

Design for a Model Course on Guidelines for Marine Weather Forecasting Regulations

Course Title

Marine Weather Forecasting Regulations and Procedures (*please revise as appropriate*)

Overview

Recent revisions of the *Guide to Marine Meteorological Services: WMO-471*, and the *Manual on Marine Meteorological Services: WMO-558*, have created a need for training for the marine weather forecasting community focused on familiarization and effective implementation of the regulations for provision and continuous improvement of marine meteorological services. This proposal outlines the design of an instructional course package to meet this need. The package can be used by any regional training center or other training provider as guidance to offer an online or face-to face training event. It might also be adapted to comprise a self-directed course.

Audience

The learning audience for this course package will consist of:

- Marine Forecasters, who are responsible for monitoring, forecasting and warning of marine meteorological phenomena, and for ensuring that quality meteorological information and services are effectively communicated to key stakeholders
- Staff recently appointed to the role of METAREA Coordinator or National Marine Services Focal Point, or a role involving service management of marine meteorological services.
- Staff experienced in the role of METAREA Coordinator or National Marine Services Focal Point, or a role involving marine service management who need to refresh their skills and knowledge, particularly following the recent revised publication of WMO 558 and WMO 471.
- Secondary audience: Other marine customers, partners or stakeholders who would benefit from understanding how marine meteorological forecast operations are conducted.

The course package will align with the Marine Weather Forecaster Skills Development Matrix in Appendix A.

The learning materials and case studies should provide context for the following audiences and geographic user bases:

- Small Island Developing States
- Least Developed Countries
- Tropics
- Polar and sea-ice
- Mid-latitude
- Complex coastlines and waterways
- Large island countries

- High density traffic areas

Training Goal

The purpose of this course is to help the learner audience to gain a deep understanding of the needs of clients (e.g. at sea or at coasts) who use marine weather information for protection of property and safety of life at sea. This course will promote the use of and aid implementation of the WMO regulations and service delivery framework outlined in the Guide to Marine Meteorological Services (WMO No.471), and increase awareness and understanding of the regulations outlined in WMO 558 Manual to effect successful implementation of WMO requirements for marine meteorological services. The course package will also align with the core competencies for marine weather forecasters outlined in Appendix B.

Learning Needs

- JCOMM and WMO regional associations have noted that many services have gaps in knowledge and application of the WMO marine service delivery framework, and that some WMO Members have marine forecasting services in development.
- Revised WMO Guide (471) and Manual (558) on marine forecasting regulations have created knowledge gaps in many services.

Learning Outcomes

The learning outcomes for the Model Course will include the following.

- Apply marine forecast regulations in daily forecast operations.
- Ability to apply the WMO marine service delivery framework to foster continuous improvement of marine services.
- Ability to describe the differences between and hierarchy of international and national regulations that govern the provision and broadcast of marine services.
- Ability to describe the end-to-end service delivery processes within the marine multi-hazard forecast and early warning system, including the roles and responsibilities of METAREA Coordinators, National Marine Focal Points, marine weather forecasters, and NAVAREA Coordinators.
- Explain the marine operations for a variety of end-users for marine forecasting services (e.g., ship captain, tourism operator, life guard, coast guard, disaster response agencies, NAVAREA Coordinators).
- Describe the use of marine meteorological information and services by the variety of end-users.
- Resolve issues related to regulations that can occur in conducting marine forecasting services.
- Describe the relevant communication methods for marine meteorological information and formats appropriate for end-users.
- Interpret the WMO's service regulations and apply them in a national context and in relation to national stakeholder requirements.

Additional or related learning outcomes derived from the Competencies for Marine Meteorological and Oceanographic Services. (Untreated Performance Criteria, Background knowledge, skills and abilities are removed from the lists below.)

4. ENSURE THE QUALITY OF METEOROLOGICAL INFORMATION AND SERVICES
Competence Description: Forecasts, warnings and related products are provided within a quality management framework.
Performance Criteria
1. Apply the organisation's quality management system and procedures as required.
4. Monitor the functioning of operational systems, gather and assess customer comments, suggestions and complaints, and take remedial actions when necessary.
5. Identify and evaluate weather forecasting and warning problems and determine appropriate corrective and preventive actions for continuous improvement.
Background knowledge, skills and abilities
Knowledge of quality management principles, practices and procedures.
Knowledge of SOPs for forecast and warning.
Knowledge of contingency plans.
Knowledge of stakeholder needs.
- Knowledge of relevant stakeholder operations and needs for and applications of forecasts, including: - Stakeholder operations (e.g., procedures, tactics, planning processes and cycles) - Stakeholder limitations, including operating limits, legal constraints, geopolitical limits) - Stakeholder desired outcomes from operation
General knowledge of stakeholder terminology (e.g., nautical terms, acronyms, abbreviations, technical terms related to forecast variables (e.g., state of the sea, currents, waves, swell, tides), customer preferred measurement units)
Knowledge of stakeholder communication and security systems, if required.
Knowledge of the Impact of weather variables, parameters and phenomena on stakeholder operations/activities.

5. COMMUNICATE METEOROLOGICAL INFORMATION TO INTERNAL AND EXTERNAL USERS
Competence Description: Marine weather forecasts and warnings are communicated in a timely and clear manner to meet user community needs.

Performance Criteria
1. Ensure that all forecasts and warnings are disseminated via the authorised communication channels to user groups.
Background knowledge, skills and abilities
• Knowledge of primary users and operations and weather sensitivities.
• Knowledge of available communication systems, techniques and methodologies.
• Ability to ask users the appropriate questions so as to better understand their needs.
• Ability to utilize cross-boundary consistency techniques – national and international, as well as inter-disciplinary / inter-agency checks as needed.

Content Scope: Basic Course Outline and Learning Activities

The course outline will follow the service delivery themes outlined in WMO-471, the WMO Strategy on Service Delivery, and the WMO Guide to implementing Quality Management, which represents a comprehensive document detailing the service delivery framework and requirements for marine meteorological services. The outline of broad topic areas appears below. This may or may not reflect the section structure of the course.

From WMO-No. 471

- Overview of Marine Meteorological Services
 1. Functions of marine meteorological service
 2. Organization of marine meteorological services
 3. Service Design Considerations
 4. User Requirements
 5. Requirements for Each Service Element
 6. Requirements for Specific Users and Applications
 7. International Coordinating Arrangements
 8. Worldwide Met-Ocean Information and Warning Service
- Requirements for Specific Products and Services, as Described in WMO 558
 1. Services for the High Seas
 2. Services for Coastal, Offshore, and Local Areas
 3. Marine Meteorological Support for Maritime Search and Rescue
 4. Services in Support of the World Wide Navigational Warning System
 5. Services in Support of Marine Environmental Emergency Response
 6. Training in the Field of Marine Meteorology
 7. Services for Marine Climatology

Learning Activities

Some of the elements for the course package might include:

Case studies, exercises, interviews on:

- Stakeholder engagement opportunities such as visiting a harbour master, visiting a ship and talking to crew, conducting a familiarisation trip on a ferry, or visiting a coastal radio station and talking to operators. May include virtual tours, video or text interviews.
- Successful applications of stakeholder engagement actions to improve service delivery
- Applying the WMO Multi-hazard early warning checklist to improve service delivery
- Applying the continuous improvement planning cycle (refer to WMO Strategy for service delivery, and WMO Guide on Quality Management)
- Adapting service design or delivery methods to cater for changes to technology or user behavior.
- Using the marine service verification guidelines
- Developing user education and communication materials as part of ongoing efforts to improve service understanding and utilization.
- Importance of applying backup guidelines (See METAREA Coordinator Operations Handbook) Pending publication, 2019
- Development of a forum to share best practices amongst marine forecasters, METAREA Coordinators and other stakeholders.
- Benefit of liaising with another marine service to identify a new technique or capability that could improve services
- Conducting a desktop exercise to benchmark national service against other WMO Members as part of a gap analysis

Model Course Components may include the following:

- A teaching guide for effective use of the model course for distance learning or face-to-face instruction
- Expected Learning outcomes
- Learning activities as described below
- Guidance for learner assessment
- Links to new and existing resources that can be of use.
- Recommendations for regional adaptations of case examples, etc., where appropriate.

Constraints and Risks

- Initial design and development should occur as much as possible before the end of 2018.
- The 2018 project consultant has limited time to contribute to the effort.
- Subject matter experts likely face many time constraints, but their input is critical.
- No additional development project budget is identified other than 2018 consultant time and the potential for travel.
- Limited existing resources exist.

Learning Solutions/Delivery Format

Given funding constraints and in order to maximize audience accessibility, the model course package will be available delivery. The actual course might be delivered either online, face-to-face, or blended. Where there is funding and resources for an in-person residence course offering, NMHSs may adapt these virtual course materials for such training events.

Required Resources

The development of the course package will require *substantial input* of materials and resources from subject matter experts dealing in marine meteorological services. Specifically, it will require the assistance of experts within the JCOMM Experts Services and Forecast Systems Programme Area (especially the WWMIWS Committee, Expert Teams on Sea Ice and Disaster Risk Reduction. These entities can identify and provide access to needed elements from various NMHSs who provide marine meteorological services. Some resources will require writing and media production, depending on design decisions. Some required input includes interview content to develop the learning activities described above.

Learning Assessment

Assessment within the model course will include exercises describe above in the Learning Activities section and a final summary assessment

Training Evaluation

The course package will include an opportunity for feedback to be provided by users of the package, as well as a recommended course assessment for those implementing the course.

Milestones and Deliverables

TBD

Appendix A—Marine Weather Forecasting Skills Development Matrix

Skill s Development Matrix – Marine service delivery roles

	Training	Meetings/experience	Equipment
METAREA Coordinator	EGC monitoring and broadcast skills GMDSS General Operators Certificate Course WMO Service Delivery Framework Understanding WMO 471 marine service delivery Understanding WMO 558 ISO 9001	Joint meeting of WWNWS and WWMIWS Visit to a ship and talk to crew and Master Familiarisation trip on ferry, or to harbour master Visit a coastal radio station and talk to operators Talk with NAVAREA Coordinator Host/conduct a visit with NAVAREA Coordinator to talk through service. Participate in an IMO meeting Public exhibition involvement (World Maritime Day) Visit another METAREA Coordinator in a different country	Nil
Marine Forecaster			
1. Analyse and monitor continually the marine weather situation;	Satellite altimeter Satellite lightning for storms Satellite imagery Marine instruments, buoys, etc. Soundings Ship reports	Not yet completed	Not yet completed
2. Forecast marine weather phenomena, variables and parameters;	Undertake course on marine meteorology Tide and sea level effects Ocean currents	Not yet completed	Not yet completed
3. Warn of hazardous marine meteorological phenomena;	Elements ● Squalls ● Waves ● Storm surges ● Tropical cyclones	Not yet completed	Not yet completed

	• Reduced visibility • Wave steepness, abnormal waves • Ice accretion		
4. Ensure the quality of marine meteorological information and services;	Access to wave buoy data Access to satellite altimeter data for verification of grids Quality Management standards ISO 9001 Writing procedures correctly and clearly Applying procedures Understanding WMO 558	Not yet completed	Not yet completed
5. Communicate marine meteorological information to internal and external users.	Understanding WMO 471 marine service delivery	Visit to a ship and talk to crew and Master Familiarisation trip on ferry, or to harbour master Visit a coastal radio station and talk to operators Talk with METAREA Coordinator Host/conduct a visit with METAREA Coordinator to talk through service.	Nil
National Marine Services Focal Point	WMO Service Delivery Framework Understanding WMO 471 marine service delivery Understanding WMO 558 ISO 9001	Visit to a ship and talk to crew and Master Familiarisation trip on ferry, or to harbour master Visit a coastal radio station and talk to operators Talk with METAREA Coordinator Host/conduct a visit with METAREA Coordinator to talk through service. Participate in an IMO meeting Public exhibition involvement (World Maritime Day) Participate in a WMO meeting	Nil

Appendix B: Competencies for Marine Weather Forecasters

Annex to draft Resolution 3.1(5)/1 (Cg-17)

COMPETENCY

Note: These are the minimum competency requirements to effectively perform the duties of a marine weather forecaster (MWF). National personnel qualification requirements for MWF, may be set at a higher level, e.g., to be also degree qualified.

Note: The marine environment includes the open and coastal seas (including the surf zone), estuaries, large lakes, rivers and their interfaces with the land and the atmosphere.

The MWF should have successfully completed the Basic Instruction Package for Meteorologists (BIP-M) or relevant parts thereof.

Within the context of these conditions:

- For the area of responsibility refer WMO-No. 558, *Manual on Marine Meteorological Services*, Volume 1 – Global Aspects and Volume II, Regional Aspects;
- In consideration of the impact of meteorological phenomena, variables and parameters on marine operations; and
- In compliance with marine user requirements, international regulations, local procedures and priorities.

The MWF should be able to (competence requirements):

1. Analyse and monitor continually the marine weather situation;
2. Forecast marine weather phenomena, variables and parameters;
3. Warn of hazardous marine meteorological phenomena;
4. Ensure the quality of marine meteorological information and services;
5. Communicate marine meteorological information to internal and external users.

Note: As these competency requirements are recommended and generic to all providers of marine weather forecast and warning services, no priority is stated to either the phenomena or parameters. Any priorities are established by the Marine Meteorological Service.