 - Geoscience Data Licensing, Production, Publication, and Citation (IAGA);
- JA08 - Probing the Earth's Lithosphere and Its Dynamics Using Geophysical Modeling;
- JH02 - Climate and Hydrological Services: Bridging from Science to Practice and Adaptation;
- JP01 - Tides of the Oceans, Atmosphere, Solid Earth, Lakes and Planets;
- JS01 – Cryoseismology;
- JS02 - Early Warning Systems for Geohazards;
- JS03 - Subduction Zone Deformation and Structure: Tracking the Sea Floor in Motion;
- JS04 - Seismo – Geodesy;
- JS05 - Probabilistic & Statistical Approaches in Geosciences;
- JS06 - Old Data for New Knowledge: Preservation and Utilization of Historical Data in the Geosciences;
- JS07 - Integrated Geophysical Programs for Earth Systems Monitoring;
- JV03 - Strain Localisation and Seismic Hazards.

The IAG specific symposia are the main issue of the IAG General Assembly:

- G01 - Reference Systems and Frames;
- G02 - Static Gravity Field and Height Systems;
- G03 - Time-variable Gravity Field;
- G04 - Earth Rotation and Geodynamics;
- G05 - Multi-signal Positioning, Remote Sensing and Applications;
- G06 - Monitoring and Understanding the Dynamic Earth with Geodetic Observations.

For all details of the symposia descriptions and the program, please visit the IUGG2019 Homepage (http://iugg2019montreal.com/). The most important deadlines are:

- February 18, 2019: Closing of abstract submission;
- February 18, 2019: Closing of Grant application submission;
- March 30, 2019: Abstract acceptance sent to participants;
- April 5, 2019: Early-bird registration closes.

IAG invites all geodesists to participate in the General Assembly 2019 and to present their work in one of the symposia. We look forward to seeing you in Montreal!

HERMANN DREWES

IAG Secretary General

The 2018 Vening Meinesz Medal is awarded to Markus Rothacher

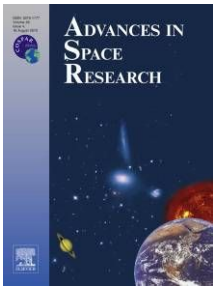
The 2018 Vening Meinesz Medal is awarded to Markus Rothacher for his pioneering work in linking geometry, rotation and gravity to space geodetic observations and subsequently enhancing the understanding of the Earth system. For details please visit https://www.egu.eu/awards-medals/vening-meinesz/2018/markus-rothacher/.

Gross received 2018 Ivan I. Mueller Award for Distinguished Service and Leadership

Richard Gross received the 2018 Ivan I. Mueller Award for Distinguished Service and Leadership at AGU's Fall Meeting 2018, held at 10–14 December in Washington, D. C. The award acknowledges "major achievements in service to and/or leadership within the field of geodesy." Further details can be found at https://eos.org/agu-news/gross-receives-2018-ivan-i-mueller-award-for-distinguished-service-and-leadership.

Advances In Space Research

Dear colleagues,



for your information, issue 63(1) of Advances in Space Research (COSPAR official journal), published on January 1, 2019, 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/63/issue/1

While it is a very large issue (59 papers and 811 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 1.539.

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

Seasons Greetings
Pascal Willis
Editor-in-Chief
Advances in Space Research

EARTH SCIENCES

Seong Hyeon Hong, John W. Conklin (2019) Finding the Suitable Drag-free Acceleration Noise Level for Future Low-low Satellite-to-satellite Tracking Geodesy Missions, Advances in Space Research, 63(1), 32-50, DOI: 10.1016/j.asr.2018.07.022

N. Panafidina, U. Hugentobler, H. Krásná, R. Schmid M. Seitz Conklin (2019) Mechanism of Error Propagation from the Subdaily Universal Time Model into the Celestial Pole Offsets Estimated by VLBI, Advances in Space Research, 63(1), 51-62, DOI: 10.1016/j.asr.2018.08.007

Akihisa Hattori, Toshimichi Otsubo Conklin (2019) Time-varying Solar Radiation Pressure on Ajisai in Comparison with LAGEOS Satellites, Advances in Space Research, 63(1), 63-72, DOI: 10.1016/j.asr.2018.08.010

Bofeng Li, Haibo Ge, Maorong Ge, Liangwei Nie, Yunzhong Shen, Harald Schuh Conklin (2019) LEO Enhanced Global Navigation Satellite System (LeGNSS) for Real-time Precise Positioning Services, Advances in Space Research, 63(1), 73-93, DOI: 10.1016/j.asr.2018.08.017

Paolo Dabove, Vincenzo Di Pietra Conklin (2019) Towards High Accuracy GNSS Real-time Positioning with Smartphones, Advances in Space Research, 63(1), 94-102, DOI: 10.1016/j.asr.2018.08.025

Yunfei Xiang, Jianping Yue, Kai Tang, Zhen Li Conklin (2019) A Comprehensive Study of the 2016 Mw 6.0 Italy Earthquake based on High-rate (10 Hz) GPS Data, Advances in Space Research, 63(1), 103-117, DOI: 10.1016/j.asr.2018.08.027

Guilhem Moreaux, Pascal Willis, Frank G. Lemoine, Nikita P. Zelensky, Alexandre Couhert, Hanane Ait Lakbir, Pascale Ferrage Conklin (2019) DPOD2014: A New DORIS Extension of ITRF2014 for Precise Orbit Determination, Advances in Space Research, 63(1), 118-138, DOI: 10.1016/j.asr.2018.08.043

K. Wang, A. Khodabandeh, P. J. G. Teunissen Conklin (2019) Precision Analysis of Troposphere Sensing Using GPS Single-frequency Signals, Advances in Space Research, 63(1), 148-159, DOI: 10.1016/j.asr.2018.09.006

Baogui Ke, Liming Zhang, Jun Xu, Chuanyin Zhang, Yamin Dang Conklin (2019) Determination of the Mean Dynamic Ocean Topography Model Through Combining Multi-Source Gravity Data and DTU15 MSS Around China's Coast, Advances in Space Research, 63(1), 203-212, DOI: 10.1016/j.asr.2018.10.040

EARTH MAGNETOSPHERE AND UPPER ATMOSPHERE

G. March, E. N. Doornbos, P. N. A. M. Visser Conklin (2019) High-fidelity Geometry Models for Improving the Consistency of CHAMP, GRACE, GOCE and Swarm Thermospheric Density Data Sets, Advances in Space Research, 63(1), 213-238, DOI: 10.1016/j.asr.2018.08.017

A. M. Padokhin, N. A. Tereshin, Yu. V. Yasyukevich, E. S. Andreeva, M. O. Nazarenko, A. S. Yasyukevich, E. A. Kozlovtseva, G. A. Kurbatov Conklin (2019) Application of BDS-GEO for Studying TEC Variability in Equatorial Ionosphere on Different Time Scales, Advances in Space Research, 63(1), 257-269, DOI: 10.1016/j.asr.2018.08.001

Temitope Seun Oluwadare, Chinh Nguyen Thai, Andrew Oke-Ovie Akala, Stefan Heise, Mahdi Alizadeh, Harald Schuh Conklin (2019) Characterization of GPS-TEC over African Equatorial Ionization Anomaly (EIA) Region during 2009–2016, Advances in Space Research, 63(1), 282-301, DOI: 10.1016/j.asr.2018.08.044

Ningbo Wang, Zishen Li, Xingliang Huo, Min Li, Xingliang Huo, Chao Yuan Conklin (2019) Refinement of Global Ionospheric Coefficients for GNSS Applications: Methodology and Results, Advances in Space Research, 63(1), 343-358, DOI: 10.1016/j.asr.2018.10.006

ASTRODYNAMICS AND SPACE DEBRIS

Dariusz Strugarek, Krzysztof Sośnica and Adrian Jäggi Conklin (2019) Characteristics of GOCE Orbits Based on Satellite Laser Ranging, Advances in Space Research, 63(1), 417-431, DOI: 10.1016/j.asr.2018.08.033

SPACE TECHNOLOGY, POLICY AND EDUCATION

Long Gu, Xiuqiang Jiang, Shuang Li, Wendan Li Conklin (2019) Optical/radio/pulsars Integrated Navigation for Mars Orbiter, Advances in Space Research, 63(1), 512-525, DOI: 10.1016/j.asr.2018.09.005

Meeting Announcements

Meetings Calendar

IAG Sponsored Meetings

4th Joint International Symposium on Deformation Monitoring (JISDM)

May 15 – 17, 2019, Athens, Greece
URL: http://jisdm2019.survey.ntua.gr/

EUREF Symposium 2019

May 22 – 24, 2019, Tallinn, Estonia
URL: http://www.euref.eu/euref_symposia.html

27th IUGG General Assembly

July 8 – 17, 2019, Montreal, Canada
URL: http://www.iugg.org/assemblies/

IAG Related Meetings

11th European Space Policy Conference

January 22 – 23, 2019, Brussels, Belgium
URL: http://www.spaceconference.eu

Munich Satellite Navigation Summit 2019

March 25-27, Munich, Germany
URL: https://www.munich-satellite-navigation-summit.org/

EGU General Assembly 2019

April 7-12 , 2019, Vienna, Austria
URL: http://www.egu2019.eu/

ESA Living Planet Symposium

May 13-17 , 2019, Milan, Italy
URL: https://lps19.esa.int

AOGS 16th Annual Meeting

July 28 – August 2, 2019, Singapore, Singapore
URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

Earth & Geo Science-2019

August 12-13, 2019, Prague, Czech Republic
URL: https://scientificfederation.com/earth-science-2019/

First International School on "Geoid Modelling, Gravity Inversion and its Applications"

September 9-13, 2019, Gävle, Sweden
URL: https://www.hig.se/4.6c77c68166435adf0b3d060.html

4th Symposium of the Committee on Space Research (COSPAR)

November 4-8, 2019, Herzliya, Israel
URL: http://www.cospar2019.org/

Reports

IAG workshop on HydroGeodesy
June 29-30, 2018, Wuhan, China

The IAG workshop on HydroGeodesy was successfully held in Wuhan, China, from 29-30 June, 2018. It has been sponsored by the International Associate of Geodesy (IAG), and the State Key Laboratory of Geodesy and Earth's Dynamics (SKLGED), Institute of Geodesy and Geophysics, Chinese Academy of Sciences (IGGCAS). The workshop was jointly held with the 3rd National Forum on Satellite Gravity and Hydrology sponsored by the Capital Normal University, the Tsinghua University, and the In Institute of Geodesy, Chinese Academy of Sciences (IGGCAS).

The workshop was attended by ~180 participants from 7 countries (China, the United States of America, Germany, France, Australia, Japan, and Singapore). Academicians of Chinese Academy of Sciences, Prof. Houze Xu (IGGCAS), and Prof. Jun Xia (Wuhan University), academicians of National Academy of Engineering (US), Prof. Bridget Scanlon (University of Texas at Austin), and Prof. Dennis P. Lettenmaier (University of California, Los Angeles), Prof. Jürgen Kusche from the University of Bonn, and Prof. C.K. Shum from the Ohio State University and IGGCAS were invited to deliver keynote speeches.

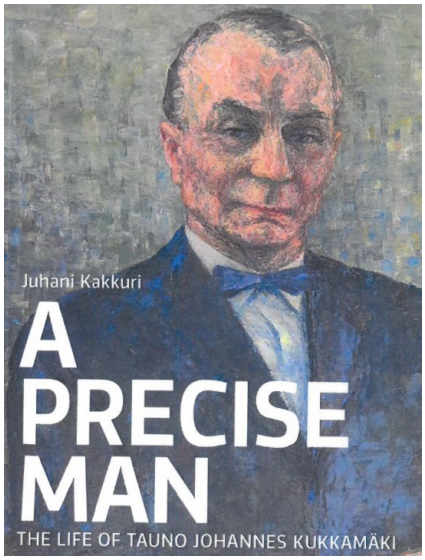
The aim of the workshop is to bring together international geodesists, hydrologists, and researchers in Earth sciences who work with multiple geodetic observations and remote sensing technologies in hydrological research related to global change. The workshop includes five sessions: (1) Groundwater Changes Using Geodetic, (2) Prospects of Future Geodetic Satellite Missions, (3) Precipitation, Evapotranspiration, and River Discharge Estimation from Remote Sensing, (4) Ice Mass Balance from Multiple Geodetic Observations, and (5) Hydrological Remote Sensing and Satellite Geodesy. The workshop follows the IAG workshop: Satellite Geodesy for Climate Studies in September 2017, Bonn, Germany and two prior successful annual National Forums on Satellite Gravity and Hydrology in Beijing, China. The workshop provides a platform for scientific exchange among senior and young scientists on hydrological applications of space geodesy. More information can be found at http://hydrogeodesy2018.csp.escience.cn.

Participants of the IAG workshop on HydroGeodesy, Wuhan, China (29–30 June, 2018)

DR. WEI FENG (Chairman)
State Key Laboratory of Geodesy and Earth's Dynamics,
Institute of Geodesy and Geophysics, Chinese Academy of Sciences

Book Review

Juhani A. Kakkuri: A precise man. The life of Tauno Johannes Kukkamäki



Title:	A precise man. *The life of Tauno Johannes Kukkamäki*
Author:	Juhani A. Kakkuri
Publisher:	National Land Survey of Finland, Helsinki
ISBN:	978-951-653-404-9
Year:	2018 (English), 2015 (Finnish)
Price:	€ 20 (Finnish)
Details:	155 pages, Printed by Gano Oy, Helsenki 2018

The great contribution for T. J. Kukkamäki written by the Geodesist and Astronomer Juhani Kakkuri contains 12 Chapters and an informative Appendix:

Forward
Family background
From graduate to a civil servant
Head of the Finnish Geodetic Institute
Measuring the base line
Solar eclipses
Triangulations with Kukkamäki
Precise leveling and stellar triangulations
Years in the United States
As a United Nation expert
Land surveying and geodesy
International cooperation
Appendix
Sources
Kukkamäki's publications
Nummela length

In the chapter "Forward" the author reviews in short why *T.J. Kukkamäki* has been so important researcher for the research in *Geodetic Science*. He was a member of the *Finnish Academy of Science and Letters* and the *Academy of Technical Sciences* representing his life's works for the *Finnish Geodetic Institute*. He started by the survey of leveling and lateral refraction studies as well as micro climate measurement conditions. He is famous for measurements of the *solar eclipses*, namely observing the complete *solar eclipse of 1947*, for measurement

the distance of *5458.8* kilometers across the Atlantic from *Eastern Coast of Brazil* to the *African Gold Coast*, *nearly two decades before the Satellite Era*. He was fond of *R.A. Hirvonen's cooperation*, another of great scientist of his time.

His scientific inventions and achievements were made together with his teacher *Y. Väisälä*. Me, the author, is very proud for receiving the *Y. Väisälä Medal* of the *Finnish Academy of Science and Letters recently*.

T.J. Kukkamäki was appointed Head of the *Finnish Geodetic Institute* in 1953, a position he held until his retirement in 1977. He started as a student at *Turku Finnish University*, his research culminated in his work in the *United States* in 1953 and 1954 by measuring by means of the *Väisälä interference comparator* in Finland and overseas, as well for his *Leveling Work* in *Pechenga* just before the outbreak of the *Winter War*. His *triangulation measurements* in *the Northern Finland in the 1950 are legendary*.

Internationally, T.J. Kukkamäki is well known for acting in the seventies as

President of the International Association of Geodesy

from 1975 to 1979. It was the time I met him first in Paris. He also acted as an *UN Expert for the Technical Assistance* in *Burma* being appointed by the *UN General Secretary*.

From the important chapter on *Family and Background* we mention his charming wife *Anna-Liisa Kukkamäki*, maiden name *Järvinen*. I met the two first when I had been at *Uppsala University* / Sweden / in 1975. I had been invited together with *Professor Evangelos Livieratos* – paid by the well-known *Professor Erik Tengström / Uppsala* – to see the most famous *Finnish Geodetic Institute* at that time located in Helsinki. At the harbor side we were welcomed by *T.J. Kukkamäki* and his deputy *Juhani Kakkuri*. We were invited to stay at home of Juhani and in the first evening I met *Anna-Liisa* and *T.J.*. At the welcome party in the home of *Juhani* I was invited to play piano: on top of my piano *Anna-Liisa* was singing *famous songs* we knew by heart. *Anna-Liisa* was outgoing, partially in contrast to *T.J.*. Indeed have a look at wedding picture showing *Anna-Liisa Jänsinen* and *Tauno Kukkamäki* in 1936 in page 19. See also the charming photo on page 20 at a conference in 1965. Her early death by an accident is very moving.

T.J. Kukkamäki completed his Master Thesis at the Finnish University Turku being presented in the chapter *"From graduate to the civil servant"*. He took lecture from *Kalle and Yrjö Väisälä*, both famous scientists internationally well known. *T.J.* chose *Yrjö Väisälä* as his supervisor: he completed his excellent Ph.D. Thesis in 1933: It was written in *German*!

"Untersuchungen über die meterendmasse aus geschmolzenem Quartz nach lichtinterferometrischen Methoden"

He was the youngest Doctor of Philosophy at the age of 23 years.

It is worth mentioning that a small planet has been called "Kukkamäki", a minor planet *number 2159* on the application of the Astronomer Liisi Oterma: 11 km diameter away from the Sun at a distance of 372 million km with orbital period around the Sun is 3.91 years. See the photo on page 35 of the influential *Yrjö Väisälä*, Professor of *Physics and Astronomy* of the *Finnish University of Turku*.

We did mention already the topics *"Head of the Finnish Geodetic Institute"* as well as *"Measuring the base line"*, the Nummela Length was presented on page 155 varying from 1947 to 1984 from 864.122.78 meters to 864.122.40 with standard estimated error up to ±0.09 millimeter. We also mentioned his work on "Solar Eclipses", "Triangulation with Kukkamäki" started in the summer of 1952, "Precise leveling and stellar triangulation", years in the United States from 1952 working for *V.A. Heiskanen* for "*Geoid calculations*", "As a United States Expert" and "Finally Land Surveying and Geodesy".

Consult the celebrated photos on page 111 in 1950 as well as 1971 with the celebrated Tarczy-Hornoch and T.J. in Sopron. For us the highlight is the final chapter in *"International Cooperation"*. The author of the book *J. Kakkuri*, the follower of T.J. as Director General of the Finnish Geodetic Institute, nowadays called Finnish Geospatial Research Institute, mentions first the accident of *Anna-Liisa Kukkamäki* in November 1977 who joint T.J. in most of the campaigns Nationally and Internationally. T.J. enjoyed very much his "Summer Villa" in Ikaalinen. I recall a short vacation time in Ikaalinen, an impressive Mäki: T.J. had invited me there serving an over-proved Whiski. In consequence I was sick for three days.

T.J. enjoyed his journey to the *Pamir Mountains*: in the autumn on 1977 he was invited by Professor *Yuri Boulanger*, Soviet Academy of Science, for a visit to the Geophysical Observatory in Gharm which was situated in a valley between the *Alain and Pamir Mountains* in Tajik: the ancient Silk Road to China. The valley was ideal for the measuring the movements of the Eurasian and Indian tectonic plates. *Professor Boulanger* thought mere breathing or wind could set the rocks in motion. T.J. was able to visit a research station located at the altitude of several thousand of meters on the slop of the mountains, *Pik Lenina* or *Pik Kommunizma* via helicopter. At this occasion he visited *Samarkand* a second time, another tectonically most interesting region.

"Kukkamäki in China", *"Journey around the World"*, *"The Lipizzaner horses"* and *"Last May Day"* are the final sections. T.J. Kukkamäki died in the Laakso Hospital in Helsinki in the first day in 1998, exactly 69 years

after the unforgettable evening when he celebrated *May Day* as a young graduate at the *"Lily of Turku"*. He is buried at the historical cemetery of the *Heinola Perisa*, close to the place where he was born.

After the successful book, *V.A. Heiskanen* Juhani Kakkuri wrote another master piece. All the time you feel his personal engagement with "T.J.", his teacher. Being a member of the *Finnish Academy of Science and Letters* as well as initial member of the *Writer's Association he knows to write Literature*. And the end of book, *Juhani Kakkuri* presents us with a detailed list of his sources as well as his 121 scientific papers: worth mentioning his last contribution about *"Maupertuis et la Finlande"* in 1986. We wish the book a wide audience: please, write to the *National Land Survey of Finland*, P.O.Box 84, 00521 Helsinki, Finland, for getting a copy,

ERIK W. GRAFAREND

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