Tides & High Frequency Splinter Summary

Seven oral presentations:

- New polar tide solutions: **Andersen & Rose** Cancet et al.
- New global tide solutions: Hart-Davis et al. – EOT20 Ray – GOT5
 - Lyard et al. FES2022
- **OGC** + Tide High-resolution models Abjean et al. – NEMO Salano et al. – HYCOM

and 4 posters:

TID2022_001 - Bathymetry improvement and high-resolution tidal modelling at regional scales Mathilde Cancet (NOVELTIS), Ergane Fouchet (NOVELTIS), Etienne Sahuc (NOVELTIS), Florent Lyard (LEGOS/OMP/CNRS), Gérald Dibarboure (CNES), Nicolas Picot (CNES) TID2022_002 - Impact of the sea ice friction on ocean tides in the Arctic Ocean, modelling insights at

various time and space scales

Mathilde Cancet (NOVELTIS), Florent Lyard (LEGOS/OMP/CNRS), Ergane Fouchet (NOVELTIS), Johnny Johannessen (NERSC), Craig Donlon (ESA/ESTEC) TID2022_003 - Improved shallow waters tidal estimates using satellite radar altimetry data and

numerical modeling.

Henrique Guarneri (TU Delft), Martin Verlaan (Delft University of Technology), Cornelis Slobbe (Delft University of Technology), Zijl Firmijn (Deltares), Julie Pietrzak (Delft University of Technology), Mirjam Snellen (Delft University of Technology), Keyzer Lennart (Delft University of Technology), Yosra Afrasteh (Delft University of Technology), Roland Klees (Delft University of Technology) TID2022_004 - Sentinel-3 SAR Mode altimetry observations of wave breaking dissipation owing to large-amplitude Internal Solitary Waves: effects on SWH and radar backscatter

Adriana M. Santos-Ferreira (University of Porto, Faculty of Sciences, Department of Geosciences, Environment and Spatial Planning and CIIMAR - Interdisciplinary Centre of Marine and Environmental Research), José C.B. da Silva (University of Porto, Faculty of Sciences, Department of Geosciences, Environment and Spatial Planning and Institute of Earth Sciences, Polo Porto), Jorge M. Magalhaes (CIIMAR - Interdisciplinary Centre of Marine and Environmental Research), Thomas Moreau (CLS – Collecte Localisation Satellites), Claire Maraldi (CNES - Centre national d'études spatiales), Franck Borde (ESA ESTEC – European Space Agency, European Space Technology and Research Centre), Craig Donlon (ESA) ESTEC – European Space Agency, European Space Technology and Research Centre)

Ocean Tides – A Global Empirical Ocean Tide Model





Created by Michael Hart-Davis, 2021

Deutsches Geodätisches Forschungsinstitut (DGFI-TUM) | Technische Universität München

Tide gauge tests suggest EOT20 improves FES2014 in shallow waters.

2021-12-03 08:00:00 - 1.00 - 0.75 - 0.50 - 0.25 Meter - 0.00 - -0.25 - -0.50 - -0.75 -1.00

ТШ

https://www.youtube.com/watch?v=L7vtDhPzq6w

GOT5.1 tide solutions







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13











+ new prediction software





Amplitude

00















(cm)

FES2022 HR mesh

The generation standard values for FES2022 global mesh were set as follows:

- Offshore resolution : 30 km
- Shelf resolution : 10 km
- Resolution at the continental slope : 6 km
- Coastal resolution: 4 km

FES2022 mesh has about 11 000 000 elements

Example on the Great Barrier Reef : initial FES2022 mesh, and then refined on the reef patterns









Assimilated solution FES2022A

P1, Q1, S2, M4, J1

2 min x 2 min grid resolution in public release



16 waves assimilated => 2N2, E2, K1, K2, L2, La2, M2, Mu2, N2, Nu2, O1,

FES2014 waves to complete spectrum => 34 waves in FES2022 atlas



Empirical models (EOT20, GOT5) advance; probably can further improve, even before SWOT.

Atmospheric tide signals remain in DAC. These should go into the ocean tide models -> better removal of tides in DAC? But what about nonlinear tide-surge interactions? (not yet modeled, but eventually will be)

Initial tests support superior quality of FES2022 More fine-tuning expected: coastline definition errors (GSHHS errors up to 20 km) very shallow water can lead to large, very localized amplitude anomalies

CryoSat-2 data are critical for improving polar tides. **Distribution of SAMOSA retracked data.** Future ESA CRISTAL data will NOT help if it is sun-synchronous.

Some important issues that affect OSTST