Coastal Oceans and Shelf Seas Task Team (COSS-TT)

International Coordination Meeting 5 (ICM5)

Breakwater Lodge Hotel, University of Cape Town

3 - 7 April 2017

ICM5 meeting report

Prepared by
Villy Kourafalou, Pierre De Mey, Kirsten Wilmer-Becker and the meeting session chairs
Enquiries:
Kirsten Wilmer-Becker  
GODAE OceanView Project Office Coordinator

Kirsten.Wilmer-Becker@metoffice.gov.uk
The Met Office FitzRoy Road, Exeter, EX1 3PB, UK
Participants of the 5th GODAE OceanView Coastal Ocean and Shelf Seas Task Team (COSS-TT) International Coordination Meeting (COSS-ICM5) held in Cape Town from 3-7 April, 2017

We thank the Nansen-Tutu Centre, SAEON, the University of Cape Town and CSIR for an outstanding local organization

Presentations referred to in this report are available from the GODAE OceanView website at https://www.godae-oceanview.org/outreach/meetings-workshops/task-team-meetings/coss-tt-workshop-2017/presentations/
Table of contents

1. Introduction .............................................................................................................. 5
   1.1. The meeting organisation .............................................................................. 5
   1.2. The host ......................................................................................................... 6
   1.3. Key note presentation .................................................................................... 6
   1.4. Meeting presentations .................................................................................. 6
2. The Meeting .............................................................................................................. 7
   2.1. Objectives ..................................................................................................... 7
   2.2. Structure ....................................................................................................... 7
   2.3. COSS-TT Membership ............................................................................... 8
   2.4. Latest COSS-TT activities and plans ............................................................. 9
   2.5 COSS Topical Collection ............................................................................. 9
   2.6 COSS-TT linkages ....................................................................................... 11
3. Science Sessions .................................................................................................... 12
   3.1. Science in support to coastal ocean forecasting - Session 1 ...................... 13
   3.2. Coastal model assessment – Session 2 ......................................................... 17
   3.3. Altimetry for studies of coastal sea-level processes and regional/coastal models – Session 3 ............................................................................................................. 23
   3.4. Operational and Pre-operational Ocean Forecasting Systems – Session 4 ........ 26
4. Final discussion and outcomes ............................................................................... 30
   4.1. Feedback from science sessions .................................................................. 30
   4.2. GOV and COSS-TT interaction ................................................................. 31
5. COSS Task Team Business Meeting & actions ...................................................... 33
6. Next meeting .......................................................................................................... 36

Appendices .................................................................................................................. 37
   Appendix A: Meeting agenda ............................................................................. 37
   Appendix B: Participants list ................................................................................ 42
   Appendix C: List of session “Seed questions” ..................................................... 44
   Appendix E: Action & agreement list from the 5th COSS-TT meeting (ICM5) ........ 49
   Appendix F: COSS-TT Terms of Reference (2015) ........................................... 51
1. **Introduction**

1.1. **The GODAE OceanView Coastal Ocean and Shelf Seas Task team (COSS-TT)**

The COSS-TT is one of the 6 Task Teams of GODAE OceanView. Its goals are the following:

- foster international collaboration to advance science and expertise in support of regional/coastal ocean forecasting
- help achieve a seamless transition framework from the global to the coastal ocean forecasting.

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).

Two types of systems are relevant to the COSS-TT:

- Regional/Coastal Ocean Forecasting Systems (R/COFS), represented in GOVST via the COSS-TT co-chairs
- Large-scale Ocean Forecasting Systems (LOFS), represented in GOVST as “National Systems”, as long as those systems have stakes in coastal regions and shelf seas (e.g. via the provision of adequate boundary conditions for coastal systems).

1.2. **The meeting organisation**

Following four previous workshops, the 5th International Coordination Event (now called “Meeting”) of the Coastal Ocean and Shelf Seas Task Team (COSS-TT ICM5) has reached out to the coastal ocean community in South Africa.

The South African Environmental Observation Network (SEAON), the Council for Scientific and Industrial Research (CSIR), the Nansen-Tutu Centre and the Marine Research Institute at the University of Cape Town jointly hosted the 5th GODAE OceanView Coastal Ocean and Shelf Seas Task Team (COSS-TT) International Coordination Meeting (COSS-ICM5). The meeting was held at the University of Cape Town’s Business School at the Breakwater Lodge campus from 3-7 April 2017, with 50 international scientists attending.

The goal of the Coastal Ocean and Shelf Seas Task Team (COSS-TT) is to work in coordination with GOVST and GOOS towards the provision of a sound scientific basis for sustainable multidisciplinary downscaling and forecasting activities in the world coastal oceans. The task team fosters international collaboration to advance science and applications on coastal and shelf dynamics, open ocean processes that control shelf break exchanges, as well as land-sea interactions through estuaries and inlets.
1.3. The host

The South African Environmental Observation Network (SAEON) was established in 2002. SAEON is an institutionalised network of departments, universities, science institutions and industrial partner, with the mandate focussing on observation, information and education.

The Council for Scientific and Industrial Research (CSIR) is a parastatal research organization in South Africa, which conducts multidisciplinary research and technological innovation to foster industrial and scientific development. The organisation focuses its research and development on national priorities in the areas of health, industry, defence and security, the natural, built and digital environments, as well as energy. In addition, the CSIR invests in and explores new research areas to help shape future applications.

The Nansen-Tutu Centre for Marine Environmental Research (NTC) is a joint venture between South African, Norwegian and U.S. institutes and aims to develop and implement operational oceanography and methods of data integration into models of the South Atlantic Ocean, the Indian Ocean and the Southern Ocean. The focus of the collaboration is on ocean state, air-sea interaction, marine environment, resources, ecosystem and climate variability, through dedicated research and capacity building. It aims to improve the capacity to observe, understand and predict marine systems on timescales from days to decades in support of scientific and societal needs including fisheries, coastal management, maritime security, recreation and tourism.

The Marine Research Institute at the University of Cape Town focuses on research, which underpins its teaching, training, capacity development and consultancy activities. Hence, it brings together active researchers in the field who add value to and benefit from this collaborative structure. At the Institution, observation, measurement, and collection of samples and data are accomplished by ship cruises, field trips and remote sensing by satellite.

The COSS-TT is very grateful to the local hosts and organiser for their invitation to run this meeting in Cape Town, for their professional and generous organisation and hospitality. In particular we offer our thanks to Björn Backeberg (CSIR), Sharon Bosma (University of Cape Town), Shari Mento (SAEON) and Charine Collins (SAEON).

1.4. Key note presentation

Dr Marjolaine Krug (from the CSIR and an associate at the Nansen-Tutu Centre) gave an invited keynote presentation on the “Challenges of observing coastal ocean and shelf sea processes”. The presentation highlighted the need for enhanced state-of-the-art observation systems such as gliders and satellite remote sensing capabilities in order coherently observe important dynamic processes affecting the coastal ocean and Shelf Sea evident in South Africa’s Exclusive Economic Zone.

Presentation available from the meeting website

1.5. Meeting presentations

All meeting presentations can be viewed and downloaded from the GOV website at: https://www.godae-oceanview.org/outreach/meetings-workshops/task-team-meetings/coss-tt-workshop-2017/presentations/.
2. The Meeting

2.1. Objectives

Since its first workshop in Miami, Jan 2012, the Coastal Ocean and Shelf Seas Task Team (COSS-TT) has fostered international collaboration to advance science and applications in support of coastal ocean forecasting. The increasing number of task team members and the high interest in the annual workshops show how important the COSS-TT initiative has become in serving the community and offering the desired opportunities for collaboration. Furthermore, the COSS-TT aiming to help achieve a seamless transition framework from the global to the coastal scales is well placed to provide the links to the global ocean forecasting centres and by helping communities to focus on remaining problems together.

The four ICM5 Science sessions (described in more detail in section 3.) were chosen to address the main issues faced by coastal ocean forecasting communities and it is hoped that the sharing of methods and outcomes can help to resolve problems and increase exchange among the systems:

- **Science in support to coastal ocean forecasting**, especially at this meeting: representation of coastal upwellings and river plumes in models, including interdisciplinary aspects (e.g. biogeochemistry sediments).
- **Coastal model assessment**, especially at this meeting: comparison of large-scale and downscaled coastal systems with the same set of metrics (as agreed at the previous meeting in Lisbon).
- **Altimetry for regional/coastal ocean models**, especially at this meeting: processes influencing coastal sea-level dynamics, and the realistic modelling of those processes (ARCOM community session)
- **Operational and pre-operational ocean forecasting systems**, especially at this meeting: coastal forecasting system description and updates; quality and performance of large-scale ocean forecasting systems in the coastal areas.

These four topics received various abstracts submissions, which can be viewed on the GOV website. In total, these included 38 oral presentations and 11 poster submissions on various topics.

Strong emphasis was given to integrate closer with the GOV large-scale system community and to update the COSS-TT community on what products are available from GOVST groups for coastal modellers.

2.2. Structure

All meeting session were chaired by a team of conveners who were invited before the meeting. Please view the meeting agenda in appendix A. The session convenors not only led the presentations session, but also chaired the discussion sessions and provided written summaries (see “3. Science sessions”). The sessions were opened by a short presentation of “seed questions” to invigorate discussions (see Appendix C). Intermediate outcomes were noted and concluded in the discussions on the final day.

The meeting also included poster sessions, an ice-breaker reception on the first day (kindly sponsored by our hosts), meeting dinner at the Two Oceans Aquarium and a tour to Robben Island.
### 2.3. COSS-TT Membership at time of meeting

The list of members at the time of ICM5 is provided below (with notes of outgoing/incoming members):

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Institution, City</th>
<th>Status</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barth, Alexander</td>
<td>U. Liège</td>
<td>Member</td>
<td>Belgium</td>
</tr>
<tr>
<td>2</td>
<td>Bricheno, Lucy</td>
<td>NOC Liverpool</td>
<td>Member</td>
<td>UK</td>
</tr>
<tr>
<td>3</td>
<td>Chao, Yi</td>
<td>RSS and UCLA, Los Angeles, CA</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>4</td>
<td>(Not nominated)</td>
<td>DFO</td>
<td>Incoming</td>
<td>Canada</td>
</tr>
<tr>
<td>5</td>
<td>Choi, Byoung-Ju</td>
<td>Kunsan National U.</td>
<td>Member</td>
<td>Korea</td>
</tr>
<tr>
<td>6</td>
<td>Cirano, Mauro</td>
<td>REMO, Rio de Janeiro</td>
<td>Member</td>
<td>Brazil</td>
</tr>
<tr>
<td>7</td>
<td>Charria, Guillaume</td>
<td>IFREMER / Previmer, Brest</td>
<td>Incoming</td>
<td>France</td>
</tr>
<tr>
<td>8</td>
<td>De Mey, Pierre</td>
<td>CNRS / LEGOS, Toulouse</td>
<td>Co-chair</td>
<td>France</td>
</tr>
<tr>
<td>9</td>
<td>Dufau, Claire</td>
<td>CLS, Toulouse</td>
<td>Member</td>
<td>France</td>
</tr>
<tr>
<td>10</td>
<td>Edwards, Chris</td>
<td>UCSC, Santa Cruz</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>11</td>
<td>He, Ruoying</td>
<td>NCSU, Raleigh, NC</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>12</td>
<td>Herzfeld, Mike</td>
<td>CSIRO, Hobart</td>
<td>Member</td>
<td>Australia</td>
</tr>
<tr>
<td>13</td>
<td>Hirose, Naoki</td>
<td>Kyushu U., Fukuoka</td>
<td>Member</td>
<td>Japan</td>
</tr>
<tr>
<td>14</td>
<td>Hole, Lars</td>
<td>Norwegian Meteorological Institute</td>
<td>Member</td>
<td>Norway</td>
</tr>
<tr>
<td>15</td>
<td>Gan, Jianping</td>
<td>Hong Kong U. of S&amp;T</td>
<td>Member</td>
<td>China</td>
</tr>
<tr>
<td>16</td>
<td>Kamachi, Masafumi</td>
<td>JMA/MRI</td>
<td>Outgoing</td>
<td>Japan</td>
</tr>
<tr>
<td>17</td>
<td>Kourafalou, Villy</td>
<td>U. Miami / RSMAS, Miami, FL</td>
<td>Co-chair</td>
<td>USA</td>
</tr>
<tr>
<td>18</td>
<td>Kurapov, Alexander</td>
<td>Oregon State U. / COAS, Corvallis, OR</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>18</td>
<td>Levier, Bruno</td>
<td>Mercator Ocean</td>
<td>Member</td>
<td>France</td>
</tr>
<tr>
<td>20</td>
<td>Liu, Guimei</td>
<td>NMEFC, Beijing</td>
<td>Member</td>
<td>China</td>
</tr>
<tr>
<td>21</td>
<td>O’Dea, Enda</td>
<td>UK Met Office, Exeter</td>
<td>Member</td>
<td>UK</td>
</tr>
<tr>
<td>22</td>
<td>Oddo, Paolo</td>
<td>CMRE, La Spezia</td>
<td>Member</td>
<td>Italy</td>
</tr>
<tr>
<td>23</td>
<td>Pinardi, Nadia</td>
<td>U. Bologna</td>
<td>Member</td>
<td>Italy</td>
</tr>
<tr>
<td>24</td>
<td>Pullen, Julie</td>
<td>Stevens Institute of technology</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>25</td>
<td>Richman, Jim</td>
<td>(No affiliation)</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>26</td>
<td>Stanev, Emil</td>
<td>HZG, Hamburg</td>
<td>Member</td>
<td>Germany</td>
</tr>
<tr>
<td>27</td>
<td>Van der Westhuysen, André</td>
<td>NOAA/NWS/NCEP</td>
<td>Member</td>
<td>USA</td>
</tr>
<tr>
<td>28</td>
<td>Zhu, Jiang</td>
<td>IAP, Beijing</td>
<td>Outgoing</td>
<td>China</td>
</tr>
</tbody>
</table>

*Table 1: Task Team membership, April 2017*

Please note that this list has been revised following ICM5. An up-to-date list can be found on the GOV/COSS-TT web pages: [https://www.godae-oceanview.org/science/task-teams/coastal-ocean-and-shelf-seas-tt/coss-tt-members/](https://www.godae-oceanview.org/science/task-teams/coastal-ocean-and-shelf-seas-tt/coss-tt-members/).
2.4. Latest COSS-TT activities and plans

Task Team members collaborating on a variety of activities:

- 5 Task Team meetings have been organized so far: share science and good practices, promote international networking and attempt strategic planning.

- A Coastal Systems Information Table is available on the GOV COSS-TT web pages.

- Two synthetic COSS Community papers from the 2013 Symposium have been published in JOO.

- 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. Next session: Portland, Feb 2018.

- We started ARCOM as a common activity between the TT and the CAW (P. Cipollini) in Lisbon and at CAW2017 in Florence. Co-chairs: C. Dufau (CLS) and J. Wilkin (Rutgers U.).

- We also started with the IV-TT Class 4-based intercomparison of LOFS and R/COFS in Lisbon. This is now a recurrent topic at all COSS-TT meetings.

- Co-chairs are also members of the DA-TT and OSEval-TT.

- A COSS Topical Collection of 15 papers has been published in Oc. Dynamics, with presentations from TT meetings. A second TC is about to open.

- 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.

**Action 5.1:** PO in collaboration with Mauro Cirano, Claire Dufau and the COSS-TT co-chairs to collect and add information to the system information table (SIT) about usage of altimetry data by regions and altimetry applications (in collaboration with ARCOM group), and carry out a general update of the SIT with fresh information

**Action 5.2:** PO to set aside space on GOV website (COSS-TT pages) for representation of joint COSS-TT/ARCOM activities

2.5 COSS Topical Collection

The first COSS Topical Collection in Ocean Dynamics has now been finalized, mostly from presentations at first four COSS-TT workshops (15 papers incl. Editorial) – enquiry about possible funding from Patrons to get it printed.

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


Lamouroux, J. et al.: Objective assessment of the contribution of the RECOPESCA 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


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

Li, 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 modelling

The launch of the Topical Collection Part 2 is planned to start soon.
2.6 COSS-TT linkages

Representation of COSS-TT at other meetings

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 Global Ocean Week 2016 event in Toulouse in October 2016.

- 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).

COSS-TT collaborations efforts

COSS-TT 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.

WCRP Grand challenges

Scientific questions for the COSS-TT have been identified by the WCRP “Grand Challenge on regional sea level changes and coastal impacts”: (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.

**Agreement 5.1:** Mauro Cirano to be the contact for the WCRP Grand Challenges (COSS-TT group)
3. Science Sessions

The GODAE OceanView Coastal and Shelf Seas Task Team (COSS-TT) works in coordination with the GODAE OceanView Science Team and GOOS towards the provision of a sound scientific basis for sustainable multidisciplinary downscaling and forecasting activities in the world coastal oceans. The COSS-TT continues to value the importance of an international forum to advance science in support of coastal ocean forecasting and applications.

The meeting focussed on four science sessions allowing the audience to address current issues of the “Coastal Ocean and Shelf Sea” communities. Prior to the meeting, the session chairs provided/collected a set of “seed questions” for addressing the most urgent issues in the science discussions.

Four sessions are covered in this chapter:

3.1 Science in support to coastal ocean forecasting
3.2 Coastal model assessment
3.3 Altimetry for regional/coastal ocean models
3.4 Operational and pre-operational ocean forecasting systems
3.1. Science in support to coastal ocean forecasting - Session 1

Session chairs and conveners were Cecilie Wettre (Met.no) and Guimei Liu (NMEFC) who kindly provided the discussion summaries (below).

This session was specifically focusing on Representation of coastal upwellings and river plumes in models, including interdisciplinary aspects (biogeochemical, sediments) and included 12 oral presentations.

Presentation titles and presenters from this session are listed below (alphabetical order):

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>Lucy Bricheno, NOC</th>
<th>Coastal modelling of a mega delta; tide and river interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>Guillaume Charria, Ifremer</td>
<td>Ongoing research for a French coastal integrated ocean observing system</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Byoung-Ju Choi, Kusan National University</td>
<td>Response of coastal ocean to the heavy rainfall in the mid-latitude coastal ocean: numerical simulations in the Yellow Sea</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Mauro Cirano, REMO</td>
<td>Applications of a high-resolution bay/coastal regional system to process studies at the Baía de Todos os Santos and adjacent Eastern Brazilian Shelf</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Serena Illig, LEGOS</td>
<td>Remote versus local forcing of the Eastern Boundary Upwelling Systems of the Southern Hemisphere</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Rita Lecci, CMCC</td>
<td>From regional ocean to shelf coastal sea modeling: dynamical downscaling of the CMEMS (MED-MFC) products and estuarine dynamics representation</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Neil Malan, University of Cape Town/ SAEON</td>
<td>Modelling the impact of Large Agulhas Current Meanders on Shelf Waters</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Ananda Pascual, IMEDEA (CSIC-UIB)</td>
<td>A multiplatform experiment to unravel meso- and submesoscale processes in an intense front (AlborEx)</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Emil Stanev, HZG</td>
<td>Inter-basin exchange in the Azov-Black-Marmara-Mediterranean Seas</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Joanna Staneva, HZG</td>
<td>An ocean-atmosphere-wave regional coupled model: improving predictions in the North Sea and Baltic Sea</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Florence Toublanc, CNES/LEGOS</td>
<td>Impact of the tides, wind and shelf circulation on the Gironde river plume dynamics</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Jennifer Veitch, SAEON</td>
<td>The role of large-scale modes of climate variability on the Cape Point wave record</td>
</tr>
</tbody>
</table>

Session 1 discussion

Prior to the meeting, the session chairs provided/collection a set of “seed questions” (in blue) for addressing the most urgent issues in the science discussions.
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 modelling capabilities, and enhance our ability to model more typical shelves or estuaries where a combination of processes interacts?

We are keen to advance our various systems and models, going to finer and finer scale, using structured and unstructured, finite grid models finite, and very advanced systems. Great progress has been made in the past years, as presented by representatives of various groups present. However, some worry, that we are digging too deep into complex systems and that we might benefit from going back to basics and do idealized studies. It might be a good idea to study simpler models in order to understand the various processes better. In this group, we might encourage collaborative studies to compare and contrast common mechanisms. This might be a thought for international collaboration across communities.

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?

We have incomplete information on the discharge of freshwater into the ocean, and it is difficult to know the coastal salinity. We need a reliable data source for river discharge/ fresh water discharge. Could COSS-TT highlight this as a limitation?

Total discharge from freshwater is currently not an Essential Climate Variable but maybe should be. It needs specifications, however. We need as much details as possible even from small rivers, since local rivers can have a big impact. We should aim to gain access to as much information as possible and let people chose what they want to use. We should try to influence and encourage providers of river data to deliver the data faster. It can take months to get data some times, and it would be much better to get the data near-real time or at real time.

This raises the question of how best to engage with the hydrology community, and how can we help them from our side as coastal ocean modellers. It was argued that fully coupled systems would help the hydrologists to answer questions that they might otherwise not be able to answer.

Hydrological questions have to be solved together by developing a language we can all understand. Oceanographers should take the lead. We could start with informing each other, e.g. within CMEMS, about what our requirements and needs are. We would need to show clear cases and could start a discussion in Europe as the community is already there.

Freshwater

General challenge for all: freshwater discharge. Measurements of freshwater discharge are done using various methods, placement of gauges, etc. COSS-TT could provide recommendations to hydrology representatives. We do not have easy access to river run-off globally. Each country has its own overview, measurement system, climatology. Could it be possible to gather all this information in a
single access point? Could we get support from WMO for example? Is there a comparable organization for global hydrology?

We propose to collaborate with “Land” people, who also have an interest in rivers and freshwater. (They have, however a very different time scale. ~10 years)

In addition, getting the bathymetry right for fine scale modeling is a challenge for all. There are difficulties at basin interconnections where straits can be very narrow. Unstructured grids were problematic to use previously due to the handling of baroclinic instability. Now that this is handled well in ocean models, unstructured grids should move from research to operational. Challenge: unstructured grids are computationally expensive.

How the coast, e.g. small bathymetric features, is resolved has an important effect on how the forcing affects the results.

A hydrology-link group of interested scientists agreed to investigate where/who we can get in touch with to cooperate on hydrology, river runoff, and freshwater input for our coastal models. Is there an international organisation for hydrology, like WMO? Are there any good meetings where hydrologists gather?

**Hydrology-link group:** Youyu Lu, Mike Herzfeld, John Wilkin, Mauro Cirano, Endo O’Dea. Nadia Ayoub, and Cecilie Wettre (coordinator)

**Action 5.3** Led by Cecilie Wettre a “Hydrology-link group” (Youyu Lu, Mike Herzfeld, John Wilkin, Mauro Cirano, Endo O’Dea, Nadia Ayoub, and Cecilie Wettre) to investigate contacts in the hydrology community for information about river runoff, and freshwater input for our coastal models. Existing contacts to hydrology are listed in this report.

Already know contacts in the “Hydrology” community:

For hydrology, the **relevant WMO group** is described here:

The panel within the World Climate Research Program possibly most aligned with the issue of river discharge observation is TOPC (Terrestrial Observing Panel for Climate)

Julie Pullen was invited into the group discussions, and informed the group that there will be a workshop on

**Coastal Hydrology and Surface Processes linked to Air/Sea Modeling**

Date: 26-27 September 2017
Location: Funchal, Madeira
Ocean Observatory of Madeira (OOM) ([http://oom.arditi.pt/](http://oom.arditi.pt/))

**Background:**

An emerging field of earth system research is the application of coupled hydrology, meteorology and oceanography models to coastal regions. Motivated by the need to predict coastal river flooding and associated impacts, several groups have undertaken the integration of hydrology models such as WRF-Hydro (NCAR) and HEC-HMS (Army Corps) into meteorological and coupled ocean/atmosphere prediction systems. Groups at NCAR and NRL are integrating their models (COAMPS/WRF-
Hydro/LIS/NOAH), and teams in the U.S., Europe and the Middle East are applying linked models to the U.S. east coast, Italian coast, west Africa, Germany, Turkey and Israel, among others. Related current efforts include the enhancement of land surface/soil moisture treatment, the representation of storm-water flows in urban settings and their effects, together with river runoff, on the marine ecosystem health. The projects cover diverse geographical settings (cities, mountains, deserts, tropics, highlands, islands) - each with distinguishing characteristics.

**Purpose:**

Given recent developments outlined above, this workshop will gather developers and practitioners of coupled air/sea/hydrology/land surface models and land assimilation system. The 2-day workshop will have one day devoted to applications and results, with day two focused on model implementation and challenges. Features of existing and developing systems include unstructured grids, global relocatability, ensembles, data assimilation, and multi-model visualization. We will also include focused discussions to develop a framework for advancing the applications and seamless integration of increasingly sophisticated models covering the coastal air/sea/land interface. These advanced models include embedded estuary models and sewer/storm-water models.

*This should be an excellent opportunity for COSS Task Team members to meet and interact with the hydrology community (see action 5.3)*

Results and actions from session 3.1 *Science in support to coastal ocean forecasting*

**Agreement 5.2:** COSS-TT (*names to be confirmed*) to look into highlighting the limitation of reliable data source for river discharge/ fresh water discharge.
3.2. Coastal model assessment – Session 2

Session chairs and conveners were Guillaume Charria (Ifremer) and Lucy Bricheno (NOC) who kindly provided the presentation and discussion summaries (below).

This session was specifically focusing on Comparison of large-scale and downscaled coastal systems with the same set of metrics (as agreed in Lisbon) and included five oral presentations and five posters.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | Marcos Garcia Sotillo, Puertos del Estado  
Comparison of global, regional and coastal operational model solutions in the IBI Area: A review of CMEMS core & PdE downstream ocean forecast services on Spanish coastal waters |   |
| 2 | Mike Herzfeld, CSIRO  
Global and regional model comparison: OFAM vs eReefs |   |
| 3 | Frank Janssen, BSH  
Operational forecasting at the German coast - local vs. global models |   |
| 4 | Simon Ruiz, IMEDEA (CSIC-UIB)  
Assessment of operational ocean forecasting systems in the Western Mediterranean using multiplatform in situ data and an eddy tracker |   |
| 5 | Pierre De Mey-Fremaux, LEGOS/CNRS  
Stochastic Coastal/Regional Uncertainty Modelling: insights from ensemble sensitivity/consistency experiments |   |

Presentations summaries are provided below.

Marcos Garcia Sotillo, Puertos del Estado  
Comparison of global, regional and coastal operational model solutions in the IBI Area: A review of CMEMS core & PdE downstream ocean forecast services on Spanish coastal waters

Marcos Garcia Sotillo (Puertos del Estado) presented the Iberian peninsula operational systems. These operational systems aim at responding to end-user needs such as the port authority which want 'information' and no 'data', for example custom-made information such as thresholds. This also requires a user-friendly web interface and good data. Through these systems, Puertos del Estado is likely to be held more and more accountable for its forecasts in future. A comparison exercise of global, regional and coastal operational model solutions in the IBI (Iberia-Biscay-Ireland) area highlighted different issues. For example, high-resolution forecast for the Gibraltar Strait (down to ~300m resolution, operational system running in less than 2 hours) shows an issue with not getting adequate freshwater inputs in the system. The nested approach (e.g. 5 model solutions nested) reveals the importance of investing in model intercomparison of parent/child domains. Another example relates to differences in observed salinity observed, although surface forcing remains unchanged. Changing initial conditions (inconsistent between domains) can impact the regional/outer nest. This indicates the possibility of the regional simulation inheriting good (or bad!) features from the parent, and shows how important consistent regional/global forcings are. However, the best skill
gain is observed when moving from global to regional with a little added value moving from regional
to harbour scale. However, due to limited coastal point data for comparison it is not possible to claim
that the models are improving at local scales.

The discussion emphasized the fact that to reproduce small features, key issues to take into
consideration are atmospheric forcings and freshwater inputs. The importance of the vertical model
resolution (and not only horizontal) has also been mentioned.

Mike Herzfeld, CSIRO

**Global and regional model comparison: OFAM vs eReefs**

Another coastal environment, the Great Barrier Reef (GBR) was introduced by Mike Herzfeld (CSIRO)
through the eReefs model. Recently mass mortality and bleaching has been experienced, but the
current models are unable to predict these catastrophic events. The operational system is based on a
4km model with tides, wetting/drying, 22 rivers and meteorological forcings nested into the global
OFAM model (no tides, 15m minimum depth). The system can be set to data assimilation mode but in
this presentation it is shown to be used in a comparison of the global and regional models which shows
that the biggest problem for the global model is that there are no tide (reaching 9m amplitude). The
bathymetry has been much improved in the eReefs (high-resolution model), while the reef matrix is
largely absent in the global model. The assessment of model simulation (intercomparison against a
network of observations) provides an explanation of the double penalty problem and applies the
Willmott (1981) skill score. Neighbourhood techniques (Ebert 2008) should help address this issue. In
average statistics, the models are comparable. At event scale, OFAM is poor (as it uses monthly
climatology for rivers, and can only get correct freshwater through Data Assimilation) and eReefs is
better reproducing observations as it can capture flash-flood events. Upwelling events are also missing
in the global model, as they are driven by internal tides. As the reef is missed in the global model, the
seasonal current reversal is only captured in eReefs.

Frank Janssen, BSH

**Operational forecasting at the German coast - local vs. global models**

Frank Janssen presented the BSH operational model for the North Sea and Baltic Sea.BSH users are
categorised as “internal”, stakeholder groups interested in oil-spill, warning/forecasting, ice
forecasting) and “external” groups covering search and rescue, German Navy, Offshore renewables or
leisure. The system is including a 3D circulation model, 3D surge model, and drift (Lagrangian) and
dispersion (river plumes). Four nest levels are implemented: 10km North-East Atlantic, 4km North Sea
and Baltic Sea, 900m local model, and 90m Harbour scale model. There is no (global) outer
hydrodynamic model and the system does not include wave modelling. Model comparisons with
CMEMS global and Baltic models have been presented using sea level tide gauge, T/S profiles, SST (in
situ & satellites), bottom temperature, surface current (ADCP, Radars), mixed layer depth (in situ
profiles), ice concentration (ice maps from in situ + satellite).

A ‘preliminary’ conclusion is that there is (so far) no clear benefit from using a global model for local
applications (more analysis are needed for Open Boundary Conditions), however, there is limited
benefit from using a regional model (more analysis needed for OBC). Combining global, regional and
local models for short term forecasts remain difficult, due to inconsistency of weather forcing and
inconsistency of operational schedules.
Simon Ruiz, IMEDEA (CSIC-UIB)

Assessment of operational ocean forecasting systems in the Western Mediterranean using multiplatform in-situ data and an eddy tracker

The Western Mediterranean sub-mesoscale variability, presented by Simon Ruiz (IMEDEA/CSIC-UIB), has been observed with a multi-platform approach. The new project MedSub is focusing on understanding the meso and submesoscale ocean interactions with the aim of improving the Mediterranean CMEMS products. By comparing the eddy kinetic energy and the mean surface circulation improvements to the mesoscale skills can be found, for example it can be shown that the Iberia-Biscay-Ireland model is too energetic (EKE high). An eddy tracker (see presentation) to identify (count) and track eddies was applied which shows the number of cyclonic / anticyclonic eddies and plots long-term composites of the fates of the eddies (the minimum lifetime of eddies tracked is 10 days). Some models (particularly global models) over-predict the number of eddies, but the eddy tracker is a good tool to understand the mesoscale dynamics of different models. The data assimilation improves the cold patch / front position. The new model is less biased due to assimilating more data close to the coast.

Pierre De Mey-Fremaux, LEGOS/CNRS

Stochastic Coastal/Regional Uncertainty Modelling: insights from ensemble sensitivity/consistency experiments

The session ended with a presentation from Pierre De Mey (LEGOS) on stochastic coastal and regional uncertainty modelling. The underlying questions for this study related to the assessment of error-bars, and how to validate error bars when looking at data assimilation. Furthermore it addressed the question about the “generation of realistic models of uncertainties”, “methods to verify ensembles against data” and what “guidance towards ensemble assimilation schemes in regional op systems” can be given.

For example, a modelled ensemble (ensemble size issue has been discussed following the presentation) with perturbed wind forcing impacts SST (Sea Surface Temperature) and SSH (Sea Surface Height). An auto-regression approach is used to see which parameters are most impacted by the perturbation (i.e. hit model with different changes to see which causes most spread). The SSH is most sensitive to wind whereas the SST is most sensitive to air temperature and wind. The Chlorophyll-a concentration is most sensitive to wind and surface drag. Overall wind perturbations dominate, while pressure changes are not so important. Winds are driving the physics, and physics drives the biogeochemistry.

The 'SANGOMA' (stochastic assimilation for the next generation ocean model applications) toolbox has been introduced and used to do pattern matching and identify dominant modes. The leading-order modes are large (regional) scale, while smaller modes can be spurious.

Posters

In the poster session, the Korean Operational Oceanographic System including a high resolution modelling for Korea was presented (Jin-Yong Choi). An example of use of a combination of several models for different areas in St Helena Bay (South Africa) was presented by Charline Collins. A European initiative through the JERICO-NEXT project for operational coastal systems was introduced by Baptiste Mourre. He also detailed the multi-platform observing system for Iberian peninsula/Ibiza.
channel in the Mediterranean Sea. For the Bay of Biscay, Nadia Ayoub presented a model-data comparison and discussed the ‘representability error’ used in data assimilation.

Session 2 Discussion

The theme of “coastal model assessment” and the “link with the coastal observing system” remains an important topic for the COSS Task Team. As in previous COSS-TT meetings it appears that the main focus is on assessing the systems, estimating errors and developing integrated systems including observing systems. The discussion was addressing two specific themes:

(1) **Assessment and metrics methodology** (neighbourhood focus or integrated method?)

Neighbourhood methods have matured in the Meteorology community (e.g. for rainfall) and are very targeted. This group could learn from this. Rather than looking at point to point comparisons one can look at regions, and find a metric that answers the question in that region. The problem of co-location was also discussed (e.g. don’t necessarily take the closest point, rather take the point that is the most ‘representative’ - e.g. same water depth).

How to handle coastal model assessment **without any** data at your specific site was another question that was discussed. This opens the opportunity for process-oriented-metrics i.e. you know how processes work and apply a theory where there are no observations. This sounds like a great idea, and is also transferable (not site specific). A paper (by Maksymczuk, 2015) presented in Lisbon described “New assessment of MyOcean forecasting systems in European Seas using process oriented metrics” and provides a good overview of the assessment techniques.

(2) **Uncertainties**

Uncertainty is a key issue for the near future operational systems, and the question was asked: “Should we use stochastic methods to estimate model error?” A consistency between error-bars for observations, error bars for models, and difference between observation and model is needed. For observations, the sensor designers should be able to define the errors on their system. We must define the metric based on the process to better define the error uncertainty.

Furthermore, distributions may not be Gaussian, so it is important to see the whole distribution (skew / tail). Bayesian modelling (prior -> posterior) gives a better idea of model uncertainty, but it is computationally expensive.

In the discussion, the European COST Action EOS-COST which aims to improve the coordination of the European efforts in the evaluation of ocean syntheses, to optimize their use and value, to ease their access, to promote their improvement and to raise confidence in their quality was presented and model intercomparison papers for different regions are developed in this project.

From this discussion, there was an attempt to converge on a parameter list (see Appendix) to develop a “model assessment reference” in the Task Team. This list has been started during the meeting and will be improved after the TT meeting.

This last point leads to following **actions before the next COSS-TT meeting:**

**Action 5.4:** Led by GC and LB, all to finalize the “Model Assessment Reference” list within the COSS community before the next COSS-TT meeting (see Appendix D for details)
In Lisbon, we introduced the following 4 “classic” classes of common metrics for model assessment:

Class 1 = dense data like maps
Class 2 = time series at point/section/slice
Class 3 = derived quantities calculated online
Class 4 = statistics of model goodness

These classes in themselves do not tell us what physical quantities / parameters / variables (pick your favourite term) we will be comparing. Therefore – the next step is to define this (are there ones specific to coastal oceans / shelf-seas?)

It was proposed that the metrics and parameters could be considered almost independently, and treated as a matrix. In some cases the intersections do not work, so some boxes are marked “N/A”:

<table>
<thead>
<tr>
<th>Class</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>2D map of surface temperature</td>
<td>Co-tidal chart</td>
<td>Maps of Rossby radii</td>
</tr>
<tr>
<td>Class 2</td>
<td>Time series of sea-surface height</td>
<td>Tidal constituents at a gauge</td>
<td>Eddy characteristics</td>
</tr>
<tr>
<td>Class 3</td>
<td>N/A</td>
<td>Lagrangian particle tracks</td>
<td>Turbulent kinetic energy spectra</td>
</tr>
<tr>
<td>Class 4</td>
<td>RMS error in significant wave height</td>
<td>Bias in derived MOC transport</td>
<td>Model mismatch in seasonal stratification</td>
</tr>
</tbody>
</table>

*Table: Examples of combining parameters and metrics for model assessment*

Further thoughts were added to the consideration of setting up a list of metrics for coastal model assessments, including questions and considerations from a JCOMP meeting:

- 'Who is the end-user for each variable'? This could help to define a tolerance.
- Need to tighten this up more generally: E.g., compare tolerance for coastal salinity with global / open-ocean!
- Suggest we set priority for each item on these lists (though is not the priority going to be very different for different people?)
- Could also group them into 'tidal processes' / mixing processes / topographic (coastal / bottom) effects?
- The UK Met Office have a 'PEGs” approach = process evaluation group – who identify errors, then try to improve governing processes
Wrapping up the discussion about the coastal model assessments reference list, it was decided to share the parameter list with all COSS-TT members and ask for input, before the list is to be published on the GOV website.

**Action 5.7:** GC and LB to confirm coastal model assessments reference list, drafting communication to COSS-TT and revise with co-chairs.

It was further proposed to set up a small group of volunteers to take this forward, which will include Guillaume Charria (GC) and Lucy Bricheno (LB). The next step would be to adopt the metrics, and make a start with the assessment using a simple approach, and exchanging on other/similar metrics, which have already been used / have been published. This effort could support forming a collaboration of publications (two people would be enough to make a start).

**Action 5.8:** PO to use the agreed communication, to circulate coastal model assessments reference list to COSS-TT members for input, and publish it on the GOV website once confirmed.
3.3. **Altimetry for studies of coastal sea-level processes and regional/coastal models – Session 3**

*Session chairs and conveners were Claire Dufau (CLS), John Wilkin (Rutgers University) and Baptiste Mourre (SOCIB) who kindly provided the presentation and discussion summaries (below).*

This session was specifically focusing on Processes influencing coastal sea-level dynamics, realistic modelling of those processes (ARCOM community session)

<table>
<thead>
<tr>
<th></th>
<th>Presents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Claire Dufau (CLS)</td>
</tr>
<tr>
<td></td>
<td>An overview of recent progress in Coastal Altimetry and its synergies with modeling</td>
</tr>
<tr>
<td>2</td>
<td>John Wilkin (Rutgers University)</td>
</tr>
<tr>
<td></td>
<td>Altimetry in coastal oceanography: highlights from the 10th Coastal Altimetry Workshop (CAW)</td>
</tr>
<tr>
<td>3</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td></td>
<td>Sea-level processes in coastal and shelf seas</td>
</tr>
<tr>
<td>4</td>
<td>Laura Braby (UCT)</td>
</tr>
<tr>
<td></td>
<td>Observed eddy dissipation in the Agulhas Current</td>
</tr>
<tr>
<td>5</td>
<td>Estee Vermeulen (UCT)</td>
</tr>
<tr>
<td></td>
<td>Investigating the relationship between volume transport and sea surface height in the Agulhas Current using the Hybrid Coordinate Ocean Model</td>
</tr>
<tr>
<td>6</td>
<td>John Wilkin (Rutgers University)</td>
</tr>
<tr>
<td></td>
<td>The impact of satellite altimeter observations on data-assimilative model based estimates of circulation in the Mid-Atlantic Bight</td>
</tr>
<tr>
<td>7</td>
<td>Gabriel Vieira de Carvalho (Prooceano)</td>
</tr>
<tr>
<td></td>
<td>Brazilian Coastal Current representation on a 4DVAR regional modelling system</td>
</tr>
<tr>
<td>8</td>
<td>Mounir Benkiran (Mercator Ocean)</td>
</tr>
<tr>
<td></td>
<td>HF processes assimilation in a 1/12° regional model</td>
</tr>
<tr>
<td>9</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td></td>
<td>Modelling high-frequency sea level oscillations associated with meteo-tsunamis over the Balearic shelf</td>
</tr>
<tr>
<td>10</td>
<td>Pierre De Mey (LEGOS)</td>
</tr>
<tr>
<td></td>
<td>Coastal ocean studies in the SWOT Science Team</td>
</tr>
</tbody>
</table>

This session was convened as the continuation of a complementary ARCOM session held during the 10th Coastal Altimetry Workshop (CAW-10) in Florence, 21-24 February 2017.

The session reported on key information presented at CAW-10.
Claire Dufau (CLS)

An overview of recent progress in Coastal Altimetry and its synergies with modeling

Claire Dufau presented a summary of recent technical progress in coastal altimeter data processing and data products relevant to coastal oceanography. Further information was provided in the format of 3 posters about altimetry datasets (ALES/COSTA, PEACHI, DUACS-HR, X-TRACK) with high along-track resolution and/or special processing to reduce noise and provide data proximate to coastlines or in shallow shelf waters.

John Wilkin (Rutgers University)

Altimetry in coastal oceanography: highlights from the 10th Coastal Altimetry Workshop (CAW)

John Wilkin gave an overview of some application highlights from CAW-10 on the use of satellite altimetry to study sea level variability in coastal waters, and data assimilation in coastal and shelf modes.

Baptiste Mourre (SOCIB)

Sea-level processes in coastal and shelf seas

Baptiste Mourre completed the session opening with a review of sea level dynamics in coastal seas to further highlight the potential of altimetry to inform studies of coastal ocean circulation. This included a schematic diagram that summarized ocean dynamics processes having a significant sea level expression according to where the fell in spatial versus temporal scale parameter space; this generated some debate during the discussion session.

The other session presentations (no 4-10) addressed

- integrated modelling and observation of mesoscale sea level variability in boundary current regions (notably the Agulhas Current and coastal southern Africa)
- altimeter data assimilation
- modelling of high frequency processes with sea level signals (e.g. meteo-tsunamis)
- future altimeter observations at high spatial resolution for coastal applications from NASA’s SWOT mission (Surface Water Ocean Topography) to launch in 2021.

Session discussion

The session concluded with a wide-ranging discussion prompted by seed questions:

1) *What physical processes have a signature in Sea Level in the coastal ocean you are modeling?*

2) *Do you have the information you need to begin, or to improve, your use of altimeter data? If not, what do you need - more knowledge about processing, access to data, examples of their usefulness, or other?*
Points of consensus and some recommendations actions arising from the discussion were:

- Sixteen people are already using gridded altimeter products; 25 use along-track data; 30 people indicated enthusiasm for becomes new users of altimeter data for COSS applications.

- It was recommended that a dedicated ARCOM sub-section should be added to the COSS-TT web site that would help direct coastal oceanographers to coastal altimetry resources (noted as actions 5.2 and 5.9 in Appendix D). This would include links to access altimeter data sets (echoing material on the community pages at http://www.coastal.eu/community) but augmented with information for non-expert altimetrists and coastal oceanography users; for example, clear statements of the time range of data availability for single altimeter platform data sets, and notes of proximity to the coast of valid data. The dedicated ARCOM pages could also accumulate tutorial presentations from ARCOM and CAW workshops, and science presentations that provide examples of altimetry for coastal oceanography.

- There was a call for global unified multi-platform high along-track resolution products, such as what the TAPAS initiative (Tailored Altimeter Products for Assimilation Systems) is delivering for European seas.

- Recognizing that appropriate use of altimeter data in coastal regimes is not always straightforward there was interest in training or tutorial activities offered in conjunction with CAW/COSS-TT/ARCOM events. Eighteen attendees indicated they would attend such an event at the next CAW, though the future continuation of CAW distinct from global Ocean Surface Topography Science Team (OSTST) meetings in uncertain.

- There was consensus to keep an ARCOM activity close to the COSS-TT ICM.

Action:
3.4. **Operational and Pre-operational Ocean Forecasting Systems – Session 4**

Session chairs and conveners were *Enda O’Dea* (Met Office) and *Bruno Levier* (Mercator Ocean) who kindly provided the presentation and discussion summaries (below).

This session was specifically focusing on **Coastal forecasting system description and updates; quality and performance of large-scale ocean forecasting systems in the coastal areas**, in the spirit of a better integration between LOFS and R/COFS in GOV.

<table>
<thead>
<tr>
<th></th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zulema Garraffo (NOAA)</td>
</tr>
<tr>
<td></td>
<td>Pre-operational coastal ocean products at NOAA’s NCEP/EMC</td>
</tr>
<tr>
<td>2</td>
<td>Bruno Levier (Mercator Ocean)</td>
</tr>
<tr>
<td></td>
<td>Regional activities at Mercator Ocean</td>
</tr>
<tr>
<td>3</td>
<td>Guimei Liu (NMEFC)</td>
</tr>
<tr>
<td></td>
<td>Development and Application of the coastal Operational Forecasting System in China</td>
</tr>
<tr>
<td>4</td>
<td>Youyu Lu (Fisheries and Oceans Canada)</td>
</tr>
<tr>
<td></td>
<td>High-resolution forecasting models based on NEMO for coastal waters around Canada</td>
</tr>
<tr>
<td>5</td>
<td>Enda O’Dea (Met Office)</td>
</tr>
<tr>
<td></td>
<td>Developments in the Met Office shelf seas forecasting system: 3D data assimilation, high resolution and coupling</td>
</tr>
<tr>
<td>6</td>
<td>Alexander Kurapov (Oregon State University)</td>
</tr>
<tr>
<td></td>
<td>West Coast Ocean Forecast System: skill assessments and analyses of anomalous oceanic conditions in 2014</td>
</tr>
<tr>
<td>7</td>
<td>Nguyen Ba Thuy (National Centre for Hydrometeorological Forecasting – NCHMF)</td>
</tr>
<tr>
<td></td>
<td>The after-runner storm surge along the north coast of Vietnam simulated by the 2D ROMS model</td>
</tr>
<tr>
<td>8</td>
<td>Björn Backeberg (CSIR)</td>
</tr>
<tr>
<td></td>
<td>Assessing how Agulhas Current surface velocities are affected by including sea surface temperature in a data assimilation system using HYCOM and the EnOI</td>
</tr>
<tr>
<td>9</td>
<td>Zhaoyi Wang (NMEFC)</td>
</tr>
<tr>
<td></td>
<td>Application and improvement of Ensemble Optimal Interpolation on Regional Ocean Modeling System (ROMS)</td>
</tr>
<tr>
<td>10</td>
<td>Cecilie Wettre (Norwegian Meteorological Institute)</td>
</tr>
<tr>
<td></td>
<td>Modeling the drift and spread of oil slicks in the Northern Gulf of Mexico using SAR imagery and forcing from a high-resolution hydrodynamic model</td>
</tr>
</tbody>
</table>
Presentations summaries are provided below:

**Zulema Garraffo (NOAA): Pre-operational coastal ocean products at NOAA’s NCEP/EMC**

Development of NOAA coastal forecast system with many applications including hurricane induced storm surge. Interesting to note it is not possible to get data from NRL.

**Guimei Liu (NMEFC): Development and Application of the coastal Operational Forecasting System in China**

Described a large number of systems (9 regions!) aimed at numerous applications including search and rescue, hazardous marine transport amongst many others. Interesting validation made possible by studies related the Hong Kong to Macau Bridge project. (Strong sub surface currents not in modelling system?)

Mike Herzfeld (CSIRO) noted that data assimilation in relation to light attenuation near coast, e.g. bed reflectance etc. is probably required to get the fine details correct.

**Bruno Levier (Mercator Ocean): Regional activities at Mercator Ocean**

Included physical processes based studies, e.g. of coastal jet showing added value of regional systems over LOFS.

**Youyu Lu (Fisheries and Oceans Canada): High-resolution forecasting models based on NEMO for coastal waters around Canada**

This talk included an interesting application of model to arrive at a possible Cold Water Temperature shock with respect to a major fish kill event in Canada.

**Enda O’Dea (Met Office): Developments in the Met Office shelf seas forecasting system: 3D data assimilation, high resolution and coupling**

Enda O’Dea presented a high resolution operational system for European NW shelf with coupling of atmosphere, waves, ocean and land with profile data assimilation.

**Alexander Kurapov (Oregon State University): West Coast Ocean Forecast System: skill assessments and analyses of anomalous oceanic conditions in 2014**

Alex Kurapov demonstrated the need to have extended coastal ocean model to incorporate physical processes such as coastally trapped waves and to get the boundaries sufficiently far away to avoid model boundary signals contaminating the domain of interest.

**Zhaoyi Wang (NMEFC): Application and improvement of Ensemble Optimal Interpolation on Regional Ocean Modeling System (ROMS)**

Showed the improvements of EnOI altimeter assimilation in operational ROMS based forecast system. Note will move to 3dVar and compare with EnOI.
Nguyen Ba Thuy (National Centre for Hydrometeorological Forecasting – NCHMF): The after-runn runner storm surge along the north coast of Vietnam simulated by the 2D ROMS model

This talk demonstrated the value of the coastal (2D) model in reproducing the important physical process of the after-runner storm surges for Northern Vietnam.

Björn Backeberg (CSIR): Assessing how Agulhas Current surface velocities are affected by including sea surface temperature in a data assimilation system using HYCOM and the EnOI

Highlighted the care required in the use of certain coarse resolution products (OSTIA) for assimilation, particularly, in areas of high variability such as the Agulhas. Really demonstrates some of the pitfalls that can occur in applying data assimilation without due care and attention to details of physical systems altered by data assimilation.

Cecilie Wettre (Norwegian Meteorological Institute): Modeling the drift and spread of oil slicks in the Northern Gulf of Mexico using SAR imagery and forcing from a high-resolution hydrodynamic model

This talk demonstrated clearly the need for 3D modelling and wave effects (Stokes Drifts etc.) to reproduce oil slick drift right up to the coast in the Gulf of Mexico. Unique opportunities to validate the modelling is presented by particulars of observations systems here as a result of various incidents in the region.

Session discussion

The session concluded with a wide-ranging discussion prompted by seed questions:

Q1 How do you assess the COFS to comply specific user’s needs?

(Type of metric, delivery of skill scores in NRT, studies on past periods, intercomparisons?)

There is a lack of awareness of how to feedback into large scale systems such as CMEMS global products, but issues with these systems that can affect regional/coastal systems should be fed back, which is possible within CMEMS.

Q2 Following the COSS-TT 2015 workshop, and linked with the EU COST-EOS WG4 project: how to assess the added value of downscaling, and in particular with global reanalysis?

2-Way nesting and/or non-structured grids are seen as the most likely pathway for operational centres to go. Some centres, BSH for example, depend upon 2-way nesting in the Danish Straits (Kattegat) to connect Baltic and North Seas for many years. Where the ocean models go into estuaries, box models of the estuaries were raised. It was not clear if there was any expertise in the room about this.

Note in the follow-on discussions on Friday a “Hydrology Investigation group” led by Cecilie
Wettre volunteered to find a group/person within the hydrology community who could be contacted to improve connections with the coastal ocean modelling community.

Q3 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?)

Bathymetry adjustments, local forcing sets were discussed as possible candidates that could be fed back to large scale systems. In addition, the area of upscaling was addressed. It is clear that upscaling is not currently employed by many operational centres, but this could be an active area to be explored further.
4. Final discussion and outcomes

The last day saw discussions that reflected on COSS-TT science, collaborations with external science groups and the other GOV Task Teams, and the COSS-TT relationship with GOV. All session chairs contributed to the outcome.

4.1. Feedback from science sessions

Coastal model assessment

The discussion addressing coastal model assessment focused on converging on a parameter list (see Appendix) to develop a “model assessment reference” in the Task Team. The list should be shared on the GOV COSS-TT website.

In addition to publishing the parameter list, it was considered setting up a small action group to take this forward. GC and LB are to lead this effort. The group should consider adopting these metrics and to start with the first as a simple exercise. This could lead to other group following the example and supporting the effort by publishing papers. It was stated that a collaboration of 2 people would be enough to start this effort. The proposal by Lucy and Guillaume is to organise an exercise a comparison of large-scale and downscaled coastal systems with the same set of metrics within the COSS-TT. In the process, use and publications related to other/similar metrics should be explored.

Guillaume and Lucy to draft the communication with all and revise with co-chairs, KWB to send to all, asking responses to be sent to Guillaume and Lucy. If required we can set up a smaller mailing list including interested people.

Hydrology

During the meeting, it was highlighted that measurements of freshwater discharge are not always readily available for ocean modellers and that contact with the Hydrological community should be sought to resolve the issue. Freshwater discharge measurements are done using various methods, placement of gauges, etc. COSS-TT could provide recommendations to hydrology representatives. However, there is some concern that being too specific could get the COSS-TT scope too close to hydrology.

It was recommended to check whether hydrology community has similar meetings at which this group could find ways to interact, or whether there is an international body for Hydrology we could engage. It was proposed to explore this connection and find links for communication with the hydrological community(s).

ARCOM and COSS-TT

It was agreed to keep ARCOM and COSS-TT close together. ARCOM should again be invited to the next COSS-TT meeting if more ARCOM / coastal observation product information is demanded by the group. There is consideration to add an ARCOM training day to the next COSS-TT meeting to better inform members of the available products and how they can be used. It was also proposed to link these plans up with TAPAS (Tailored Altimeter Products for Assimilation Systems). Alternatively, it could be tried for ARCOM to work with OSTST on observation data / product training, but the coastal part might need to be handled separately. GOVST and OSTST area already linked.
Action 5.9: Claire Dufau et al. to provide information to KWB for an ARCOM web-page to sit under the GOV pages. KWB to contact them for information.

Ocean Observations for Physics and Climate panel

John Wilkin gave a presentation with focus on integration of ocean observations across the coastal shelf boundary. The presentation highlighted the plans for a “Boundary current / shelf seas interaction group” that is being set up by John within OOPC. The group is planning a workshop in 2018, to recommend an international pilot process experiments in boundary current/shelf-sea regimes to guide the development of sustained observation and modeling; and to improve downscaling of climate models to represent higher frequency, smaller scale processes that drive coastal and shelf circulation, and ecosystem response. Furthermore it is anticipated the a task team for “Boundary Current/Shelf Sea Interaction” could be set up to review previous and on-going boundary current observing experiments; and existing and novel technologies for coordinated shelf-sea/deep-ocean observation which could be presented at Ocean Obs ‘19. GOV and in particular the COSS-TT would be well placed to contribute to this effort.

Presentation available from:  Boundary current and shelf seas interaction

4.2. GOV and COSS-TT interaction

Links with other TTs in GOV

There is strong interest to learn more about the activities and potential overlap with the other GOV Task Teams. Joint meetings are encouraged and invitees from other TTs could provide TT overviews and a cross-link to common activities. This was seen as particular relevant in the context of preparing for the GOV symposium in 2018. Topics of interest could be Bio Argo or other coastal observations, which would be of interest to the MEAP-TT. This can include sharing of information about free access to data products and model code as well as how this material can be made available.

Interaction with the GOVST

Strong emphasis was given for the COSS-TT to integrate closer with the GOV large-scale system community and to update the COSS-TT community on what products are available from GOVST groups for coastal modellers. It was proposed for the COSS-TT to consider to develop papers of LOFS upscaling and through the papers indicate that the COSS-TT community would be happy to contribute to upscaling projects, e.g. in the next topical collection (see more information). Group members should provide a short outline and invite co-authors. This could include a review paper on upscaling initiatives currently carried out in the community or work with observations in coastal areas showing COSS-TT as a catalyst for more interaction.

It was considered to interact stronger with CMEMS on initiative the COSS-TT can contribute to, also with regard of securing funding for core aims. Emil agreed to speak to Alex Barth on organising an initiative in this direction, with further volunteers welcome.

GOV support
Interaction with the GOVST could provide valuable input on the overarching themes in the COSS-TT and derive the science drivers for common activities. This will have to include input and advice from the GOV Patrons Group.

The PO should support the TT through representation of partners (e.g. ARCOM), system descriptions (COFS and LOFS) and activities on the GOV (COSS-TT) website.

Furthermore, GOV can provide:

- Overarching science and R&D topics of interest to whole GOV, which the COSS-TT could translate into questions for the COSS community
- Clear communication and support of Patrons, incl. funded incentive actions
- Easy-to-use information and graphics on the available LOFS products and their characteristics
- More involvement of the TT in the GOV Symposia and training activities (e.g. Summer Schools)

**Final points:**

- List of participants with email/affiliation to all meeting attendees. (Kirsten)
- Meeting report. (Kirsten)
- Kirsten, Villy and Pierre will work on an improved website with links and useful information for the TT (and ARCOM)
- Better defined the roles of TT co-chairs and TT members.
- We have been contacted by colleagues from WCRP Grand Challenge on Coastal Impacts – TT contact: Mauro.
- New Topical Collection (Part 2) will open within ~3 months – Good option to publish results presented here. Will send info soon. Editorial board: Emil, Mauro, Guillaume, Pierre.
- Next TT meeting dates (tentative): 10-14 September 2018.

*Presentation available from: [GOV interactions and support](#)*
5. **COSS Task Team Business Meeting & actions**

A one-hour Task Team Business Meeting (BM) was held on Wednesday, 5 April 2017 (halfway through the meeting). As at every COSS-TT workshop, the BM provides an opportunity for TT members (or their registered substitutes) and co-chairs to discuss actions done since the last meeting or activities planned for the future. The BM was open to all ICWS attendees.

**Introduction**

PDM provided an overview of the TT status and highlighting the roles and responsibilities of the TT co-chairs and members. He reminded the TT of the COSS-TT terms of reference (ToR).

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

The **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”**).

**Membership**

Masafumi Kamachi, GOV member and COSS-TT champion retired after the last meeting. John Siddorn, Met Office has taken over the role and becomes new COSS-TT champion.

It was proposed to consider contacting NRL for an additional member (as Jim Richman retired but still likes to stay on as COSS-TT member). Although contacts are available (via Lucy Bricheno) it was agreed to first consult with Jim Richman in this matter.

Nguyen Ba Thuy, NHMS, Vietnam was invited as member. His group is involved in Tsunami research and he is supported by Met.no regards travel cost and meeting participation.

The GOV Patrons Group is unfortunately not able to provide funding for TT members with financial needs.

**Overview of member changes**

- New members since Lisbon
  - 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 with Cecilie Wettre as substitute
  - Joanna Staneva, HZG, Germany
• Replacements since Lisbon
  – DFO, Canada: Joël Chassé → Youyu Lu
  – IFREMER, France: Franck Dumas → Guillaume Charria

• Leaving the TT
  – Masa Kamachi, MRI, Japan [former COSS-TT champion, retired]

• New member invitations at this meeting
  – Yeqiang Shu, SCSIO, China, as replacement of Jiang Zhu
  – Marcos Garcia Sotillo, Puertos del Estado, Spain
  – Ananda Pascual, IMEDEA, Spain
  – Björn Backeberg, CSIR, South Africa
  – Nguyen Ba Thuy, NHMS, Vietnam

**Links with LOFS – relevance to GOV – COSS-TT characteristics**

The COSS-TT represents an important activity for GOV through providing the link between the COFS (Coastal Ocean Forecasting Systems) and LOFS (Large-scale Ocean Forecasting Systems), specifically with the GOV systems. The COSS-TT serves a much larger science community than the other GOV task teams, integrating systems from diverse geographically areas, fields of expertise and different levels of operationality. Currently, the LOFS are not very well represented at COSS-TT meetings, and so it was recommended to encourage COSS-TT members to become members of LOFS activity groups as well as other GOV TTs.

**Action 5.10:** All COSS-TT member are encouraged to closer engage with science and research groups linked to the GOV large-scale system community, and to feed back to COSS-TT where collaborations or mutual membership would be useful.

**Terms of Reference for the COSS-TT (ToR) and COSS-TT strategy**

The COSS-TT ToR (see Appendix F) was discussed to reconsider the COSS-TT scope, e.g. links/overlap with hydrology. It was proposed to revisit the ToR and consider rewording its content.

**Action 5.11:** TT co-chairs and TT to reword the ToR concerning its scope: Global to coastal scales and shelf regions... or global, shelf, coastal and estuary scales, etc.

The definition of the “Coastal Ocean” should be revisited and checked whether it needs updating. Any changes to the Tor will have to be agreed by the task team.

**TT Science**

Feedback from the Patrons Group confirms support for the COSS-TT science goals:

- COFS – LOFS interaction (GOV will help facilitate the effort) showing the added value of downscaling
- Linking to other TTs (example DA-TT)
- Support the integration with other groups active in the coastal modelling field
**CROSS-TT collaborations**

**ARCOM, CAW and SWOT**

It was agreed that the close collaboration with ARCOM and COSS-TT should continue.

It was stated that it is still unclear whether ARCOM meetings and CAW (Coastal Altimetry Workshop) will exist in parallel. In future, CAW and COSS-TT meetings could happen in the same week, with shared splinter sessions.

CAW and ARCOM have to decide if they like to remain a community or join as one group. The COSS-TT wants to continue the interaction with the altimetry community. The current arrangement of inviting ARCOM representatives to COSS meetings works well. Additional links with CAW on setting up help, tutorials for the coastal modellers was considered.

In addition, links with the SWOT science team is also being considered. PdM will talk to Nadia Ayoub.

**WCRP Grand Challenge**

COSS-TT was contacted by WCRP Grand Challenge on coastal impacts, particular on long term sea level monitoring. Long term monitoring is one of the drivers for the COSS-TT science strategy.

Mauro confirmed he would be happy to serve as a liaison between COSS and WCRP Grand Challenge, knowing Katja Domingue. Mauro is an associated members of the IQuOD (International Quality controlled Ocean Database).

**Action 5.12:** Co-chairs and MC to consider inviting members of the Grand Challenge to the next COSS-TT meeting.

**Collaboration with the COST-EOS (validation of reanalysis)**

The COST-EOS project is now half completed and organised a few workshop. It is now launching papers about regional/coastal ocean synthesis comparisons. COSS-TT members are welcome to participate in this intercomparison, which would also involve COSS-TT as a group. The COSS-TT should set up a strategy of encouraging involvement in external projects.

**Any other topics**

It was proposed to consider writing a *white paper*, which can work as a summary paper for the next GOV symposium. This will encourage close collaboration within the COSS-TT and will keep people at working together, providing momentum for the GOV symposium.

**Intercomparison of coastal models** could work by inviting groups to compare model output located in the same region (using the same or similar model domain, resolution, observations, forcings, etc.)

Updating the information in the SIT and include areas of geographical coverage, would be helpful for learning where group domains overlap.

An activity agreed in Lisbon is being followed up, and relates to “Comparing the LOFS solution to the downscaled COFS with the same metrics”. This should continue and could be provide papers for the new Topical Collection.
Information about the COSS-TT on the GOV website should be updated and improved. The PO and COSS-TT co-chairs to consider how to do this, to improve COSS-TT visibility of the groups and coverage, also to link to LOFS, COFS. A plan for improvements and implementation on website to be developed asap.

**Action 5.13:** PO to provide list of participants with email/ affiliation to all meeting attendees

### Topical collection

The second Topical Collection (TC-2) of the COSS-TT was agreed, and 12 people in the room agreed to contribute.

As a similar effort has just started in NOAA on a similar topic (coastal ocean prediction) we should:

- follow our own schedule and identify special topics that fit with the current COSS-TT related science issues
- make sure that the TC is supported by enough authors from the COSS-TT and wider community
- make sure material is available, but we need to identify the right topic

Ocean Dynamics is a good and fitting journal; however, timescales are not completely clear. For example we could start in 1 year, leaving the call open for 1 year, with the white paper being published beforehand.

It was agreed that five TC editors (Mauro Cirano, Emil Stanev, Guillaume Charria, Pierre de May-Frémaux and Villy Kourafalou) would support the effort.

**Action 5.14:** PO to add list of papers from the Topical Collection (with link to papers) to the GOV website

**Action 5.15:** TC editors (and PO if needed) to enquire with potential authors of the TC and ask for an expression of interest to participate.

Payment from Patrons for Topical Collection print is pending (PO and COSS-TT co-chairs to follow up)

### 6. Next meeting

We are planning the next meeting in autumn 2018, specifically 10-14 September. The COSS-TT would like to propose that the GOV symposium should be organised in late October/early Nov 2018.

The location on the meeting will be determined in the next few months.
### Appendices

**Appendix A: Meeting agenda**

#### DAY 1: Monday, 3 April 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>Topics and presentations</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30-12:30</td>
<td>Registration (Badges, poster hang-up, etc.)</td>
<td>Local hosts</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td>Lunch (1 hour)</td>
<td></td>
</tr>
<tr>
<td><strong>Introduction Session</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:30 – 13:40</td>
<td>Welcome: Announcements, practical information, location, local hosts, posters, meals, social events, etc.</td>
<td>Local hosts</td>
</tr>
<tr>
<td>13:40 – 14:00</td>
<td>Invited presentation</td>
<td>Marjolaine Krug (CSIR)</td>
</tr>
<tr>
<td>14:00 – 14:20</td>
<td>Recent GOV activities and patrons’ feedback</td>
<td>Kirsten Wilmer-Becker (GOV PO)</td>
</tr>
<tr>
<td>14:20 – 14:40</td>
<td>Meeting objectives and discussion</td>
<td>Pierre De Mey and Villy Kourafalou</td>
</tr>
<tr>
<td><strong>Session 1 – Science in support of coastal ocean forecasting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:40 – 15:00</td>
<td>Modelling the impact of Large Agulhas Current Meanders on Shelf Waters</td>
<td>Neil Malan (UCT/SAEON)</td>
</tr>
<tr>
<td>15:00 – 15:20</td>
<td>Remote versus local forcing of the Eastern Boundary Upwelling Systems of the Southern Hemisphere</td>
<td>Séréna Illig (LEGOS/ICEMASA)</td>
</tr>
<tr>
<td>15:20 – 15:40</td>
<td>The role of large-scale modes of climate variability on the Cape Point wave record</td>
<td>Jennifer Veitch (SAEON)</td>
</tr>
<tr>
<td>15:40 – 16:00</td>
<td>Coffee break (20 min)</td>
<td></td>
</tr>
<tr>
<td>16:00 – 16:20</td>
<td>An ocean-atmosphere-wave regional coupled model: improving predictions in the North Sea and Baltic Sea</td>
<td>Joanna Staneva (HZG)</td>
</tr>
<tr>
<td>16:20 – 16:40</td>
<td>Coastal modelling of a mega delta; tide and river interactions</td>
<td>Lucy Bricheno (NOC)</td>
</tr>
<tr>
<td>16:40 – 17:00</td>
<td>Impact of the tides, wind and shelf circulation on the Gironde river plume dynamics</td>
<td>Florence Toublanc (LEGOS)</td>
</tr>
<tr>
<td>17:00 – 17:20</td>
<td>Session 1 - poster 5’ presentation (2 posters) and discussion</td>
<td></td>
</tr>
<tr>
<td>17:20 – 19:00</td>
<td>Poster session and ice-breaker (at Breakwater Lodge/ meeting venue)</td>
<td></td>
</tr>
<tr>
<td>19:00</td>
<td>End of day 1</td>
<td></td>
</tr>
</tbody>
</table>
### DAY 2: Tuesday, 4 April 2017

#### Session 1 – Science in support of coastal ocean forecasting (continued from Day 1)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 – 09:20</td>
<td>Inter-basin exchange in the Azov-Black-Marmara-Mediterranean Seas</td>
<td>Emil Stanev (HZG)</td>
</tr>
<tr>
<td>09:20 – 09:40</td>
<td>From regional ocean to shelf coastal sea modeling: dynamical downscaling of the CMEMS (MED-MFC) products and estuarine dynamics representation</td>
<td>Rita Lecci (CMCC)</td>
</tr>
<tr>
<td>09:40 – 10:00</td>
<td>A multiplatform experiment to unravel meso- and submesoscale processes in an intense front (AlborEx)</td>
<td>Ananda Pascual (IMEDEA/CSIC-UIB)</td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td><strong>Coffee break and poster viewing</strong></td>
<td></td>
</tr>
<tr>
<td>10:30 – 10:50</td>
<td>Ongoing research for a French coastal integrated ocean observing system</td>
<td>Guillaume Charria (Ifremer)</td>
</tr>
<tr>
<td>10:50 – 11:10</td>
<td>Response of coastal ocean to the heavy rainfall in the mid-latitude coastal ocean: numerical simulations in the Yellow Sea</td>
<td>Byoung-Ju Choi (Kusan National University)</td>
</tr>
<tr>
<td>11:10 – 11:30</td>
<td>Applications of a high-resolution bay/coastal regional system to process studies at the Baía de Todos os Santos and adjacent Eastern Brazilian Shelf</td>
<td>Mauro Cirano (REMO)</td>
</tr>
<tr>
<td>11:30 – 12:00</td>
<td>Discussion on presentations and on science in support of coastal ocean forecasting (led by session chairs + TT co-chairs)</td>
<td></td>
</tr>
<tr>
<td>12:00 – 14:00</td>
<td><strong>Lunch break</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Session 2 – Coastal observing systems and model assessment

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00 – 14:20</td>
<td>Comparison of global, regional and coastal operational model solutions in the IBI Area: A review of CMEMS core &amp; PdE downstream ocean forecast services on Spanish coastal waters</td>
<td>Marcos Garcia Sotillo (Puertos del Estado)</td>
</tr>
<tr>
<td>14:20 – 14:40</td>
<td>Global and regional model comparison: OFAM vs. eReefs</td>
<td>Mike Herzfeld (CSIRO)</td>
</tr>
<tr>
<td>14:40 – 15:00</td>
<td>Operational forecasting at the German coast - local vs. global models</td>
<td>Frank Janssen (BSH)</td>
</tr>
<tr>
<td>15:00 – 15:30</td>
<td><strong>Session 2 - poster 5-min presentations (5 presentations) and discussion</strong></td>
<td></td>
</tr>
<tr>
<td>15:30 – 16:00</td>
<td><strong>Coffee break and poster viewing</strong></td>
<td></td>
</tr>
<tr>
<td>16:00 – 16:20</td>
<td>Assessment of operational ocean forecasting systems in the Western Mediterranean using multiplatform in situ data and an eddy tracker</td>
<td>Simon Ruiz (IMEDEA/CSIC-UIB)</td>
</tr>
<tr>
<td>16:20 – 16:40</td>
<td>Stochastic Coastal/Regional Uncertainty Modelling: insights from ensemble sensitivity/consistency experiments</td>
<td>Pierre De Mey (LEGOS)</td>
</tr>
<tr>
<td>16:40 – 17:00</td>
<td>Discussion on presentations and on science in support of model assessment + slides on COST-EOS (led by session chairs + TT co-chairs)</td>
<td></td>
</tr>
<tr>
<td>17:00</td>
<td><strong>End of day 2</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Session 3 — Altimetry for studies of coastal sea-level processes and regional/coastal models

*continuation of ARCOM session at CAW10*

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 – 09:20</td>
<td>An overview of recent progress in Coastal Altimetry and its synergies with modeling</td>
<td>Claire Dufau (CLS)</td>
</tr>
<tr>
<td>09:20 – 09:40</td>
<td>Altimetry in coastal oceanography: highlights from the 10th Coastal Altimetry Workshop (CAW)</td>
<td>John Wilkin (Rutgers University)</td>
</tr>
<tr>
<td>09:40 – 10:00</td>
<td>Sea-level processes in coastal and shelf seas</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td>10:00 – 10:30</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>10:30 – 10:50</td>
<td>Observed eddy dissipation in the Agulhas Current</td>
<td>Laura Braby (UCT)</td>
</tr>
<tr>
<td>10:50 – 11:10</td>
<td>Investigating the relationship between volume transport and sea surface height in the Agulhas Current using the Hybrid Coordinate Ocean Model</td>
<td>Estee Vermeulen (UCT)</td>
</tr>
<tr>
<td>11:10 – 11:30</td>
<td>The impact of satellite altimeter observations on data-assimilative model based estimates of circulation in the Mid-Atlantic Bight</td>
<td>John Wilkin (Rutgers University)</td>
</tr>
<tr>
<td>11:30 – 11:50</td>
<td>Brazilian Coastal Current representation on a 4DVAR regional modelling system</td>
<td>Gabriel Vieira de Carvalho (Prooceano)</td>
</tr>
<tr>
<td>11:50 – 13:30</td>
<td>Lunch break</td>
<td></td>
</tr>
<tr>
<td>13:30 – 13:50</td>
<td>HF processes assimilation in a 1/12° regional model</td>
<td>Mounir Benkiran (CLS)</td>
</tr>
<tr>
<td>13:50 – 14:10</td>
<td>Modelling high-frequency sea level oscillations associated with meteotsunamis over the Balearic shelf</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td>14:10 – 14:30</td>
<td>Coastal ocean studies in the SWOT Science Team</td>
<td>Pierre De Mey (LEGOS)</td>
</tr>
<tr>
<td>14:30 – 15:15</td>
<td>Discussion (led by ARCOM Science Team co-chairs)</td>
<td></td>
</tr>
<tr>
<td>15:15 – 15:45</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>15:45 – 16:45</td>
<td>COSS Task Team meeting</td>
<td></td>
</tr>
<tr>
<td>16:45</td>
<td>End of day 3</td>
<td></td>
</tr>
</tbody>
</table>
### Session 4 – Operational and pre-operational coastal ocean forecasting systems

**Presenter**: Session chairs: Enda O’Dea and Bruno Levier

<table>
<thead>
<tr>
<th>Time</th>
<th>Topics</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:30 – 09:50</td>
<td>Pre-operational coastal ocean products at NOAA’s NCEP/EMC</td>
<td>Zulema Garraffo (NOAA)</td>
</tr>
<tr>
<td>09:50 – 10:10</td>
<td>Regional activities at Mercator Ocean</td>
<td>Bruno Levier (Mercator Ocean)</td>
</tr>
<tr>
<td>10:10 – 10:30</td>
<td><strong>Session 4 - poster 5-min presentations (6 presentations) and discussion</strong></td>
<td></td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Coffee break and poster viewing</td>
<td></td>
</tr>
<tr>
<td>11:00 – 11:20</td>
<td>Development and Application of the coastal Operational Forecasting System in China</td>
<td>Guimei Liu (NMEFC)</td>
</tr>
<tr>
<td>11:20 – 11:40</td>
<td>High-resolution forecasting models based on NEMO for coastal waters around Canada</td>
<td>Youyu Lu (Fisheries and Oceans Canada)</td>
</tr>
<tr>
<td>11:40 – 12:00</td>
<td>Developments in the Met Office shelf seas forecasting system: 3D data assimilation, high resolution and coupling</td>
<td>Enda O’Dea (Met Office)</td>
</tr>
<tr>
<td>12:00 – 14:00</td>
<td>Lunch break</td>
<td></td>
</tr>
<tr>
<td>14:00 – 14:20</td>
<td>West Coast Ocean Forecast System: skill assessments and analyses of anomalous oceanic conditions in 2014</td>
<td>Alexander Kurapov (Oregon State University)</td>
</tr>
<tr>
<td>14:20 – 14:40</td>
<td>The after-runner storm surge along the north coast of Vietnam simulated by the 2D ROMS model</td>
<td>Nguyen Ba Thuy (National Centre for Hydrometeorological Forecasting – NCHMF)</td>
</tr>
<tr>
<td>14:40 – 15:00</td>
<td>Assessing how Agulhas Current surface velocities are affected by including sea surface temperature in a data assimilation system using HYCOM and the EnOI</td>
<td>Björn Backeberg (CSIR)</td>
</tr>
<tr>
<td>15:00 – 15:30</td>
<td>Coffee break and poster viewing</td>
<td></td>
</tr>
<tr>
<td>15:30 – 15:50</td>
<td>Application and improvement of Ensemble Optimal Interpolation on Regional Ocean Modeling System (ROMS)</td>
<td>Zhaoyi Wang (NMEFC)</td>
</tr>
<tr>
<td>15:50 – 16:10</td>
<td>Modeling the drift and spread of oil slicks in the Northern Gulf of Mexico using SAR imagery and forcing from a high-resolution hydrodynamic model</td>
<td>Cecilie Wettre (Norwegian Meteorological Institute)</td>
</tr>
<tr>
<td>16:10 – 16:30</td>
<td>Discussion on presentations and on science in support of model assessment (led by session chairs + TT co-chairs)</td>
<td></td>
</tr>
<tr>
<td>16:30</td>
<td><strong>End of day 3</strong></td>
<td></td>
</tr>
<tr>
<td>~19:00</td>
<td><strong>Meeting dinner at the Two Ocean Aquarium, Waterfront</strong></td>
<td></td>
</tr>
</tbody>
</table>
DAY 5  Friday, 7 April 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>Topics and presentations</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:30 – 10:15</td>
<td>Panel discussion on COSS-TT science and links with other Task Teams – Panel members: all session chairs and TT co-chairs – <strong>led by Emil Stanev and Villy Kourafalou</strong></td>
<td></td>
</tr>
<tr>
<td>10:15 – 10:45</td>
<td>Coffee break and poster removal</td>
<td></td>
</tr>
<tr>
<td>10:45 – 11:30</td>
<td>Discussion on the role of the COSS Task Team within GODAE OceanView and feedback onto large-scale forecasting systems – <strong>led by Pierre De Mey and Kirsten Wilmer-Becker</strong></td>
<td></td>
</tr>
<tr>
<td>11:30 – 12:00</td>
<td>Meeting conclusions, actions, thanks (TT co-chairs, KWB, local hosts)</td>
<td></td>
</tr>
<tr>
<td>12:00 – 13:00</td>
<td>Lunch</td>
<td></td>
</tr>
</tbody>
</table>

Posters

<table>
<thead>
<tr>
<th>No</th>
<th>Session</th>
<th>Poster title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Addressing Challenges of Coastal Communities through Ocean Research for Developing Economies (ACCORD)</td>
<td>Lucy Bricheno (NOC)</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Modelling and Observing the East Australian Current System and its impacts on shelf circulation</td>
<td>Moninya Roughan (UNWS Australia)</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Significance of model-data comparisons for high-resolution coastal simulations: an example in the Bay of Biscay (North-East Atlantic)</td>
<td>Nadia Ayoub (LEGOS/CNRS)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>An Improvement of model performance in according high resolution in the Coastal area</td>
<td>Jin-Yong Choi (KIOST)</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>Towards a Coastal Modelling System for South Africa: A St Helena Bay Case Study</td>
<td>Charine Collins (SAEON)</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>Multi-platform coastal model assessment and impact of downscaling in the Western Mediterranean Sea</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>“Operational oceanography and coastal forecasting” Joint Research Activity Project in JERICO-NEXT, the European Coastal Observatory Network</td>
<td>Baptiste Mourre (SOCIB)</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>The UKC2 regional coupled prediction system</td>
<td>Lucy Bricheno (NOC)</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>Development of an Infrastructure for South African Shelf and Coastal modelling</td>
<td>Deirdre Byrne (National Department of Environmental Affairs, South Africa)</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>Recent Development of Operational Forecasting System for Hydro-dynamic Characteristics over the seas around Korea</td>
<td>Kwang-Soon Park (KIOST)</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>Development of a Brazilian Integrated Operation Forecast Model</td>
<td>Bruno Primo (LOF/COPPE)</td>
</tr>
</tbody>
</table>
## Appendix B: Participants list

<table>
<thead>
<tr>
<th>No</th>
<th>First name</th>
<th>Name</th>
<th>Affiliation</th>
<th>Country</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nadia</td>
<td>Ayoub</td>
<td>LEGOS/CNRS</td>
<td>France</td>
<td><a href="mailto:nadia.ayoub@legos.obs-mip.fr">nadia.ayoub@legos.obs-mip.fr</a></td>
</tr>
<tr>
<td>2</td>
<td>Nguyen</td>
<td>Ba Thuy</td>
<td>National Centre for Hydrometeorological Forecasting - NCHMF</td>
<td>Vietnam</td>
<td><a href="mailto:thuybanguyen@gmail.com">thuybanguyen@gmail.com</a></td>
</tr>
<tr>
<td>3</td>
<td>Björn</td>
<td>Backeberg</td>
<td>CSIR / Nansen-Tutu Centre</td>
<td>South Africa</td>
<td><a href="mailto:BBackeberg@csir.co.za">BBackeberg@csir.co.za</a></td>
</tr>
<tr>
<td>4</td>
<td>Mounir</td>
<td>Benkiran</td>
<td>Mercator Ocean</td>
<td>France</td>
<td><a href="mailto:mbenkiran@mercator-ocean.fr">mbenkiran@mercator-ocean.fr</a></td>
</tr>
<tr>
<td>5</td>
<td>Laura</td>
<td>Braby</td>
<td>Department of Oceanography, University of Cape Town</td>
<td>South Africa</td>
<td><a href="mailto:laurabraby@gmail.com">laurabraby@gmail.com</a></td>
</tr>
<tr>
<td>6</td>
<td>Lucy</td>
<td>Bricheno</td>
<td>National Oceanography Centre</td>
<td>UK</td>
<td>luic noc.ac.uk</td>
</tr>
<tr>
<td>7</td>
<td>Deirdre</td>
<td>Byrne</td>
<td>National Department of Environmental Affairs, South Africa</td>
<td>South Africa</td>
<td>dbyrne environment.gov.za</td>
</tr>
<tr>
<td>8</td>
<td>Guillaume</td>
<td>Charria</td>
<td>IFREMER / LOPS</td>
<td>France</td>
<td><a href="mailto:guillaume.charria@ifremer.fr">guillaume.charria@ifremer.fr</a></td>
</tr>
<tr>
<td>9</td>
<td>Byoung-Ju</td>
<td>Choi</td>
<td>Kunsan National University</td>
<td>Korea</td>
<td>bjchoi kunsan.ac.kr</td>
</tr>
<tr>
<td>10</td>
<td>Jin-Yong</td>
<td>Choi</td>
<td>KIOST</td>
<td>KOREA</td>
<td><a href="mailto:dol76@kiost.ac.kr">dol76@kiost.ac.kr</a></td>
</tr>
<tr>
<td>11</td>
<td>Mauro</td>
<td>Cirano</td>
<td>REMO</td>
<td>Brazil</td>
<td><a href="mailto:mauro.cirano@gmail.com">mauro.cirano@gmail.com</a></td>
</tr>
<tr>
<td>12</td>
<td>Charine</td>
<td>Collins</td>
<td>South African Environmental Observation Network (SAEON)</td>
<td>South Africa</td>
<td>charine saeon.ac.za</td>
</tr>
<tr>
<td>13</td>
<td>Pierre</td>
<td>De Mey</td>
<td>CNRS/LEGOS</td>
<td>France</td>
<td><a href="mailto:pdm789@gmail.com">pdm789@gmail.com</a></td>
</tr>
<tr>
<td>14</td>
<td>Marcos</td>
<td>Garcia Sotillo</td>
<td>Puertos del Estado</td>
<td>Spain</td>
<td><a href="mailto:marcos@puertos.es">marcos@puertos.es</a></td>
</tr>
<tr>
<td>15</td>
<td>Zulema</td>
<td>Garraffo</td>
<td>IMSG at NOAA/NCEP/EMC</td>
<td>USA</td>
<td><a href="mailto:zulema.garraffo@noaa.gov">zulema.garraffo@noaa.gov</a></td>
</tr>
<tr>
<td>16</td>
<td>Ki-Young</td>
<td>Heo</td>
<td>Korea Institute of Ocean Science and Technology</td>
<td>Korea</td>
<td><a href="mailto:kyheo21@kiost.ac.kr">kyheo21@kiost.ac.kr</a></td>
</tr>
<tr>
<td>17</td>
<td>Juliet</td>
<td>Hermes</td>
<td>SAEON</td>
<td>South Africa</td>
<td>juliet saeon.ac.za</td>
</tr>
<tr>
<td>18</td>
<td>Mike</td>
<td>Herzfeld</td>
<td>CSIRO</td>
<td>Australia</td>
<td><a href="mailto:mike.herzfeld@csiro.au">mike.herzfeld@csiro.au</a></td>
</tr>
<tr>
<td>19</td>
<td>Serena</td>
<td>Illig</td>
<td>IRD</td>
<td>France</td>
<td><a href="mailto:serena.illig@legos.obs-mip.fr">serena.illig@legos.obs-mip.fr</a></td>
</tr>
<tr>
<td>20</td>
<td>Rodrigue</td>
<td>Anicet Imbol</td>
<td>University of Cape Town</td>
<td>South Africa</td>
<td><a href="mailto:rodrigueanicet@gmail.com">rodrigueanicet@gmail.com</a></td>
</tr>
<tr>
<td>21</td>
<td>Frank</td>
<td>Janssen</td>
<td>BSH</td>
<td>Germany</td>
<td>frank <a href="mailto:janssen@bsh.de">janssen@bsh.de</a></td>
</tr>
<tr>
<td>22</td>
<td>Villy</td>
<td>Kourafalou</td>
<td>Univ. of Miami</td>
<td>USA</td>
<td>vkourafalou rsmas.miami.edu</td>
</tr>
<tr>
<td>23</td>
<td>Marjolaine</td>
<td>Krug</td>
<td>CSIR</td>
<td>South Africa</td>
<td><a href="mailto:mkrug@csir.co.za">mkrug@csir.co.za</a></td>
</tr>
<tr>
<td>24</td>
<td>Alexander</td>
<td>Kurapov</td>
<td>Oregon State University</td>
<td>USA</td>
<td>kurapov coas.oregonstate.edu</td>
</tr>
<tr>
<td>25</td>
<td>Jae-Il</td>
<td>Kwon</td>
<td>Korea Institute of Ocean Science and Technology</td>
<td>Korea</td>
<td><a href="mailto:jikwon@kiost.ac.kr">jikwon@kiost.ac.kr</a></td>
</tr>
<tr>
<td>26</td>
<td>Rita</td>
<td>Lecci</td>
<td>CMCC Foundation</td>
<td>Italy</td>
<td><a href="mailto:rita.lecci@cmcc.it">rita.lecci@cmcc.it</a></td>
</tr>
<tr>
<td>27</td>
<td>Bruno</td>
<td>Levier</td>
<td>Mercator Ocean</td>
<td>France</td>
<td><a href="mailto:bruno.levier@mercator-ocean.fr">bruno.levier@mercator-ocean.fr</a></td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Affiliation</td>
<td>Location</td>
<td>Email</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------</td>
<td>---------------------------------------</td>
<td>--------------</td>
<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Guimei Liu</td>
<td>NMEFC</td>
<td>China</td>
<td><a href="mailto:LIUGM@NMEFC.GOV.CN">LIUGM@NMEFC.GOV.CN</a></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Youyu Lu</td>
<td>Fisheries and Oceans Canada</td>
<td>Canada</td>
<td><a href="mailto:youyu.lu@dfo-mpo.gc.ca">youyu.lu@dfo-mpo.gc.ca</a></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Neil Malan</td>
<td>University of Cape Town/SAEON</td>
<td>South Africa</td>
<td><a href="mailto:neilmalan@gmail.com">neilmalan@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Baptiste Mourre</td>
<td>SOCIB</td>
<td>Spain</td>
<td><a href="mailto:bmourre@socib.es">bmourre@socib.es</a></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Enda O'Dea</td>
<td>Met Office</td>
<td>UK</td>
<td><a href="mailto:enda.odega@metoffice.gov.uk">enda.odega@metoffice.gov.uk</a></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Kwang-Soon Park</td>
<td>Korea Institute of Ocean Science and Technology</td>
<td>Korea</td>
<td><a href="mailto:kspark@kiost.ac.kr">kspark@kiost.ac.kr</a></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Ananda Pascual</td>
<td>IMEDEA(CSIC-UIB)</td>
<td>SPAIN</td>
<td><a href="mailto:ananda.pascual@imedea.uib-csic.es">ananda.pascual@imedea.uib-csic.es</a></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Bruno Primo</td>
<td>LOF/COPPE</td>
<td>Brazil</td>
<td><a href="mailto:brunovps@gmail.com">brunovps@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Moninya Roughan</td>
<td>UNSW Australia</td>
<td>Australia</td>
<td><a href="mailto:mroughan@unsw.edu.au">mroughan@unsw.edu.au</a></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Simon Ruiz</td>
<td>IMEDEA (CSIC-UIB)</td>
<td>Spain</td>
<td><a href="mailto:simon.ruiz@imedea.uib-csic.es">simon.ruiz@imedea.uib-csic.es</a></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Emil Stanev</td>
<td>Institute of Coastal Research, HZG</td>
<td>Germany</td>
<td><a href="mailto:emil.stanev@hzg.de">emil.stanev@hzg.de</a></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Joanna Staneva</td>
<td>Institute for Coastal Research, HZG</td>
<td>Germany</td>
<td><a href="mailto:joanna.staneva@hzg.de">joanna.staneva@hzg.de</a></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Florence Toublanc</td>
<td>CNES</td>
<td>FRANCE</td>
<td><a href="mailto:florence.toublanc@legos.obs-mip.fr">florence.toublanc@legos.obs-mip.fr</a></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Jennifer Veitch</td>
<td>SAEON</td>
<td>South Africa</td>
<td><a href="mailto:jenny@saeon.ac.za">jenny@saeon.ac.za</a></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Estee Vermeulen</td>
<td>University of Cape Town</td>
<td>South Africa</td>
<td><a href="mailto:esteever01@gmail.com">esteever01@gmail.com</a></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Marcello Vichi</td>
<td>UCT</td>
<td>South Africa</td>
<td><a href="mailto:marcello.vichi@uct.ac.za">marcello.vichi@uct.ac.za</a></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Gabriel Vieira de Carvalho</td>
<td>Prooceano</td>
<td>Brazil</td>
<td><a href="mailto:gabriel@prooceano.com.br">gabriel@prooceano.com.br</a></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Zhaoyi Wang</td>
<td>NMEFC</td>
<td>China</td>
<td><a href="mailto:wang_zhaoyi@163.com">wang_zhaoyi@163.com</a></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Ceclie Wettre</td>
<td>Met.no</td>
<td>Norway</td>
<td><a href="mailto:ceciliew@met.no">ceciliew@met.no</a></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>John Wilkin</td>
<td>Rutgers University</td>
<td>USA</td>
<td><a href="mailto:jwilkin@rutgers.edu">jwilkin@rutgers.edu</a></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Kirsten Wilmer-Becker</td>
<td>Met Office</td>
<td>UK</td>
<td><a href="mailto:kirsten.wilmer-becker@metoffice.gov.uk">kirsten.wilmer-becker@metoffice.gov.uk</a></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C: List of session “Seed questions”

Session – Intro

Session chairs: Björn Backeberg and Joanna Staneva

Challenges for the coastal observing system

Key considerations:
- New observing systems technologies
- Synergy between observing systems, modelling and forecasting systems
- Linkages of the COSS-TT activities to the other GOV TTs

Session 1 - Science in support to coastal ocean forecasting

with the following special themes in particular: representation of coastal upwellings and river plumes in models, including interdisciplinary aspects (bgc, sediments).

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.

1) Are we able to identify the most significant physical-meteorological processes that to some extent act on all the world shelves and coastal waters?

2) 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;

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

Session 2 - Coastal model assessment

with the following special theme in particular: comparison of large-scale and downscaled coastal systems with the same set of metrics (as agreed in Lisbon).

Session chairs: Lucy Bricheno and Guillaume Charria

1) As models become increasingly high-resolution, how can we design (integrated?) metrics which do not introduce the ‘double penalty’ problem?
2) How do we compare large-scale and downscaled models when they are on different domains e.g. the land/sea mask varies?

3) Comparing instantaneous (often observed) with time averaged variables (which are often output from models)

4) How can model and observation uncertainties be taken into account in model assessment?

5) What are methodologies to further explore for estimating model uncertainties (e.g. stochastic modelling)?

6) Following existing downscaling approaches (e.g. 1 way nesting, 2 ways nesting, online, offline), how do we assess the improvements related to downscaled solutions? For example, in which kind of region (e.g. wide/thin shelf) or dynamical regime (e.g. intense slope current, rofi regime) two-way nested solutions benefit downscaled and large-scale solutions?

**Session 3 - Altimetry for regional/coastal ocean models**
with the following special theme in particular: processes influencing coastal sea-level dynamics, realistic modelling of those processes ([ARCOM](https://www.arcom.eu)) community session)

**Session chairs:** Claire Dufau and John Wilkin

1) What physical processes have a signature in Sea Level in the coastal ocean you are modeling?

2) Do you have the information you need to begin, or to improve, your use of altimetry data? If not, what do you need - more knowledge about processing, access to data, examples of their usefulness, or other?

**Session 4 - Operational and pre-operational ocean forecasting systems**
with the following special themes in particular: coastal forecasting system description and updates; quality and performance of large-scale ocean forecasting systems in the coastal areas.

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

1) How do you assess the COFS to comply with specific user’s needs? (type of metric, delivery of skill scores in NRT, studies on past periods, intercomparisons?)

2) 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.
3) How can LOFS benefit from COFS development? Improving the sharing of tools and forcing datasets (river inputs, bathymetry, validation datasets etc...) and vice versa, what has to be improved in LOFS to benefit the COFS? (tides/no tides, frequency of outputs, bathymetry, specific evaluation?)

4) Can we, and how can we, improve the functioning of the COSS-TT to enhance GOV integration?
Appendix D: Coastal model assessment parameter list

Group 1 = Traditional variables (directly observed)
- u, v, w velocities
- water level / sea surface height
- wave (Hs, direction, period)
- 3D temperature
- 3D salinity
- ice cover
- ice thickness
- turbulent dissipation (rate)
- chlorophyll content
- suspended sediment concentration / sediment size

Group 2 = Derived variables (requires post-processing or online diagnostics)
- Total ocean heat content
- Transport (volume / heat / etc) through a section
- Surface fluxes (heat, salt)
- Total ice volume rather than ice cover area
- Boundary current separation (average position)
- Sediment flux
- Vertical / lateral gradients
- Lagrangian metrics / Lagrangian diffusion
- Relative vorticity (Surface)
- “tidal stuff”
- Tidal constituents (M2, M4, ...)
- Amphidromic position
- Tidal phase
- “mixing stuff”
- Mixing metrics
- Mixed layer depth
- Eddy kinetic energy
- Derived numbers (stratification - N²)
- Potential energy anomaly

Group 3 = Process-based metrics (requires dynamical understanding)
- Representative length scales (Rossby radius, tidal excursion)
- Representative time scales (e.g. tidal / seasonal?)
- Plume behaviour (stratification index)
- Eddies (number of eddies, size, cyclonic/anticyclonic, ...)
- Internal waves
- Fourier / spectral analysis
- Mixing lengthscales / timescales

Dimensionless numbers
- Simpson-Hunter
- Baroclinic/Rossby number
- Barotropic Rossby number
- Richardson Number (stratification),
- Froude,
- Burger (and slope Burger),
- Ekman Number
- Kelvin Number
In Lisbon COSS-TT, we defined 4 classes of common metrics for model assessment:

Class 1 = maps, can be a monthly averaged, depth averaged slice, or a daily average at a specific depth.

Class 2 = model representation at known observation sites / mooring points. Slices across ocean sections / time series at moorings

Class 3 = derived quantities (e.g. MOC, ocean heat content..)

Class 4 = statistical analysis comparing model/observations (e.g. rms error / biases)
### Appendix E: Action & agreement list from the 5th COSS-TT meeting (ICMS)

<table>
<thead>
<tr>
<th>No</th>
<th>Owner</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>KWB</td>
<td><strong>PO</strong> in collaboration with Mauro Cirano, Claire Dufau and the COSS-TT co-chairs to collect and add information to the system information table (SIT) about usage of altimetry data by regions and altimetry applications (in collaboration with ARCOM group), and carry out a general update of the SIT with fresh information.</td>
</tr>
<tr>
<td>5.2</td>
<td>KWB</td>
<td><strong>PO</strong> to set aside space on GOV website (COSS-TT pages) for representation of joint COSS-TT/ARCOM activities.</td>
</tr>
<tr>
<td>5.3</td>
<td>Cecilie Wettre + hydrology group</td>
<td>Led by <strong>Cecilie Wettre</strong> a “Hydrology-link group” (Youyu Lu, Mike Herzfeld, John Wilkin, Mauro Cirano, Endo O’Dea, Nadia Ayoub, and Cecilie Wettre) to investigate contacts in the hydrology community for information about river runoff, and freshwater input for our coastal models. Existing contacts to hydrology are listed in this report.</td>
</tr>
<tr>
<td>5.4</td>
<td>LB and GC</td>
<td><strong>LB and GC</strong> to finalize the “Model Assessment Reference” list within the COSS community before the next COSS-TT meeting (see Appendix D for details).</td>
</tr>
<tr>
<td>5.5</td>
<td>COSS-TT co-chairs</td>
<td>Bring a small group forward into common publication(s) on model intercomparison with focuses on dedicated processes in different regions. People already interested/identified for this action: J. Staneva, M. Garcia Sotillo, L. Bricheno, V. Kourafalou, P. de Mey, G. Charria.</td>
</tr>
<tr>
<td>5.6</td>
<td>LB and GC + COSS-TT</td>
<td><strong>All</strong> to feedback to GC and LB on what variables should be compared when performing <em>coastal</em> model assessment.</td>
</tr>
<tr>
<td>5.7</td>
<td>LB and GC + COSS-TT co-chairs</td>
<td><strong>GC and LB</strong> to confirm coastal model assessments reference list, drafting communication to COSS-TT and revise with co-chairs.</td>
</tr>
<tr>
<td>5.8</td>
<td>KWB</td>
<td><strong>PO</strong> to use the agreed communication, to circulate coastal model assessments reference list to COSS-TT members for input, and publish it on the GOV website once confirmed.</td>
</tr>
<tr>
<td>5.9</td>
<td>Claire Dufau</td>
<td><strong>Claire Dufau</strong> et al. to provide information to KWB for an ARCOM web-page to sit under the GOV pages. KWB to contact them for information.</td>
</tr>
<tr>
<td>5.10</td>
<td>COSS-TT</td>
<td>All <strong>COSS-TT member</strong> are encouraged to closer engage with science and research groups linked to the GOV large-scale system community, and to feed back to COSS-TT where collaborations or mutual membership would be useful.</td>
</tr>
<tr>
<td>5.11</td>
<td>COSS-TT co-chairs</td>
<td><strong>TT co-chairs and TT</strong> to reword the ToR concerning its scope: Global to coastal scales and shelf regions...or global, shelf, coastal and estuary scales, etc.</td>
</tr>
<tr>
<td>5.12</td>
<td>COSS-TT co-chairs and MC</td>
<td><strong>Co-chairs and MC</strong> to consider inviting members of the Grand Challenge to the next COSS-TT meeting.</td>
</tr>
<tr>
<td></td>
<td>Owner</td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5.13</td>
<td>KWB</td>
<td><strong>PO</strong> to provide list of participants with email/ affiliation to all meeting attendees</td>
</tr>
<tr>
<td>5.14</td>
<td>KWB</td>
<td><strong>PO</strong> to add list of papers from the Topical Collection (with link to papers) to the GOV website</td>
</tr>
<tr>
<td>5.15</td>
<td>TC editors</td>
<td><strong>TC editors</strong> (and <strong>PO</strong> if needed) to enquire with potential authors of the TC and ask for an expression of interest to participate</td>
</tr>
</tbody>
</table>

**Agreements**

<table>
<thead>
<tr>
<th>No</th>
<th>Owner</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>MC</td>
<td>Mauro Cirano to be the contact for the WCRP Grand Challenges (COSS-TT group)</td>
</tr>
<tr>
<td>5.2</td>
<td>COSS-TT</td>
<td>COSS-TT <em>(names to be confirmed)</em> to look into highlighting the limitation of reliable data source for river discharge/ fresh water discharge.</td>
</tr>
</tbody>
</table>
Appendix F: COSS-TT Terms of Reference (2015)

The mission goal of the Coastal Ocean and Shelf Seas Task Team (COSS-TT) is to work in coordination with GOVST and GOOS towards the provision of a sound scientific basis for sustainable multidisciplinary downscaling and forecasting activities in the world coastal oceans. The Task Team fosters international collaboration to advance science and applications on coastal and shelf dynamics, open ocean processes that control shelf break exchanges, as well as land-sea interactions through estuaries and inlets. The strategic goal of the Task Team is to help achieve a seamless transition framework from the global to the coastal/littoral scale. The main disciplines considered by the Task Team are physics and the interaction between physical and biogeochemical processes.

Two key areas of activity have been identified so far: firstly, to establish community links by convening co-sponsored forums to discuss cross-cutting issues and secondly to define and implement international coordination between coastal ocean forecasting projects.

Shelf seas and coastal services are a critically important area for most of the sponsors of GOV; several of the sponsors already make real-time predictions of the shelf seas and/or coastal areas in their vicinity. However, whilst there is a long history of storm surge predictions, many components necessary for current and future coastal ocean forecasting, such as the assimilation of observational data in the shelf seas, modern downscaling approaches, and monitoring and prediction of the broader ecosystem, to name a few, are relatively immature.

Collaboration with groups whose primary focus is on coastal prediction is highly desirable. This has already been embraced by the Task Team, by integrating new Task Team members who have relevant expertise and will be tasked with advancing such connections.

The Task Team has taken on the role of advancing science in support of ocean forecasting in the coastal and shelf seas. This has been done by engaging a broader community, from both academic and operational origins, in a series of open global forum activities for exchange of information which was previously lacking in this area. These include Task Team workshops that include both Task Team members and external experts from the international community, as well as well attended special sessions at international conferences. Future work will continue to consolidate the international community engaged in monitoring and prediction in the coastal and shelf seas. In particular, the Task Team will focus on the following strategic priorities:

1. provide scientific support for the development of integrated Coastal Ocean Forecasting Systems (COFS) and applications that benefit society;
2. promote the integration between COFS and basin-scale or global models, toward best practices for downscaling across appropriate scales;
3. facilitate linkages with scientific communities of ancillary interests, especially the coastal altimetry community.

In addition, the Task Team will collaborate with other GOV Task Teams under specific activities of common interest in the coastal and shelf seas. These include: the development of best practices for prediction assessments (with the IV-TT); quantifying the impact of observations to guide array design (with the OSEval-TT), coastal data assimilation (with the DA-TT) and the interface between open ocean and shelf models, as well as interaction with the MEAP-TT.