UAW

advancing geodesy

unified analysis workshop

October 21-23, 2022
Thessaloniki
Greece

Unified Analysis Workshop

Logistics

Venue
Electra Palace Aristotelous 9, Thessaloniki, Greece
Website: https://www.electrahotels.gr/hotels/electra-palace-thessaloniki/

Hotels
Participants are expected to book individually their accommodation. For these **suggested hotels** – Electra Palace, Luxembourg Hotel and City Hotel – a block booking has been made at **reduced prices** for the REFAG and UAW participants. Please make your reservations by contacting directly these hotels mentioning the **Reservation code: UAW2022**. The organizers are not involved in any manner in booking of hotels. You can find a list of the hotels with the reduced prices at the REFAG website: https://www.refag2022.org/venue-and-travel/accommodation/

Registration & Registration Fee
Online registration at https://register.nbevents.gr/uaw2022
Early Registration fee (until September 20, 2022):
Participating in-person: 150 € (or 90 € for simultaneous registration for REGAG2022)
Participating virtual only: 100 €
(After 20.09.2022 an additional fee of 40 Euros will be applied for late registrations.)

Lunch
On your own.

Local Organizing Committee
Christopher Kotsakis, (A.U.Th., Greece)

Scientific Organizing Committee
Zuheir Altamimi (IPGP-IGN, France)
Detlef Angermann (DGFI-TUM, Germany)
Riccardo Barzaghi (Polimi, Italy)
Sten Bergstrand (RISE, Sweden)
Johannes Bouman (BKG, Germany)
Xavier Collilieux (IPGP-IGN, France)
Allison Craddock (NASA/JPL, USA)
Rolf Dach (AIUB, Switzerland)
Kirsten Elger (GFZ, Germany)
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Ryan Hippenstiel (NGS, USA)
Cinzia Luceri (e-Geos/ASI, Italy)
Basara Miyahara, Co-Chair (GSI, Japan)
Erricos Pavlis (JCET/UMBC, USA)
Michael Pearlman (CfA, USA)
John Ries (U Texas/CSR, USA)
Salim Masoumi (Geoscience Australia)
Laura Sánchez (DGFI-TUM, Germany)
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Nick Stamatakos (USNO, USA)
Petr Štěpánek (GOP, Czech Republic)
Daniela Thaller (BKG, Germany)

Website
https://ggos.org/event/unified-analysis-workshop-uaw-2022/

Wi-Fi Access

Login:	Electra Palace Thessaloniki
Password:	No password

Unified Analysis Workshop

Schedule Summary

	Friday October 21	Saturday October 22	Sunday October 23
08:30 - 09:00	Opening / DORIS	Gravity for POD	Site Survey
09:00 - 09:30	DORIS	Gravity for POD	Site Survey
09:30 - 10:00	DORIS/ *Break*	Gravity for POD	Site Survey
10:00 - 10:30	*Break*/ DORIS	*Break*	*Break*
10:30 - 11:00	DORIS	Gravity for POD	Physical Geodesy
11:00 - 11:30	GNSS	Reference Frames	Physical Geodesy
11:30 - 12:00	GNSS	Reference Frames	Physical Geodesy
12:00 - 13:30	*Lunch*	*Lunch*	*Lunch*
13:30 - 14:00	GNSS	Reference Frames	Physical Geodesy
14:00 - 14:30	GNSS	Reference Frames	GGOS
14:30 - 15:00	VLBI	Standard	GGOS
15:00 - 15:30	VLBI	Standard	GGOS
15:30 - 16:00	*Break*	*Break*	*Break*
16:00 - 16:30	VLBI	Standard	Summary
16:30 - 17:00	VLBI	Standard	Summary
17:00 - 17:30	SLR	Infrastructure	Summary
17:30 - 18:00	SLR	Infrastructure	Summary
18:00 - 18:30	SLR	Infrastructure	Summary Closing / *Adjourn*
18:30 - 19:00	SLR / *Adjourn*	Infrastructure / *Adjourn*	

Unified Analysis Workshop

Opening Session

Overview
Unified Analysis Workshops are co-organized by the International Association of Geodesy's (IAG's) Global Geodetic Observing System (GGOS) and International Earth Rotation and Reference Systems Service (IERS). This is the 6th in a series of workshops that are held every two to three years for the purpose of discussing issues that are common to all the space-geodetic measurement techniques. Attendance at the Workshops are by invitation only with each IAG Service nominating 5-6 experts to attend and participate in the discussion. ITRF2020 was released in 2021 year and the focus of this year's Workshop is ITRF2020. The Workshop is held in conjunction with the Commission 1 Symposium, REFAG2022 which also focuses on Reference Frames. At this year's Workshop the discussion is focused on:

- Systematic Errors and Biases in DORIS Observations
- Systematic Errors and Biases in GNSS Observations
- Systematic Errors and Biases in VLBI Observations
- Systematic Errors and Biases in SLR Observations
- Gravity Models for POD
- Reference Systems and Frames
- Standards, Conventions, and Formats
- Global Space Geodesy Infrastructure
- Site Survey and Co-location
- Reference Systems and Frames in Physical Geodesy
- GGOS (DOIs for Geodetic Data Sets & UN Global Geodetic Reference Frame)

Chairs
Basara Miyahara (GSI, Japan)
Robert Heinkelmann (GFZ, Germany)
Zuheir Altamimi (IPGP-IGN, France)

Presentations Friday October 21

08:00 – 08:30	Registration
08:30 – 08:35	Welcome IAG Commission 1 Christopher Kotsakis
08:35 – 08:45	Introduction to UAW2022 Basara Miyahara, Robert Heinkelmann, and Zuheir Altamimi

Unified Analysis Workshop

Systematic Errors and Biases in DORIS

Overview
The goal of the session is to present the experience gained during the DORIS ITRF 2020 re-processing and the evaluation of the preliminary version of new ITRF (ITRF2020). Unlike SLR, where precise geodetic solutions are based on spherical satellites observations, DORIS analysts must deal with the specific shape and orientation of each satellite of the system, with risk of introducing satellite-specific bias. New developments in the DORIS system and their impact on the quality of DORIS products will also be presented. The impact of the South Atlantic anomaly and its mitigation strategy is discussed as an important source of systematic errors in DORIS.

Chairs
Petr Štěpánek (GOP, Czech Republic)

Presentations Friday October 21

08:45 – 09:00	DORIS system evolution Guilhem Moreaux
09:00 – 09:15	South Atlantic Anomaly mitigation strategies Petr Štěpánek
09:15 – 09:30	Lessons learned from the ITRF2020 reprocessing Guilhem Moreaux
09:30 – 09:45	DORIS evaluation of the ITRF2020P Frank G. Lemoine (in virtual)
09:45 – 10:15	Break
10:15 – 11:00	Discussion

Unified Analysis Workshop

Systematic Errors and Biases in GNSS

Overview
A key focus of this session is the contribution of the International GNSS Service (IGS) to the latest version of the International Terrestrial Reference Frame (ITRF2020). For the first time, IGS included Galileo observations in addition to GPS and GLONASS observations in the processing of its contribution to the ITRF2020, known as Repro3. The calibrated antenna measurements of the Galileo allowed for the first time for the terrestrial scale of the GNSS solutions to be independent of the ITRF. Scale [rate] differences were observed between GNSS solutions and the other geodetic techniques, which will be discussed in this session. Systematic errors identified in the IGS Repro3 will be explored, such as those impacting the orbit modelling of the GNSS satellites. Other impacts from inclusion of Galileo in the GNSS solutions such as those on the estimated coordinates will also be discussed. ITRF2020 included for the first time seasonal signals; the potential impact of the seasonal signals on the GNSS solutions will be explored.

Chairs
Salim Masoumi (Geoscience Australia, Australia)
Rolf Dach (AIUB, Switzerland)

Presentations Friday October 21

11:00 – 11:15	Systematic errors in the IGS contribution to ITRF2020 Paul Rebischung
11:15 – 11:30	Transition from the IGS14 to IGS20 antenna model file Arturo Villiger
11:30 – 11:45	Orbit modelling issues identified from Repro3 Rolf Dach
11:45 – 12:00	Discussion
12:00 – 13:30	Lunch
13:30 – 13:45	Differences between Galileo and GPS coordinate estimates from separate and combined solutions Thomas Herring
13:45 – 14:00	Phase center offsets and terrestrial scale from Galileo and LEOs Benjamin Männel
14:00 – 14:15	ITRF2020 seasonal signals Paul Ries (in virtual)
14:15 – 14:30	Discussion and Wrap-up

Unified Analysis Workshop

Systematic Errors and Biases in VLBI

Overview

Chairs
John Gipson (NASA/GSFC, USA)

Presentations Friday October 21

14:30 – 14:45	Antenna Deformation Rüdiger Haas
14:45 – 15:00	Source Structure Effects Minghui Xu
15:00 – 15:15	Atmosphere modeling Benedikt Soja
15:15 – 15:30	Transition to VGOS Hendrik Helmers
15:30 – 16:00	Break
16:00 – 16:15	Thoughts on collocated site design Guangli Wang (in virtual)
16:15 – 16:30	VLBI Scale and ITRF2020 John Gipson
16:30 – 17:00	Discussion

Unified Analysis Workshop

Systematic Errors and Biases in SLR

Overview
The goal of this session is twofold: (a) to inform the ITRF2020 users about the proper implementation for SLR data analysis consistent with the new ILRS models used for its development, and (b) to examine areas where additional systematics might originate from in the future and identify ways to mitigate their influence on our results and products.

Chairs
Cinzia Luceri (e-Geos/ASI, Italy)
Erricos Pavlis (JCET/UMBC, USA)

Presentations Friday October 21

17:00 – 17:15	Systematic Errors in SLR Data Modeled in ITRF2020 Cinzia Luceri
17:15 – 17:30	Systematic Error Rationalization for NASA SLR Systems Van Husson
17:30 – 17:45	The nature of low-return SLR normal points John Ries
17:45 – 18:00	Tropospheric delay modeling based on NWMs for SLR solutions Krzysztof Sośnica
18:00 – 19:00	Discussion

Unified Analysis Workshop 2022

Gravity Models for POD

Overview
The goal of the session is to examine the available state-of-the-art sources of information/models for the description of static and time-varying gravitational forces in the process of Precision Orbit Determination (POD). The emphasis is on information/models available for analysis of recent/current data which implies a need for "forecasting" into the near future on the basis of past years' observations. The main focus will be on the very low degree components of the gravitational field due to their stronger influence on all orbits. Investigations on the definition of the origin of the ITRF and its "variations" due to geophysical phenomena as well as possible GM estimates from a multitude of SLR targets will be also presented and discussed.

Chairs
Erricos C. Pavlis (GESTAR II/UMBC, USA)
John Ries (CSR/UT at Austin, USA)

Presentations Saturday October 22

08:30 – 08:45	COST-G combined gravity field models for POD Ulrich Meyer
08:45 – 09:00	Low Degree SH from SLR and GRACE/GRACE-FO Mission Models Erricos C. Pavlis
09:00 – 09:15	Investigation of GM Estimation from Various SLR Targets John Ries
09:15 – 09:30	Geocenter Motion Implementation with ITRF2020 John Ries
09:30 – 10:00	Discussion
10:00 – 10:30	Break
10:30 – 11:00	Discussion

Unified Analysis Workshop 2022

Reference Systems and Frames

Overview
The terrestrial reference frame (TRF) is the foundation for virtually all space-based, airborne and ground-based Earth observations. Through its tie to the celestial reference frame (CRF) by time dependent Earth orientation parameters, it is also fundamentally important for interplanetary spacecraft tracking and navigation. The TRF determined by geodetic measurements is the indispensable foundation for all geo-referenced data used by science and society. It plays a key role in modeling and estimating the motion of the Earth in space, in measuring change and deformation of all components of the Earth system, and in providing the ability to connect measurements made at the same place at different times, a critical requirement for understanding global, regional and local change. Providing an accurate, stable, homogeneous, and maintainable terrestrial reference frame to support numerous scientific and societal applications is one of the essential goals of the International Association of Geodesy's (IAG's) Global Geodetic Observing System (GGOS). This session is a forum for discussing the ways and means of improving the TRF, including understanding the inconsistencies of the current TRFs and the possibility of jointly determining them with the CRF.

Chairs
Zuheir Altamimi (IPGP-IGN, France)
Richard Gross (NASA/JPL, USA)
Manuela Seitz (DGFI-TUM, Germany)

Presentations Saturday October 22

11:00 – 11:20	DTRF2020: first results Manuela Seitz ((in virtual)
11:20 – 11:40	JTRF2020: Status and Plans Richard Gross
11:40 – 12:00	ITRF2020 and Beyond Zuheir Altamimi
11:00 – 13:30	Lunch
13:30 – 14:30	Discussion

Unified Analysis Workshop 2022

Standards, Conventions, and Formats

Overview
A key focus of this session is on the revision/updating of the IERS Conventions. The venue will provide an excellent opportunity to present and discuss any significant changes that might be incorporated in the next issue of the IERS Conventions. At first, an overview about the status of the IERS Conventions Update will be given, followed by presentations on particular topics such as nutation issues, high-frequency EOPs, relativistic effects, etc. Furthermore, the GGOS Bureau of Products and Standards (BPS) will provide an overview about its activities on standards. In the second part, there will be the opportunity to discuss remaining issues concerning the IERS Conventions Update as well as general topics on standards, conventions, and formats. The expected outcome are recommendations on standards, in particular regarding the next issue of the IERS Conventions.

Chairs
Detlef Angermann (DGFI-TUM, Germany)
Nick Stamatakos (USNO, USA

Presentations Saturday October 22

14:30 – 14:45	Status of the IERS Conventions Update Nick Stamatakos
14:45 – 15:00	Update on Nutation Issues Jose Ferrandiz
15:00 – 15:15	Update on High-Frequency EOPs John Gipson
15:15 – 15:30	BPS Activities on Standards Detlef Angermann et al.
15:30 – 16:00	Break
16:00 – 16:15	Short presentations in context of IERS conventions update - Relativistic issues Sergei Klioner (in virtual) - tbd
16:15 – 17:00	Discussion

Unified Analysis Workshop 2022

Global Space Geodesy Infrastructure

Overview
The Infrastructure Session gives the measurement techniques an opportunity to bring us up to date on their progress and plans, and for the PLATO group to present advances in product combination and new approaches to dealing with the data.

Chairs
Michael Pearlman (CfA, USA)
Daniela Thaller (BKG, Germany)

Presentations Saturday October 22

17:00 – 17:15	Status and plans of the International VLBI Service for Geodesy and Astrometry (IVS) Rüdiger Haas, Dirk Behrend
17:15 – 17:30	90th Anniversary of the Permanent Service for Mean Sea Level - current developments and future plans Elizabeth Bradshaw (in virtual)
17:30 – 17:45	The International Laser Ranging Service: status and plans Michael Pearlman, Claudia Carabajal, Erricos Pavlis (in virtual)
17:45 – 18:00	The IGS Infrastructure - Addressing the shifting user needs Markus Bradke
18:00 – 18:15	New Absolute Gravity Infrastructure Hartmut Wziontek
18:15 – 18:30	The DORIS Network: its advantages for geodesy Guilhem Moreaux, Jerome Saunier
18:30 – 18:45	Recent Activities of the GGOS Standing Committee on Performance Simulations and Architectural Trade-Offs (PLATO) Benjamin Männel, Daniela Thaller
18:45 – 19:00	Discussion

Unified Analysis Workshop 2022

Site Survey and Co-location

Overview
This session will focus on activities of various members of the working group including progress on tie surveys, developments in technology, and updates on previously defined objectives. Both operational and research achievements will be highlighted and discussion on future goals will be welcomed.

Chairs
Ryan Hippenstiel (NGS, USA)
Sten Bergstrand (RISE, Sweden)
Xavier Collilieux (IPGP-IGN, France)

Presentations Sunday October 23

08:30 – 08:35	Session Introduction Ryan Hippenstiel
08:35 – 08:55	Creating connections for geodesy – Local Tie surveys in Australia Anna Riddell (in virtual)
08:55 – 09:15	Reference point determination using photogrammetry Michael Lösler, Cornelia Eschelbach
09:15 – 09:35	Refocus on the field - An Update on the Site Survey Working Group Ryan Hippenstiel
09:35 – 10:00	Discussion

Unified Analysis Workshop 2022

Reference Systems and Frames in Physical Geodesy

Overview
In 2015, the International Association of Geodesy (IAG) released two resolutions for the implementation of two main components of a modern physical reference system. The first resolution is devoted to the definition and realisation of a global unified height system. The realisation of the global height system, conventionally called the International Height Reference Frame (IHRF), is based on the determination of the gravity potential (and its variations with time) at station positions defined in the International Terrestrial Reference Frame (ITRF). The second resolution concentrates on the establishment of the International Terrestrial Gravity Reference Frame (ITGRF). Measurements with absolute gravimeters, the traceability of which is ensured by inter-comparisons and monitoring at reference stations, provide the basis of the frame. The status of implementation of both frames will be discussed and revised in this session. Furthermore, for the precise gravity potential determination, a high-resolution gravity field modelling is needed. From this perspective, this session presents also advances in the calculation of the high-resolution global gravity model EGM2020 (Earth Gravitational Model 2020) and the comparison/calibration of analysis approaches for the computation of the potential using gravity data of high-resolution. The session will close with some insights into novel technologies for the measurement of the gravity field.

Chairs
Laura Sánchez (DGFI-TUM, Germany)
Riccardo Barzaghi (Polimi, Italy)

Presentations Sunday October 23

10:30 – 10:35	Introduction Laura Sánchez
10:35 – 10:53	Advances in the definition and realisation of a modern gravity reference system Hartmut Wziontek
10:53 – 11:11	Recent achievements in the computation of EGM2020 Daniel E. Barnes, Howard Small
11:11 – 11:29	High-resolution gravity field modelling: calibration of computation methods (The Colorado Experiment) Riccardo Barzaghi
11:29 – 11:48	Applications of Terrestrial Clock Networks in Geodesy Jürgen Müller, Asha Vincent, Hu Wu and Akbar Shabanloui (in virtual)
11:48 – 12:00	Discussion
12:00 – 13:30	Lunch
13:30 – 14:00	Discussion

GGOS
(DOIs for Geodetic Data Sets & UN Global Geodetic Reference Frame)

Overview
This session will explore two topics identified by the GGOS Executive Committee as important issues relevant to the analysis community: recent progress toward Digital Object Identifiers (DOIs) for geodetic data sets, as well as work of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) Subcommittee on Geodesy on advocacy of the Global Geodetic Reference Frame, and progress toward establishing a UN Global Geodetic Center of Excellence (GGCE) in Bonn, Germany. The session will focus on introducing the participants to the current status of each topic, with extended time for discussion and feedback. Discussion will be facilitated by the session co-chairs. Participants are encouraged to ask questions and share their own experiences implementing DOIs, as well as to identify what aspects of geodetic analysis should be considered of highest priority to the UN GGIM and future GGCE.

Chairs
Kirsten Elger (GFZ, Germany)
Johannes Bouman (BKG, Germany)
Allison Craddock (NASA/JPL, USA)

Presentations Sunday October 23

14:00 – 14:05	Session welcome and overview Allison Craddock
14:05 – 14:20	Recent progress toward DOIs for geodetic data sets and key issues Kirsten Elger
14:20 – 14:45	Discussion
14:45 – 15:00	Update on the UN GGIM Subcommittee on Geodesy, and progress toward establishing a UN Global Geodetic Centre of Excellence Johannes Bouman
15:00 – 15:25	Discussion
15:25 – 15:30	Session summary and action items Allison Craddock, Kirsten Elger, Johannes Bouman

Unified Analysis Workshop

Closing Session

Chairs
Basara Miyahara (GSI, Japan)
Robert Heinkelmann (GFZ, Germany)

Presentations Sunday October 23

16:00 – 18:00	Summary and Discussion of Recommendations
16:00 – 16:10	Systematic Errors and Biases in DORIS Petr Štěpánek
16:10 – 16:20	Systematic Errors and Biases in GNSS Salim Masoumi and Rolf Dach
16:20 – 16:30	Systematic Errors and Biases in VLBI John Gipson
16:30 – 16:40	Systematic Errors and Biases in SLR Cinzia Luceri and Erricos Pavlis
16:40 – 16:50	Gravity Models for POD Erricos Pavlis and John Ries
16:50 – 17:00	Global Space Geodesy Infrastructure Michael Pearlman and Daniela Thaller
17:00 – 17:10	Standards, Conventions, and Formats Detlef Angermann and Nick Stamatakos
17:10 – 17:20	GGOS (DOIs & UN GGRF) Kirsten Elger, Johannes Bouman and Allison Craddock
17:20 – 17:30	Reference Systems and Frames in Physical Geodesy Laura Sánchez and Riccardo Barzaghi
17:30 – 17:40	Reference Systems and Frames Zuheir Altamimi, Richard Gross, and Manuela Seitz
17:40 – 17:50	Site Survey and Co-location Ryan Hippenstiel, Sten Bergstrand and Xavier Collilieux
17:50 – 18:10	Discussion
18:10 – 18:20	Any Other Business
18:20 – 18:30	Next Meeting
18:30	Adjourn

Unified Analysis Workshop

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Unified Analysis Workshop

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