

GODAE OceanView



**Coastal Oceans and Shelf Seas Task Team
(COSS-TT)
International Coordination Workshop 2 (ICW2)**

CMCC, Lecce, Italy

4 – 7 February 2013

REPORT

Prepared by

Villy Kourafalou and Pierre De Mey

(COSS-TT co-chairs)

Enquiries should be addressed to:

Kirsten Wilmer-Becker
GODAE OceanView Project Office Coordinator

Kirsten.Wilmer-Becker@metoffice.gov.uk

The Met Office
FitzRoy Road, Exeter, EX1 3PB, UK

Tel: +44 (0)1392 884916

Fax: +44 (0)1392 885681

<http://www.godae-oceanview.org>



COSS-TT ICW2 workshop participants, Lecce, Italy



Many thanks to CMCC and the Lecce OceanLab 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/coss-tt-workshop-2013/presentations/>.

Table of contents

1	Introduction.....	5
1.1	The workshop	5
1.2	Our host.....	5
1.3	Presentations.....	5
1.4	This document	5
2	Introductory session: coastal ocean prediction science and workshop objectives	6
2.1	The session	6
2.2	Workshop objectives (Co-chairs).....	6
2.2.1	Task Team objectives.....	6
2.2.2	Task Team Membership	6
2.2.3	Task Team activities.....	7
2.2.4	Linking with other communities.....	7
2.2.5	Workshop attendance	8
2.2.6	Objectives of this workshop	8
3	Theme 1: System Reviews	10
3.1	The session	10
3.2	The reviewed systems	10
4	Theme 2A: Advances in integrated coastal observations	14
4.1	The session	14
4.2	Coastal observation challenges	14
4.3	Array design and OSSEs	14
4.4	Data assimilation as a data integrator	15
5	Theme 2B: Advances in Downscaling.....	16
5.1	The session	16
5.2	High-resolution modelling.....	16
5.3	Numerical issues of downscaling.....	16
5.4	Data assimilation while downscaling	17
6	Theme 2C: Coastal Applications.....	18
6.1	The session	18
6.2	A proposed model integrating application-targeted science, funding and training.....	18
7	Memorandum of Understanding	20
7.1	The session	20
7.2	Why an MoU?.....	20
7.3	What should there be in the COSS-TT MoU?	20
7.4	Will the MoU impact the COSS-TT role in GOV?	21
7.5	Language.....	21
7.6	The discussion	21
7.7	Further steps	21
7.8	Progress update	21
8	Core Group meeting.....	23
8.1	The session	23
8.2	Consolidating the COSS community.....	23
8.3	Exchanging information and identifying good practices.....	24
8.3.1	COSS community online forum	24
8.3.2	Systems Information Table (SIT).....	24

8.3.3	Tools inventory	25
8.4	Working together	25
8.4.1	Interest and opportunities of collaboration	25
8.4.2	Pilot projects.....	25
8.4.3	Smaller, ad hoc projects	27
8.4.4	Sharing expertise and good practices	27
8.4.5	Identifying convergent interests	27
8.5	Membership	27
8.5.1	Role of members	27
8.5.2	Membership update.....	28
8.5.3	Effects of COSS-TT Initiative MoU on membership.....	28
8.6	Training/Education/Outreach	28
8.7	Recommendations on the format of future workshops	29
8.8	Upcoming year events (2013-2014)	29
8.8.1	GOV Symposium (USA, 4-6 November 2013).....	29
8.8.2	GOV Review (USA, 7 November 2013)	30
8.8.3	Third COSS-TT workshop (Puerto Rico, ICW3, 21-24 January 2014)	30
8.8.4	Hawai'i Ocean Sciences Meeting (USA, 23-28 February 2014)	30
8.9	Actions list	31
8.9.1	ICW1 actions.....	31
8.9.2	ICW2 actions.....	31
Appendix A: ICW2 participants.....		32
Appendix B: ICW2 actions list.....		34
Appendix C: ICW2 agenda		35

1 Introduction

1.1 The workshop

The second workshop of the Coastal Ocean and Shelf Seas Task Team (COSS-TT) continues the Task Team work plan to coordinate and advance science for sustainable multidisciplinary downscaling and forecasting activities in the world coastal oceans, in coordination with the GODAE OceanView Science Team (GOVST) and GOOS (Global Ocean Observing System; <http://www.ioc-goos.org/>). The COSS-TT workshops provide a platform for communications and collaborations, serving the constantly growing international coastal ocean forecasting community.

The workshop was held at Lecce's historic Castle of Charles V, and hosted by the Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC) in Lecce, Southern Italy on February 4-7, 2013.

This second event followed the first workshop held at the University of Miami on January 10-12, 2012 (<https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/>). The attendees were COSS-TT members or substitutes and broader COSS community scientists, including interested members of the regional/coastal ocean monitoring and forecasting communities.

The attendees had excellent opportunities for networking throughout the symposium and during three social events that also exposed them to the rich culture of the host town: a) ice-breaker reception at Lecce's MUST Museum; b) workshop dinner at a typical masseria in an olive grove outside Lecce; c) guided walking tour around the historic sites of the city of Lecce.

1.2 Our host

The host Institute (CMCC, <http://www.cmcc.it/>) is an Italian non-profit research institute established in 2005. It includes six consortium members: Istituto Nazionale di Geofisica e Vulcanologia, Fondazione ENI Enrico Mattei, Università del Salento, Università degli Studi del Sannio, Centro Italiano di Ricerche Aerospaziali, Università Cà Foscari Venezia.

Interdisciplinary research includes the Numerical Applications and Scenarios division, focusing on the study of climate variability, the physical-biogeochemical interactions in the climate system, and the implementation of operational oceanography systems for short-term ocean forecasting, especially through numerical simulations.

1.3 Presentations

All presentations are available online at: <https://www.godae-oceanview.org/outreach/meetings-workshops/task-team-meetings/coss-tt-workshop-2013/presentations/>.

1.4 This document

This document summarizes the material that was presented as well as the discussions between participants.

Throughout this document, **highlighted points and issues** are indicated in **blue**.

2 Introductory session: coastal ocean prediction science and workshop objectives

2.1 The session

The COSS-TT co-chairs introduced the workshop and explained its objectives in an *initial address* summarized below. This was followed by a presentation of the CMCC/OceanLab Lecce group by Giovanni Coppini, and by a keynote talk by Nadia Pinardi on “*The science of ocean predictions in the coastal zone: issues and perspectives*”.

2.2 Workshop objectives (Co-chairs)

2.2.1 Task Team objectives

The main goal of the TT has not changed: it is to work in coordination with the GOVST and GOOS towards the provision of a sound scientific basis for sustainable multidisciplinary downscaling and forecasting activities in the world coastal oceans. The strategic goal of the TT is to help achieve a seamless framework from the global to the coastal/littoral scale, starting in pilot coastal regions.

The COSS-TT is currently rich of 23 members and is one of the GOV Task Teams, but COSS is also an international community in the building (nicknamed “COSS Community”).

2.2.2 Task Team Membership

The Task Team membership constitutes the link with national initiatives and remains as a permanent body:

Name	Institution, City	Country
Aikman, Frank	NOAA	USA
Barth, Alexander	U. Liège	Belgium
Chao, Yi	RSS and UCLA, Los Angeles, CA	USA
Chassé, Joël	DFO, Mont-Joli, QC	Canada
Cirano, Mauro	REMO, Rio de Janeiro	Brazil
Craig, Peter	CSIRO, Hobart	Australia
De Mey, Pierre	CNRS / LEGOS, Toulouse	France
Dumas, Franck	IFREMER / Previmer, Brest	France
He, Ruoying	NCSU, Raleigh, NC	USA
Herzfeld, Mike	CSIRO, Hobart	Australia
Hirose, Naoki	Kyushu U., Fukuoka	Japan
Jianping, Gan	Hong Kong U. of S&T	China
Kourafalou, Villy	U. Miami / RSMAS, Miami, FL	USA
Kurapov, Alexander	Oregon State U. / COAS, Corvallis, OR	USA
Liu, Guimei	NMEFC, Beijing	China
O’Dea, Enda	UK Met Office, Exeter	UK
Oddo, Paolo	INGV, Bologna	Italy
Oey, Leo	U. Princeton, NJ	USA
Patchen, Richard	NOAA / NOS, Silver Spring, MD	USA
Pinardi, Nadia	U. Bologna	Italy
Richman, Jim	NRL, Stennis Space Ctr., MS	USA
Stanev, Emil	HZG, Hamburg	Germany
Zhu, Jiang	IAP, Shenzhen	China

Table 1: COSS-TT membership as of January 1, 2013

Twelve members on a total of 23 were present in Lecce.

Please note that some members have substitutes not shown above. Changes in the membership and the addition of new members can of course be considered at any time.

So far attendance varies from one workshop to the next and it is found that not all TT members are active contributors. **Beyond individual participation, moral commitment at the level of institutes is necessary and must be implemented in the next years.**

2.2.3 Task Team activities

Although the TT was created in 2009, several key activities only started in 2012. In particular, the first COSS international coordination workshop was organized at, and in partnership with, U. Miami in Jan 2012. The outcome from the *first* international coordination workshop in Miami, Jan 2012, is available in a comprehensive [workshop report](#). The strategic goal of supporting efforts towards a seamless ocean forecasting framework from the global to the coastal/littoral scale was validated. Larger-scale common actions and pilot projects were found desirable and this second workshop addressed options for collaboration.

Feedbacks from the Miami workshop confirmed the need for this type of workshop as it serves a gap by offering an overarching view of existing systems and provides a platform for shared activities and collaborations. **A third International Coordination Workshop is to be organized in January 2014.**

During and after the first workshop the decision was taken to establish a Systems Information Table (SIT) based on a template, to be filled by each regional, shelf or coastal system represented in the TT and Community. 31 systems so far have provided information and an [xls-version](#) of the table is available from the TT website. It is planned to set up individual systems pages to provide comprehensive systems information online. **Efforts must be made so that the SIT template is filled and updated by all COSS Community members.**

In Miami, common actions and **pilot projects** were found desirable, but still **need to get started**.

As per the COSS-TT Work plan¹, another type of activity is to convene forums to discuss targeted science issues. In February 2012, 4 oral session “slots” plus posters were convened by the TT at the Ocean Sciences meeting, Salt Lake City. **A session proposal is to be submitted to the 2014 Ocean Sciences meeting in Hawai’i.**

The TT co-chairs also regularly communicate with GOV co-chairs on TT objectives.

2.2.4 Linking with other communities

During the CAW’2012² in Riva del Garda, Italy, Villy Kourafalou presented COSS-TT activities. The next challenges for the COSS-TT will be to evaluate coastal altimetry contributions to COSS hindcasts and forecasts by

- *Short-term:* compare the physical content of models and observations (need complementary data)
- *Long-term:* assimilate the data and quantify their impact on model simulations .

COSS-TT systems could offer an excellent test-bed for evaluations of coastal altimetry options. There is a need for methods to assess the performance and configuration of present and future altimetry (nadir, SWOT).

¹ <https://www.godae-oceanview.org/science/task-teams/coastal-ocean-and-shelf-seas-tt/coss-tt-activities/>

² CAW’2012 – Coastal Altimetry Workshop: <http://www.coastalaltimetry.org/>

Also not every regional/coastal model can be directly represented in the TT. We might get inspiration from the GOOS Regional Alliances strategy. A European Coastal and Shelf Seas modeling group proposal has been endorsed by EuroGOOS (Co-chairs: Paolo Oddo, INGV, member of TT, and Ole Krarup Leth, DMI) with direct affiliation to the COSS-TT. Other regional initiatives are encouraged by the TT, such as Southeast Asia, or the Gulf of Mexico (not an Action item).

2.2.5 Workshop attendance

The attendance is progressing, since 55 were registered for ICW2 (Lecce), while 44 had registered for ICW1 (Miami). However the attendance is highly variable: only 14 ICW2 registrants had attended ICW1. **The stabilization of the loyalty of the coastal ocean forecasting community is one of the goals we have to pursue.**

2.2.6 Objectives of this workshop

One overarching objective of COSS-TT workshops is to establish community links between ongoing coastal ocean forecasting projects.

A major theme of the 2013 workshop regarded the **steps to be taken to improve the stability and strength of the coastal forecasting system community:**

- Networking & Homework: What could/should we do together?
 - o E.g. adding foreign partners to our proposals – what for?
 - o How do we tap the expertise of this group? Profiles on web site?
- Making it official & committing: Should we ask our institutes to sign a Memorandum of Understanding (MoU)?
- Informing & networking: Can the website help? And how?
- Informing: Can the Systems Information Table (SIT) help? And how?

During the workshop, several discussion slots were provided to establish a way of how members of the TT and the wider community could/should work together. Overall, the participation of attendees was not as strong as hoped, but several interesting ideas came out of the discussions (see later in this report).

There is also a plan to set up a Memorandum of Understanding (MoU) among the TT members which was already proposed at the Miami workshop. A MoU draft was discussed at the end of the workshop.

This workshop's specific objectives were as follows:

1. Review ongoing coastal ocean forecasting projects in the world coastal oceans, with a particular focus on system updates, progress and challenges since the Miami workshop
2. Discuss background scientific advances and identify common/coordinated actions (for some willing groups) in three particular areas (not limitative):
 - 2A. Advances in integrated coastal observations
 - 2B. Advances in downscaling
 - 2C. Coastal applications
3. Enhance international collaboration and formalize COSS sustainability (and format/goals)
 - Memorandum of Understanding

- Regional initiatives.

4. A Core Group³ meeting at the end of the workshop.

The Agenda is shown in **Appendix C**. Science sessions 2A, 2B, 2C were arranged around major themes found relevant for the participation of the Task Team to the GODAE OceanView Symposium. Those science sessions were led by workshop chairs and rapporteurs. The main task of Rapporteurs was to identify **needs and opportunities of shared or common work** during the science sessions, asking the question “What could/should we do together?”. They were expected to freely summarize their views on the work that could be shared, as well as on any subject they feel important, as a way to start the debate in the discussion time ending each session.

³ ICW2 Core Group = Permanent Task Team + ICW2 Session chairs + ICW2 rapporteurs

3 Theme 1: System Reviews

3.1 The session

Theme chairs: Villy Kourafalou, Pierre De Mey

This session included 15 talks and 2 posters presenting the status and progress of some of the coastal forecasting systems represented at the workshop. Presenters are shown in **Table 2** by order of appearance in the agenda.

Country	Project/system	Institute/OOS	Presenter
Italy	Mediterranean Forecasting System (MFS)	INGV, MonGOOS	Tonani
Italy	Adriatic-Ionian Forecasting System (AIFS) Southern Adriatic Northern Ionian Forecasting System (SANIFS)	OceanLab, CMCC	Galati
Greece	Greek national operational monitoring and forecasting system (POSEIDON)	HCMR	Korres
Italy	IONian Integrated marine Observatory (IONIO)	INGV +CMCC	Oddo
Turkey	Northern Levantine Circulation Model (NLEV)	IMS-METU	Aydogdu
Portugal	MOHID	MARETEC-IST	Campuzano
France	REANALYSIS : IBI-1/12°, North East Atlantic regional system with tides, 2002-2009	Mercator Ocean, IBIROOS	Benkiran
UK	NWS MFC & AMM7	Met Office, NOOS	O'Dea
Germany	Field AC & COSYNA	HZG, BOOS	Stanev
USA	Multi model skill assessment	Rutgers U., MARACOOS	Wilkin
Brazil	Brazilian Oceanographic Modeling and Observation Network (REMO)	REMO	Cirano
USA	Pilot Oregon coastal ocean forecast model	OSU/COAS	Kurapov
China	HYCOM regional - counter wind current in SCS	IAP, South China Sea Institute of Oceanology, CAS	Xie
S. Korea	Yellow and East China Sea Regional Ocean Modeling System (YES_ROMS)	Kunsan National U.	Choi
Puerto Rico	San Juan Bay and Virgin Islands models	UPR, CariCOOS	Solano
Japan	MRI.COM	MRI	Sakamoto (poster)
Cyprus	CYCOFOS	U. Cyprus	Zodiatis (poster)

Table 2: COSS Forecasting Systems reviewed at ICW2 (Theme 1)

System representatives were also expected to contribute a half page with regard to advances made and/or challenges met.

3.2 The reviewed systems

The Mediterranean Forecasting System (MFS) continues to be developed and improved (Tonani et al., **INGV**) as a component of MyOcean. The system now outputs Stokes drift currents which they (and several other groups at the meeting) find to critically improve the forecast of surface currents. The biogeochemistry forecasts now include dissolved Oxygen concentration, primary production and phytoplankton biomass in addition to Chlorophyll and nutrients. Future upgrades include the addition of the atmospheric pressure term and the assimilation of Chlorophyll and Argo trajectories.

A new forecasting system for the entire Adriatic Sea and Ionian Sea (AIFS) is under development at **OceanLab, CMCC**, with support from the TESSA and IONIO projects, including the nested coastal high resolution Southern Adriatic Northern Ionian Forecasting System (SANIFS) (Galati et al.).

POSEIDON is the Greek national operational monitoring and forecasting system (Korres, **HCMR**, et al.). This atmospheric/hydrodynamic/wave/ecosystem forecasting project, linked with the IONIO project, is targeted at end-user needs. As part of the POSEIDON observational component (including ferrybox and HF radar), Greece as a member of the Euro-Argo infrastructure will start deploying at least 3 floats/year within the Aegean and the Eastern Mediterranean Sea.

Paolo Oddo (**INGV+CMCC**) et al. presented the Ionian Integrated marine Observatory (IONI) Project, a joint effort of Italian and Greek institutes. IONIO is made of an observing system, a forecasting system delivering current and wave forecasts, a service, and three decision-support systems (search and rescue, ship routing and safety, pollution hazard mapping). The system is seen as an opportunity to develop scientific knowledge towards the needs of end users and decision makers.

In the framework of the European project SESAME (Southern European Seas: Assessing and Modelling Ecosystem Changes), the Institute of Marine Sciences (**IMS**) at **METU** has been adapting ROMS to the Northern Levantine Basin (NLEV model) and has been using it to simulate the basin hydrodynamics and ecosystem with FENNEL biology compartment (Aydogdu et al.). One of the objectives was to investigate the response of hydrodynamic and ecosystem components of the basin to an atmospheric climate change scenario. NLEV has recently been validated with respect to CTD and Sea-Level Anomaly data. There is a need for statistical verification methods, and data assimilation methods.

The Portuguese **MARETEC-IST** group (Campuzano et al.) aims at developing exploitable model-based products, delivering scientifically up-to-date engineering solutions for the wide variety of challenges presented by the research, exploration and management of water resources and (more recently) land use in the Portugal Coastal Areas and ZEE. Ongoing work includes implementing two-way nesting in order to include the estuaries results in the Lusitania and Portuguese COntinental Models (PCOMS).

Benkiran et al. from **Mercator Ocean** presented results from a data assimilative regional 1/12° 2002-2009 reanalysis over the Northeast Atlantic Shelf domain (part of the "IBI" domain). This is a contribution to the European MyOcean project. The model resolves tides and is forced by atmospheric pressure. Initial and boundary conditions use the global Mercator Ocean reanalysis product GLORYS2v1. The nested reanalysis manages to stay close to the observations while adding the effects of high-frequency and high-resolution processes. The authors also showed the positive effect of assimilating altimetry with a reduced set of corrections ("TAPAS" dataset) in such a high-frequency-resolving model.

In the continuity to their presentation in Miami, Enda O'Dea et al. (**Met Office**) presented improvements to the operational Marine Core Service (MyOcean) model for the Northwest European shelf seas (NWS MFC). The modeling suite AMM7 includes the European Regional Seas Ecosystem Model (ERSEM). Developments underway include a new vertical stretching function for terrain-following coordinates, new Baltic boundary conditions, new rivers from Ehye, 2D-varying light attenuation, and 2D-varying bed friction. In the next steps, the Met office is considering a higher resolution model to be initially developed as part of the Fastnet Shelf Break Project, nominally 1/60° resolution with rotated grid.

Using the example of the COSYNA system in the German bight, Emil Stanev (**HZG**) et al. addressed the question of which enhancements are needed to shorten the distance between the European Global Monitoring for Environment and Security program (GMES, now Copernicus) and coastal downstream services. The scientific challenges are multiple (see talk). The overall future direction recommended is twofold: (1) Aggregate data from fixed platforms, shore-based radars, and satellites and maximize the synergy between data streams from observations and numerical modelling in coastal monitoring and forecasting systems, and (2) combine resources and infrastructures from

ongoing national and international activities. The simultaneous assimilation + estimation of boundary conditions is one way ahead. Infrastructures such as COSYNA, Previmer, AIFS-SANIFS, IONIO have to be optimized to provide structural capacity for a sustainable service on an operational basis.

John Wilkin (**Rutgers U.**) et al. provided a skill assessment of 7 real-time models, and a regional climatology, by comparison to observations gathered by the Mid-Atlantic Regional Association of Coastal Ocean Observing Systems (MARACOOS). Operational inner-shelf and estuary models require open boundary condition data at mid to outer shelf, and we expect that regional real-time models should be able provide useful information. Some existing regional/global models are indeed found to provide useful Open Boundary Condition data for real-time models of the Mid-Atlantic Bight (MAB) inner-shelf and estuaries. Results (see talk) suggest directions to emphasize for skill improvement, and point to possibilities for multi-model ensemble analyses.

Mauro Cirano (**REMO**) et al. presented the current situation of coastal ocean forecasting in S. American countries (Argentina, Brazil, Chile, Colombia, Ecuador, Peru). Although operational oceanography efforts are generally associated with the Navy, each country is at a different stage, and apart from wave forecasts, Brazil seems to be the only country that has a regional oceanic forecast system in use (REMO). A better collaboration among these countries could be established to help the development and future implementation of the forecast systems.

- The improvement of HYCOM/REMO (Basin) and ROMS/REMO (Regional) operational models is underway, with better data assimilation schemes (e.g. 4DVAR, EnOI). One of the objectives is to provide initial and BCs for the coastal systems. The Amazon river inflow is still a challenge.
- Chile built an oceanic forecast system, which due to lack of funds was interrupted. There are ongoing efforts to revitalize the system. Chilean Navy is currently working on the implementation of their own current and wave forecast (due mid-2013).

Alexander Kurapov (**OSU/COAS**) et al. presented ocean circulation forecasts along the coasts of the US Pacific Northwest region with the Pilot Oregon coastal ocean forecast model. Their forecasts are currently used by NOAA ORR to track marine debris objects. The inclusion of the Columbia River plume is found to significantly improve the quality of the forecasts, in particular in presence of variable shortwave radiation attenuation, dependent on SSS, to represent spring/summer stratification on the inshore side. Regarding 4DVar assimilation, the presence of the river plume affects the zones of influence of assimilated observations (in 3D), which may suggest a need for a modified initial condition covariance (suitable for horizontally inhomogeneous near-surface conditions).

A data-assimilative simulation of the counter-wind current in the Northern South China Sea (SCS) in winter was described by Xie (**IAP, CAS**) et al. in collaboration with the Nansen Center. An Ensemble OI scheme is used to assimilate along-track SLA, and to correct the mesoscale circulation while leaving the tidal signal unchanged. An energy analysis indicates that this counter-wind current in the northern SCS could be transient, and has a close relationship with the eddy processes which are active in winter.

As Ensemble forecasting system for Yellow and East China Seas (YES_ROMS) has been developed at **Kunsan National U.** (S. Korea) and produces 3-day forecasts since August 2010 (Choi et al.). A multi-model Ensemble simulation approach is adopted in order to improve model performance and increase ensemble spread. Several other systems in the COSS-TT use Ensemble Forecasting as well, and it is important to make progress towards the tuning up of such systems.

CariCOOS and the University of Puerto Rico (**UPR**⁴) are starting numerical simulations on estuarine and coastal circulation in the Caribbean and the Virgin Islands using ROMS (Solano et al.). The first results seem to agree with ADCP and mooring observations available via CariCOOS. Future work includes coupling of (real time) atmospheric and wave models.

⁴ As of writing time of this report, UPR will be our local host for the 2014 workshop.

4 Theme 2A: Advances in integrated coastal observations

4.1 The session

Theme chair: Yi Chao

Rapporteurs: Zhijin Li, Emil Stanev

In this session, 11 talks and 4 posters were presented and a 50-minute discussion slot occurred at the end. The findings and related discussion are summarized below.

The scope for integrated observing systems follows the definition of TT objectives to advance seamless forecasting from the deep ocean to the nearshore, through the continental shelf. Such systems should, therefore, reach from the open ocean to the shore, past the shelf break, including nearshore areas (e.g. surf zone), as these would be of most interest to users.

4.2 Coastal observation challenges

Observing systems in coastal areas are often localized in specific areas of interest, defined by local communities and users. Looking forward, and in agreement with the TT scope, **it is important to enhance efforts on coupling with the global ocean observing systems** and on integrating **needs that are particular to specific regions**. Such efforts will advance the development of complementary observing strategies and methodologies that are applicable in a variety of coastal settings.

Satellite measurements face particular challenges in coastal regions, such as land contamination, freshwater fluxes from river inputs and complex dynamic structures on a variety of time scales. Emerging methodologies in Coastal Altimetry are very promising and of mutual interest with the COSS community. The fusion of remote and in situ data sets is an ongoing challenge and requires close synergy between the data providing and user groups. For instance, the TT should encourage the COSS community to contribute input and participate in ongoing monitoring field experiments whenever possible.

As a group, we should try to give clear statements about the **complementarities between different data sets** (remote sensing, in-situ). These have to meet the needs of observationalists optimizing the functionality of **coastal observatories** (OSE/OSSE).

We should not decouple coastal modelling activities from specific coastal data.

It was proposed to set up linkages with groups concerned with storm surge, hydrology or waves. **It was also suggested to strengthen the link to JCOMM.**

Action	Add ICW3 agenda item about JCOMM links
---------------	----------------------------------------

4.3 Array design and OSSEs

It would be good to be able to demonstrate in a convincing way several examples when **array design methods** have been used to guide observations. This is one of the most important direction of the next developments, which will ensure that available coastal observations are used in an optimal way (this way is not well known now) in coastal operational oceanography.

Addressing the above challenges can also greatly benefit from Observing System Experiments (OSEs) and Observing System Simulation Experiments (OSSEs). Recent developments in ocean

OSSEs were presented which, for the first time, are following the rigorous methodology developed by the atmospheric community and are emerging as a powerful tool for array design and the optimization of observing systems. **Regional OSE/OSSEs should be utilized for COSS systems, to quantify impact of existing and future observations on regional forecasts.** This activity would be valuable for long term planning, through feedback to agencies responsible for observations and for demonstrating the utility and needs for coastal observations.

It would be nice to have a working group in the frame of COSS-TT dealing with these issues. This group, if formed, could provide methods and easy-to-use tools to the interested communities. (See also **Section 8.**)

4.4 Data assimilation as a data integrator

The broad spectrum of applications (see **Theme 2C**) requires a wide range of data assimilation schemes. Different schemes were presented, including nudging, ensemble optimal interpolation (OI), Ensemble Kalman filter (EnKF), three/four-dimensional variational data assimilation (3/4DVAR). These data assimilation schemes have become increasingly mature. However, while there are many community-based ocean models in existence, there is no community standard for the wide range of data assimilation schemes. **The TT should consider playing a significant role in evaluation and identification of the best data assimilation schemes** for different geophysical regions, scientific objectives and practical applications.

5 Theme 2B: Advances in Downscaling

5.1 The session

Theme chair: Mauro Cirano

Rapporteurs: Andy Moore, Enda O'Dea

In this session, 3 talks and one poster were presented and a 40-minute discussion slot occurred at the end.

Downscaling from low resolution to higher resolution nested domains remains an active area of research with many problems including non-conservation, nested model drift, boundary reflection etc.

5.2 High-resolution modelling

The need to resolve scales at **very high resolution** is clear from user perspectives as highlighted by Chao for the fisheries collapse study. Furthermore this study also highlighted the users' need for seasonal and inter-annual forecasts rather than hours and days. Seasonal forecasts require downscaling of very coarse seasonal forecasts from ensemble runs at global/basin scale.

One common question that seems to arise relates to the appropriate ratio of the resolution between the low and high resolution models. There are some informal rules of thumb which are often invoked, but there appears to be no rigorous rule. **It would be useful for this group to share experience on what works and what does not work.**

A **lack of observations for validating the sub-meso-scale circulations** that are simulated by high resolution, down-scaled regional models is an issue. These circulations are typically non-linear and sensitive to uncertainties in the initial conditions; surface forcing and open boundary conditions, in which case an ensemble approach would seem appropriate to quantify the uncertainty in the final product.

5.3 Numerical issues of downscaling

It should be noted that downscaling from a low resolution model to a high resolution model is technically challenging, and there is probably no single approach that is generally appropriate in all cases. The numerous approaches that are evolving tackle such issues arising in downscaling. From complex 4D data assimilation, through to **spectral nudging** (Garreau *et al.*) and **two-way nesting** that allows application of radiation conditions such as Flather or Orlanski (Herzfeld). Herzfeld's approach offers an alternative methodology that should be fairly uniformly applicable to most models and offers the possibility of using boundary schemes from within the nominal model to mitigate some of the issues inherent with two-way nesting.

Other fundamental issues include **interpolation methods** from one grid to another which respect to conservation laws, including interpolation from one type of grid to another (e.g. sigma coordinates to z-level; structured to unstructured grids) (e.g. presentation by Chao *et al.*).

High resolution estuarine models require **unstructured grid** approaches and thus require complex matching with coarser, typically structured, grid models of shelf or regional scale models that force the open boundary. The knowledge in dealing with such unstructured meshes, including their application, manipulation and dissemination to users was highlighted as something that could be

beneficial to members of this group who have not had such experience to date. Similarly there is a fairly steep learning curve involved in application of schemes such as AGRIF that can put off modellers from two way nesting. Again a shared experience of the common pitfalls in such applications would benefit many members of this group. There does appear to be an effort to write a number of Matlab toolboxes for dealing with unstructured grids, however it is the rapporteurs' opinion that Python should be used to ensure any such tools would be freely available to all developers.

5.4 Data assimilation while downscaling

It might be preferable to perform **data assimilation** on both the low and high resolution grids if sufficient observations exist on the high resolution grid (e.g. poster of *Ishikawa*), while in the case of poor data coverage it may be more sensible to constrain the high resolution solution by a data assimilation-constrained lower resolution circulation via the boundary conditions, and possibly using other methods such as spectral nudging (e.g. presentation by *Garreau et al.*).

6 Theme 2C: Coastal Applications

6.1 The session

Theme chair: Alexander Kurapov

Rapporteurs: Yoichi Ishikawa, Pierre Garreau

In this session, 5 oral talks and 2 posters were presented and a 50-minute discussion slot occurred at the end.

The session recognized that applications of the coastal and regional systems, in tandem with the associated challenges with observations, data assimilation and downscaling, are of crucial importance, as **the coastal ocean is the closest ocean region to human activity**.

Particular emphasis was given in advances in **oil spill prediction**, a topic that has gained a lot of attention since the 2010 DeepWater Horizon incident in the Gulf of Mexico. Results from consortia dedicated to developing oil spill models for academic use (as opposed to proprietary codes from the private industry) include the MEDSLIK effort in the Mediterranean and groups under the Gulf Research Initiative in the Gulf of Mexico. In addition, advances in coastal warning systems (e.g. sea level) and in support of maritime safety were discussed.

6.2 A proposed model integrating application-targeted science, funding and training

Although this session focused on specific applications, presentations in other sessions made useful links between the scientific issues and the broad range of applications that were exemplified in this dedicated session.

The broad spectrum of applications are generally utilizing current field and sea level variability, including wave fields derived from coastal systems. Although the focus has been on the physical aspect, the goal is to advance **integration with biogeochemical and comprehensive ecosystem models** to assess the water quality for coastal environment in application fields.

Although challenging, this integration has to face issues of: a) different levels of development in the physical and ecosystem components; b) the needed balance between advancing scientific research and satisfying emerging application needs and requirements. Such an approach is also critical for funding issues, where the **utility of science to societal and economic needs** is increasingly driving the mission of funding agencies. As forecasting services are getting more involved with end-users, they have to provide high quality products and educate these users (and the general public) for the utility of coastal marine prediction and the need to sustain the **high level of research and training** that will ensure continuity and enhancement.

The engagement of the COSS community with end-users and stakeholders is a challenging, but critical issue. Successful examples were discussed (e.g. Coast Guard for search and rescue, fisheries management, extreme events on flooding or erosion etc.). A two-way approach has to be enhanced, so that **feedback from users helps the evaluation of forecasting systems and guides the planning of applications**.

Regional issues at the international level need to be addressed, with the TT serving as the facilitator of exchanges and updates. In this context, a **dedicated working group** could be considered. The role of such a group would be to engage with environmental agencies or other

governmental and non-governmental groups, within national efforts and dispensing the related experiences to the TT, toward the development and coordination of best practices. This was considered as a future effort and interim actions were suggested toward working together with the GOV in user engagement, education and outreach.

7 Memorandum of Understanding

Theme Chair: Nadia Pinardi

7.1 The session

A preliminary draft version of the COSSTT-IN MoU was presented by Julia Rogers, a legal consultant with strong prior experience in such documents. The initial MoU was discussed and a number of changes were proposed and taken into account. Subsequent steps were proposed in order to implement the MoU.

7.2 Why an MoU?

At last year's workshop it was agreed to consider setting up a Memorandum of Understanding among the TT members and a draft has been prepared for discussion at this workshop. The main reason for creating the MoU is to **initiate a process of consolidation of the coordination work** started by the COSS-TT, thus allowing it to both continue its affiliation with GOV and have an independently consolidated mission and structure. It is also important to **involve participating institutes beyond mere individuals**. A further advantage for the scientist is to be given leverage to argue his/her commitment for the TT, which may result in stronger institutional support for travel and subsistence and other needs arising from TT activities such as attending workshops.

The goal is to use a COSS-TT dedicated MoU to facilitate planning and implementing coordinated science discussions and experiments in the "global coastal ocean" over the foreseeable future. Such an MoU should also help formalize the connection between this group and other relevant international groups (GOOS, JCOMM).

7.3 What should there be in the COSS-TT MoU?

The form of the MoU represents a declaration of interest, an agreement in principle, and sets out the objectives and modalities for achieving them. The MoU offers a flexible level of commitment and detail and can be adapted to the particular needs. It is not legally binding – i.e. no penalties for acting against the terms – and does not include financial or other firm commitments.

The **COSS-TT Initiative ("COSSTT-IN") MoU** is to identify and formalize mutually-agreed expectations in pursuit of a common goal with the focus on strengthening the commitment to the Initiative. It is hoped that the MoU will morally oblige the participants to consider objectives and mechanisms in concrete terms to create a road map and time frame for developing and implementing the Initiative. It should also foster institutional endorsement and buy-in.

The Terms of Reference (ToR) of the COSSTT-IN MoU include the advancements of science as a core commitment and to facilitate research with no financial obligation. The MoU preserves the capacity of scientists to participate, but also consolidates the required institutional aspects. It is meant to include organisations, rather than individuals, so that changes in representation within the TT do not influence the participating organizations, thus preserving continuity.

In the event that future changes are required (i.e., as new issues might arise, or to satisfy specific requests by new organizations that wish to join), such changes will require the approval of all previous signatories.

7.4 Will the MoU impact the COSS-TT role in GOV?

The MoU is to be written in the spirit to strengthen the TT, ensure its legacy, and support the work plan and activities of the COSS-TT within GOV. The MoU will not weaken the COSS-TT relationship with GOV and no conflict should arise from it. On the contrary, the MoU will lead to a stronger recognition of the COSS-TT which should benefit GOV.

7.5 Language

The COSSTT-IN MoU is **non-binding legally**, but its language is legal. Therefore, that language is to be elaborated by the legal consultant in coordination with the current Task Team co-chairs, while satisfying any modifications requested by candidate organizations. The goal is to build consensus with a legal document that satisfies the legal counsel of the broad range of organizations that are expected to sign.

7.6 The discussion

Several important issues were raised:

- Individuals (scientists) cannot sign for themselves and must **identify the appropriate signatories** in their organization.
- Regardless of the non-binding character, some institute signatures may not be easy to obtain, so there should be a **mechanism to “invite” non-Participant colleagues** to Task Team activities.
- Information about the MoU should be provided online.
- A **letter** should accompany the MoU to explain its objectives and how it works. It should annex information about the COSS-TT objectives and work plan.
- It was proposed to **consider inviting international programs** such as EuroGOOS to become signatories of the MoU.

7.7 Further steps

- A MoU working group was set up to continue the discussion about the document following the Lecce workshop and to revise its structure and content to try to make it compatible with all members’ organisation requirements.
- The signature process is expected to start before the third COSS-TT International Coordination Workshop (ICW3).

Action	Write Memorandum of Understanding and accompanying rules of use, have it signed by COSS Community members (co-chairs, ad hoc group)
Action	An item will be added to the ICW3 agenda regarding the MoU implementation process.

7.8 Progress update

Since ICW2, the MoU working group has had several discussions and iterations with the legal consultant. The MoU draft was sent to several organizations (mainly those of working group

members, ranging from academia to government and the private sector) and was revised according to their input, seeking language that can be broadly accepted. **A final draft has been completed and will be available for signing before ICW3.**

8 Core Group⁵ meeting

Chairs: Pierre De Mey, Villy Kourafalou

8.1 The session

This final session dealt with the definition of strategic priorities for the Task Team, and the collection of actions to be taken after this meeting. A strategic outlook was presented by the co-chairs, and a discussion was held on the topics listed below.

8.2 Consolidating the COSS community

The ultimate goal of the TT, and of this workshop, is to advance science towards coastal ocean forecasting and its applications (as per the COSS-TT Terms or Reference). The strategic goal of the TT is to help achieve a seamless framework from the global to the coastal/littoral scale (as per the COSS-TT work plan amended following the Miami workshop). With such a perspective in mind, several important steps have been taken so far by the Task Team:

- The **COSS Task Team** represents the interests of the international Coastal Ocean Forecasting community in GODAE OceanView (its Co-chairs are *de facto* members of the GOV Science Team).
- Two **international coordination workshops** have been organized so far, and a third one is in preparation; these have been successfully embraced by the community as a much needed forum to discuss latest scientific advances, promote international networking and update strategic planning.
- Several **special sessions** have been sponsored by the Task Team at AGU and Ocean Sciences Meetings over the years; these have consolidated the outcomes of the TT workshops and allowed exposure of TT goals and outcomes through outreach to the broader scientific community.
- A pilot affiliated EuroGOOS working group on coastal ocean modelling has been created, with the hope that it can serve as a model for other **regional initiatives**.
- Links have been established with **other dynamic communities** such as the Coastal Altimetry community, and more links are planned.

However, as the introductory address and attendance statistics showed (see **Section 2.2.5**), **we are not yet a stabilized community**. The attendance to workshops is variable from one event to the next, and not every attendee yet is fully involved in the building of a strong coastal forecasting community. Steps are to be taken to improve the stability and strength of that community, while remaining inclusive and open to new partnerships.

The international coordination workshops have already been proven a successful TT activity. However, their continuation should not be taken for granted. COSS-TT workshops should be considered as an unprecedented opportunity to cement our community, while advancing science in support of sustainable, multidisciplinary ocean forecasting. In order to make this activity more permanent, **we must prove to ourselves, to GOV, to our institutes, to government agencies, that we are satisfying a crucial need**, and that the COSS concept is beneficial to all. We should attend the

⁵ ICW2 Core Group = Permanent Task Team + ICW2 Session chairs + ICW2 rapporteurs.

workshops, not only to share ideas and expertise, but also to get organized and embark in mutually fruitful collaboration. This implies [exchanging information and identifying good practices](#) (Section 8.3) and [getting to work together](#) (Section 8.4).

8.3 Exchanging information and identifying good practices

8.3.1 COSS community online forum

It was proposed that the COSS Task Team implements a mechanism to facilitate the exchange of information within the COSS community, in particular between workshops. This could be done by e.g. [setting up a hierarchical online forum](#) for the COSS community. Sections could include the following:

- [Information on the systems](#), links to SIT and to individual web sites
- [General announcements](#) (e.g. new proposals and activities, planned field experiments, new tools with links to get them, etc.)
- [Job advertisements](#)
- [Training announcements](#) and links (lectures, summer schools, MOOCs⁶, etc.)
- [Publications](#) by COSS community members or publications of interest
- [Topics for open discussion](#), allowing members to share experience & expertise: e.g. metrics to evaluate forecast systems, role of specific processes, using specific tools, questions regarding the SIT, etc.

Such a forum would help many new systems evolve better and faster if they receive support from more advanced systems.

The properties of the forum that people would find desirable include the following:

- Private character of forum (membership requires initial approval by TT co-chairs)
- Ability to do free-text search
- Ability to delegate moderation to topic creators/editors
- E-mail subscription (no need to log on)
- Ability to have member profiles with expertise areas of members.

No specific experience with setting up such a system was found in the audience. It was proposed that the co-chairs install a [prototype forum](#) using one of the existing web-based blog platforms (such as Wordpress).

Action	Install a prototype COSS community online forum before the next workshop and have its suitability validated by the COSS community (co-chairs)
---------------	-----------------------------------------------------------------------------------------------------------------------------------------------

8.3.2 Systems Information Table (SIT)

To facilitate collaboration, the TT should continue the updates of the Systems Information Table (SIT), which was viewed as an [important web-based inventory of coastal modelling, data assimilation and operational forecasting systems](#). The system information will be maintained and further groups should add their project/system details. It was proposed to include publication lists.

⁶ MOOC = Massive Open Online Course

Action SIT template must be filled and updated by all COSS Community members, including up-to-date information on advances and/or challenges

At the moment, the SIT is maintained by Kirsten Wilmer-Becker (Project Office), and is separate from the envisaged forum system. Several questions remain – they should be addressed at the next workshop:

- How should the SIT information be used and publicized?
- How do we keep the information up to date?

Action Plan discussion on SIT at ICW3

8.3.3 Tools inventory

It was suggested that COSS-TT additionally hosts an **inventory** (or more ambitiously a depot) **of general-interest tools**: coastal data processing tools, data assimilation tools, modelling tools, diagnostic tools, conversion/interpolation tools, and application tools. This can be of practical importance, as the development of coastal ocean forecast systems (where the focus is on a limited coastal area) is often challenged by limited resources and partial funding. The inventory would help the users identify schemes that are optimally suited for their requirement of applications, so that they perform under funding limitations and enhance opportunities for attracting sustainable resources.

Such an inventory would be complementary to the forum and SIT mentioned above, although it could as well be integrated with them.

It was suggested that some of these issues are tackled in the MyOcean2 European ocean forecasting project, and could be expanded to a global level by interlinking with other groups (in the COSS-TT).

8.4 Working together

8.4.1 Interest and opportunities of collaboration

Collaboration is crucial and **the TT should facilitate active networking among members and the broader community**. Building stable relationships will provide much needed leveraging to make concrete steps toward addressing the challenges in coastal ocean forecasting. It was recognized that international collaboration is not always easy to establish. Three types of collaborative actions were discussed:

- **Pilot Projects**, showcasing international collaboration on important topics for coastal ocean modelling and forecasting (Section 8.4.2)
- **Smaller, ad hoc projects** (Section 8.4.3)
- **Sharing expertise and good practices** with a wider community (Section 8.4.4).

8.4.2 Pilot projects

The large number of groups involved in coastal ocean forecasting requires a sensible approach of managing activities.

It was proposed to **consider setting up pilot projects that can showcase international collaboration**.

Pilot Projects do not have to be built from scratch; they could come up to just adding one or more (free) foreign partner(s) to an existing proposal. The goal is to eventually design comprehensive international projects and be able to justify the need for coordinated funding from international agencies.

The following pilot project topics/“building bricks” were proposed during the discussion:

1. *Array Design Studies*
 - Relevant data: gliders, ferrybox, radars, moorings, possibly ALT, SST, ...
 - Two or more regions of the globe; OSEs, OSSEs, other methods
 - Challenges: technological, observation contents, geographic validity of results
2. *Downscaling Approaches (including Climate)*
 - Use same GOV large-scale solution,
 - Several regions, models, data (assessment, assimilation)
 - Assess role of controls: ICs vs. LOBCs vs. Surface forcings vs. Rivers etc.
 - Challenges: numerical, DA-related, data-related
3. *Upper-ocean processes & estimates in the COSS*
 - Wave-current interactions, vertical mixing schemes, surface drift estimates
 - Real case studies
4. *Probabilistic Approaches and Risk Assessment in the COSS + coastal hazards*
 - TBD – Ensemble-related, application-related
5. *Coastal altimetry*
6. *Coastal ecosystems*
7. *Applications (e.g. oil spill)*
8. *Reconstruction of long time series, coastal ocean reanalyses*
9. *Climate downscaling*
10. *Provide systems as test-beds for future observing system (e.g. altimetry, SWOT)*
11. *Land/sea interactions*
12. *Connection to hydrology.*

Coastal ecosystems were proposed as a pilot project area – possibly conflicting with the MEP-TT. GOV already has a Marine Ecosystem Prediction Task Team, but so far exchange with the COSS-TT has been limited.

Action COSS-TT co-chairs to improve linkages with the MEP-TT (recurring action)

One possible avenue to organize a Pilot Project, among others, would be around **collaborative field experiments**.

Options for **finding project funding support** were also discussed. Financial support for **collaborative projects** could be found through “Science Across Virtual Institutes ([SAVI](#))” – a mechanism to foster and strengthen interaction among scientists, engineers and educators

internationally. It was advised that this resource should be pursued by submitting proposals for collaborative science activities. In this context the MoU is expected to be beneficial.

One way to elaborate Pilot Projects of interest to a wide community would be to have *ad hoc working groups*. The MoU includes that possibility.

8.4.3 Smaller, ad hoc projects

Different, smaller projects are also possible, e.g. user-case driven studies, oil spill, training, etc. They could start on a small scale, e.g. with one or two partners. They could benefit from announcements and subsequent linking between people through the forum.

Even more than Pilot Projects, COSS ad hoc projects could come up to just adding one or more (free) foreign partner(s) to an existing proposal.

8.4.4 Sharing expertise and good practices

The question of writing White Papers had been discussed during the 1st workshop (Miami). It has not been specifically discussed during the 2nd workshop (Lecce), but it remains on the future agenda of COSS-TT workshops. As already mentioned above, the proposed MoU allows for Working Groups to be created within the Task Team. Some Working Groups could be responsible for elaborating *Technical/White Papers aimed at sharing expertise and good practices*, to the interest of others.

In Lecce, it was proposed in particular that the COSS-TT provide suggestions and advices on characteristics of different *data assimilation schemes*. COSS-TT may organize inter-comparisons and evaluations of those systems and tools, and the results may provide valuable suggestions and advices on using those systems. COSS-TT may provide recommendations to standardize a variety of common components in data assimilation schemes, which shall be shared by different systems and tool packages. It shall help shorten the learning curve for users to move up to more advanced and sophisticated systems, and make the change to a new system more progressively rather than starting from scratch.

8.4.5 Identifying convergent interests

The diverse list of topics above needs to be narrowed to the most convergent interests in the community.

To learn more about which collaborative projects and expertise sharing the different groups represented in COSS-TT could contribute, it was proposed to *set up a survey*.

In addition, the ICW3 agenda will have to help identify those convergent interests in the community, and select priority directions to follow.

Action	Set up survey exploring interest of COSS community to take part in collaborative projects and expertise sharing, and report in ICW3
Action	Plan discussion and first conclusions on collaborative projects and expertise sharing at ICW3, start forming working groups (co-chairs, TT)

8.5 Membership

8.5.1 Role of members

Task Team members should continue to act as communicators between the group and the “world” by promoting the TT and its activities and by inviting people to get in touch.

It was noted that **the co-chairs should try to actively involve TT members between meetings**, although it might be difficult to get feedback on every subject because of time constraints

8.5.2 Membership update

Updates to the list of members were given, in particular regarding the substitutes of some members. **Task Team members are strongly encouraged to attend in person or to select a colleague in their team who can attend all meetings.**

Frank Aikman, NOAA is a new Task Team member.

It was suggested to continue getting in touch with new communities, e.g. in South America, Africa, India, Russia.

8.5.3 Effects of COSS-TT Initiative MoU on membership

The COSS-TT Initiative (COSS-TT-IN) MoU, when active, will reshape the Task Team membership (see Section 7):

- The notion of Participant will be introduced. A COSS-TT-IN Participant (or simply “Participant”) will be an institution who has signed the MoU. The participating institutions themselves will be the new Task Team members.
- Annual workshops will serve as General Assemblies of Participants. At General Assemblies, participating institutions will be represented by scientists belonging to that institution (with only one vote per Participant, whenever voting will occur).
- In order to remain an inclusive community, a previous Task Team member whose institution has not (yet) signed the MoU will be invited to participate in workshops (with no voting rights).
- The MoU instates mechanisms to elect (by name this time) the COSS-TT Co-Chairs and Management Board.

8.6 Training/Education/Outreach

It was suggested to address the **need of younger scientists for learning** and that the workshops could include an opportunity for education and training. It was suggested to consider the possibility to prepare a guideline document in support of new systems, offering information of technical system set up, lessons learned and experiences from advanced groups. To that end, steps aimed at sharing expertise and good practices, such as the writing of Technical/White Papers or managing topics on the forum, would also be very welcome (see **Section 8.4.4**). Resources for training might be available. [OceanTeacher](#)⁷ was suggested as a good website for training/teaching material for oceanographers, which can also be used for broader outreach.

Further education/training suggestions include:

- Taking care of Coastal Ocean Forecasting lectures at a **GOV Summer School**
- Web-based lectures (YouTube, audio PPTs).

⁷ OceanTeacher has been developed as a training system for ocean data managers (working in ocean data centres), marine information managers (marine librarians) as well as for marine researchers who wish to acquire knowledge on data and/or information management.

Brazil is planning a workshop on operational oceanography in September 2013 for developing countries including Africa, South America, China (by invitation only). Funds are available and TT member Mauro Cirano confirmed reporting back to this group on the outcome.

Action Plan reporting about that workshop at ICW3 (Mauro Cirano)

It was also noted that the TT should encourage the **production of educational and outreach materials** to highlight the success of the existing COSS operational forecasting systems.

8.7 Recommendations on the format of future workshops

For future workshops to be most efficient, a combination of **breakout sessions** with feedback reports in plenary was seen as a good workshop structure. The size of breakout groups should be small enough to facilitate effective discussions. This could accompany the setting up of *ad hoc* **Working Groups**.

Breakout group discussion should if possible be well prepared. The chair should already circulate the questions/topics before the workshop so people can prepare. Group members expertise should fit the topics/questions of the breakouts.

Presentations should still be given in plenary.

Poster sessions should be better incorporated in the meeting by providing extra poster sessions, which could be arranged with food/drinks.

Action Follow the report recommendations if possible when planning ICW3 (co-chairs)

8.8 Upcoming year events (2013-2014)

8.8.1 GOV Symposium (USA, 4-6 November 2013)

The 2013 GODAE OceanView Symposium will be held NOAA/NCWCP, near Washington DC, USA, on 4-6 November 2013. The Symposium is open to all.

As per the Symposium website⁸, *“The GODAE OceanView Symposium will provide an opportunity to review the key scientific achievements of GOV in the last years, to critically examine the outcomes, and to discuss the next steps towards the future of operational ocean analysis and forecasting and its international coordination.”*

Villy Kourafalou is a member of the Programme Committee for the Symposium.

Both co-chairs are co-conveners of **Session 3.4 “Ocean Forecasting in the Coastal Domain: Scientific Challenges and User Needs/Benefits”**. The acceptance of several submitted oral and poster abstracts to Session 3.4 was notified by Kirsten Wilmer-Becker. The detailed session agenda is being elaborated by the co-chairs as of writing this document, and will be communicated soon by Kirsten.

A community review paper on COSS forecasting and science is also in the works. Its co-authors will be the Session presenters contacted by Kirsten and the Task Team as a whole. The community paper will provide a synthesis of current COSS research and activities, as a contribution to the GOV special issue (planned for publication after the GOV symposium).

Action Report on GOV Symposium and community paper status at ICW3 (co-chairs)

⁸ <https://www.godae-oceanview.org/outreach/meetings-workshops/symposia-summer-schools/Symposium-Review-2013/>

8.8.2 GOV Review (USA, 7 November 2013)

The Symposium will be followed by one day of Review concentrating on the work by the Task Teams, including the COSS-TT. The Review is by invitation only. Both COSS-TT co-chairs will participate in the Review, will present activities of the TT and will answer the questions of the Review panel.

Action Report on GOV Review at ICW3 (co-chairs)

8.8.3 Third COSS-TT workshop (Puerto Rico, ICW3, 21-24 January 2014)

Action A third International Coordination Workshop (ICW3) is to be organized in January 2014 (co-chairs)

ICW3 will be held at Rincon Beach resort, Puerto Rico, on 21-24 January 2014.

The workshop will be hosted by the University of Puerto Rico at Mayaguez (Department of Marine Sciences), and the CariCOOS (Caribbean Coastal Ocean Observing System). As the COSS-TT is reaching out to the broader COSS community, participation from the Caribbean and developing countries will be greatly encouraged.

The **First Announcement**⁹ is available. The Second Announcement and Call for Papers will be disseminated very soon.

Offers in Lecce included Puerto Rico and the University of Santa Cruz. The co-chairs are very grateful to both institutes for their offers. We are looking forward to an exciting meeting in Puerto Rico in January.

Particular priority themes suggested in Lecce included predictability, and wave-current interactions.

8.8.4 Hawai'i Ocean Sciences Meeting (USA, 23-28 February 2014)

Action A session proposal is to be submitted to the 2014 Ocean Sciences meeting in Hawai'i (co-chairs)

As we did several times in the past, we submitted a session at OSM'2014, to be held at the Hawai'i Convention Center, Honolulu, Hawai'i, USA. The session was accepted. Abstract submissions are accepted until Oct. 3, 2014.

Session 003 - Advances in Coastal Ocean Modelling, Observations, and Prediction

Downscaling and extending predictability in coastal and shelf seas are two of the objectives of the GODAE OceanView (GOV) initiative through its Coastal Ocean and Shelf Seas Task Team (COSS-TT). Broad participation and international coordination of interdisciplinary coastal and shelf models nested in data assimilative large scale models are COSS-TT priorities. This session will provide a forum for multi-scale hydrodynamic modelling and integrated observational studies that aim toward scientific validation, prediction and operational applications of numerical models in coastal and shelf seas, leading to new understanding of multiscale nonlinear ocean processes. Applications of nested models, such as the influence of physical processes on ecosystem dynamics and interdisciplinary coastal predictions are also welcome. The session will promote the discussion of methodologies that lead to reliable coastal forecasts and applications (such as data assimilation, probabilistic approaches, influence of nesting, currents-waves and atmosphere-ocean interactions), Observing System Simulation Experiments and the impact of sustainable, integrated modelling and observational networks that connect local, regional and global scales.

⁹ <https://www.godae-oceanview.org/outreach/meetings-workshops/task-team-meetings/coss-tt-workshop-2014/>

Organizers:

Villy Kourafalou, University of Miami/RSMAS, USA (COSS-TT co-chair)

Pierre De Mey, LEGOS, France (COSS-TT co-chair)

Yi Chao, Remote Sensing Solutions, Inc. (COSS-TT member).

8.9 Actions list

8.9.1 ICW1 actions

Actions listed in the Miami report were reviewed. All actions are now closed except for the following:

No	Owner	Action	Progress/comments
4	Villy Kourafalou	Linkages with MEP-TT	Not started, keep in Actions List
8	Co-chairs, TT, Kirsten Wilmer-Becker	COSS-TT web site architecture	Not started, keep in Actions list with new name: "COSS community online forum"
11	Co-chairs	Launch drafting of White Paper(s)	Not started, keep on hold (to be reactivated later by working groups)

8.9.2 ICW2 actions

The collected actions for this workshop are in **Appendix B**.

Appendix A: ICW2 participants

(with linked e-mail addresses)

Ardo Allik	Marine Systems Institute, Tallin	Estonia
Esam Awad	CMCC	Italy
Ali Aydogdu	Institute of Marine Sciences	Turkey
Nadia Ayoub	LEGOS/CNRS	France
Alexander Barth	GHER, AGO, University of Liège	Belgium
Mounir Benkiran	CLS	France
Antonio Bonaduce	CMCC	Italy
Steve Brenner	Bar Ilan University	Israel
Francisco J. Campuzano	Maretec - Instituto Superior Técnico	Portugal
Yi Chao	Remote Sensing Solutions, Inc.	USA
Byoung-Ju Choi	Kunsan National University	South Korea
Stefania Angela Ciliberti	CMCC	Italy
Mauro Cirano	REMO	Brazil
Giovanni Coppini	CMCC	Italy
Andrea Cucco	National Research Council , CNR-IAMC	Italy
Michela De Dominicis	INGV	Italy
Pierre De Mey	CNRS / LEGOS	France
Damiano Delrosso	INGV	Italy
Srdjan Dobricic	CMCC	Italy
Claire Dufau	CLS	France
Christopher Edwards	University of California	USA
Silvia Falchetti	University of Bologna, CIRSA	Italy
Ivan Federico	CMCC	Italy
Maria Barbara Galati	CMCC	Italy
Pierre Garreau	IFREMER	France
Daniel Hayes	University of Cyprus	Cyprus
Mike Herzfeld	CSIRO	Australia
Yoichi Ishikawa	JAMSTEC	Japan
Xie Jiping	IAP, CAS	China
Gerasimos Korres	Hellenic Centre for Marine Research - Institute of Oceanography	Greece
Villy Kourafalou	University of Miami	USA
Yannis N. Krestenitis	Aristotle University of Thessaloniki	Greece
Alexander Kurapov	CEOAS, Oregon State University	USA
Rita Lecci	CMCC	Italy
Zhijin Li	JPL	USA
Taavi Liblik	Tallinn University of Technology	Estonia
Marco Mancini	CMCC	Italy
Gianandrea Mannarini	CMCC	Italy
Yasumasa Miyazawa	JAMSTEC	Japan
Andrew Moore	University of California Santa Cruz	USA
Baptiste Mourre	Centre for Maritime Research and Experimentation	France
Fernando Niño	LEGOS/CTOH	France

Paolo Oddo	INGV	Italy
Enda O'Dea	Met Office	UK
Emin Özsoy	Institute of Marine Sciences	Turkey
Marcello Passaro	National Oceanography Centre	UK
Nadia Pinardi	University of Bologna	Italy
Julia Rogers	CMCC	Italy
Kei Sakamoto	Meteorological Research Institute	Japan
Elena Shchekinova	CMCC	Italy
Miguel Solano	University of Puerto Rico Mayaguez	Puerto Rico
Emil Stanev	HZG	Germany
Marina Tonani	INGV	Italy
Francesco Trotta	CIRSA Ravenna, University of Bologna	Italy
Giorgia Verri	CMCC	Italy
John Wilkin	Rutgers University	USA
Kirsten Wilmer-Becker	Met Office	UK
George Zodiatis	University of Cyprus	Cyprus

Appendix B: ICW2 actions list

ICW2 actions status as of September 29, 2013:

No	Owner	Action	Progress/comments
1	Kirsten Wilmer-Becker	Make talks available on the web site	Done
2	Co-chairs	Draft meeting report	Done
3	Co-chairs	Linkages with MEP-TT	Not started, outstanding
4	Kirsten Wilmer-Becker, co-chairs	Set up survey exploring interest of COSS community to take part in collaborative projects and expertise sharing, and report in ICW3	Not started
5	Co-chairs	Install a prototype COSS community online forum before the next workshop and have its suitability validated by the COSS community	Ongoing
6	MoU working group	Write Memorandum of Understanding and accompanying rules of use, have it signed by COSS Community members	Ongoing
7	Kirsten Wilmer-Becker	Make sure that SIT template is filled and updated by all COSS Community members, including up-to-date information on advances and/or challenges	Permanent
8	Co-chairs	A session proposal is to be submitted to the 2014 Ocean Sciences meeting in Hawai'i	Done
9	Co-chairs	Launch drafting of Technical/White Paper(s)	Not started, on hold (to be reactivated later by working groups)
10	Co-chairs, Kirsten Wilmer-Becker	Organize ICW3 in January 2014	Ongoing
	Co-chairs, local organizers, Kirsten Wilmer-Becker	Secure venue	Done
	Co-chairs	Follow the report recommendations if possible when planning ICW3	Not started
	Co-chairs	Add item on MoU implementation process	Not started
	Kirsten Wilmer-Becker, co-chairs	Add item on discussion on SIT at ICW3	Not started
	Kirsten Wilmer-Becker, co-chairs	Add item on discussion and first conclusions on collaborative projects and expertise sharing at ICW3, start forming working groups	Not started
	Co-chairs, Nadia Pinardi	Add ICW3 agenda item about JCOMM links	Not started
	Mauro Cirano	Add item on reporting about the Brazilian workshop for developing countries at ICW3	Not started
	Co-chairs	Add item on GOV Symposium and community paper status at ICW3	Not started
	Co-chairs	Add item on GOV Review at ICW3	Not started

Appendix C: ICW2 agenda

Sunday, 3 February – COSS-TT International Coordination Workshop 2 (Day 0)

	<i>Topic</i>	<i>Location</i>	<i>Audience</i>
From 18:00	Welcome reception	CMCC, Via Augusto Imperatore, 16	All

Monday, 4 February – COSS-TT International Coordination Workshop 2 (Day 1)

	<i>Topics and presentations</i>	<i>Presenter</i>
9:00 – 9:20	Registration (Payments (please bring payment confirmation ticket), badges, poster hang-up, etc.)	Registration desk
9:20 – 9:30	Welcome (Practical information, posters, meals, social events, etc.)	Local hosts
9:30 – 10:00	Introduction to this workshop - The Task team; actions since Miami; SIT - GODAE OceanView context - Workshop contents, objectives and expected outcomes	Pierre De Mey and Villy Kourafalou
10:00 – 10:30	Key-note presentation : The science of ocean predictions in the coastal zone: issues and perspectives	Nadia Pinaridi, University of Bologna
10:30 – 10:50	Coffee break, poster viewing & registration	
	Theme 1: System review presentations - Review of regional and coastal systems - Advances in the groups since Miami	Theme chairs: Villy Kourafalou, Pierre De Mey
10:50 – 11:10	1.1 The Mediterranean Forecasting System	Marina Tonani, INGV, Italy
11:10 – 11:30	1.2 Towards a new operational forecasting system in Adriatic and Ionian Sea	Maria Barbara Galati, CMCC, Italy
11:30 – 11:50	1.3 Forecasting at the Mediterranean and the Aegean Sea scale: the POSEIDON system	Gerasimos Korres, Hellenic Centre for Marine Research, Greece
11:50 – 12:10	1.4 The IONIO Project	Paolo Oddo, INGV, Italy
12:10 – 12:30	1.5 Performance of the Northern Levantine Circulation Model (NLEV), sea-level calibration and applications	Ali Aydogdu, Middle East Technical University, Institute of Marine Sciences, Turkey
12:30 – 14:00	Lunch break	
14:00 – 14:20	1.6 From the deep ocean to the estuarine intertidal areas: an operational framework for the Portuguese Exclusive Economic Zone	Francisco J Campuzano, Maretec, Portugal
14:20 – 14:40	1.7 Regional High Resolution Reanalysis over European North East Shelf domain	Mounir Benkiran, CLS, France
14:40 – 15:00	1.8 Improvements to the operational Marine Core Service (MyOcean) model for the Northwest European shelf seas	Enda O’Dea, Met Office, UK
15:00 – 15:20	1.9 Recent developments in the European coastal observing and forecasting systems. FIELD-AC and future trends	Emil Stanev, HZG, Germany

15:20 – 15:40	Coffee break, poster viewing & registration	
15:40 – 16:00	1.10 An evaluation of real-time forecast models of Middle Atlantic Bight shelf waters	John Wilkin, Rutgers University, USA
16:00 – 16:20	1.11 The South American initiatives in regional modeling with focus on operational oceanography	Mauro Cirano, REMO, Brazil
16:20 -16:40	1.12 Ocean circulation forecasts along the coasts of the US Pacific Northwest region	Alexander Kurapov, Oregon State University, USA
16:40 – 17:00	1.13 Assimilative simulation of the counter-wind current in the northern SCS in winter	Jiping Xie, IAP, CAS, China
17:00	End of day 1	

Tuesday, 5 February – COSS-TT International Coordination Workshop 2 (Day 2)

	<i>Topics and presentations</i>	<i>Presenter</i>
	Theme 1- continued	
9:00 – 9:20	1.14 Assimilation of SST to the Yellow and East China Sea circulation model using the ensemble Kalman filter	Byoung-Ju Choi, Kunsan National University, South Korea
9:20 – 9:40	1.15 Numerical simulation on estuarine, coastal and off-shore circulation in Puerto Rico and the Virgin Islands using the Regional Ocean Modeling System (ROMS)	Miguel Solano, University of Puerto Rico
9:40 – 10:00	News from other systems (e.g. from TT members to say a few words about their latest updates since Miami)	Various Attendees
10:00 – 10:20	Coffee break & poster viewing	
10:20 – 10:40	Invited talk: International initiatives: Euro-GOOS Coastal Modelling WG	Paolo Oddo
	Theme 2A: Advances in integrated coastal observations <ul style="list-style-type: none"> - Integrated observational systems - Objective array design methods - Coastal altimetry - Coastal observatories & data 	Theme chair: Yi Chao Rapporteurs: Zhijin Li, Emil Stanev
10:40 – 11:00	2A.1 Array testing and impact of observations in the coastal ocean by ensemble methods	Pierre De Mey, LEGOS, France
11:00 – 11:20	2A.2 Glider observations and regional ocean predictions at the Centre for Maritime Research and Experimentation	Baptiste Moure, Centre for Maritime Research and Experimentation, NATO
11:20 – 11:40	2A.3 Observing Systems Experiment with coastal in situ observations in the Adriatic Sea	Srdjan Dobricic, CMCC
11:40 – 12:00	2A.4 The CYCOFOS operational flow forecast: now assimilating glider data	Daniel Hayes, University of Cyprus
12:00 – 12:20	2A.5 Coastal observing system in the Gulf of Finland (Baltic Sea)	Taavi Liblik, Tallinn University of Technology, Estonia
12:20 – 13:50	Lunch break	

13:50 – 14:10	2A.6 Observing System Evaluation for the Black Sea: Focus on ARGO floats and altimetry during 2005-2012	Emil Stanev, HZG, Germany
14:10 – 14:30	2A.7 Gulf of Mexico prediction and Observing System Simulation Experiments (OSSEs)	Villy Kourafalou, University of Miami, USA
14:30 – 14:50	2A.8 Observing System Experiments Using a Multi-Scale Three-Dimensional Variational Data Assimilation System	Zhijin Li, JPL, NASA, USA
14:50 – 15:10	2A.9 The Regional Ocean Modeling System (ROMS) 4D-Var Data Assimilation Systems	Andrew Moore, University of California, USA
15:10 – 15:30	Coffee break & poster viewing	
15:30 – 15:50	2A.10 Application of ROMS 4D-Var assimilation methods to the California Current System	Christopher Edwards, University of California, USA
15:50 – 16:10	2A.11 Dynamic interpolation of the high-resolution sea surface temperature data obtained from the Aqua-Terra satellites (MODIS-SST) using an ensemble	Yasumasa Miyazawa, JAMSTEC, Japan
16:10 – 17:00	Discussion on Theme 2A: What could/should we do together?	Rapporteurs from theme 2A, co-chairs, all wishing to comment
17:00	<i>End of day 2</i>	
Evening	Workshop dinner	

Wednesday, 6 February – COSS-TT International Coordination Workshop 3 (Day 3)

	<i>Topics and presentations</i>	<i>Presenter</i>
	Theme 2B - continued	
	Theme 2B: Advances in downscaling <ul style="list-style-type: none"> - Downscaling and grid nesting methodologies - Balanced initialization methods - Unstructured grid modelling 	Theme chair: Mauro Cirano Rapporteurs: Andy Moore, Enda O’Dea
9:00 – 9:20	2B.1 Operational Downscaling in Mediterranean Sea MENOR Configuration of PREVIMER	Pierre Garreau, Ifremer, France
9:20 – 9:40	2B.2 Downscaling to Study Interactions between the Coastal Ocean and Bay/Estuary	Yi Chao, Remote Sensing Solutions, Inc., USA
9:40 – 10:00	2B.3 Two-way nesting in a downscaled model suite of the Great Barrier Reef	Mike Herzfeld, CSIRO, Australia
10:00– 10:20	Coffee break & poster viewing	
10:20 – 11:00	Discussion on Theme 2B: What could/should we do together?	Rapporteurs from theme 2B, co-chairs, all wishing to comment
	Theme 2C: Coastal applications <ul style="list-style-type: none"> - Physical, ecosystem, oil spill, industry applications 	Theme chair: Alexander Kurapov Rapporteurs: Yoichi Ishikawa, Pierre Garreau
11:00 – 11:20	2C.1 <i>SeaConditions</i> : to know the present and future sea conditions for safer navigation and informed sea-territory management	Giovanni Coppini, CMCC, Italy
11:20 – 11:40	2C.2 Early warning system level forecast	Antonio Bonaduce, CMCC, Italy

	along the Italian coast: a semi-empirical approach	
11:40 – 12:00	2C.3 Ocean predictions for supporting the marine safety in the Mediterranean	George Zodiatis, University of Cyprus
12:00 – 12:20	2C.4 Oil spill modelling in the southeastern Mediterranean	Steve Brenner, Bar Ilan University, Israel
12:20 – 13:50	Lunch break	
13:50 – 14:10	2C.5 High-resolution real-time forecasting systems for predicting the water circulation and the fate of dispersed pollutants in coastal areas	Andrea Cucco, CNR-IAMC, Italy
14:10 – 15:00	Discussion on Theme 2C: What could/should we do together?	Rapporteurs from theme 2C, co-chairs, all wishing to comment
15:00– 15:20	Coffee break & poster viewing	
	MEDSLIK meeting	Chair: Giovanni Coppini
15:20 – 17:00	Presentation & discussion	Giovanni Coppini
17:00	End of day 3	

Thursday, 7 February – COSS-TT International Coordination Workshop 2 (Day 4)

	<i>Topics and presentations</i>	<i>Presenter/ chair</i>
	Theme 3: TT Organization Panel: How do we make the COSS action sustainable, and with which goals and format?	Theme Chair: Nadia Pinardi
8:30 – 9:30	Discussion on MoU & COSS sustainability	Nadia Pinardi, Villy Kourafalou
9:30 – 10:30	Discussion on proposal initiatives and opportunities from COSS groups	Co-chairs, all
10:30 – 10:50	Coffee break & poster viewing	
10:50 – 13:00	COSS-TT Core Group meeting <ul style="list-style-type: none"> - Preparation for the GOV review, symposium, White Paper, common proposals - List of actions - Next meeting - Any other topic 	COSS-TT co-chairs and TT Core group (Task Team members or substitutes, Theme chairs and Rapporteurs)
13:00 – 14:00	Lunch break	
14:00 - 17:00	Networking activity	Guided tour through Lecce (4€ fee)
17:00	Closing of workshop	

Posters (P.1 – P.10)

Abstract title	Presenter	Topic
P.1 Development of a high-resolution Japanese coastal ocean model toward operational monitoring and forecasting	Kei Sakamoto, MRI	1

P.2 Parallelizing the Hydrodynamical Code of the Cyprus Coastal Ocean Forecasting System	George Zodiatis, Oceanography Center University of Cyprus & Giovanni Coppini, INGV	1
P.3 Assessing the use of satellite altimetry and SST data to constrain a coastal model in the Bay of Biscay	Nadia Ayoub, LEGOS/CNRS	2A
P.4 Covariance localization and statistical robust ensemble updates	Alexander Barth, Yajing Yan, Jean-Marie Beckers GHER, AGO, University of Liège	2A
P.5 Altimetry data dedicated to Coastal Ocean Analysis	Claire Dufau, CLS	2A
P.6 Coastal Altimetry: A New Resource for Validation and Assimilation?	Marcello Passaro, National Oceanography Center Southampton	2A
P.7 Development of an incremental 4D-VAR system Toward a leading-edge downscaling approach	Yoichi Ishikawa, JAMSTEC	2B
P.8 <i>Multi-scale modelling for the coastal ocean (poster not presented)</i>	<i>Alejandro Souza, National Oceanography Centre (did not attend)</i>	2B
P.9 MEDSLIK-II open source oil spill model: validation and application to emergency cases in the Mediterranean Sea	Michela De Dominicis, INGV	2C
P.10 "WaveForUs": A Daily Wave and Circulation Forecast for the Public and Emergency Use in the Thermaikos Gulf	Yannis N. Krestenitis, Aristotle University of Thessaloniki	2C