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Editorial note for the geodesy and geodynamics journal special issue contemporary research in geodynamics and earth tides - Selection from the 19th international symposium on geodynamics and earth tides, 2021, Wuhan, China

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This volume aims at providing a platform for sharing valuable topics discussed at the 19th International Symposium on Geodynamics and Earth Tides, 23–26 June 2021, Wuhan, China. The complete overview of all nineteen Symposia is found in Table 1, where the times and venues are listed.

The Symposium was held successfully at the Innovation Academy for Precision Measurement Science and Technology of the Chinese Academy of Sciences in Wuhan, China, with about 200 attendants on site (Fig. 1a). Due to the COVID-19 pandemic, about 200 international participants from 26 countries and regions attended the symposium online (Fig. 1b).

The topics at the Symposium were grouped into six sessions, i.e., tides and non-tidal loading, geodynamics and the earthquake cycle, variations in Earth rotation, new technology and software development, time variable gravity and mass redistribution, and monitoring of subsurface fluids (Table 2). A selection of the contributions is published in two special issues of the journals Geodesy and Geodynamics and Pure and Applied Geophysics, with nineteen published papers.

A review of the topics in the Symposium is given in Sun et al. (2022) [1]. Ducarme (2022) [2] proposed the "hybrid" pressure correction method to separate the local and global pressure contributions in tidal gravity records. Ducarme et al. (2022) [3] analyzed the characteristics of tide-free sea level variations and modelled ocean tides in French Polynesia. Topics on the earthquake cycle and geodynamics with modern geodetic measurements were discussed in the Symposium. Yan et al. (2022) [4] reviewed the tidal triggering of global earthquakes and found a high correlation between semidiurnal and diurnal tides and tectonic, volcanic, and slow earthquakes. In addition to semidiurnal and diurnal tides, Tanaka et al. (2022) [5] discussed the contribution of nontidal variations in ocean bottom pressure to slow earthquakes. Pedapudi et al. (2022) [6] investigated the free oscillations of the Earth after the large earthquakes in Chile (February 27, 2010, Mag 8.8) and Japan (April 11, 2011, Mag 9.1) based on the superconducting

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Table 1
The Earth Tides Symposia since 1957. Since 2016 the topic was broadened to International Symposium on Geodynamics and Earth Tides (G-ET).

	Venue	Time period
1	Uccle, Belgium	1957, 04.24–26
2	Munich, Germany	1958, 07.21–26
3	Trieste, Italy	1959, 07.06–11
4	Bruxelles, Belgium	1961, 06.05–10
5	Bruxelles, Belgium	1964, 06.01–06
6	Strasbourg, France	1969, 09.15–20
7	Sopron, Hungary	1973, 09.10–14
8	Bonn, Germany	1977, 09.19–24
9	New York, USA	1981, 08.17–22
10	Madrid, Spain	1985, 09.23–27
11	Helsinki, Finland	1989, 07.31–08.05
12	Beijing, China	1993, 08.04–07
13	Brussels, Belgium	1997, 08.22–25
14	Mizusawa, Japan	2000, 08.28–09.01
15	Ottawa, Canada	2004, 08.02–06
16	Jena, Germany	2008, 09.01–05
17	Warsaw, Poland	2013, 04.15–18
18	Trieste, Italy	2016, 06.05–09
19	Wuhan, China	2021, 06.23–26

gravimeter (SG) installed in Badargadh, Gujarat, India. Eshkuvatov et al. (2022) [7] reported the anomalous variations in Global Navigation Satellite System Total Electron Content (GNSS-TEC) prior to the strong local earthquakes in Uzbekistan and Pakistan. Abetov et al. (2022) [8] analyzed the seismicity due to local hydrocarbon production in Kazakhstan using repeated leveling, GNSS measurements, gravimetric and seismological observations. Kong et al. (2022) [9] analyzed the plate motion of the Eurasian plate by applying Singular Spectrum Analysis (SSA) and Fast Fourier Transform (FFT) to Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) observations.

Table 2
Scientific sessions of the 19th G-ET Symposium and the convenors.

	Session	Convenors
1	Tides and non-tidal loading	Jean-Paul Boy, Heping Sun, Hartmut Wziontek, David Crossley
2	Geodynamics and the earthquake cycle	Severine Rosat, Kosuke Heki, Thomas Jahr, Wenke Sun
3	Variations in Earth rotation	Chengli Huang, Harald Schuh, Ben Chao, Janusz Bogusz
4	New technology and software development	Olivier Francis, Jürgen Müller, Hannu Ruotsalainen, Zhongkun Hu
5	Time variable gravity and mass redistribution	Cheinway Hwang, Carla Braitenberg, Holger Steffen, Wei Feng
6	Monitoring of subsurface fluids	Jacques Hinderer, Jaakko Makinen, Yoichi Fukuda, Giuliana Rossi

Ten papers are published in the special issue of Pure and Applied Geophysics. Sun (2022) [10] comprehensively reported the progress on the Earth's gravity tides and its application on geodynamics in China. Jahr et al. (2022) [11] reported the scientific experience and a reanimation of SG CD-034 in the Geodynamic Observatory Moxa of the Friedrich Schiller University Jena, Germany.

Based on the two co-located SG observations with 520 m depth difference, Kumar et al. (2022) [12] found that the gravity residuals

a) b)

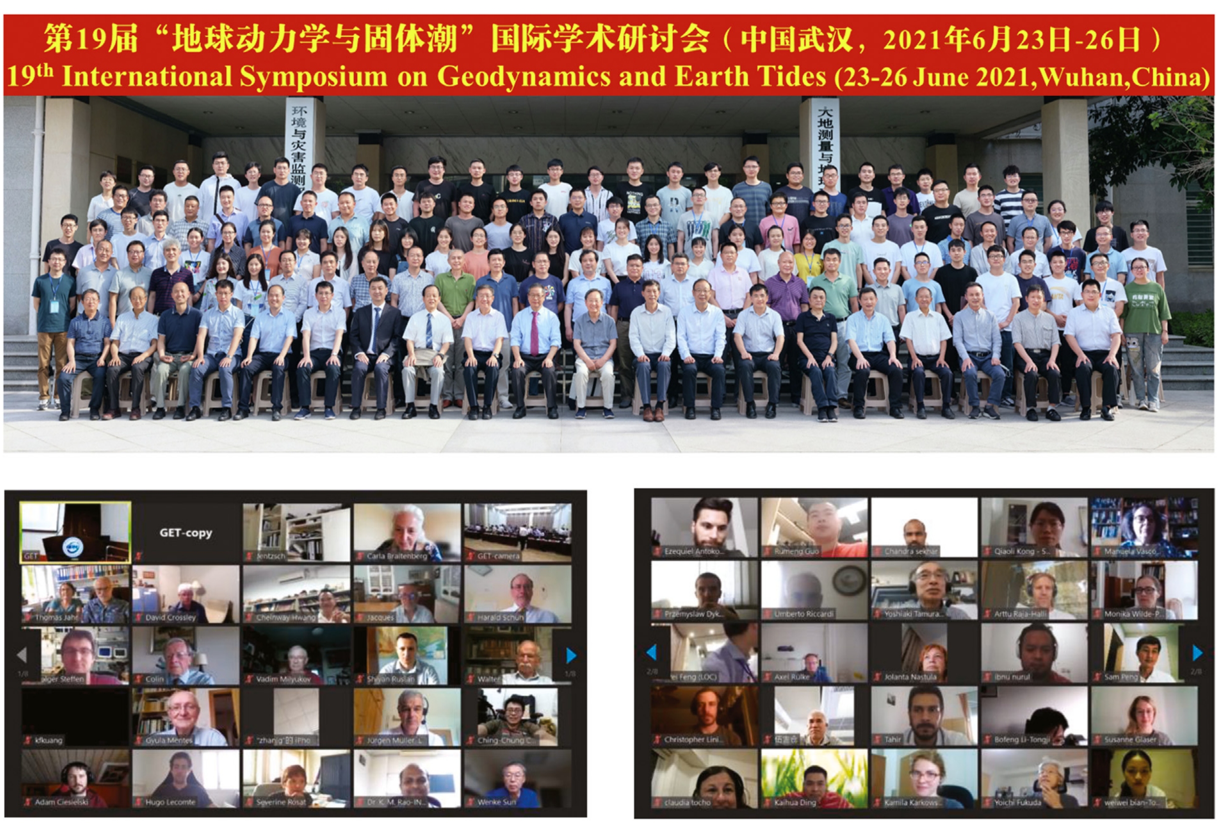

Fig. 1. a) The participants of the Symposium on site in front of the main building of APM, CAS, where the Symposium was held. b) Part of international participants of the Symposium online.

can be explained well by large later fluxes and rapid runoff occurring in the catchment. Elsaka et al. (2022) [13] estimated the calibration factor of the iGrav-043 based on the tidal analysis with co-located SG observations from OSG-CT040 in the Grand Duchy of Luxembourg. Luan et al. (2022) [14] analyzed iGrav-007 SG measurements in Kunming, China, and found good correlations between SG gravity residuals and hydrological signals on seasonal time scale. A first reliable gravity tidal model was established for the Lake Nasser region of Egypt based on three-year gravity records from two spring relative gravimeters [15]. Based on both absolute and relative gravimeters in southeastern Tibet, Chen et al. (2022) [16] applied the Bayesian gravity adjustment to interpret the crustal mass redistributions in this region, which were possibly controlled by active block boundaries and fluids distributed in the deep crust. Based on campaign gravity, GPS, and leveling observations, Zhang et al. (2022) [17] calculated the regional gravity changes and 3-D crustal deformations in the northeastern Tibet. The gravity changes show obvious negative–positive patterns across the Qilian thrust belt, which suggests that the northeastern TP thrust towards the North China Craton block beneath the Qilian thrust belt. Lin et al. (2022) [18] analyzed high-resolution borehole strainmeter signals to constrain the fault plane solutions and locations of the 2009 Fengpin-Hualien earthquakes, in eastern Taiwan, China. Zhou et al. (2022) [19] evaluated the temperature variation due to the Earth's deformation under the tide-generating force. The magnitude of the tidal temperature variation can be more than 1 mK under both isothermal and adiabatic boundary conditions.

An important event during the Symposium was the awarding ceremony of the Paul Melchior medalist. The Paul Melchior medal has been given since 1997 for awarding outstanding scientists in geodesy and Earth Tides. The previous awardees are Paul Melchior (1997), Hans-Georg Wenzel (2000), John Goodkind (2004), Bernard Ducarme and Tadahiro Sato (2008), Houtse Hsu (2013), and Trevor F. Baker (2016). Exceptionally, after the evaluation of award Committee, the Paul Melchior Medal 2021 is a triple nomination, with three awardees, David Crossley, Gerhard Jentzsch, and Walter Zürn. The laudatios for three awardees were given by Bernard Ducarme, Carla Braitenberg, and Michel Van Camp (Appendix 1).

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The authors declare they have no financial interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.geog.2022.11.002.

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