



**International Review Workshop on
Satellite Altimetry Cal/Val Activities and Applications
2018**

Workshop Programme



**23 - 26 April 2018 | "The Venetian Arsenal"
Center of Mediterranean Architecture | Chania, Crete, Greece**



European Union
Programme



Europe's eyes on Earth



Sunday, 22 April 2018: 19:00–21:00:

19:00-21:00 **Welcome Reception:**
The Symposium Venue, Center of Mediterranean Architecture
Participants will have a chance to meet each other. Drinks will be offered.

Monday, 23 April, 2018: 8:00-9:00

8:00-9:00 Registration

Monday, 23 April, 2018

09:00 **Link** **Opening Session**

Stelios P. Mertikas –International Cal/Val Review Workshop Convener
Evan Diamantopoulos, Rector of the Technical University of Crete

Delegation from Local Authorities and City of Chania

09:25 **S1-63** Satellite Earth Observation and Geosciences-The IUGG Perspective
Michael Sideris, IUGG President,

Session 1: Fiducial Reference Measurements for Altimetry and Metrology.

Chairs: **Craig Donlon**, **Stelios Mertikas**

09:40 **S1-01** Fiducial Reference Measurements for Altimetry
Craig Donlon

10:00 **S1-68** Fundamental Time Systems for Altimetry Standardization
Demetrios Matsakis

Coffee Break 10:20-10:40

10:40 **S1-69** Calibration techniques for accurate time transfer
Elizabeth Laier English

11:00 **S1-67** ESA Altimetry Campaigns in Support of ESA's Earth Explorers and Sentinel Missions
Tânia Casal, **Malcolm Davidson**, **Tommaso Parrinello**

11:20 **S1-30** Sentinel-3A STM Mission Performance Centre: a Successful Example of a Global Cal/Val Approach
Sylvie Labroue, **Matthias Raynal**, **Pierre Féménias**, **Remko Scharroo**, **Saleh Abdalla**, **Pablo Nilo**, **Marie Laure Frery**, **Mathilde Cancet** and **Graham Quartly**

11:40 **S1-23** Estimation of any Altimeter Mean Sea Level Drifts between 1993 and 2017 by Comparison with Tide-gauges Measurements
Michaël Ablain, **Rémy Jugier** and **Nicolas Picot**

12:00 **Panel Discussion:** What, Why and How FRM for Altimetry? How metrology and fundamental standards are to help establish guidelines for Cal/Val uncertainty? How to monitor Oceans, Inland Waters, and Polar Regions in an Objective, Homogeneous and Continuous manner?

Lunch Break 12:30-14:00

Session 2: Past & Current International Cal/Val Activities.

Chairs: **Bruce Haines**, **Pascal Bonnefond**

14:00 **S2-04** Geodetic Reliability of the Corsica Sites Through Sentinel-3A and CryoSat-2 Calibration
Pascal Bonnefond, **Olivier Laurain**, **Pierre Exertier**, **François Boy**, **Thierry Guinle**, **Nicolas Picot**, **Craig Donlon**, **Pierre Féménias**, **Tommaso Parrinello** and **Salvatore Dinardo**

14:20 **S2-38** California's Offshore Harvest Platform: Twenty Five Years of Monitoring the Altimetric Record
Bruce Haines and **Shailen Desai**

- 14:40 **S2-02** Calibration of Satellite Altimetry at the Permanent Facilities in Gavdos and Crete, Greece
Stelios Mertikas, Craig Donlon, Constantin Mavrocordatos, Pierre Féménias, Demetris Galanakis, Ole B. Andersen, Achilles Tripolitsiotis, Xenophon Frantzis, Ilias N. Tziavos, Francois Boy, Thierry Guinle
- 15:00 **S2-45** A Review of the Altimeter Validation Facility in Bass Strait, Australia
Christopher Watson, Benoit Legresy, Matt King, Jack Beardsley and Alistai Deane
- 15:20 **S2-28** Regional in Situ Cal/Val of Satellite Altimeter Range at Non-dedicated Sites
Mathilde Cancet, Pascal Bonnefond, Bruce Haines, Christopher Watson, Florent Lyard and Olivier Laurain

Coffee Break 15:40-16:10

Session 2: Past & Current International Cal/Val Activities

Chairs: Mingsen Lin, Christopher Watson

- 16:10 **S2-19** Copernicus POD Service - Orbit Validation of Sentinel-3 Mission
Jaime Fernández, Heike Peter and Pierre Féménias
- 16:40 **S2-26** Systematic Validation of Altimetry Water Surface Height Measurements over Rivers and Lakes
Nicolas Taburet, Lionel Zawadzki, Sylvie Labroue, Michael Ablain, Remi Jugier, Maxime Vayre, Matthias Raynal, Pierre Féménias, Jean-François Cretaux and Stephane Calmant
- 17:00 **S2-36** Calibration and Validation Activities of ISRO's Earth Observation Satellites (Especially SARAL/AltiKa)
Aloke Mathur and Babu Narasimhan
- 17:15 **Panel Discussion:** Various constituents contributing to Val/Val uncertainties? How each individual Cal/Val team addresses them? How to set the foundations for International Cal/Val Altimetry standardization?

Tuesday, 24 April, 2018

Session 2: Past & Current International Cal/Val Activities.

Chairs: Christopher Watson, Denise Dettmering

- 09:00 **S2-27** Fully-Focused SAR Altimetry of the Crete Transponder Using Sentinel-3A Level1A Data
Walter Smith
- 09:20 **S2-20** CryoSat-2 Range, Datation and Interferometer Calibration with Svalbard Transponder
Albert Garcia-Mondéjar, Marco Fornari, Jerome Bouffard, Joe Wood, Pierre Féménias and Mònica Roca
- 09:40 **S2-09** Multi-Mission Cross-Calibration of Satellite Altimeters: Constructing a Long-Term Data Record for Sea Level Change Studies
Denise Dettmering and Christian Schwatke
- 10:00 **S2-07** Validation of Improved Significant Wave Heights from Brown-peaky Retracker Around East Coast of Australia
Fukai Peng and Xiaoli Deng
- 10:20 **S2-55** Calibration and Validation of Satellite Altimetric Missions on the German Bight and Baltic Sea Coast
Luciana Fenoglio-Marc, Salvatore Dinardo and Matthias Becker

Coffee Break 10:40-11:10

Session 3: Evaluating Uncertainties with Metrology Standards

Chairs: Alope K. Mathur, Ambrus Kenyeres

- 11:10 **S3-21** Trend Uncertainties of Global Mean Sea Level Evolution Over the 25-year Altimetry Era
Michaël Ablain, Lionel Zawadzki, Benoit Meyssygnac and Anny Cazenave
- 11:30 **S3-24** Sentinel-3A Surface Topography Mission Microwave Radiometer: Wet Tropospheric Correction Uncertainties
Marie-Laure Frery, Bruno Picard, Mathilde Siméon, Pierre Féménias and Remko Scharroo
- 11:50 **S3-61** Fiducial Reference Measurements for Satellite Ocean Colour (FRM4SOC)
Riho Vendt, Andrew Banks, Tânia Casal, Craig Donlon, Christophe Lerebourg, Kevin Ruddick and Gavin Tilstone
- 12:10 Panel Discussion: Variations between transponder, sea-surface, absolute, relative, inland waters and polar calibrations. Guidelines for expressing uncertainty in Cal/Val. Best practices and transparent protocols.

Lunch Break 12:30-14:00

Session 4: Calibration of Future Satellite Altimetry.

Chairs: Lee Lueng Fu, Pierre Femenias

- 14:00 **S4-10** Calibration and Validation of the Sea Surface Height from the Anticipated SWOT Mission
Lee-Lueng Fu and Jinbo Wang
- 14:20 **S4-37** A New Era of Climate Quality Calibration for Altimeter Radiometers
Shannon Brown and Tanvir Islam
- 14:40 **S4-51** Cal/Val Activities of Satellite Altimetry for Hydrology in Brazil
Daniel Moreira, Stéphane Calmant, Félix Perosanz, Jean-François Cretaux, Adrien Paris, Joecila Santos Da Silva and Otto Rotunno Filho
- 15:00 **S4-33** Contribution of Conventional Altimetry for Inland Waters Observation: Results from Jason-3 and Sentinel-3 and Perspectives for SWOT Validation
Sophie Le Gac, Denis Blumstein, Sylvain Biancamaria, Jean-François Cretaux, Stéphane Calmant, François Boy and Nicolas Picot
- 15:20 **S4-06** The Calibration of CryoSat Interferometer: Current Approach and New Perspectives
Michele Scagliola, Marco Fornari, Jerome Bouffard and Tommaso Parrinello

Coffee Break 15:40-16:10

Session 5: Maintaining the EO Climate Record From Altimetry & ESA Climate Change Initiative

Chairs: Robert Cullen, Lee-Lueng Fu

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| 16:10 | S5-11 | CryoSat: ESA'S Ice Explorer Mission, Eight Years in Operations: Status and Future Outlook
Tommaso Parrinello, Jerome Bouffard, Marco Fornari and Michele Scagliola |
| 16:40 | S5-52 | On the Sentinel-3A Radiometer-base Wet Path Delay – a Contribution to the Long-term Sea Level Record
M. Joana Fernandes, Clara Lázaro and Telmo Vieira |
| 17:00 | S5-47 | Assessing the Stability of the Satellite Derived GMSL Record Using Tide Gauges
Christopher Watson, Benoit Legresy and Matt King |
| 17:20 | S5-12 | The Importance of Metadata and Standards for Climate Data and Long Term Archives
Jessica Hausman |

Panel Discussion: Framework for future altimetry missions in terms of their calibration (Ku-band, Ka-band, X-band, wide swath, SAR, LRM, radiometer, etc.). Needs for new measurements and instrumentation. Synergy with other non-altimetry missions. Practical guidelines for future Cal/Val sites.

Wednesday, 25 April, 2018

Session 6: The Changing Environment

Chairs: Roland Pail, Xiaoli Deng, Michael Sideris

- 09:00 **S6-48** Sea Level Trends and Variability in the Adriatic Sea and Around Venice
Stefano Vignudelli, Francesco De Biasio, Andrea Scozzari and Stefano Zecchetto
- 09:20 **S6-56** Altimeter Detections of Changes in Mountain Glaciers, Tibetan Lake Levels and Elevations over Groundwater-Depleted Croplands
Cheinway Hwang
- 09:40 **S6-17** Observing Extreme Water Levels in the Mekong Basin with Multi-mission Altimetry
Eva Boergens, Denise Dettmering and Florian Seitz
- 10:00 **S6-70** Assessment of NRT Wind and Wave Data from Sentinel-3 Mission
Saleh Abdalla

Coffee Break 10:30-11:00

Session 7: Polar Regions Applications.

Chairs: Lars Stenseng, Petr Knudsen, Ole Andersen

- 11:00 **S7-62** Copernicus Polar Ice and Snow Topography Mission
Michael Kern, Robert Cullen, Gerhard Ressler, Tommaso Parinello, Vincent Toumazou and Cristina Martin Puig
- 11:20 **S7-43** DTU17 Global Marine Gravity Field and DTU18 MSS–First Validation in the Arctic Ocean
Ole Andersen, Lars Stenseng, Carsten Ludwigsen and Per Knudsen
- 11:40 **S7-44** A 25-year Arctic Sea-level Record (1991-2016) and first look at Arctic Sea Level Budget Closure
Ole Andersen, Stine Kildegaard Rose, Marcello Passaro and Jerome Benveniste
- 12:00 Panel Discussion: Coastal Altimetry and Polar regions requirements for altimetry calibration. Wind, Wave and Extreme value calibration. Model and Reference Surface calibration and validation.

Lunch Break 12:30-14:00

Free afternoon.

Archeological Excursion in the Chania Old Town: Guided Walking Tour:
Walk through centuries and explore the culture and religious influence of several civilizations (ancient Greek but also Venetian, Jewish, and Turkish) in city's architecture.

19:00 Gala Dinner

Thursday, 26 April, 2018

Sessions 8 & 9: IAG Modelling with Altimetry: Bathymetry, Geoid, Sea Level, Gravity, Heights & GGOS

Chairs: Ole Andersen, Denise Dettmering

9:00	S8-29	High Resolution Tidal Modelling at Regional Scales Mathilde Cancet, Florent Lyard and Florence Toublanc
9:15	S8-53	Towards a Methodology for Estimating Extreme Return Levels and its Climate Variability of Coastal Sea Level From Satellite Altimetry Hector Lobeto and Melisa Menendez
9:30	S8-57	Mean Dynamic Topography in the Mediterranean Sea From Altimetry, Gravity and In-situ Data Marie Helene Rio, Sean Bruinsma and Milena Menna
9:45	S8-58	Sea Level Variability in the Strait of Gibraltar From Along-track High Spatial Resolution Altimeter Products Jesus Gomez-Enri, Stefano Vignudelli, Alfredo Izquierdo, Marcello Passaro, Carlos Jose Gonzalez, Paolo Cipollini, Miguel Bruno, Oscar Alvarez and Rafael Mañanes

Coffee Break 10:00-10:30

10:30	S9-34	High-Rate GPS Clock Corrections for Supporting the PPP-RTK in Ocean Waveform Retrieving Xiufeng He, Xu Tang and Hongkai Shi
10:45	S9-35	Comparison of Jason-2 Coastal Product With Tide Gauge and HF Radar Data Osamu Isoguchi and Naoto Ebuchi
11:00	S9-64	Range Calibration of ESA's Pulse-Width Limited Altimeters from ERS-1 to EnviSat Richard Francis

International Cal/Val Review Summary and Conclusions

Chairs: Rob Cullen, Stelios Mertikas

11:20	Link	<p>Round Table: Scientific and Operational Roadmap for Satellite Altimetry Cal/Val</p> <ul style="list-style-type: none"> • Critically review the current methodology applied at the Permanent Facilities for satellite altimetry calibration and validation using ground-based measurements; • Define requirements, establish standards and provide recommendations and best practices for altimetry calibration such that all measurements and results made for monitoring the Earth, the environment, the sea level, etc., are well-characterized and linked to other areas of science and technology through a world's measurement system established and maintained under the International System of Units and Metrology Standards; • Document procedures for Fiducial Reference Measurements in satellite altimetry so that results are traceable to SI-units, reliable in the long term, comparable worldwide, to support an objective and unquestionable monitoring of the Sea Level and Climate Change; • Establish procedures and protocols for characterizing the uncertainty budget of all FRM instruments and derived results over the entire end-to-end duration of a satellite mission; • Define and document procedures, protocols and best practices to evaluate differences in instrument performances under a range of conditions to maintain satellite altimetry observations, to support the Earth Observation for the future; • Summarize all scientific achievements for satellite altimetry Cal/Val and its applications in the context of Fiducial Reference Measurements.
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Closing Excursion: Visit Monumental Olive Tree & "ANOSKELI" Winery & Olive Mill

Visit one of the oldest trees in the world, the "VOUVES" Olive Tree Museum, and the "ANOSKELI" Winery followed by a first-hand experience of olive oil production and winemaking and tasting.

Posters will be displayed for the full duration of the Workshop, beginning on Monday morning and will remain in place through Thursday at 13:00.

- SP-05** CryoSat SIRAL: Instrument Performance after 7 years of operations
Michele Scagliola, Marco Fornari, Jerome Bouffard and Tommaso Parrinello
- SP-08** Performance of new multi-sensor (Sentinel-3) and past (CryoSat-2 and Jason-2) satellite altimetry missions in the Gulf of Finland, Baltic Sea
Elzbieta Birgiel, Nicole Delpeche-Ellmann and Artu Ellmann
- SP-13** Satellite altimeter combined measurements and local persistent small-scale ocean-atmosphere signatures
Yves Quilfen and Bertrand Chapron
- SP-14** Storm waves sharpening in the Agulhas current: satellite observations and modeling
Yves Quilfen, Maria Yurovskaya, Bertrand Chapron and Fabrice Ardhuin
- SP-15** Examination of Sea Surface Currents Using a Synergy of Satellite, In-situ and Hydrodynamic Model Data for the Gulf of Finland, Baltic Sea
Nicole Delpeche-Ellmann, Bert Viikmae and Elzbieta Birgiel
- SP-16** Arctic Ocean Topography from Ocean Modeling and Satellite Altimetry: Correspondence, discrepancies and prospects for combination
Felix Möller, Claudia Wekerle, Denise Dettmering, Wolfgang Bosch and Florian Seitz
- SP-18** Toward new validation concept for high-resolution altimetry Era: application to the Coastal Ligurian Sea
Marco Meloni, Jerome Bouffard, Andrea Doglioli and Anne Petrenko
- SP-22** Sentinel-3 Range and Datation Calibration with Crete Transponder
Albert Garcia-Mondejar, Stelios Mertikas, Demetris Galanakis, Sylvie Labroue, Jérôme Bruniquel, Graham Quartly, Pierre Fimunias, Constantin Mavrocordatos, Pablo Garcia and Monica Roca
- SP-25** Toward an overview of CryoSat Cal/Val activities and results
Jerome Bouffard, Tommaso Parrinello and Pierre Fimunias
- SP-32** The progress and outlook of the international cooperation program on satellite altimeter calibration between China-Greece
Xinghua Zhou, Lei Yang and Stelios P Mertikas
- SP-39** Improved Arctic Ocean Bathymetry and Regional Tide Atlas – a CP4O initiative
Ole Andersen, Adil Abulaitijand, Mathilde Cancet, Jerome Benveninte and Davis Cotton
- SP-40** Arctic Freshwater fluxes from Earth Observation data
Ole Andersen, Karina Nielsen, Louise Sandberg Sørensen, Henriette Skourup, Thomas Nagler, Alexei Kouraev, Elena Zakharova and Diego Fernandez
- SP-41** Final results from GOCE++ Dynamical Coastal Topography and tide gauge unification using altimetry and GOCE
Ole Andersen, Karina Nielsen, Per Knudsen, Luciana Fenoglio Marc, Michael Kern, Chris Hughes, Mederic Gravelle and Rory Bingham
- SP-42** Global and regional evaluation of first two years of Sentinel-3 and the impact of Mean Sea Surfaces and ocean tide corrections.
Ole Andersen and Heidi Ranndal
- SP-46** New observations for the calibration and validation of future altimeter missions: Perspectives from the Bass Strait facility
Christopher Watson, Benoit Legresy, Jack Beardsley and Alistair Deane
- SP-49** Coastal sea level from CryoSat-2 SARIn altimetry in Norway
Marina Idzanovic, Vegard Ophaug and Ole Andersen
- SP-50** The coastal mean dynamic topography in Norway observed by CryoSat-2 and GOCE
Martina Idzanovic, Vegard Ophaug and Ole Andersen
- SP-54** Satellite altimetry for potential determination towards HSU and geoid modeling
Ourania N. Altiparmaki, Georgios S. Vergos and Ilias N. Tziavos
- SP-60** Determining land-sea vertical datums around Taiwan using coastal altimetry, gravity and tide gauge data
Wan-Hsin Yang, Wen-Hsuan Huang and Cheinway Hwang
- SP-66** Monitoring temporal and spatial variations of inland water levels in Canada using Jason, CryoSat and SARAL altimetry data
Masume Akbari and Michael Sideris



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