



# Coastal Ocean and Shelf Seas Task Team Cape Town meeting objectives

*Pierre De Mey, LEGOS*

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**5<sup>th</sup> International Coordination Meeting of the GODAE OceanView Coastal Ocean and Shelf Seas Task Team  
Cape Town, 3-7 April 2017**

# COSS-TT embraces a vibrant international community



**#1 Miami, Jan 2012**



**#2 Lecce, Feb 2013**



**#3 Rincon, Jan 2014**



**#4 Lisbon Sep 2015**

4th COSS-TT/ARCOM workshop, Lisbon, 31 Aug-4 Sep 2015

First of all, let us say a big THANK YOU to our hosts and to all who helped organize this 5<sup>th</sup> meeting in Cape Town

Björn, Sharon, Shari, Charine, Roxanne, Kirsten



# The COSS-TT: Terms of Reference and Strategy

The GODAE OceanView Coastal Ocean and Shelf Seas Task Team

1. fosters international collaboration to advance science and applications in support of coastal ocean forecasting
2. aims to help achieve a seamless transition framework from the global to the coastal scales.

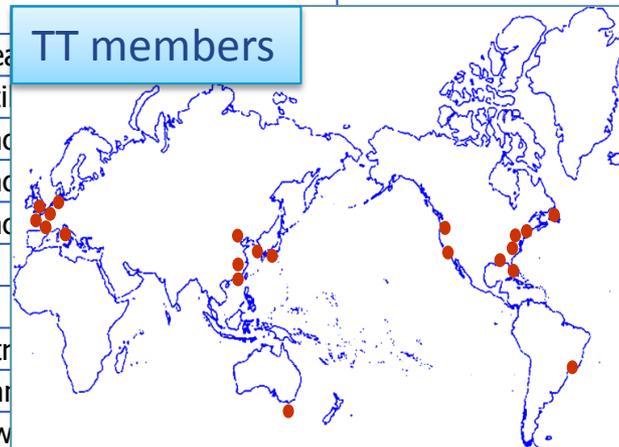
The COSS-TT *strategy* is to bridge several communities and subcultures by addressing their specific *questions* together:

- Global/regional ocean forecasters in GOV (*e.g. on model assessment and improvement in coastal regions*)
- Coastal modellers and scientists (*e.g. on best downscaling approaches*)
- International ocean observing programs with a coastal component (*e.g. on synergistic studies with coastal modellers and added value*).

# The Task Team as of April 2017

Name	Institutes	Country
Barth, Alexander	University og Liège / GHER	Belgium
Bricheon, Lucy	NOC	UK
Chao, Yi	RSS and UCLA	USA
Choi, Byoung-Ju	Kunsan National University	Korea
Cirano, Mauro	REMO, Rio de Janeiro	Brazil
Charria, Guillaume	Ifremer/Previmer	France
De Mey, Pierre	CNRS / LEGOS	France
Dufau, Claire	CLS	France
Edwards, Chris	UC Santa Cruz	USA
He, Ruoying	NCSU	USA
Herzfeld, Mike	CSIRO, Hobart	Australia
Hirose, Naoki	Kuyushu University, Fukuoka	Japan
Hole, Lars	Met.no	Norway
Jianping, Gan	Hong Kong University of S&T	China
Kamachi, Masafumi	MRI-JMA	Japan
Kourafalou, Villy	University of Miami	USA
Kurapov, Alexander	Oregon State University	USA
Levier, Bruno	Mercator Ocean	Germany
Lui, Guimei	NMEFC	China
Lu, Youyu	DFO	Canada
O'Dea, Enda	Met Office	UK
Oddo, Paolo	CMRE	Italy
Pinardi, Nadia	University of Bologna	Italy
Pullen, Julie	SIO	USA
Richman, Jim	NRL ( <i>retired</i> )	USA
Stanev, Emil	HZG	Germany
Staneva, Joanna	HZG	Germany
Van der Westhuysen, Andre	NOAA/NWS/NCEP	USA
Zhu, Jiang	IAP/CAS	China

TT members



Our PG Champions:

- Pierre-Yves Le Traon (Mercator)
- John Siddorn (Met Office)

Membership changes  
to be discussed  
on Wednesday

# This meeting (1/2)

- *Science in support of coastal ocean forecasting*, with special focus on the representation of estuaries, river plumes and upwellings in coastal models. **(Session 1)**
- *Coastal observing systems and model assessment*, with special focus on looking at same metrics in large-scale and coastal systems, and illustrating the added value of downscaling from large-scale systems. **(Session 2, topic will be recurring)**
- *Altimetry for studies of coastal sea-level processes and regional/coastal models*, as a follow-up to the 1st ARCOM workshop launched in Lisbon and to CAW-10 in Florence. Processes influencing coastal sea-level dynamics. **(Session 3)**
- *Operational and pre-operational coastal ocean forecasting systems*, including developments of large-scale systems to enhance performance in coastal regions and vice versa. **(Session 4)**

# This meeting (2/2)

- Specific thrust: Integration with GODAE OceanView
  - Update on products from GOVST groups to coastal modellers
  - Session 4
  - Discussion on Friday morning
- Discussions
  - At end of each presentation (5 **full** minutes – thanks)
  - Around posters (+ **5-minute oral poster presentations**)
  - At coffee breaks
  - At end of each session (30 minutes, extendable)
    - *Seed questions* by chairs, to spark the discussion
  - On Friday morning
    - Science (panel), summarize session discussions (chairs: Stanev/Kourafalou)
    - Integration with GOV (chairs: De Mey/Wilmer-Becker)
  - Task Team meeting (members only please)
    - Wed afternoon: membership, publication, actions.

Two types of systems with regional/coastal relevance within GOV:

- COFS – Coastal Ocean Forecasting Systems
  - Represented in COSS-TT
  - Represented in GOVST via TT co-chairs
- LOFS – Large-scale Ocean Forecasting Systems
  - Represented in GOVST
  - Not always adequately represented in COSS-TT (despite presence of coastal regions in these large-scale systems)
  - Integration of LOFS objectives and needs with developments under COSS-TT is critical.

## More news

- The COSS-TT was presented at the SWOTST meeting in Pasadena in June 2016 (a poster is available on the SWOT pages as PDF)
- The COSS-TT, IV-TT and COST EOS were directly involved in the the Global Ocean Week 2016 event in Toulouse in October 2016.
- COSS has strengthened collaboration with CAW (Coastal Altimetry Workshops, <http://www.coastalaltimetry.org>) through ARCOM, with a dedicated session in CAW-10 (February 2017, Florence, Italy), **continued as session 3 here**.
  - CAW-10 has been publicized to the COSS mailing list, and the COSS-TT co-chairs and 4 other TT members attended.
  - GOV and the COSS-TT have also been explained to the CAW community.
- The first COSS Topical Collection in Ocean Dynamics is being finalized, mostly from presentations at first 4 COSS-TT workshops (15 papers incl. Editorial) – enquiry about possible funding from Patrons to get it printed. **Launch of Part 2 to be discussed at this meeting.**

# 1st COSS Topical Collection, Ocean Dynamics

De Mey, P., E. Stanev and V. Kourafalou: Science in support of coastal ocean forecasting—part 1. (Editorial)

## (1) Coastal monitoring and array design

Grayek, S. et al.: Assessment of the Black Sea observing system. A focus on 2005-2012 Argo campaigns.

Lamouroux, J. et al.: Objective assessment of the contribution of the RECOPECA network to the monitoring of 3D coastal ocean variables in the Bay of Biscay and the English Channel

## (2) Coastal modelling, integration, and model-data synergy

Campuzano, F. et al.: Coupling watersheds, estuaries and regional ocean through numerical modelling for Western Iberia: a novel methodology

Durski, S.M. et al.: Coastal ocean variability in the U.S. Pacific Northwest region: Seasonal patterns, winter circulation and the influence of the 2009-2010 El Nino

Le Hénaff, M. et al.: Mississippi waters reaching South Florida reefs under no flood conditions: synthesis of observing and modeling system findings

Lima, M. et al.: An Assessment of the Brazil Current Baroclinic Structure and Variability Near 22°S in Distinct Ocean Forecasting and Analysis Systems

Sakamoto, K. et al.: Development of an operational coastal model of the Seto Inland Sea, Japan

## (3) Coastal data assimilation and prediction

Da Rocha Fragoso, M. et al.: A 4D-variational ocean data assimilation application for Santos Basin - Brazil

Han, S. et al.: Multi-model ensemble estimation of volume transport through the straits of the East/Japan Sea

Kwon, K.M. et al.: Effect of model error representation in the Yellow and East China Sea modeling system based on the ensemble Kalman filter

Lj, Zh. et al.: Coastal Ocean Data Assimilation Using A Multi-Scale Three-Dimensional Variational Scheme

Xie, J., et al.: Analysis of the northern South China Sea counter-wind current in winter using a data assimilation model

## (4) Coastal applications

Brenner, S. et al.: Oil spill modeling in the southeastern Mediterranean Sea in support of accelerated offshore oil and gas exploration

Zodiatis, G. et al.: The impact of sea surface currents in wave power potential modeling

# Session 1 - Science in support to coastal ocean forecasting

*Session chairs: Cecilie Wettre and Guimei Liu*

*The worldwide coastal ocean exhibits vast geographical diversity, depending on the size and openness of bays and estuaries; the width of the continental shelf; the proximity of strong oceanic currents; the strength of tides, winds, river runoff, and surface heat fluxes; and other characteristics.*

- Are we able to identify the most significant physical-meteorological processes that to some extent act on all the world shelves and coastal waters?
- Can we initiate cross-cutting studies that could be used to improve our modeling capabilities, and enhance our ability to model more typical shelves or estuaries where a combination of processes interacts?

*Near-coast predictions require winds, air pressure and waves resolved on similar scales, and well-resolved in time.*

- Do we have what is required for appropriate forcing of the coastal ocean? How can we improve this situation?

# Session 2: Coastal observing systems and model assessment

*Session chairs: Guillaume Charria and Lucy Bricheno*

- As models become increasingly high-resolution, how can we design (integrated?) metrics which do not introduce the “double penalty” problem?
- How do we compare large-scale and downscaled models when they are on different domains e.g. the land/sea mask varies?
- Comparing instantaneous (often observed) with time averaged variables (which are often output from models)
- How can model and observation uncertainties be taken into account in model assessment ?
- What are methodologies to further explore for estimating model uncertainties (e.g. stochastic modelling)?
- Following existing downscaling approaches (e.g. 1-way nesting, 2-way nesting, online, offline), how do we assess the improvements related to downscaled solutions? For example, in which kind of region (e.g. wide/narrow shelf) or dynamical regime (e.g. intense slope current, ROFI regime) 2-way nested solutions benefit downscaled and large-scale solutions?

# Session 3: Altimetry for studies of coastal sea-level processes and regional/coastal models

*Session chairs: Claire Dufau and John Wilkin*

- What physical processes have a signature in Sea Level in the coastal ocean we are modeling?
- Do we have the information we need to begin, or to improve, our use of altimetry data? If not, what do we need - more knowledge about processing, access to data, examples of their usefulness, or other?

# Session 4 - Op and pre-op ocean forecasting systems

*Session chairs: Enda O'Dea and Bruno Levier*

- How do we assess the COFS to comply with specific user's needs? (type of metric, delivery of skill scores in NRT, studies on past periods, intercomparisons?)
- Following the COSS TT 2015 workshop, and linked with the EU COST-EOS WG4 project: how do you assess the added value of downscaling? In particular with global reanalyses. → S2
- How can LOFS benefit from COFS development? Improving the sharing of tools and forcing datasets (river inputs, bathymetry, validation datasets etc...).
- And the contrary, what has to be improved in LOFS for COFS benefit? (tides/no tides, frequency of outputs, bathymetry, specific evaluation?)
- Can we, and how can we, improve the functioning of the COSS-TT to enhance GOV integration?

# Introduction session

*Session chairs: Björn Backeberg and Joanna Staneva*

## Challenges for the coastal observing system

### Key considerations:

- New observing systems technologies → S2
- Synergy between observing systems, modelling and forecasting systems → All sessions
- Linkages of the COSS-TT activities to the other GOV TTs → Fri

Scientific questions identified by the WCRP “Grand Challenge on regional sea level changes and coastal impacts” that could be relevant to COSS-TT :

*(provided by B. Meyssignac, LEGOS)*

- 1) Understanding the role of coastal and ocean interior processes (e.g., shelf sea dynamics, ocean mixing, freshwater input, etc.) on local sea level. It includes the understanding of the structure of sea level variability across the coastal zone to be able to properly assess models against data, determine model deficiencies, as well as advance the physical interpretation of the coastal sea level records
- 2) Determine limits of predictability of coastal sea level as function of space and time scale and the role of changing climate modes for coastal sea level predictions.
- 3) Understand and reduce regional/coastal inter-model spread in sea level change due to change in ocean properties (temperature, salinity, circulation, mass distribution).
- 4) Downscaling sea level variability and uncertainties from regional to local coastal scales,
- 5) Probabilistic information and return-period from combined effects of sea level rise and changes in extremes (e.g., storm surges).
- 6) Information on how sea level variability on different time and space scales combine to produce local extremes

# Practical points

- Please load your talks on the presentation machine before the beginning of each session!
- This also applies to 5-minute oral poster presentations!
- ...

Let us have a very good meeting!

*dw31.me*





TT meeting

# Task Team Meeting

- TT Business
  - Membership changes →
  - New Topical Collection (“Science in support of Coastal Ocean Forecasting – Part 2”) – Is it timely? Need 2 TC Editors.
  - Collaborations with other TTs (activities, meetings) – what are the COSS plans?
  - Investment in SIT – how to take it forward if at all?
  - Next meeting date and location (probably in fall of 2018; probably EU, possibly in relation with ESA)
- Science steering
  - Our Terms of Reference vs. message from Patrons
  - Future of ARCOM and links with CAW →
  - Collaboration with COST-EOS? →
  - Links with SWOTST?
  - See if a TT member could serve as liaison with the WRCP Grand Challenge on coastal impacts (Meyssignac/Domingues/Stammer/Ponte) – we have a request from them for the TT to be listed in their proposal (scientific support w/no commitment) →

- New members (7)

- Masa Kamachi, MRI, Japan [COSS-TT champion, retired]: John Siddorn is our new champion (along with PY)
- Chris Edwards, UCSC [also a MEAP-TT member]
- Bruno Levier, Mercator Ocean, France
- Claire Dufau, CLS, France – link w/ ARCOM, CAW
- Lucy Bricheno, NOC, UK
- Lars Hole, Met.no, Norway
- Joanna Staneva, HZG, Germany

- Replacements (2)

- DFO, Canada: Joël Chassé → Youyu Lu
- IFREMER, France: Franck Dumas → Guillaume Charria

- Being discussed (1)

- Nguyen Ba Thuy, NHMS, Vietnam
- Yeqiang Shu, SCSIO, China, as replacement of Jiang Zhu

# ARCOM Terms of Reference (agreed upon in Lisbon)

- I. Discuss the interest of sea level measurements for the regional/coastal ocean modellers and COFS
- II. Present the available altimetry missions and products to the coastal forecasting community; discuss recent advances and projects
- III. Discuss how altimetry can improve the forecast quality and enable new applications in the regional/coastal oceans
- IV. Discuss how to use altimetry products in R/COFS for assimilation and validation
- V. Establish a community of practice to advance complementary uses of coastal altimetry in regional/coastal modelling and prediction, involving the COFS and altimetry groups

ARCOM serves as a link between coastal modellers in COSS-TT and altimetry specialists in CAW. ARCOM has sessions in both 2017 COSS-TT and CAW events.

# COST-EOS and GOV

- COST-EOS aims to document, consolidate, and expand the ocean synthesis assessment initiatives which are already conducted in the community, including the **GOV IV-TT** effort with **CLIVAR GSOP ORA-IP**.
- The **link between COST-EOS and the GOV COSS-TT** is also essential insofar as (1) the assessment of downscaled syntheses, (2) the representation of regional/coastal processes in large-scale syntheses, and (3) estimates of the coastal impact and signature of large-scale climate change are considered as important topics in COST-EOS (not yet fully covered in ORA-IP).

Scientific questions identified by the WCRP “Grand Challenge on regional sea level changes and coastal impacts” that could be relevant to COSS-TT :

*(provided by B. Meyssignac, LEGOS)*

- 1) Understanding the role of coastal and ocean interior processes (e.g., shelf sea dynamics, ocean mixing, freshwater input, etc.) on local sea level. It includes the understanding of the structure of sea level variability across the coastal zone to be able to properly assess models against data, determine model deficiencies, as well as advance the physical interpretation of the coastal sea level records
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- 6) Information on how sea level variability on different time and space scales combine to produce local extremes



Additional slides

# Selected activities and achievements

- The Task Team acts as a link between the international **Coastal Ocean Forecasting community** and GODAE OceanView.
- A **Coastal Systems Information Table** is available.
- Four **International Coordination Workshops** have been organized so far; these have been successfully embraced by the community as a much needed forum to discuss latest scientific advances, promote international networking and update strategic planning.
- Several **special sessions** have been sponsored by the Task Team at AGU and OSM over the years; these have consolidated the outcomes of the TT workshops and allowed outreach to the broader scientific community. **Most recent such session: New Orleans, Feb 2016.**
- Links are being developed with the **IV-TT** and with other active international communities, such as the **Coastal Altimetry community** and EuroGOOS.
- Two synthetic **COSS Community papers** from the 2013 Symposium have been published in JOO.
- A **COSS Topical Collection** of 14 papers has been published in Oc. Dynamics. An Editorial is being published.
- Co-chair V. Kourafalou is a Member of JCOMM's " Cross-cutting Task Team for Integrated Marine Meteorological and Oceanographic Services" within WMO's Information System (**TT-MOWIS**); Task Team led by Euro-GOOS chair E. Buch.

# Quad chart describing the progress of annual activity in the GOV TTs

Name of TT: COSS-TT

Date: 30/09/2016

## Short description and objectives of the activities started /planned for this year:

- FA1: Continue general TT work on targeted science to enable/support the development of COFS and applications and meet priority challenges
- FA2: Work towards better integration between COFS and LOFS via downscaling, illustrate added value via consistent metrics
- FA3: Link with the active regional/coastal altimetry community and accompany the jumps in resolution and in "information forcing" towards extending prediction capabilities of COFS

## Future plans to continue/ improve current activities:

- ICW-5 is scheduled for April 2017, in Capetown (South Africa); it will include homework on COFS metrics and added value of downscaling as decided at ICW-4 jointly with IV-TT
- ICW-5 will include sessions in ARCOM (Altimetry for Regional and Coastal Models), as a follow-up to the 1st ARCOM workshop during the 2015 ICW-4 in Lisbon.

## Accomplishments of the TT this year:

- COSS-TT-sponsored sessions at AGU/Ocean Sciences 2016 conference in February (New Orleans, USA)
- COSS Topical Collection in Ocean Dynamics close to being finalized (15 papers accepted).
- In accordance with FA3, COSS has strengthened collaboration with CAW (Coastal Altimetry Workshop) through ARCOM, which will have dedicated sessions in CAW-10 (February 2017, Florence, Italy), in a coordinated fashion with the ARCOM sessions at ICW-5. CAW-10 has been publicized to the COSS mailing list and the COSS-TT co-chairs will attend.
- This is an intermediate year between workshops. The next workshop (ICW-5) is in preparation together with the local organizers and in synergy with CAW-10 and ARCOM.

## Issues/ problems:

- None identified this semester (other than co-chairs being very busy!)

## Additional comments: KEY:--

FA = Focus Area (as agreed upon in Beijing)

COFS = Coastal Ocean Forecasting System

LOFS = Large-scale Ocean Forecasting System

ICW: International Coordination Workshop

ARCOM = Altimetry for Regional and Coastal Ocean Models

# COSS-TT Focus Activities (FA)

As agreed at GOVST5 (Beijing) and GOVST6 (Sydney):

- FA1: Discuss science to enable/support the development of COFS and applications
- FA2: Work towards better integration between COFS and LOFS via downscaling (models & data), and in particular illustrate the added value of downscaling via consistent metrics
- FA3: Link with the active regional/coastal altimetry community and discuss how altimetry can improve the forecast quality and enable new applications in the regional/coastal oceans.

# COSS-TT workshops

The GODAE OceanView COSS-TT is an active open community: it is engaging coastal modellers, data specialists and forecasters worldwide (~150 at the moment). The COSS-TT is organising regular International Coordination Workshops which are open to all.

## Interested? Contacts:

Pierre De Mey [pierre.de-mey@legos.obs-mip.fr](mailto:pierre.de-mey@legos.obs-mip.fr)

Villy Kourafalou [vkourafalou@rsmas.miami.edu](mailto:vkourafalou@rsmas.miami.edu)

Web: [www.godae-oceanview.org](http://www.godae-oceanview.org) > Science > Task Teams

Next ICW  
In 2017

5<sup>th</sup> COSS-TT international workshop:  
**Cape Town, South Africa**  
**3-7 April 2017**

Hosts: Nansen-Tutu Centre, South African  
Environmental Observation Network (SAEON)  
with support from the CSIR and the University  
of Cape Town.



# “Science in support of coastal forecasting”: science drivers

Four workshops helped define priority areas where science is needed for the development of Coastal Ocean Forecasting Systems:

1. **Monitoring** of physical and biogeochemical parameters in coastal regions (in particular permanent/long-term)
2. Development of fine-scale coastal ocean **models**
3. **Integration**: Downscaling the ocean estimation problem from large-scale to coastal-scale models, data and forcings, coastal data assimilation and prediction, consistent validation metrics
4. Coastal-scale atmosphere-waves-ocean **couplings**
5. **Ecosystem response** to the physical drivers
6. **Probabilistic approaches** and risk assessment in the coastal ocean, including extreme events

# Coastal model assessment session in Lisbon

<b>Session 3: Data and metrics to assess the added value of downscaling</b> <b>-- Session co-organized by COSS-TT, IV-TT, and EU COST-EOS</b>	<b>Session chairs: Fabrice Hernandez (IV-TT) and Pierre De Mey (COSS-TT)</b>
<i>Introduction to Session 3</i>	<i>Pierre De Mey and Villy Kourafalou</i>
Overview of recent progresses of validation and inter comparison GOV activity of global forecasting systems	<i>Fabrice Hernandez (IV-TT, Mercator Ocean, France)</i>
GODAE OceanView Class 4 intercomparison	<i>Andy Ryan (Met Office, UK)</i>
New assessment of MyOcean forecasting systems in European Seas using process oriented metrics	<i>Jan Maksymczuk (Met Office, UK)</i>
Evaluation of Ocean Syntheses COST-EOS action : a European network to inform the quality of Ocean Syntheses for applications, downscaling and model nesting	<i>Marie Drévilion (COST-EOS, Mercator Ocean, France)</i>
IBIRYS: a Regional High Resolution Reanalysis (physical and biogeochemical) over the European North East Shelf	<i>Bruno Levier (Mercator Ocean, France)</i>
<i>Discussion: Practical steps to be taken jointly by COSS-TT, IV-TT and COST-EOS WG4 for the assessment of the added value of regional/coastal downscaling</i>	
Observing System Simulation Experiments in the North Atlantic Ocean hurricane region: system evaluation and regional applications	<i>Villy Kourafalou (U. Miami, USA)</i>
UK Environmental Prediction – coupled coastal modelling at high resolution	<i>Lucy Bricheno (NOCL, UK)</i>
Upgrade of the operational Global Real Time Ocean Forecast System: Global and Regional Metrics	<i>Avichal Mehra (NOAA, USA)</i>
<i>Discussion: Specific Science Topics to be targeted</i>	

# Coastal model assessment -- Follow-up so far

In Lisbon, the COSS-TT, IV-TT and COST-EOS WG4 submitted two proposals for general discussion:

- **Proposal A:** Modelling groups compare large-scale and downscaled coastal systems with same metrics
  - Very much active. Dedicated session planned in Cape Town.
- **Proposal B:** Cross-TT Working Group towards a Coastal Pilot Project (with IV-TT) including the preparation of a White Paper mostly focussed on metrics
  - Did not advance as much as hoped. Coastal modelling groups not too motivated. COSS-TT and IV-TT to get together soon to discuss next steps.

The COSS-TT, IV-TT and COST EOS were directly involved in the common preparation of the Global Ocean Week 2016 event in Toulouse last month, with presentations and discussions on coastal model assessment. All 3 groups remain close and work with each other.