→ 11th COASTAL ALTIMETRY WORKSHOP

Coastal Altimetry Training

PROGRAMME

12–15 June 2018 | ESA–ESRIN | Frascati (Rome), Italy

Tuesday 12 June 2018

Moderators: ***Marcello Passaro, Marco Restano, Stefano Vignudelli, Jérôme Benveniste***

Training course Objectives

1. Introduce the challenges and progresses of coastal altimetry to a non-expert audience
2. Provide a description and an application of existing coastal-dedicated datasets
3. Explain the synergies of Coastal Altimetry with other coastal observing systems

Time	Title	Lecturer
8:45	Welcome and Introduction	Jérôme Benveniste and Marcello Passaro
	THEORY	
9:00	From Range Retrieval to Sea Surface Height Anomaly	Remko Scharroo
	Although the sea surface height anomaly is the prime variable of interest to a lot of users, it is in fact a (very much) derived quantity that includes, besides the altimeter range, a host of corrections based on observations as well as models. It is of great importance to understand the source and limitations of those corrections to properly evaluate the strength and weaknesses of altimetry in the coastal domain. In addition, depending on your application, some of those corrections should be invoked, or not, or one of various alternatives provided on the product should be used. This presentation aims to give an overview of the available corrections, their derivation, their limitations in the coastal domain, and their applicability to a number of applications.	

9:40	Mean Sea Surface, Geoid and Tides at the coast	Marie-Hélène Rio
	Mean Sea Surface, Mean Dynamic Topography, geoid and tides are all key elements for the optimal exploitation of altimeter data in oceanography. When approaching the coast, a number of specific issues arises that may result in less accurate estimates of the altimeter derived absolute dynamic topography. In this lecture we will review the main challenges to be faced in coastal areas as well as the state-of-the art solutions for a precise determination of these reference surfaces and the tidal signal.	
10:20	Coffee Break	
10:50	Measuring Waves, Wind and Sea State Bias at the Coast	Doug Vandemark
	We will address specific differences in both technical and geophysical aspects of wind-wave investigation within 100 km of the coast, when compared to open ocean altimeter application of sea state, wind speed, and the sea state bias range correction measurements. A survey of the applications for high resolution and long-term coastal altimeter sea state data will be discussed in the context of both coastal modeling and prediction as well as process studies. Past and present approaches to improve these satellite measurements for users will be summarized.	
DATASET & APPLICATIONS		
11:30	Hands on Satellite Altimetry in Synergy for Coastal Models	John Wilkin
	Using coastal altimetry in conjunction with a data assimilative high-resolution coastal ocean forecasting system: re-definition of the Mean Sea Surface close to the coast, improving Mean Dynamic Topography, reconciling sea level datum with tide gauges, and consistency in model and data physics (to DAC, or not to DAC). Practical considerations for near real time operations and automation.	
12:20	Lunch	
13:30	ALES and Coastal Sea Level	Marcello Passaro
	In this lecture, the characteristics of the available altimetry product derived from the ALES algorithm will be described, with particular focus on data access and format. Example of use will be provided. A comparison of along-track coastal mean sea surface vs currently available mean sea surface models along an altimetry track is foreseen. Moreover, examples will be shown on how scientists have used the ALES data for coastal sea level analysis.	

14:20	XTrack and Synergy with Remote Sensing Data	Fabien Léger
	X-TRACK has been developed in order to optimize the completeness and the accuracy of the sea surface height information derived from satellite altimetry in coastal ocean areas. It is tailored for extending the use of altimetry data to coastal ocean applications and provides freely available along-track Sea Level Anomaly time series that cover all the coastal oceans. This presentation proposes to present the X-TRACK products (both sea level and tidal harmonic estimations) and show how to compute different diagnostics as well as how they can be used in different coastal applications (coastal ocean circulation studies, mesoscale feature monitoring, regional model validation, tidal analysis,...).	
15:10	Coffee Break	
15:40	TAPAS and Synergy with Coastal Models	Claire Dufau
	Thanks to regular interactive workshops gathering altimeter experts and regional modelers, Tailored Altimetry Products for Assimilation Systems (TAPAS) are proposed in the MyOcean/CMEMS catalogue since 2013. These Sea Level Anomalies products allow regional modelers to change the physical content of the altimeter measurement in consistency with their model capabilities and characteristics, considerably improving the results of the assimilation of the altimeter measurement into such models. In this lecture, we will describe the TAPAS products, their content, their format and how to use them. A synthesis of the most recent outcomes of the TAPAS working group will provide examples of their use and present new experimental datasets.	
SAR ALTIMETRY		
16:30	SAR Altimetry Concepts	Walter H. F. Smith
	Currently, the CryoSat-2 and Sentinel-3 altimetery satellites can collect data in either conventional (“LRM”, like Jason-3) or “SAR” mode, and Jason-CS/Sentinel-6 (to launch in 2020) will provide both simultaneously. The SAR mode data can be processed to narrow the instrument’s “view” of the surface, with potential advantages in the coastal zone. This lecture will introduce SAR altimetry concepts and acquaint the audience with the concepts and jargon (for example, “Doppler”, “multi-looking”, “Hamming window”, “coherence”) needed to understand the data processing options.	

17:20	SARvatore and Progress in SAR Altimetry Applications	Salvatore Dinardo and Marco Restano
	In this lecture, we will address the different methodologies to process L1A data up to L2 in SAR mode, describing the most cutting-edge techniques which have been developed in the recent years and their relative applications. An introduction to ESA/ESRIN GPOD platform, SARvatore service for CryoSat-2 and Sentinel-3 and other Radar Altimetry services will be given and it will be featured what GPOD platform can offer to users and how users can expand the environment and deploy their own applications in the system.	
18:10	Wrap-up and Networking Ice-Breaker Refreshment Session	
19:30	Evacuate premises and meet for dinner all together	

Wednesday 13 June 2018 — DAY 1

Opening Session

9:00 | **Welcome and Introduction (Jérôme Benveniste)**

9:15 | **Overview of Coastal Altimetry Workshop achievements (Paolo Cipollini)**

	Session 1A: Technical Issues in Coastal Altimetry - Retracking	CHAIRS: Marcello Passaro, Marco Restano
9:40	Compared performances of current altimetry missions over coastal areas	P. Thibaut, M. Raynal, M. Ablain, F. Boy, N. Picot, T. Guinle, P. Femenias

10:00	Two Years of Coastal SAR and PLRM Altimetry in the North East Atlantic With Sentinel-3A and CryoSat-2	S. Dinardo, L. Fenoglio, C. Buchhaupt, R. Scharroo, M.J. Fernandes, M. Becker, J. Benveniste
10:20-10:50	**Coffee Break**	
	Session 1A: Technical Issues in Coastal Altimetry - Retracking (cont'd)	**CHAIRS: Marcello Passaro, Marco Restano**
10:50	Validation of a Global Dataset Based on Subwaveform Retracking: Improving the Precision of Pulse-Limited Satellite Altimetry	M . Passaro, W.H.F. Smith, C. Schwatke, G. Piccioni, D. Dettmering
11:10	Assessing Sentinel-3 Wave Height Records in the Coastal Zone	F. Nencioli, G. Quartly, D. Conley
11:30	Coastal Improvements for Tide Models: the Impact of ALES Retracker	G. Piccioni, D. Dettmering, M. Passaro, C. Schwatke, W. Bosch, F. Seitz
11:50	Bathymetry Improvement and Tidal Modelling at Regional Scales in the NEA and in Indonesia	M. Cancet, F. Toublanc, F. Lyard, G. Dibarboure, T. Guinle

12:10-12:30	**S1 Poster Flashes (2 mn - 2 slides)**	
	Contribution of Waveform Decontamination for Improving Coastal Altimetric Sea Surface Heights	H. Wang, Y. Chu, C.K. Shum
	An Assessment of a Coastal Altimetry Data Product in the Indonesian Waters	J. Lumban-Gaol, S. Vignudelli, R. Leben, D. Adrian, O. Takahiro, I. Nurjaya, B.P. Pasaribu
	Improvement of the Arctic Ocean Bathymetry and Regional Tide Atlas – a CP40 Initiative	M. Cancet, O. Andersen, D. Cotton, J. Benveniste

	Sentinel-3 SAR Altimetry Over Coastal and Open Ocean: Performance Assessment and Improved Retrieval Methods in the ESA SCOOP Project	D. Cotton, T. Moreau, M. Raynal, E. Makhoul, M. Cancet, L. Fenoglio-Marc, M. Naeije, M.J. Fernandes, C. Lazaro, A. Shaw, M. Restano, A. Ambrosio, J. Benveniste
	Comparison of Altimetric Datasets Along the Greenland Coast	J. Hausman, I. Fenty, J. Nilsson, K. Madsen, P. Knudsen
	Coastal Retracking Using Along-Track Waveform Echograms in Seas of Indonesia	K. Ichikawa, X. Wang
12:30-12:50	**Discussion on the Technical Issues in Coastal Altimetry (Session 1A)**	**ALL**
12:50-14:00	**Lunch**	
	Session 1B: Technical Issues in Coastal Altimetry - Corrections, Calibration & Products	**CHAIRS: Kaoru Ichikawa, Graham Quartly**
14:00	Impact of Geophysical Corrections on Altimetry Sea Level Estimations Near the Coast	F. Birol, F. Niño, F. Léger, F. Blarel
14:20	On the Need for High-Rate Range Corrections for Satellite Altimetry Studies Over Coastal and Inland Water Regions	J. Fernandes, N. Pires, T. Vieira, E. Vieira, C. Lázaro
14:40	The High-Resolution Microwave Radiometer (HRMR) on Sentinel-6: Measuring Path Delay in the Coastal Zone	S. Brown, A. Tanner, S. Padmanabhan, I. Ramos, P. Kangaslahti,
15:00	Calibrating SAR SSH of Sentinel-3A and CryoSat-2 over the Corsica Facilities	P. Bonnefond, O. Laurain, T. Guinle, N. Picot, P. Féménias
15:20	From Level-2 Algorithms to High-Resolution Altimeter Products to Better Observe Ocean Dynamics in Coastal Areas	Y. Faugere, M-I. Pujol, M. Ablain, C. Ubelmann, C. Dufau, N. Picot, G. Dibarboure

Wednesday 13 June 2018 — DAY 1

15:40-15:50	Discussion on the Technical Issues in Coastal Altimetry (Session 1B)	ALL
15:50-16:20	Coffee Break	
	Session 2A: Application of Coastal Altimetry Data	**CHAIRS: Jesús Gómez-Enri, Salvatore Dinardo**
16:20	Investigating Altimeter and Tide-Gauge Sea Level Differences with CryoSat-2 and Sentinel-3A	L. Fenoglio, S. Dinardo, C. Buchhaupt, B. Uebbing, R. Scharroo, M.J. Fernandes, J. Kusche, M. Becker, J. Benveniste
16:40	Validity of Sentinel-3 SAR Wind and Wave Data near the Coast	S. Abdalla, J-R. Bidlot
17:00	Detection of Intraseasonal Oscillations in the Indian Ocean from Satellite Altimetry	S. Bulusu, C. Trott, V.S.N. Murty

17:20-17:50	S2 Poster Flashes (2 mn - 2 slides)	
	Absolute Water Levels at the Estuary of the Karnaphuli River (Bay of Bengal, Bangladesh) : Comparison Between Sea / River Surface Heights Gained by GNSS Survey and Satellite Altimetry in Coastal Environment	M. Ishaque, S. Calmant, D. Moreira, F. Durand, L. Testut, Y. Krien, V. Ballu, F. Papa
	Evaluation of Coastal Sea Level Change Near Hong Kong from Jason-2 Altimetry	X. Xu, F. Birol, A. Cazenave
	Last Developments and Perspectives of the X-TRACK Regional Altimeter Products	F. Léger, F. Birol, F. Niño, S. Fleury, M. Passaro
	On the Use of Sentinel-3A SRAL Altimeter Waveforms at the Finest Posting Rate (80 Hz) for the Detection of Ships	J. Gómez-Enri, R. Mulero, S. Vignudelli, A. Scozzari

	Sea Level Anomalies and Mesoscale Activity Using Altimetry Along the African Coasts in the Eastern Tropical Atlantic Ocean (OSTST Alti-ETAO Project)	H.B. Dieng, I. Dadou, F. Léger, F. Birol, F. Lyard, Y. Morel, A. Chaigneau
	Inter-Comparison of Different Altimetric Datasets Through Spectral Analysis: Application to the Dynamics of Bay of Biscay and New Caledonia	M-L. Dabat, N. Ayoub, F. Marin, L. Gourdeau, G. Sérazin, F. Léger, F. Birol
	The First Results of Monitoring the Ice Cover of the Sea of Okhotsk in 2015-2016 According to the Measurements of the Radar Cross Section at Small Incidence Angles	M. Riabkova, V. Karaev, A. Maksimov
	Synergy Between Coastal Altimetry Data and Land-based High-Frequency (HF) Radars	F. Oliveira, P.L. Mazzini
	Coastal Region Applications from Satellite Altimetry Missions	M. Srinivasan, A. De Charon
	Use of Satellite Altimetry and Moderate Resolution Imaging Technology of Flood Extent to Support Seasonal Outlooks of Nuisance Flood Risk Along United States Coastlines and Managed Areas	V. Ransi, D. Pirhalla, S. Sheridan
	Tracking of Eddy Propagation in the Southern Luzon Strait	A.L. Del Rosario, C.L. Amedo-Repollo, C. Villanoy
17:50-20:00	**Poster Session and Cocktail**	

Thursday 14 June 2018 DAY 2

	Session 2A: Application of Coastal Altimetry Data (cont'd)	CHAIRS: Luciana Fenoglio, Stefano Vignudelli
9:00	Multi-Scale Analysis and Applications of Coastal Altimetry Observations Over the Ligurian sea	M. Meloni, A. Doglioli, A. Petrenko, J. Bouffard, G. Valladeau
9:20	Satellite Altimetry and Tide Gauge Data in Local Vertical Datum Unification	R. Reyes, R. Forsberg
9:40	Coastal Altimetry for Ocean Applications in the Strait of Gibraltar	J. Gómez-Enri, S. Vignudelli, A. Izquierdo, M. Passaro, C.J. Gonzalez, P. Cipollini, M. Bruno, O. Alvarez, R. Mañanes
10:00	Combining Coastal Altimetry Data with In-Situ and Land-Based Remote Data for Improving the Monitoring of the Dynamics in the Southeastern Bay of Biscay	A. Caballero, A. Rubio, M.-H. Rio, N. Ayoub, J. Mader, G. Larnicol, I. Manso-Narvarte, C. Dufau
10:20	Coastal Altimetry activities on the Coastal Thematic Exploitation Platform	S. Clerc, S. Vignudelli, C. Bevy, E. Tuhoy
10:40-11:10	**Coffee Break**	
	Session 2B: Application of Coastal Altimetry Data - Sea Level, Currents & Data Assimilation	**CHAIRS: Martín Saraceno, Remko Scharroo**
11:10	Regional Sea-Level Trends and Variability from Altimetry and Tide Gauges at the Northern Australian Coast	Z. Gharineiat, X. Deng
11:30	Progress in the Validation of Coastal Sea Level Rates Using Coastal Altimetry Products	A. Shaw, F. Mir Calafat, N. Dayoub

11:50	Feasibility Evaluation of Extracting Submesoscale Surface Currents from High-Resolution Sea Surface Heights in a Coastal Region	E. A. Lee and S. Y. Kim
12:10	The Performance of Satellite Altimetry Currents in a Wide Continental Shelf	L.S. Lago, M. Saraceno, P. Martos, R. Guerrero, A. Piola, C. Provost
12:30	ALES on Co-ReSyF: a Platform for Easy and Efficient Access to Coastal Altimetry Data	N. Dayoub, P. Cipollini, H. Snaith, V. Byfield
12:50-14:00	**Lunch**	
	Session 2B: Application of Coastal Altimetry Data - Sea Level, Currents & Data Assimilation (cont'd)	**CHAIRS: Nadim Dayoub, Guoqi Han**
14:00	Impact of the Assimilation of High-Resolution and High-Frequency Data in a Regional Model	M. Benkiran, E. Rémy, J-M. Iellouche, C. Dufau
14:20	Data Assimilation of Along-Track Sea Level Anomaly on Regional Ocean Modeling System	Z. Wang, G. Lyu, H. Wang, G. Liu
14:40	Assimilation of High-Resolution Altimetry in a Canadian East Coast Forecasting System	M. Benkiran, C. Dufau, G. Smith, Y. Liu, F. Davidson
15:00-15:40	**Discussion on the Applications of Coastal Altimetry (Sessions 2A & 2B)**	**ALL**

Thursday 14 June 2018 — DAY 2

15:40-16:10	Coffee Break	
	Session 3: Synergistic and Climate Studies	**CHAIRS: David Cotton, Doug Vandemark**
16:10	Coastal Currents Along the Yucatan Peninsula	J.A. Kurczyn Robledo, C.M. Appendini, X. Flores, G. Posada
16:30	Assessment and Calibration of Century Based Wind and Wave Climate Data Record in Coastal Zone Using Radar Altimeter Data	S. Abdalla, B. Ozbahceci, A.R. Turgut, A. Bozoklu
16:50	Climate Variability and Trends of Coastal Currents off Atlantic Canada from Satellite Altimetry	G. Han, N. Chen
17:10	Southwestern Atlantic Currents from InSitu and Satellite Altimetry	M. Saraceno, G. Paniagua, L. Lago, C. Artana, R. Ferrari, A. Piola, C. Provost, R. Guerrero

17:30-18:00	S3 Poster Flashes (2 mn - 2 slides)	
	Philippine Sea Level Responses to Intraseasonal, Seasonal and Interannual Variabilities in the Tropical Western Pacific Region	A. Gallentes, A. Punongbayan, C. Repollo
	Long Term Sea Level Changes from Satellite Altimetry Used in Geographical Multicriteria Analysis to Support Coastal Planning	S. Gorelli, J. Gómez-Enri, M. Rotonda, S. Vignudelli
	An Assessment of the Quality of the ESA Sea Level CCI Products in the Coastal Zone of the Northern Adriatic Sea Using Tide Gauge Measurements and Coastal Altimetry Products	S. Vignudelli, F. De Biasio, A. Scozzari, S. Zecchetto

	Investigating a Slope Water Intrusion Event Into the Gulf of Maine – Parallel Assessment Using a Data Assimilative Regional Ocean Model and New Satellite Salinity Observations	D. Vandemark, S. Grodsky, J. Levin, J. Wilkin, H. Feng
	An Evaluation of Present-Day Sea Level Change in the Black Sea by Considering of Steric and Mass Components	N.B. Avsar, S.H. Kutoglu
	The Importance of Altimetry Data on Deciphering Brazil Current Core Velocities and Corresponding Volume Transport	I. Pita, M. Cirano, M. Mata, M. Lima
	Investigation of Relationship Between Lake Coastline Change and Climatic Factors Using Satellite Images: a Case Study Burdur Lake (Turkey)	Ş. Şener, E. Şener, A. Davraz
	Coastline Change Assessment on the Shallow Lakes in Kızılırmak Delta (Turkey) Using Worldview-2 and Landsat Satellite Images Time Series	E. Şener, Ş. Şener, M. Güler

18:00-18:30	**Poster Session and Cocktail**

19:30-22:30	**Social Dinner [No-Host]**

Friday 15 June 2018 — DAY 3

9:00	Coastal Altimetry for Sea_Level_cci & Sea_Level_Budget_Closure_cci	SL_cci and SLBC_cci Projects
	Session 3: Synergistic and Climate Studies (cont'd)	**CHAIRS: David Cotton, Paolo Cipollini**
9:20	Trends and Variability in Coastal Sea State and Sea Level from the CCI+ Sea State Project	C. Gommenginger, N. Dayoub, F. Wimmer, A. Shaw, C. Banks, F. Calafat, H. Snaith, M. Srokosz, E. Ash
9:40	Application of Satellite Altimetry as a Tool for Managing Coastal Risk in Mozambique, Madagascar and South Africa	D. Cotton, A. Becker, V. Byfield, F. Calafat, N. Dayoub
10:00	Normalized Radar Cross Section and Slope Variance Measured Over Inland Water Bodies	M. Panfilova, V. Karaev
10:20	Estimating Sea Level Variations Due to Greenland Ice Sheet Melting	S. Stolzenberger, R. Rietbroek, J. Kusche
10:40-11:10	**Discussion on Synergistic and Climate Studies (Session 3) and Coastal Altimetry for Climate**	**ALL**
11:10-11:40	**Coffee Break and Final Look at Posters**	

11:40-12:10	**Report from Session Chairs (10' each)**

12:10-13:30	**Final Discussion, Recommendations and Closing Remarks**

notes:

Detailed technical and scientific information
can be found at: **www.coastalaltimetry.org**