GODAE OceanView

Coastal Oceans and Shelf Seas Task Team (COSS-TT) International Coordination Workshop 1

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REPORT

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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/presentations/.

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2 Executive summary

The GODAE OceanView (GOV; https://www.godae-oceanview.org/) Coastal Ocean and Shelf Seas Task Team (COSS-TT) continues and expands the activities of the former GODAE Coastal and Shelf Seas Working Group (http://www.godae.org/CSSWG.html). The main goal of the COSS-TT is 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 is one of the GOV Task Teams, but COSS is also a Community in the building, gathering at Workshops and other COSS-TT sponsored events, communications and collaborations.

The 2012 Workshop, hosted by the University of Miami/RSMAS on January 10-12, 2012, and held in a pleasant and studious atmosphere, was the first one and established the framework for a future long series. It allowed the newly-appointed Task Team and Community to get to know each other, examine the achievements and perspectives of Coastal Ocean Forecasting Systems (COFS), discuss outstanding science issues for the success of the COFS (namely in this particular workshop: model assessment, data assimilation, data availability and applications), and make decisions regarding sustainable organization, international coordination and future activities.

As a result of the workshop, the COSS-TT contribution to the GOV Workplan was updated, and an Actions List has been established and is being followed. A strategic goal was defined: to support efforts toward a seamless ocean forecasting framework from the global to the coastal/littoral scale. An improved coordination with the global modelling community was suggested, to ensure a continuous improvement in the quality of products provided as boundary conditions for nested models.

It was decided to have a second COSS workshop in early 2013 in Lecce, Italy, hosted by the Coastal Studies Institute, Euro-Mediterranean Center for Climate Change. Part of the meeting will be a Science workshop, and another part will be a Task Team meeting with a particular topic on how we get organized beyond a possible end of GOV in 2012. A sub-TT panel has been nominated and will take care of preparing the organizational discussion in Lecce.

One of the important practical decisions taken at this workshop was to establish a Systems Information Table (SIT) based on a template (*see Appendix D*) to be filled by each regional, shelf or coastal system represented; the SIT will be visible via the COSS-TT web page and will include: a list of system attributes, important features, objectives and applications, current status of forecasting capabilities and future timeline, including issues being currently addressed. Systems not represented in the workshop are being invited to provide the same information. In a complementary way, we will consider drafting a White paper in the upcoming year; the focus of such a document would be on one or more of the following topics: science priorities directed at funding agencies, application/users requirements, or organizational issues. It is aimed that a draft paper should be in place ahead of the 2nd COSS workshop for TT review and approval.

3 Workshop objectives and agenda – Session 1

Session 1 presented the objectives and the focus of the Task Team and of the Workshop, and discussed agenda items (Presentations online - https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/presentations/#session1)

The general objectives of the 2012 workshop were as follows:

1. Review ongoing coastal ocean forecasting projects in the world coastal oceans, with a particular focus in this workshop on model assessment.
2. Define and implement an "adequate level" of international scientific coordination between coastal ocean forecasting projects, with the main goal of advancing science in support of coastal ocean forecasting, but considering scientific, as well as operational, objectives and applications.
3. Discuss linkages and establish a common framework that can be communicated to funding agencies with the goal of initiating international funding opportunities and/or seed funds for international Pilot projects.
4. Define the links with GOV, and in particular the steps to be taken to enhance the added value of GOV for coastal ocean forecasting projects, and of coastal ocean forecasting projects for GOV.

More specific objectives were to:

5. Examine the linkages with GOOS, in particular the GOOS regional alliances (http://gosic.org/goos/GRA.htm) and PICO (Panel for Integrated Coastal Observation, part of GOOS).
6. Decide a common content for the template to populate a Systems Information Table (*Appendix D*), gathering and publicly disseminating information for all systems.
7. Discuss good practices and common strategies – in particular regarding (7.1) methods for assessment and assimilation, and (7.2) data for forcing, assessment and assimilation in the regional and coastal ocean, such as SST, ARGO, dedicated coastal altimetry products and applications.
8. Discuss what COSS-TT members and the broader COSS Community expect from the Task Team leadership and from COSS workshops, examine possible collaborations between projects, identify international Pilot projects involving several groups, make plans for a White Paper.
9. Implement a sustainable organization for the COSS-TT.

The agenda (see *Appendix C*) was structured as follows:

- An introductory Session 1.
- Session 2, to review ongoing coastal ocean forecasting activities in 15 representative groups worldwide (objectives 1 and 6).
- Session 3, dealing with methods for assessment and assimilation (objective 7.1).
- Session 4, dealing with data for forcing, assessment and assimilation and applications (objective 7.2).

- Session 5, a general discussion on objective 8, following a splinter session where two working groups addressed the same list of questions.
- Session 6, a discussion on objective 9 and a wrap-up of the meeting in the form of a list of actions (objectives 2-5).
- A Task Team meeting (TT members only) was held on Wednesday evening and prepared actions to be discussed in Session 6.

In the introductory Session, the Task Team primary objectives were reviewed: Coastal Ocean and Shelf Seas processes, including shelf break exchanges, shelf dynamics, coastal current & associated (sub-)mesoscale, mostly regarding physics but also the interactions between physical and biogeochemical processes, in collaboration with the GOV Marine Ecosystem and Prediction Task Team (MEP-TT). In particular, it was noted that the influence of coastal ocean processes is felt far beyond the shelf break, overlapping and interacting with open ocean dynamics, which GOV global and basin-scale systems aim at describing and forecasting. It was decided that an important strategic goal of the COSS-TT is to help achieve a seamless ocean forecasting framework from the global to the coastal/littoral scale.

The introductory session also attempted to clarify what we try to achieve with the COSS-TT:

- The main objective of the TT is the scientific coordination of (ongoing) coastal ocean forecasting systems (COFS); providing a related science forum (as was the focus of the previous CSSWG) is a complimentary objective.
- COSS international coordination workshops are open not only to TT members but also to the COSS Community (by invitation).
- TT members are scientists, who are directly or closely associated with the development of COFS, and who can commit (along with their teams) to obey decisions made by the team at TT workshops. They also serve as agents of exchanges of ideas with a broader community.
- In the TT membership, priority is given to coastal systems with clear objectives, calendar, and products.
- The downstream/applicative aspects are important for the TT, as long as they open new fields for science. Also it is important to bridge the gap between funded academic research (mainly from government funds) and applications suitable for the industry.

Session 1 also discussed the links of the TT with the GOV Science Team and Patrons Group, and with PICO and regional GOOS (objective 5).

4 Ongoing coastal ocean forecasting activities – Session 2

This session was split in two parts, covered by two groups of Rapporteurs. The Rapporteurs were to fill in information sheets on the systems (in best effort mode), and to present their summaries and conclusions in plenary.

Session 2 included 20 Talks (Presentations online - https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/presentations/#session2-part1) and 4 posters.

Individual and/or groups of nations maintaining a large number of regional and coastal ocean forecast systems at operational and research centers include (alphabetically):

- Australia (CSIRO ROAM, Trike systems);
- Brazil (REMO);
- Canada *(not presented)*
- China (Hong Kong U. of Science and Technology; Institute of Atmospheric Physics, China Academy of Science);
- European Union (Mediterranean Forecast System, PREVIMER and IBI coastal systems in France, German Bight forecasting in Germany, ADRICOSM in Italy, NEMO in the UK);
- Japan (RIAM, Kyushu Univ. DREAMS system; JMA MRI NPAC, WNPAC and new coastal ocean forecast system);
- India *(not presented)*;
- Israel (coastal systems);
- U.S.A. (Navy HYCOM and NCOM, various applications, including the Gulf of Mexico, with several nested models by UM/RSMAS and USF, PMEL Gulf of Mexico; NOAA/NOS NGOM, nearshore, and estuarine system; Northeast Atlantic coast: NCSU MABGOM and SABGOM; West Pacific Coast: OSU Real-Time Coastal Ocean Forecast System).

There is a broad range of system status from in-development to fully operational with large diversity in these systems:

- Multiple ocean models (HYCOM, NCOM, ROMS, NEMO, POM, FVCOM, EMS, RIAMOM, MRI community ocean model).
- Multiple DA methods (MVOI, Ensemble OI, Ensemble Kalman Filter, 3DVAR, 4DVAR).
- Multiple outer ocean models (global HYCOM, NCEP climate fcst. system, JMA MRI global model, MyOcean models, others).
- Multiple atmospheric forcing sources (U.S Navy NOGAPS and COAMPS, NOAA North America Model, NOAA /NCEP GFS, ACCESS-A, NOAA/NCEP climate forecast system, ECMWF models, JMA models, national meteorological offices models).
- Various efforts to parameterize lateral forcings (such as tides, rivers and buoyant outflows through straits).
- Strong efforts to evaluate and validate these systems.

There is also large variety of applications:

- Nowcasts, several-day forecasts, long-range forecasts, marine meteorology, coastal currents, disaster warning, fisheries, ecosystem dynamics, red tide blooms, anoxia, estuary/shelf exchanges, shelf/ocean exchanges, evaluate impact of observations

(OSE/OSSEs, stochastic methods), drifter trajectory prediction, eddy evolution, predictability studies, etc.

- Highlights included prediction associated with the Gulf of Mexico Deepwater Horizon oil spill and the Fukushima nuclear accident.
- Given the large diversity of systems and applications, it will be important to foster and maintain communication among the many groups involved in coastal and regional ocean forecasting.

5 Methods for assessment and assimilation in coastal ocean forecast systems – Session 3

There were 7 talks in this session (presentations online - https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/presentations/#session3). Some talks from Sessions 1 and 2 also provided ideas on Session 3 topics.

5.1 Data assimilation methods

Variety of assimilation methods: OI, 3DVAR, 4DVAR, EnKF, EnKSmoother. Each method has their pros and cons. There is not a settled opinion on whether any method is the best.

Despite differences in approaches, we all have **similar goals**: improved state estimation, accurate forecasts, estimates of the forecast error. **Interactions between research groups** exploring different approaches would help to further advance techniques.

Common challenges: limited "observability" of coastal processes: data sets that might be adequate to represent processes in the interior ocean are **sparse** (in space and time) compared to the scales of motion in the coastal areas.

Additional difficulties for DA system are due to the **non-homogeneous** (in space and time) character of model error statistics (which can be revealed by ensemble and adjoint based methods). Presence of river plumes, mixing and motions on distinctively different scales may provide additional challenges.

Each method requires careful attention to specification of prior statistics (**error covariances**), such as error in forecast, initial condition, forcing, boundary condition. Specification of model errors may require non-trivial hypotheses.

Data assimilation allows **dynamically based space interpolation** (and in case of 4DVAR and EnKS time-interpolation) of the data and **synthesis of data** from different platforms. Data assimilation schemes are capable to ingest radial component HF surface currents and yield (u,v) maps; they can ingest noisy SST fields from different satellites and yield a smooth estimate of SST. Each data source is to contribute toward providing a multivariate correction to the ocean state. Effect of assimilation of surface data on subsurface structures needs to be further assessed – more subsurface data are required.

For full assessment of the DA results we have to focus on both low frequency (**subinertial**, nearly geostrophic) and high-frequency (**inertial, internal tide**) components of the flow.

5.2 Model / DA assessment methods

Methods for assessment range from traditional (RMSE, correlation, Taylor diagrams) to estimates of dynamical and heat balances introduced by DA and analyses of dynamical structures. New stochastic methods (such as Polynomial Chaos) are being proposed to assess statistics of outputs beyond the mean and covariance.

Ensemble-based (single model, multiple model) assessments of the forecast variance provide guidance for adaptive sampling. Multiple model ensembles help to identify outliers and potential model/DA system problems.

5.3 Other topics

OSSEs: the "nature" run is difficult to formulate in regional/coastal OSSEs, as it requires high resolution and inclusion of coastal physics and appropriate forcings, that could be missing in the parent models (such as nearshore processes, tides and river inputs). A benefit of running OSSEs is in that they can help assess the potential impact of future coastal observational platforms and help optimize existing ones.

With regard to **improved resolution of global models** (horizontal grid less than 5 km), additional studies (input from community) are needed to demonstrate value of increased resolution in the coastal areas. An important aspect is that high resolution global models do not necessarily adequately represent coastal physics present in nested models, or can take advantage of local data sets. Increase in resolution, therefore, does not necessarily counter-balance the utility of nested models that are targeted for specific applications and optimal forecasting. Other topics that were covered and discussed in this session include:

- array design;
- consistency in analysis of ensembles;
- free runs of models nested in global models;
- two-way nesting.

6 Data for forcing, assessment and assimilation in coastal ocean forecast systems and applications – Session 4

There were 6 talks dedicated to various data for validation and assimilation, such as ARGO floats, GHRSST, coastal altimetry. Presentations online - https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/presentations/#session4), with additional data references from relevant talks in other sessions: HF radar, gliders (well organized community), scanfish, drifters, buoys...

6.1 Atmospheric forcing

Global atmospheric models:

- NOAA/NCEP GDAS 0.5° at resolution of 1 hour;
- NOAA/NCEP GFS every 3 hours (for first 72 hours hourly fields are available);
- ECMWF products,...

Limited area atmospheric models:

- NOAA/NCEP NAM, Implementations of Aladdin, WRF, COSMO,...

It was determined that **spatial resolution of atmospheric forcing is important** for regional/coastal ocean modeling applications (need to resolve orographic effects, provide realistic wind strength).

6.2 Large-scale ocean fields

The following real-time models (validated and with data assimilation) are primarily used for the lateral forcing of nested models:

- NRL Global HYCOM (now 1/12° resolution and 3.5 km in future);
- NOAA RTOFS HYCOM (1/12° resolution);
- MERCATOR (1/12° resolution) and other MyOcean simulations.

Several regional models are also used (or can be used) for boundary conditions of coastal models.

Several issues with the present status of boundary conditions provided by operational global models were reported. At several instances, nested systems resort to climatological boundary conditions to avoid biases that may contaminate the nested model solutions. It became apparent that increase of resolution in global models has to be accompanied by a rigorous evaluation on the quality of fields provided. This suggests that enhanced coordination with the global forecasting community is necessary to ensure quality products for the needs of nested models.

6.3 Ocean observations

Observations presented in session:

	6.3.1 Global ARGO	6.3.2 Satellite SST	6.3.3 Altimetry
Design focus	Deep ocean (large-scale)	Not specific (expect microwave)	Deep ocean (large-scale)
Current deployment/ resolution	3500 floats / in average one float every ~300 km²	Many satellites (~10): * polar orbiting ~1 km resolution/daily * geostationary: ~10km/hourly	Currently 5 satellites (more to come) along track res.: 300 m/1 km (filtered SLA) Processed: JASON2/Envisat
Spatial coverage	Global (deeper than 2000 m)	Global	Global + regional products available
Parameters	T/S but also velocity	Skin temperature	Sea surface anomaly
Typical applications/ processes	large-scale circulation, study of seasonal +interannual variability, global heat content data,...	Study of air-sea interactions, ocean circulation, ocean/ atmospheric modeling...	* sea level rise, current monitoring, waves, storm surge * tides,...
Challenges	* drifting of sensors * sustainable funding Future: * high latitude * biochemical sensors	* Diurnal heat, * strong vertical temperature gradient (modeling required)	* retracking, * environment/geophysical corrections, * mean sea surface * validation
Projects / data access	www.argo.net	www.ghrsst.org	www.costalt.eu / PISTACH (aviso.oceanobs.com)

7 Setting a framework to discuss and decide good practices and common strategies – Parallel/splinter sessions and Session 5

During the workshop two working groups discussed good practices & common strategies in two splinter sessions (Splinter session outcomes online: https://www.godae-oceanview.org/outreach/meetings-workshops/coss-tt-workshop/presentations/#session5).

The summary below provides an overview of the outcome of the working group discussions:

7.1 Expectations from the Task Team and the TT workshop

The role of TT members is to act as the central group of COSS and undertake the following tasks:

- oversee all COSS activities;
- identify common methodologies and objectives;
- facilitate connections between groups working in the same regions;
- seek travel funds for researchers from certain countries to attend TT workshops;

- organize formal sessions at international meetings.

The role of the TT workshop was to first provide a clear picture of the **status of operational coastal oceanography** around the world. In order to classify the systems, the following information is being collected and compiled in the Systems Information Table (*see Appendix D*): name of Operational System (real time, re-analyses), time-line, products, applications and users, validation strategy, use of large scale products (for initial/boundary conditions, forcing and assimilation).

Given that this was the first international COSS-TT workshop, it was useful to explore the **motivation and expectations** of attendees. The main motivation was to network with groups from around the world, broaden international exchanges, get latest updates and share information. This was an essential workshop attribute, since participants had previously primarily interacted with groups within their continents, continuing a traditionally "local" view of coastal prediction.

The **biggest outcome of the workshop** was setting the foundation to establish an international coastal ocean modelling community (similar to the well established global ocean modelling community). In addition, there was consensus that it is extremely beneficial to establish an **annual meeting** (of similar workshop format) that will ensure a long-term vision toward addressing the objectives set forth in this first workshop. A potential benefit from these workshops is to identify common (and good) protocol for coastal model implementation.

7.2 Common objectives

Despite the diversity of the systems presented, the following common objectives were identified:

- Provide the best forecast products to users, and demonstrate their value (determine "re-packaging" needs to attract industry), leading to the related political backing to sustain the long-term research and development.
- Synergy between observing and modeling/forecasting.
- Perform OSE/OSSEs (demonstrate data impact, optimize existing and design future observing systems).

7.3 Particular system issues which could be addressed together

It was determined that addressing the common objectives leads to a synergistic approach, around the following issues:

- Development of **common metrics** for model validation.
- Coastal areas are much more sensitive than the open seas to some **specific physical processes influencing intrinsic predictability** such as "fast" response to atmospheric events, wave-current interactions, topographically-constrained processes, such as the coastal waveguide, etc.

- In general, the quality of the **nesting** model results is very important for the coastal modeling community. Moreover, if the global models start to implement processes that are crucial for coastal prediction (such as tides, atmospheric pressure, land runoff etc.) and these processes have not the accuracy required by the coastal models, problems may arise in the nesting procedure, when using the large scale product for nesting. *We do need a section dedicated to implementation of tides in the white paper (especially in the presence of data assimilation).*
- Develop a strategy on how to sustain this community (e.g. akin to GHRSST)
- Exchange researchers and students
- Provide training (e.g. summer schools)
- Establish and empower sub-TT to work on specific issues

7.4 Opportunities for formal collaboration and starting Pilot Projects

Although informal collaborations are already in place and should continue and expand, it is important to establish international partnerships that are organized around formal agreements and/or mutual funding, such as:

- Education and training, exchange opportunities for students and post-docs.
- Summer schools and year-round invited seminars/lectures.
- Share data (e.g. bathymetry, river discharges, atmospheric forcing), modeling, data assimilation and diagnostic analysis tools.
- Share experience with a goal to transfer knowledge.
- Support each other (e.g. joint proposals, support letters for each other's proposals).
- Pursue the funding of Pilot Projects for two or more international partners.

7.5 Objectives of a COSS White Paper

The upcoming White Paper will be fully addressed at the 2nd workshop, following exchanges on a draft to be circulated in the interim. A preliminary draft is as follows.

- Classify the systems based on their objectives.
- Identify the right focus, challenges, "home" and appropriate links for this group within the many existing international organizations (evolving).
- Articulate the vision/strategy/roadmap.
- Actively pursue outreach & community building.
- Make recommendations on COSS related research priorities; these can be essential to funding agencies for the drafting of RFPs for proposals. In addition, a substantial campaign has to be put forward for expanding funding strategies that promote international partnerships in coastal modeling.

7.6 Website use

The website is the main public **dissemination and communication tool** for all COSS activities, including those of the TT and should support exchanges within the community (share news, job positions, meetings, related activities). Specific sections are as follows:

- Publicize **Job opportunities** (specific to job announcements by TT members)
- Develop a **forum for the discussion of technical questions**
- Share information, **link to Education and Training**, (i.e. how to create a model domain?).
- Facilitate, coordinate, and enable **international exchanges** and cross-fertilization.
- List of **publications**.
- **Networking** (blog, wiki FAQ, Q/A, find the expert for a particular question).
- Reach out to **other communities**.

A major service of the web page is to collect and publicize all the **information on coastal prediction Systems**; focus is currently on pre-operational systems, but a more inclusive list might be decided in the future. It is very important that this (Systems Information Table or SIT - *see Appendix D*) is updated regularly.

Material from the SIT can probably be used in order to create sub-teams (common forcing, using the same dataset). The SIT can provide an **overview of the coastal prediction system needs** to the model/observations data providers; this information is also important for addressing funding strategies.

There will be "internal" and "external" versions of the SIT. The TT will take care of "transforming" the internal document for public use. A SIT template is already in place, but SIT needs to be dynamic with updates, as needed (Twiki should meet this criterion).

7.7 Workshop format

The 1st workshop format was received very positively. Suggested improvements for future workshops are outlined below.

- More time should be allocated for questions and Working Group discussions / brain-storming.
- Share/emphasize problems/challenges; identify priorities and common strategies (may help define future funding strategies and response to funding opportunities).
- Enhance parallel sessions (working groups), focussing on different aspects (e.g. data assimilation, tides) common to most regions.
- Balance research (prevalent in this meeting) with operation (transition from research to operation) and education (both marine forecasters and next-generation modellers).
- Extend invitations to TT supporting/oversight groups (e.g. champions/super users) to future meetings (via Skype, if necessary).

- Organize side meetings during international conferences, such as American Geophysical Union/American Meteorological Society/European Geophysical Union/Asia Oceania Geosciences Society.

7.8 Regional affiliated groups

In the spirit of "the more we share, the less we duplicate", we need to pursue regional collaborations and integration with affiliated "geographic" groups. One example is the newly created EuroGOOS Coastal and Shelf Seas Modeling working group. Is it desirable to have similar initiatives all around the world.

8 Workshop outcomes and Future activities – TT meeting and Session 6

Most of the material for this session was prepared at a Task Team limited-audience meeting on Wednesday evening, and discussed in plenary in the final session.

Please also see the Actions List in *Appendix B*.

8.1 TT Membership

New members were welcomed and a discussion on possible future members was held. Ideally the TT membership should have representation from regions globally. The US and EU areas are already well represented. Candidate regions should include the Arctic, for which a representative from Norway may be suitable. A member from South Africa and India would be a welcome addition. It was noted that modelling in South Africa has advanced considerably and would be a good representation for the African region. A representative from India has already been identified (did not attend due to lack of travel funds; the TT should develop a strategy to address such logistical issues).

On the further expansion of the TT, it was noted that it should be of functional size and certain criteria should be put in place to make for a more formal and structured process beyond the initial set of members. The TT doesn't need to be exhaustive, but ideally representative for the regions. Terms of reference are also required. It is still to be determined if the emphasis for membership should be on operational systems or whether experts without an operational system can also join.

8.2 Web page

The Systems Information Table (SIT) (*see Appendix D*) was discussed and it was noted that SIT could be a summary page, from which links to other more detailed pages of each system could be made. Additional information could be: datasets (or where to get them) publications, jobs, news, and meetings. A Twiki tool has been implemented.

8.3 Collaborations

The group emphasized that there is a need for concrete examples. Prototype collaborations, pilot cases were discussed. A test bed area, with common forcing where users could plug and apply their latest physics, data assimilation etc. and verify against a set of common observations was postulated.

Another important aspect of the TT is the possibility to raise awareness of coastal modelling activities with relevant agencies, thus enhancing possible opportunities for project funding and collaboration with other groups; for example, observational groups or hydrological modelling groups etc. TT members who have responsibilities in complimentary groups (such as steering committees etc.) can be direct agents of COSS updates.

It was recognized that interests may vary among different parties, from both operational centers and research institutes.

From NOAA's perspective, the TT presents an opportunity for members to focus on phenomena of common interest and the priority should be Research and Development for operational systems of the future. Assessment of gaps in the systems is critical to derive a focused path forward. Presentations in future workshops should not only highlight success but share limitations of systems to help direct where research resources should go. Shared experience is important as a set of best practices for how setting up coastal systems can be formulated.

NOAA is also keen on integration of the various environmental modelling systems with a 'mountain to sea' approach. Other U.S. agencies (example: NASA and NSF) have embraced teh concept of "Earth System Modeling", which is directly applicable to COSS research. Thus , it is important to 'join up' with various other communities that have similar demands, under the international GOOS priorities.

Another point was raised with respect to observations and the focus of global observations used for coastal applications. COSS should be focusing on groups involved with observations specifically for coastal processes, and feeding back to them modelling requirements.

GOV co-chair Eric Dombrowsky offered to identify members of the open ocean community with experience in observations that may be of relevance to the costal community and suggested that the Task Team may consider adding a member that is explicitly involved in altimetry.

Other suggestions include linking with ocean colour and remote sensing of water quality and the usage of full resolution data from various ocean colour products.

8.4 White paper planning

It is generally easier to write a longer white paper first, with constituent parts written by leaders in specific areas e.g. tides, altimetry, HF Radar, inputs, down/up scaling, coupling, assimilation etc.

However, an emphasis needs to be placed on what the requirements of users are and how to pitch objectives to funding agencies. It's critically important for such a paper to address what is needed, what should the COSS research and development focus should be, and how COSS can satisfy needs identified by the GODAE OceanView Patrons' Group (https://www.godae-oceanview.org/organisation/patrons-sponsors/).

In the longer term the white paper could be condensed into a peer-reviewed paper for a journal concerned with operational oceanography. It was also noted that a decision needs to be taken on whether publicity is more important than peer review. Perhaps aiming at EOS or similar might serve the TT interests more quickly.

As a target it is aimed that a draft paper should be in place ahead of the next meeting in one year's time.

8.5 Steps towards a sustainable organization

The general consensus among participants was that it was very important to have, in the next years and beyond, a group such as the COSS-TT addressing the international scientific coordination of coastal ocean forecasting. The question of adopting a sustainable organization came up. A Memorandum of Understanding is one possible way to that end, albeit not the only one.

The notion of asking members to participate in a MOU was debated and different parties indicated the ease or difficulty they would have in such a formality. From the perspective of most members it should be relatively straight forward. The MOU would only need departmental level signature and this has already been done with other institutions in the past. In the U.S. the process is much more formal and there really needs to be a very clear cut argument made about the underlying case.

The European experience of successful MOU's indicate that they should have:

- well phrased motivation;
- clear statement that no expenses are generated;
- no need to sustain/obligate;
- specific number of meetings per year;
- clear Science Plan;
- clear rules on entry.

One question came up: *What if a member cannot sign it; is this a show stopper?*

The perspective of NOAA and NRL is that for them a MOU is not required in this context, and may actually complicate things unnecessarily. The point was raised that if relationships with big organizations such as NASA, ESA etc. are desired, many of these relationships are already covered in GODAE OceanView. The suggestion is that a MOU might be more beneficial with smaller organisations and Universities.

In defense of the MOU it was noted that the MOU is not about funding, but for facilitating technical coordination. As an example MedGOOS (http://www.medgoos.net/) has helped foster data exchange in the Mediterranean.

It is not until much further in the future that issues of funding, for example funding of a project office, be considered. For sustained collaboration (10 years) a MOU can help, particularly if there is a pilot project from which to extend.

A Task Team sub-group on organization, in charge of considering options for a MOU as well as other options in preparation for the next workshop, was formed. It is composed of Nadia

Pinardi, Jiangping Gan, Steve Brenner, Guillaume Charria, Hugo Oliviera TBC, and both TT chairs.

8.6 Next workshop

The next COSS international workshop will be 5-8 February, 2013, in Lecce (Italy). The workshop will be hosted by the Coastal Studies Institute, Euro-Mediterranean Center for Climate Change

Future/alternate locations (suggested by the prospective hosts) are Brest, Southern China, and Brazil.

Suggestions for the 2013 workshop:

- Part of the meeting will be a Science workshop, open to community (by invitation)
- The Task Team meeting will be longer than in 2012 (including organizational issues)
- We will make every effort to facilitate the participation of colleagues that did not participate in 2012 due to various logistical issues, especially from Canada, India, Norway, South Africa, South Korea.

The following topics were identified as missing from this workshop, and suggested to be included in 2013:

- Coastal observations, coastal observatories, HF radars, gliders, scanfish, profilers, buoys...
- Ocean Colour.
- Ecosystem applications.

9 Appendix A: List of participants

NAME	AFFILIATION	COUNTRY
Androulidakis, Yannis	University Miami /RSMAS	USA
Avissar, Roni	University Miami /RSMAS	USA
Ayoub, Nadia	CNRS / LEGOS	FRANCE
Barth, Alex	University of Liege	BELGIUM
Brenner, Steve	Bar Ilan University/ University of Miami	ISRAEL
Bulhoes de Morais, Cesar Reinert	CHM(Brazilian Navy Hydrographic Center)-REMO	BRAZIL
Chao, Yi	JPL	USA
Charria, Guillaume	IFREMER	FRANCE
De Dominicis, Michela	INGV	ITALY
De Mey, Pierre	CNRS / LEGOS	FRANCE
DiGiacomo, Paul	NOAA	USA
Dombrowsky, Eric	MERCATOR Océan	FRANCE
Dufau, Claire	CLS	FRANCE
Gan, Jianping	Hong Kong University of Science & Technology	China
Garraffo, Zulema	NOAA NCEP	USA
Garzoli, Silvia	NOAA	USA
Halliwell, George	NOAA / AOML	USA
He, Ruoying	NCSU and WHOI	USA
Herzfeld, Mike	CSIRO	AUSTRALIA
Hirose, Naoki	Kyushu University	JAPAN
Kang, HeeSook	University Miami /RSMAS	USA
Hogan, Pat	NRL	USA
Kourafalou, Villy	University Miami /RSMAS	USA
Kurapov, Alex	Oregon State University	USA
Le Hénaff, Matthieu	University Miami /RSMAS	USA
Minnett, Peter	University Miami /RSMAS	USA
O'Dea, Enda	Met Office	UK
Oddo, Paolo	INGV	ITALY
Oliviera, Hugo	REMO	BRAZIL
Patchen, Rich	NOAA	USA
Picot, Nicolas	CNES	FRANCE
Pinardi, Nadia	University of Bologna	ITALY
Richman, Jim	NRL	USA
Srinivasan, Ashwanth	University Miami /RSMAS	USA
Stanev, Emil	HZG (ex GKSS)	GERMANY
Tamura, Hitoshi	JAMSTEC	JAPAN
Usui, Nohirisa	MRI-JMA	JAPAN
Zhu, Jiang	IAP/CAS	CHINA

Apologies

Atlas, Robert	NOAA, AML	USA
Miyazawa , Yasumasa	JAMSTEC	JAPAN
Nakada, Satoshi	Kyoto University	JAPAN

Pavanathra, Francis	INCOIS	INDIA
Qinzheng, Liu	NMEFC	CHINA
Walko, Bob	University of Miami	USA
Wang, Dakui	NMEFC	CHINA
Kirsten Wilmer-Becker	Met Office	UK

10 Appendix B: Actions list

No	Owner	Action	Progress/comments
1	**Co-chairs**	**Stabilize TT membership**	
	PDM	Identify Ifremer member	**Done** (Franck Dumas, with Guillaume Charria as backup)
	PDM	Identify NMEFC member	**Done** (Liu Guimei, with Wang Dakui as backup)
	PDM	Identify CSIRO member	**Done** (Mike Herzfeld)
	PDM	Identify DFO member	**Done** (Joël Chassé, with Denis Lefaivre as backup)
	PDM	Identify S. Korean member	Ongoing
2	KWB	**Make talks available on the web site**	Done
3	VK, CMCC	**Discuss with potential hosts of next workshop & make decision**	Done (Lecce, Italy, Feb, 2-4, 2013), may need revision
4	VK	**Linkages with MEP-TT**	Not started
5	KWB	**Set up e-mail list for TT and COMM**	Ongoing
6	Co-chairs, TT, KWB	**Draft meeting report & work plan update with actions list**	
	PDM	Draft work plan update	Done
7	Co-chairs, TT, KWB	**Establish System Information Table** *(Appendix D)*	Ongoing
	Co-chairs, KWB	Draft and mail template, including PICO POIs	Ongoing
	TT and community	Fill up template	Not started
	Co-chairs, KWB	Draft table on twiki	Demo only
8	Co-chairs, TT, KWB	**COSS-TT web site architecture**	Not started
	Co-chairs, TT, KWB	Include updatable census of useful links for web page (COMM, permanent): bathymetry, atm forcings, tools, etc.	Not started
	Co-chairs, TT, KWB	Include Job opportunities and other news (COMM, permanent)	Not started
9	Co-chairs, list unclear	**Discussions with coastal altimetry community on possible common actions**	Not started except for OSTST2 proposals
10	Co-chairs, panel members	**Launch sub-TT panel on TT organization**	Not started
	Co-chairs, N. Pinardi	Identify panel members	Not started
11	Co-chairs	**Launch drafting of White Paper**	Not started
	Co-chairs	Establish focus: science or organization?	Not started, may require Table
12	Co-chairs, local organizers, TT, KWB	**Draft & organize next workshop**	Not started

11 Appendix C: Agenda

Day 1 - Tuesday 10 Jan 2012

08:15 - 08:45 Registration

08:45 - 10:00 Session 1 - Meeting objectives & background

10:30 - 15:10 Session 2 - part 1: Ongoing coastal ocean forecasting activities

15;30 - 17:00 Session 2 - part 2

from 17:30 Reception at RSMAS PATIO hosted by RSMAS Dean R. Avissar

Day 2 - Wednesday 11 Jan 2012

08:30 - 08:40	Summary of session 2 - part 1
08:40 - 11:30	Session 2 - part 2: Ongoing coastal ocean forecasting activities
11:30 - 14:50	Session 3 - Methods for assessment and assimilation in coastal ocean forecast systems
14:50 - 15:00	Summary of session 2 - part 2
15:40 - 17:30	Parallel Sessions

Day 3 - Thursday 13 Jan 2012

08:30 - 08:40	Summary of session 3
08:40 - 11:10	Session 4 - Data for forcing, assessment and assimilation in coastal ocean forecast systems and applications
11:10 - 12:10	Session 5 - Setting a framework to discuss and decide good paractice & common strategies(summaries from parallel sessions)
13;30 - 13:40	Summary of session 4
13:40 - 16:00	Workshop outcomes and future activties
16:00	Workshop adjourns

Please view the **full agenda** on the GODAE OceanView website:
https://www.godae-oceanview.org/files/download.php?m=documents&f=120120095228-COSSTTMIAMIAGENDAJan19.pdf

12 Appendix D: System information table template

System/ Project overview and description

System/ project overview

Contact name (system/ project representative)	
System/ project name	
Institute(s), country	
System/ project description	
Domain(s) - area(s) covered	

System/ project Objectives

Objectives (what for / aims)?	
System/ project status	
Has it a timeline? (meaning: Is the system developed in the form of successive versions? If so, what will the next version bring and when is it planned?)	
Which products are provided?	
Real-time? (Yes/ No)	
Issues? (this will be kept confidential to the COSS-TT and COSS Community)	

Assessment strategies

Strategies to assess quality:	
Data used for assessment:	
Issues? (this will be kept confidential to the COSS-TT and COSS Community)	

Use of large scale products

Which products do you use?	
Downscaling approaches	
Issues? (this will be kept confidential to the COSS-TT and COSS Community)	

Applications

Applications	
PICO POIs* (phenomena of interest)?	
Issues? (this will be kept confidential to the COSS-TT and COSS Community)	

**** PICO (Panel for Integrated Coastal Observation) Phenomena of interest (POI) are the following:***
- Coastal Eutrophication and Hypoxia
- Human Exposure to Waterborne Pathogens
- Harmful Algal Bloom
- Habitat Loss & Modification
- Vulnerability to Coastal Flooding
- Ocean Acidification
- Food security
See also http://www.ioos.gov/global/final_coastal_goos_pico_report.pdf