NATO STANDARD

ATP-32

NATO MILITARY OCEANOGRAPHIC AND RAPID ENVIRONMENTAL ASSESSMENT SUPPORT PROCEDURES

Edition E Version 2

SEPTEMBER 2019

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED METEOROLOGICAL AND OCEANOGRAPHIC PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

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NATO LETTER OF PROMULGATION

9 September 2019

1. The enclosed Allied Meteorological and Oceanographic (METOC) Publication ATP-32, Edition E, Version 2, NATO MILITARY OCEANOGRAPHIC AND RAPID ENVIRONMENTAL ASSESSMENT SUPPORT PROCEDURES, which has been approved by the nations in the Military Committee Joint Standardization Board, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 1171.

2. ATP-32, Edition E, Version 2, is effective upon receipt and supersedes ATP-32, Edition E, Version 1 which shall be destroyed in accordance with the local procedures for the destruction of documents.

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4. This publication shall be handled in accordance with C-M(2002)60.

for

Dieter Schmaglowski
Deputy Director NSO
Branch Head P&C

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
CZE	The Czech Armed Forces have limited capabilities of METOC Support in the area of oceanography. Pertinent tasks will be performed for operations abroad or NATO exercises only on request.
LVA	Latvian Naval Forces have limited technical capabilities for measurement of meteorological and oceanographic parameters and reporting observation data in accordance with the STANAG requirements.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

1.1. REFERENCES

a. MC 0594/2 (Final), Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces, 31 Jul 2018
b. ACO Directive 80-34, Meteorological and Oceanographic Support, 03 February 2016
c. MC 0632 (Final), NATO Recognized Environmental Picture (REP) Concept, 09 June 2015

1.2. NATO MILITARY OCEANOGRAPHIC AND RAPID ENVIRONMENTAL ASSESSMENT SUPPORT

1. This publication provides military oceanography (MILOC) and rapid environmental assessment (REA) support procedures outlining the provision of services, data and products for NATO operations[1] including reporting standards**,** codes and formats. Users should contact their national meteorological and oceanographic (METOC) representatives to the Military Committee (MC) or the Allied Command Operations (ACO)-level working groups, panels or conferences in order to retrieve information regarding national MILOC activities or capabilities or refer to ACO METOC reports.

2. MILOC refers to oceanographic support that supports certain NATO operations, as defined in Reference A. Information is obtained by in-situ or remote sensing measurements, together with advanced computer-based modelling. Accurate, timely and relevant MILOC and REA information provides NATO commanders with the opportunity to plan, execute, support and sustain specific operations. This applies especially to the commander Allied Joint Force Command (JFC) and commander Allied Maritime Command (MARCOM). MILOC and REA are key components to effective, efficient and safe NATO operations and also support comprehensive preparation of the operational environment (CPOE) process.

3. This publication implements policy at Reference A, and is consistent with the ACO Directive outlining METOC support within the NATO Command Structure (NCS) at Reference B. National MILOC capabilities are the main providers of the data and products in accordance with the Integrated METOC (IMETOC) Support principle. METOC support, data and products from National centres may be augmented with outputs from a REA.

4. In accordance with the IMETOC Support principle the IMETOC lead nation is responsible for provision of MILOC support. For NATO operations, MILOC support is

[1] In this document and its Annexes, “operations” refers to operations, missions, exercises and other NATO-led activities, unless explicitly stated; i.e. “Exercise support…”

coordinated with national military staffs by SHAPE METOC staff on behalf of, and in coordination with, the JFC and/or MARCOM staffs. METOC arrangements will be detailed in Annex T of the relevant operation plan (OPLAN) or order and specific IMETOC support is arranged by ACO CMO through an Integrated support plan (ISP) with the corresponding lead and/or assisting nation(s) (LN/AN(s)) according to Reference A. MILOC support across the NATO force structure (NFS) for any operation will be consistent with IMETOC support principles to ensure unity of effort, maximize effectiveness and reduce duplication of effort. For NATO exercises, METOC arrangements will be detailed in Annex W of the relevant Exercise Operational Plan (EXOPLAN) Instruction.

5. These procedures may also be used by national forces conducting non-NATO operations. Requests in such cases should be directed and coordinated on a bilateral basis with the appropriate national authorities.

1.3. NATO MILITARY OCEANOGRAPHIC SUPPORT PROCESSES

1. NATO has very limited organic METOC data sources and is reliant on nations to provide METOC data, products, imagery and collection capabilities. Accurate, timely, consistent and relevant MILOC information can provide commanders, whether part of the NFS or NCS, with the knowledge necessary to anticipate and exploit the best window of opportunity to plan, execute, support and sustain NATO operations and missions. Exploiting MILOC information for CPOE to support planning and operational staff and to optimise the employment of sensors, weapons, logistics, equipment and personnel is the key to effective, efficient and safe NATO operations.

2. Within the NCS, the establishment of component-level controlled databases such as the recognised maritime picture (RMP), recognised air picture (RAP) and recognised land picture (RLP) are NATO procedures that ensure unity of effort. Similar principles are applied in joint operations in support of the Common Operational Picture (COP), to the METOC functional level under IMETOC support principles ensuring decision-making consistency based on the principle of “One Operation, One Forecast” and through the use of designated datums[2] to produce the planned recognised environmental picture (REP) (Reference C). Like the broader context of METOC information, MILOC information has spatial and temporal dimensions that permit the information to be databased and provided to decision makers through a METOC functional service. Under the IMETOC support principles, meteorological and oceanographic information is interdependent and should be holistically viewed as fully integrated processes or products. METOC contributions to these recognised pictures form the basis of a coherent understanding of the operational environment for situational awareness and decision-making. It is a

[2] A datum is a basis for horizontal control surveys, consisting of the longitude and latitude of a certain point, the azimuth of a certain line from this point, and two constants used in defining the terrestrial spheroid. This would be necessary in any REA survey work.

national responsibility to ensure access and availability of appropriate IMETOC support information outside the NCS.

Likewise under IMETOC support arrangements, the LN and/or AN(s) are responsible to ensure the information is available within the NCS.

3. Strategic, operational and tactical level MILOC forecasts and their derived impacts are available to all levels of command to improve understanding of the environmental impacts upon their forces. Typically these will be provided as a representative picture/graphic that operators and decision-makers may access or query but also as automatic and non-automatic data exchanges for sensors, weapons and equipment systems. MILOC information will form an integral part of the METOC contribution to the REP**,** once it is incorporated in ACO, and the overall NATO common operational picture (NCOP). The NATO C2 System NCOP is the standard system to display the operational recognised pictures.

4. MILOC support to NATO commanders originates from national and international MILOC structures, and is supplied as either raw data (e.g. observations, imagery) or as processed information (e.g. numerical model output, forecasts, impact matrices).

5. Operations in unfamiliar areas may require REA that could trigger a dedicated mission and/or assets to collect and process METOC, hydrographic and geospatial information. The aim of REA is to provide just enough information to enable an understanding of the effects of the environment on operations in a timely manner and to contribute to the appropriate recognized picture. REA procedures are covered in Chapter 3.

6. SHAPE holds a classified oceanographic database, called the NATO standardised oceanographic database (NSODB) that was originally designed to directly support antisubmarine warfare (ASW) operations, and which can be made available to Allies on request. This outline mark-up language (OML) database contains only data and no viewer and so needs a host software system to view in order to operate. Data consists of bottom type, acoustic information, topography and is the only standard ASW database. Much of this information is now contained in the additional military layer (AML) field ‘Integrated Water Column’ and it is listed in the REA Category 1 database. NATO currently does not hold a suitable tactical decision aid (TDA) in which to view the data but it is available for nations to use in their own systems. SHAPE J2 GEOMETOC holds the latest version of the NSODB and will act as the distribution hub, through the NATO Secret Wide Area Network (NSWAN) or document dissemination process.

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CHAPTER 2 MILOC REPORTS AND FORMATS

2.1. REFERENCES

a. MC 0594/2 (Final), Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces, 31 July 2018
b. AMETOCP-4 Vol II, Ed A, V1 (NR) dated 24 May 2019

2.2. INTRODUCTION

1. In order to ensure that appropriate and up to date oceanographic support for NATO forces is available it is essential that, whenever possible, NATO ships and aircraft report oceanographic measurements and observations to the appropriate centres using the standard format.

2. In accordance with Reference A, NATO policy provides that, during transit and patrols, surface units or groups should take and transmit regular data observations as outlined in applicable directions, consistent with ACO Comprehensive Operations Planning Directive.

3. Expendable probes are expensive and as such ASW or METOC officer recommendations should be considered for launch frequency - probes should be launched only in tactically significant areas. Choke points, sea lines of communication (SLOC), ocean features, littoral areas and known data sparse areas are also of particular interest, both for on board TDA applications and inclusion in climatological databases.

2.3. CENTRES

1. Oceanographic observations should be routinely reported by message to all of the following addresses:

FLEWEACEN NORFOLK VA
LANT NCCS WEATHER NORFOLK VA
MRC NORFOLK VA
JOMOC
DCOO DA
HQSTC
CISMF DATA
DEU NAVY HQ GEOINFO DIV

METOC HALIFAX
METOC ESQUIMALT
FLENUMMETOCCEN DATA MONTEREY CA
ONHO TURKEY
HYDROUK TAUNTON

2.4. CLASSIFICATION OF DATA

Data collected by operational units will normally have a minimum classification of NATO Restricted, however units should consult national or NATO operation orders in case of the necessity for higher classification. National military authorities are encouraged to downgrade classified oceanographic data when possible, consistent with the originating nations' directives.

2.5. OBSERVATIONS AND MEASUREMENTS TO REPORT AND CODES TO USE

1. It is recommended to use standard World Meteorological Organization (WMO) codes whenever possible to report oceanographic observations and measurements. For code details, consult Reference B:

   a. FM 62 TRACKOB (VIII Ext.) for marine surface observation along a ship's track,
   b. FM 63 BATHY (IX Ext., X Ext., XI Ext.) for reporting bathy-thermal observations,
   c. FM 64 TESAC (IX Ext., XI Ext.) for reporting observations of temperature, salinity and current.

2. Other military used reporting codes are as follows (further details on the following signals in Reference B):

   a. VELO CODE: This code serves to report sound velocity/depth recordings and should be used for VELO observations.
   b. NOISE MEASUREMENTS: This code is used to transmit ambient noise data.

3. Significant biological activity (such as marine mammal sightings or unusual phenomena) should be reported whenever observed. The report may be added after any routine environmental observation (Bathy or weather observation) or sent by separate message. Plain language description of biological activity may include the following:

   a. Date, time and location.

b. Monitoring type (visual, acoustic or other).

c. Environmental conditions at time of observation (visibility, sea state).

d. Type and number of animals observed (or short description if unidentified).

e. Direction, speed of movement and any specific characteristics of behaviour.

f. Distance from sighting vessel.

Amplifying information can be included if relevant, including whether radiating, length of interaction with sighting vessel, etc. if it is considered to add value. Observations will contribute to the updating of national and NATO marine biology databases. This plain language description for marine mammal information from NATO units should be forwarded to the custodian of the UKHO, the NATO Marine Mammal Database at Marine.Life@ukho.gov.uk.

ANNEXES:

A. NATO/MILITARY OCEANOGRAPHIC INFORMATION CENTRES
B. ACTIVE SONAR RISK MITIGATION TO MARINE LIFE

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ANNEX A MILITARY OCEANOGRAPHIC INFORMATION CENTRES

A.1. REFERENCES

a. MC 0594/2 (Final), Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces, 31 Jul 2018.

In accordance with Reference A all METOC data should be requested via the IMETOC LN. The following address lists provide contact details of NATO member Oceanographic Centre's in the event of an urgent operational requirement.

APPENDICES

1. CAN Canadian Forces Meteorological and Oceanographic Centre Esquimalt
2. CAN Canadian Forces Meteorological and Oceanographic Centre Halifax
3. CAN Canadian Joint Meteorological Centre
4. DEU German Navy HQ GEOINFO DIV
5. DNK Defence Centre for Operational Oceanography (DCOO)
6. FRA Toulouse Centre (CISMF)
7. GBR Marine and Astronomical Science Team (Marine Environment)
8. GBR Northwood Centre
9. ITA I.H.I. Oceanographic Section
10. ROU Romanian Navy
11. TUR Office Of Navigation, Hydrography And Oceanography (ONHO)
12. USA Commander Naval Meteorology and Oceanography Command (CNMOC)

Appendix 1 CAN CANADIAN FORCES METEOROLOGICAL AND OCEANOGRAPHIC CENTRE ESQUIMALT

A.1.1. FULL NAME OF CENTRE:

Canadian Forces Meteorological and Oceanographic Centre Esquimalt (METOC Esquimalt)

A.1.2. STATUS:

A Canadian Armed Forces Centre for military meteorology and oceanography providing services to NATO by agreement.

A.1.3. ADDRESS FOR CORRESPONDENCE:

Maritime Forces Pacific Headquarters
P.O. Box 17000 Stn Forces
Victoria, British Columbia
Canada
V9A 7N2
Attention: METOC Esquimalt

A.1.4. MESSAGE ADDRESS:

METOC ESQUIMALT

A.1.5. CONTACT INFORMATION:

E-mail Address: ESQDutyMet@forces.gc.ca
Duty Phone: [1] 250-363-2957

Appendix 2 CAN CANADIAN FORCES METEOROLOGICAL AND OCEANOGRAPHIC CENTRE HALIFAX

A.2.1. FULL NAME OF CENTRE:

Canadian Forces Meteorological and Oceanographic Centre Halifax (METOC Halifax)

A.2.2. STATUS:

A Canadian Armed Forces Centre for military meteorology and oceanography providing services to NATO by agreement.

A.2.3. ADDRESS FOR CORRESPONDENCE:

Maritime Forces Atlantic Headquarters
P.O. Box 99000 Stn Forces
Halifax, Nova Scotia
Canada
B3K 5X5
Attention: METOC Halifax

A.2.4. MESSAGE ADDRESS:

METOC HALIFAX

A.2.5. CONTACT INFORMATION:

E-mail Address: METOCOPERATIONS@forces.gc.ca
Duty Phone: [1] 902-427-6385

Appendix 3 CAN CANADIAN JOINT METEOROLOGICAL CENTRE

A.3.1. FULL NAME OF CENTRE:

Canadian Joint Meteorological Centre (JMC)

A.3.2. STATUS:

A Canadian Armed Forces Centre for military meteorology providing services to NATO by agreement.

A.3.3. ADDRESS FOR CORRESPONDENCE:

Joint Meteorological Centre
P.O. Box 17000 Stn Forces
Oromocto, New Brunswick
Canada
E2V 4J5

A.3.4. MESSAGE ADDRESS:

JOINT MET CENTRE GAGETOWN

A.3.5. CONTACT INFORMATION:

E-mail Address: GAGJMCRemoteBriefReq@forces.gc.ca
Duty Phone: 1-800-996-3836 / (1-800-WX-METEO)

Appendix 4 DEU German NAVY HQ GEOINFO DIV

A.4.1. FULL NAME OF CENTRE

German Navy Headquarters Geoinformation Division (DEU NAVY HQ GEOINFO DIV).

A.4.2. STATUS

The German Navy Headquarters Geoinformation Division is providing maritime geoinformation support to national forces and to NATO on request.

A.4.3. ADDRESS FOR CORRESPONDENCE

German Navy Headquarters
Geoinformation Division
Kopernikusstrasse 1
18057 ROSTOCK
GERMANY

A.4.4. MESSAGE ADDRESS

MM-DEU NAVCMD OPSDIV GEOINFO GLUECKSBURG (Routing indicator: RGFBPG)

A.4.5. CONTACT INFORMATION

Telephone: +49 4631 666 3911

E-mail address:
markdoeinsgeoanforderung@bundeswehr.org (24/7)
markdoeinsgeo@bundeswehr.org (Monday-Friday, 07-16)

Appendix 5 DNK DEFENCE CENTRE FOR OPERATIONAL OCEANOGRAPHY (DCOO)

A.5.1. FULL NAME OF CENTRE

Defense Centre for Operational Oceanography (DCOO)

A.5.2. STATUS

DCOO is the Danish Defense point of contact (POC) for METOC and REA.

A.5.3. ADDRESS FOR CORRESPONDENCE

Forsvarsministeriets Materiel- og Indskøbsstyrelse
Att.: Forsvarets Center for Operativ Oceanografi (FCOO)
Lautrupbjerg 1-5 DK-2750 Ballerup
Denmark

A.5.4. MESSAGE ADDRESS

DCOO DNK

A.5.5. CONTACT INFORMATION

Commercial Telephone: +45 72572383
Unclassified email: bja@fcoo.dk
Classified email: DCOO DNK BJA
Public Home Page: https://fcoo.dk
Hours: Working hours
Primary areas of coverage: Denmark, Faeroes and Greenland

Appendix 6 FRA TOULOUSE CENTRE (CISMF)

A.6.1. FULL NAME OF CENTRE

Centre Interarmees de Soutien Meteo-oceanographique des Forces (CISMF).

A.6.2. STATUS

French Joint METOC Centre providing support to national authorities and forces, and to NATO on request. CISMF is also identified as Military Forecast Centre (MFC) in the NATO document AMETOCP-2.

A.6.3. ADDRESS OF CORRESPONDENCE

Monsieur le Capitaine de Frégate
Commandant le CISMF
BP 63576
31035 TOULOUSE CEDEX 1
Telephone: +33 567 76 6801

A.6.4. E-MAIL ADDRESS

cismf.superviseur.fct@intradef.gouv.fr - For urgent request (operational 24/24 duty) and for routine request

For urgent request, check by phone call to +33 567 76 6802. (operations centre)

A.6.5. MESSAGE ADDRESS

CISMF TOULOUSE (routing indicator : RFFMVB)	:	for support requests and administrative signals
CISMF DATA (routing indicator : RFFIVB)	:	for signals containing oceanographic and meteorological data.

Appendix 7 GBR MARINE & ASTRONOMICAL SCIENCE TEAM (MARINE ENVIRONMENT)

A.7.1. FULL NAME OF CENTRE

Marine & Astronomical Science Team (Marine Environment)

A.7.2. STATUS

As part of the UK Hydrographic Office, the Marine and Astronomical Science Team (Marine Environment), database seabed and marine physical, optical, acoustic and biological data to support the delivery of situational awareness products to the Royal Navy and MOD.

A.7.3. ADDRESS FOR CORRESPONDENCE

MAST(ME)
DMGIC
UK Hydrographic Office
Admiralty Way
Taunton TA1 2DN
UK

A.7.4. MESSAGE ADDRESS

HYDROUK TAUNTON Type “FAO MAST(ME), DMGIC” in 1st line of text.

A.7.5. CONTACT INFORMATION

Commercial Telephone: +44(0)1823 337900 Ext 3597
Classified email: NSWAN: UKHydro MWDC
Group Mailbox: UKHO-DMGIC@ukho.gov.uk

Appendix 8 GBR NORTHWOOD CENTRE

A.8.1. FULL NAME OF CENTRE

Fleet Commander, Joint Operational Meteorological and Oceanographic Centre (JOMOC)

A.8.2. STATUS

United Kingdom national centre but providing oceanographic and acoustic data to NATO on request.

A.8.3. ADDRESS FOR CORRESPONDENCE

Fleet Commander
JOMOC,
Northwood, Middlesex, HA6 3HP
United Kingdom

A.8.4. CONTACT INFORMATION

JOMOC Duty Maritime Forecaster
Telephone: 0044 (0)1923 958111
NATO NCN: * 157 58111
Fax: 0044 (0)1923 958117
Email: NAVYOPS-JOMOCGROUP@mod.uk
Website: http://www.jomoc.net

Appendix 9 ITA I.H.I. OCEANOGRAPHIC SECTION

A.9.1. FULL NAME OF CENTRE

Italian Hydrographic Institute – Military Oceanography Section (Genoa, Italy).

A.9.2. STATUS

Italian Hydrographic Institute is the National Cartographic institution in charge for the production of official nautical documents, and for the Oceanographic support to the Navy, the Italian Defence, and to NATO on request. The Institute is dependent from the Italian Navy Headquarters, and included in IT MOD. The METOC capability and service is carried out by the Military Oceanography Section, in cooperation with the Italian Air Force MET Centre (CNMCA – National Centre of Aeronautical Meteorology and Climatology).

A.9.3. ADDRESS FOR CORRESPONDENCE

Istituto Idrografico della Marina
C.P. 1660 – Ufficio Postale Genova Centro
16121 Genova

A.9.4. MESSAGE ADDRESS

MARIDROGRAFICO GENOVA

A.9.5. CONTACT INFORMATION

Unclass. Email (I.H.I.): maridrografico.genova@marina.difesa.it
Unclass. Email (OC Section): iim_metoc@marina.difesa.it
Telephone : +39 010 24431 (Operator)
+39 010 2443213 (Division Head)
+39 010 2443219 (OC Section)

Appendix 10 ROU ROMANIAN NAVY

A.10.1. FULL NAME OF CENTRE

Maritime Hydrographic Directorate

A.10.2. STATUS

A.10.3. ADDRESS FOR CORRESPONDENCE

Maritime Hydrographic Directorate, 900218 Constanta, Fulgerului no. 1 ROMANIA

A.10.4. CONTACT INFORMATION

Commercial Telephone: +40241651040; +40744308991
Unclassified email: lucidumitrache@gmail.com ; dumitrache.lucian@dhmfn.ro
Public Home Page:

Appendix 11 TUR OFFICE OF NAVIGATION, HYDROGRAPHY AND OCEANOGRAPHY (ONHO)

A.11.1. FULL NAME OF CENTRE

Office Of Navigation, Hydrography And Oceanography (ONHO)

A.11.2. STATUS

National Navigation, Hydrography and Oceanography Centre of Turkey.

A.11.3. ADDRESS FOR CORRESPONDENCE

Director

Office of Navigation, Hydrograpghy and Oceanography 34805
Beykoz/Istanbul/Turkey
Seyir, Hidrografi Ve Osinografi Dairesi Baskanligi 34805 Beykoz/Istanbul/Turkiye

A.11.4. MESSAGE ADDRESS

TURNHOS/ISTANBUL where routing indicator is RXQMNE

A.11.5. CONTACT INFORMATION

Commercial Telephone: + 90 216 322 25 80
Fax: + 90 216 331 05 25
Unclassified email: info@shodb.gov.tr
Classified email:
Public Home Page: www.shodb.gov.tr

Appendix 12 USA CNMOC Maritime Operations Center (MOC) CTG 80.7

A.12.1. FULL NAME OF CENTRE

Full name of Centre: Commander Naval Meteorology and Oceanographic Command (CNMOC) Maritime Operations Center (MOC) CTG 80.7, Stennis Space Center, Mississipi, USA.

A.12.2. STATUS

U.S. Navy Meteorology and Oceanography Maritime Operations Center (MOC) coordinates all environmental support for operational reach back for naval, joint, coalition, and national missions. Performs data fusion for planning and operations, and operates global and regional meteorological and oceanographic models.

A.12.3. ADDRESS FOR CORRESPONDENCE

Attn: Battle Watch Captain (BWC)
Commander, Naval Meteorology and Oceanography Command
1100 Balch Blvd
Stennis Space Center, Mississippi 39522

A.12.4. MESSAGE ADDRESS

COMNAMETOCCOM STENNIS SPACE CENTER MS

A.12.5. CONTACT INFORMATION (24 HOUR)

CNMOC/CTG 80.7 Battle Watch Captain
NIPR: CNMOC_BWC.fct@navy.mil
Commercial: 001-1-228-688-4248
Cellular: 001-1-228-342-6013
Commercial Telephone: 00-1-831- 657-1406/1407

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ANNEX B ACTIVE SONAR RISK MITIGATION TO MARINE LIFE

B.1. REFERENCES

a. MC 0547, Code of Conduct for the Use of Active Sonar to ensure the protection of Marine Life within the framework of Alliance Maritime Activities, 12 June 2018.

B.2. BACKGROUND

1. In accordance with Reference A, NATO is committed to compliance with environmental requirements and minimising potential adverse effects on marine flora and fauna. Environmental protection (EP) policy is laid down in MC 469 and Reference A is an extension of this with specific reference to marine fauna.

2. It is prudent to otherwise minimise any potential impact on marine life. Mitigation planning should be conducted prior to any NATO activities in case of contact with marine life.

3. EP policy continues to evolve and mitigation procedures will evolve in parallel. NATO is fully engaged in ensuring its forces adhere to developing environmental law throughout their operating environments.

B.3. PLANNING

1. According to Reference A, NATO commanders are expected to ensure that environmental risk management is integrated into any OPLAN. EP considerations need to take account of expected marine life activity, migratory routes, protection areas and their likely interaction with military forces and operations.

2. If directed, METOC staff should liaise with EP planners to ensure compliance with both NATO and potential host nation (HN) policy. Planning should involve EP, ASW, mine warfare (MW) and other interested communities. Subsequent production of Annex Y to the OPLAN/EXOPLAN will then indicate generic planning activity conducted and actions to be undertaken by NATO forces.

3. NATO utilises the integrated decision aid (IDA), a software package developed by the NATO Centre for Maritime Research and Experimentation (CMRE), for the production of active sonar risk mitigation (ASRM) output, which is available on request from SHAPE. This technical software, through the use of oceanographic and other databases, calculates potential risk to marine life against sonar transmissions

and may be used, where possible, in the planning for suitable NATO operational areas. Updates to this software are not planned, nor is a training package available. The software itself is available for NATO members on request from SHAPE Chief METOC Officer (SHAPE CMO).

4. Databases of bathymetry, species movement and activity, sensors and oceanographic details are necessary for accurate depiction and estimation of sonar effects on marine life. These databases may be classified or nationally restricted.

5. Use of national software similar to IDA (such as S-2117, SONATE and SAKAMATA) may also be used in order to plan for operational activity in order to placate national concerns and regulations that may be different from NATO regulations on EP, or in the absence of detailed datasets for the operational area.

6. Once directed, it is incumbent upon planners to ensure sufficient risk mitigation is conducted prior to any operation or exercise.

B.4. OPERATIONS

1. During operations, protective measures should be used at all times by military forces in order to minimise risk to marine life, both in the use of active sonar and other military missions. Details on these measures are in Reference A.

2. The safety of personnel, military assets or the operational need may result in some planned measures being omitted or cancelled, where the operational commander deems appropriate.

CHAPTER 3 REA SUPPORT

3.1. REFERENCES

a. AJP-2.7 Allied Doctrine for Joint Intelligence, Surveillance and Reconnaissance, 11 Jul 2016
b. AMETOCP-3, NATO METOC Communications Manual, 11 January 2016
c. MC 0594/2 (Final), Military Committee Policy on Meteorological and Oceanographic Support to NATO Forces, 31 Jul 2018
d. MC 296/3, NATO Geospatial Policy, 31 Oct 2016
e. AMETOCP-4 Vol II, Ed A, V1 (NR) dated 24 May 2019
f. ATP-06(D), Naval Mine countermeasure operations planning and execution, July 2016
g. ATP-08, Doctrine on Amphibious Operations, March 2017
h. ATP-28(D), Anti-Submarine Warfare Manual, 31 Oct 2017
i. AJP-3.17, Allied Joint Doctrine for Geospatial Support, 06 Oct 2016

3.2. INTRODUCTION

1. NATO's military objectives encompass crisis response, peace support and humanitarian operations as well as traditional warfighting. This has fundamentally changed the nature of military environmental support requirements since such operations may occur at short notice and be conducted in highly variable, poorly monitored and possibly hostile physical environments. This necessitates the use of dynamic and reactionary processes to deliver operational data. This chapter addresses the provision of REA support to combined/joint operations that currently lies beyond the scope of the established day-to-day METOC and geospatial support architectures within NATO.

2. These procedures provide guidance to decision makers, METOC and/or other geospatial specialists on how REA should be conducted. Tactical reconnaissance missions may be used in support of the REA process as reconnaissance is undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. REA is complementary to the intelligence and joint intelligence, surveillance and reconnaissance (JISR) processes (Reference A) as it falls under the remit of both intelligence (data) collection and reconnaissance.

3. REA procedures will be necessary where there is a shortfall in available data that is essential for the conduct and planning of NATO missions. REA supports all planned tasks including the full spectrum of NATO activities and will be required at the initial stage of operational planning.

4. REA is a systematic and comprehensive process that incorporates four overlapping stages:

a. **Direction**. Represents the 1st stage and includes the identification of requirements, the planning of the collection effort and a continuous check of the information flow.

b. **Data Collection**. Emphasises the coordinated and comprehensive collection of environmental data[3] within a specific joint operations area (JOA) (Reference B).

c. **Processing**. Includes data assimilation, analysis, modelling and fusion to create a usable and coherent set of products.

d. **Dissemination.** The final stage includes the product assembly and/or distribution via appropriate NATO networks.

As described in Annex A, the process should be visualized as a continuous cycle, regardless of the REA category.

5. Planning and activation for REA must proceed in conjunction with force employment planning in an iterative process that enables the operational commander to refine their decisions. REA must be conducted within the appropriate time scale, taking into account the nature of the operation and following the appropriate Commander Critical Information Requirements (CCIR) process. Through this process, REA contributes to the REP and the common understanding of the operational environment in order to improve situational awareness, decision making and operational effectiveness in line with the NCOP.

6. REA is a complementary strategy to the support provided to NATO air, sea and ground formations and their geospatial and environmental data. Furthermore, it naturally complies with the IMETOC support principle and the NATO geospatial policy in accordance with References C and D.

7. REA should be regularly exercised, in order to evaluate procedures, investigate new technology and recommend areas for improvement.

3.3. DEFINITIONS

1. As defined in Reference C, REA contributes to the common understanding of the operational environment by collecting, processing and disseminating meteorological, oceanographic and geospatial data and products to forces, in order to improve operational effectiveness through enhanced situational awareness and decision making.

[3] Environmental data as defined in AMETOCP-3 Annex C

2. REA data collection is organized into three implementation categories. These categories are not sequential; rather, they specify a particular type of operation. All NATO operations shall would be expected to conduct a Cat 1 search to identify suitable data holdings during the mission planning phase. Subsequent REA categories then may or may not be required, according to data discrepancies or evolving needs.

a. **Category 1 – Search and Acquisition REA**. This category comprises those assessment activities performed prior to the commencement of an operation or exercise and includes archive data searches, satellite and unmanned vehicle remote sensing, computer modelling and other data analysis. Category 1 REA should be undertaken immediately to ensure archive data and model output consistency and to prepare REA Support Centres for implementation of subsequent activities. Searches will involve both METOC and geospatial data holdings and maximum coordination is necessary to ensure comprehensive coverage while avoiding duplication or unnecessary effort. Data from all sources should be considered, including that of open source data. The CAT 1 search shall also include the delivery mechanism and subsequent timeliness of such data to the NATO user.

b. **Category 2 – Permissive REA**. Operations in this category are those involving the deployment of ships, submarines, aircraft, unmanned underwater vehicles (UUV), unmanned aircraft systems (UAS) or remotely piloted vehicle (RPV) or remotely piloted aircraft (RPA) and other assets to a JOA, including space based assets, and employment of those assets for on-scene data collection in a permissive security environment. These activities could be conducted in exercises, humanitarian, or disaster relief scenarios or where no / negligible threat to data collection assets exist.

c. **Category 3 – Non-permissive REA**. In those situations where hostile forces may be encountered, the insertion of assets such as submarines, special forces, UUV or UAS might be necessary to acquire essential environmental information, or combat ships and/or specialized ships and aircraft conducting tasks in the JOA. The continued use of space based remote sensing vehicles should be maximized. Considerations between the two operational categories will depend on OPSEC considerations, threat levels and forces available.

3. Many REA Cat 1, 2, 3 products should be viewed as supplemental environmental information. These products should not be incorporated into standard maritime or air navigation systems until they have been approved by the individual nation’s accreditation procedures, due to the rapid data collection process or more limited scope for assurance measures on data accuracy.

3.4. ORGANIZATION

1. NATO, lacks a dedicated REA capability (databases, deployable and disposable devices, survey ships, satellites and human expertise), and so relies on member states to provide clearly identified assets as requested in the combined joint statement of requirements (CJSOR). Such capabilities will be owned by the national armed forces or their supporting structures, termed Support Centres in this document. This section aims to describe the coordination of these assets as soon as REA is initiated.

2. The CAT 1 REA data search is initiated within SHAPE following direction from the NAC concerning an operation or engagement. For exercises, once the OSE has scheduled an exercise and directed an HQ to be OCE, planning may commence, including gathering all necessary environmental support products, including conducting the REA Cat 1 search. The subsequent stages of REA are a sequential process which should be conducted as rapidly as is possible following initiation (see Annex C).

3. Responsibility for the conduct and control of REA operations is as follows:

a. **SHAPE.** SHAPE J2 GEOMETOC provide strategic guidance for environmental support to all NATO operations and exercises and will designate the REA Coordinator within the NCS.

b. **REA Coordinator (REAC).** Nominally at the operational level, the REAC advises the Operational Commander regarding REA and must be included in the appropriate planning groups. The REAC will be within the NCS at either the JFC or MARCOM/LANDCOM HQ. The REAC is responsible for:

(1) Assisting the Operational Commander in identifying the environmental information requirements.

(2) Initiate the REA Cat 1 data search and acquisition process and liaise with all required authorities to ensure provision of data under IMETOC and geospatial coordinating nation (CoN) principles.

(3) Identify REA information shortfalls in accordance with the operational needs in cooperation with the IMETOC LNs and geospatial coordinating nation (CoN).

(4) Define the asset requirement (including human resources), and identify a REA Commander to coordinate them in-theatre.

(5) Provide advice and guidance to the REA Commander on utilisation of REA assets.

(6) Coordinate the REA section of the standard geospatial and METOC support annexes of the OPLAN/EXOPLAN, including integration with App 1 and 2 to Annex T.

(7) Coordinate the dissemination of REA products to all appropriate levels of command, including establishing a data hub or exchange if necessary.

(8) Coordinate potential lessons learned and forward to the Joint Analysis and Lessons Learned Centre (JALLC) or to SHAPE.

c. **REA Commander (REACdr).** The tactical in-theatre REACdr advises the Tactical Commander in the use of REA assets, capabilities and priorities. The REACdr will most likely be from a NFS HQ and should be involved early in the planning process. Responsibilities include:

(1) Provide advice to the Tactical Commander and feedback to the REAC.

(2) Write an OPTASK REA to supplement the standard OPTASK METOC in order to designate command and control, direction and processing requirements of REA support. A format for the OPTASK REA is contained in Reference E.

(3) Direct and coordinate REA assets and REA Support Cells in-theatre.

(4) Identify critical observations from operations and forward to the REAC for consideration to lessons learned process.

(5) Disseminate REA products and data within the NCS and NFS.

d. **REA Supports Cells (REASCL).** REASCL are in-theatre cells under the direction of the REACdr that perform initial analysis of measurements and observations. They may also tailor quick-look products and decision aids to meet the requirements of the users in close coordination with the REACdr. These cells would be connected with the REACdr, physically or virtually or aboard the dedicated REA platforms.

e. **The IMETOC LN NRF and GISN** (including HISN and TISN as per reference D) will take on responsibility for the provision of the initial sources of data and information for the REAC.

f. **IMETOC LN/AN, Geospatial Coordinating/Participating Nations.** In accordance with References C and D, these nations are the primary providers of environmental data and support to NATO operations. They should provide details of data shortfalls to the REAC. These nations may also provide data analysis and product development from collected data if such processing is not possible from the REASCL.

g. **Host Nation (HN).** A HN is expected to deliver as much environmental information as possible over their national area of responsibility during the entire REA process, where appropriate.

4. Figure 3.1. illustrates the different links within the REA organization for REA Cat 2 and 3. The REA Cat 1 process, initiated and coordinated by SHAPE the REAC, is supported by the IMETOC LN and geospatial CoN and HN, if appropriate. The diagram provides a demonstration of possible links, dependent on the situation. Cat 2 REA will have a HN but it is possible that a Cat 3 will not have a HN, or one that is not willing or able to provide data and services. Not all links will be active or necessary, or indeed exist in each circumstance. The typical direction and guidance document for each level is also noted.

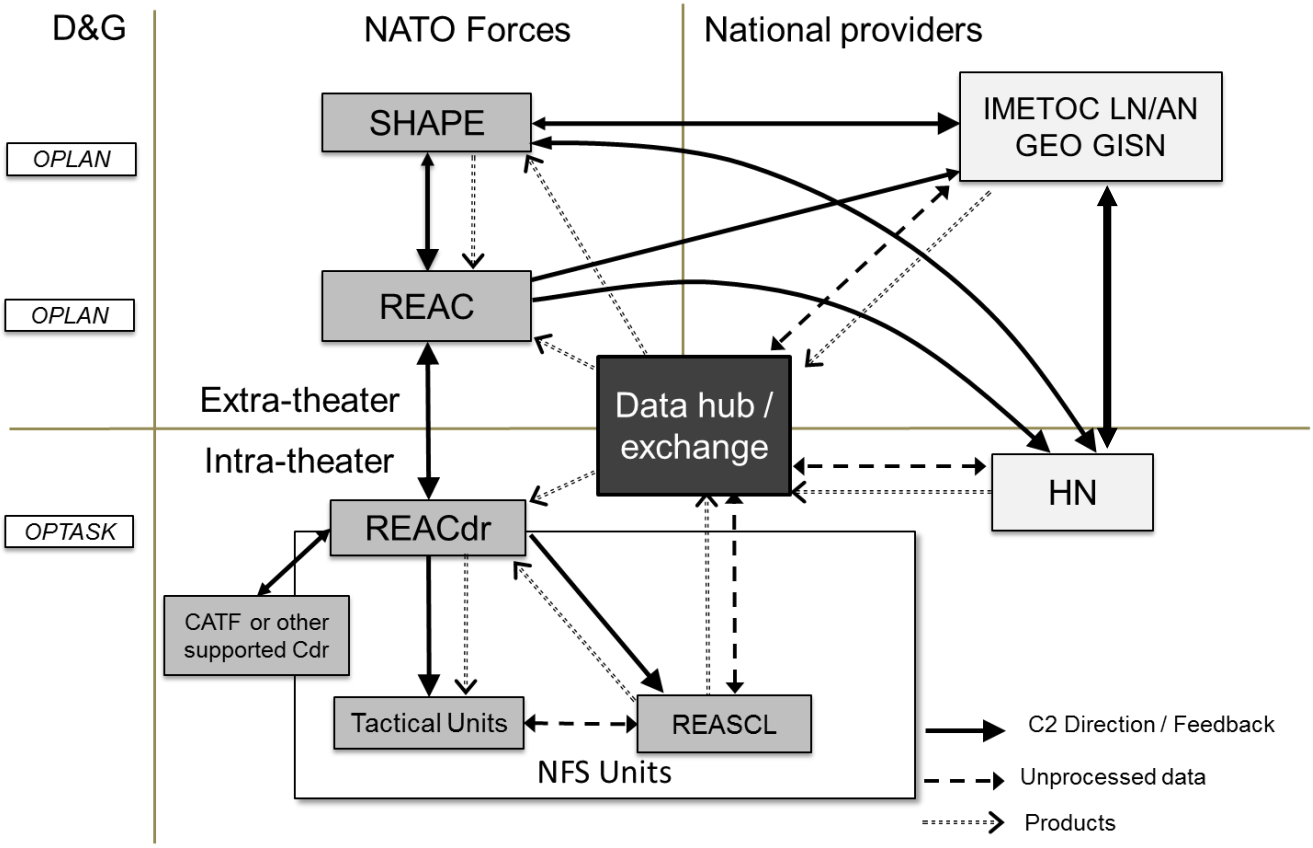

Figure 1: REA Organization and information flow

3.5 COMMUNICATION AND INFORMATION SYSTEMS

Products from the REA process must be considered an integral part of the NCOP and should [generally] be provided in a format compatible with NATO standards when operational constraints allow and the intent is to display on NATO AIS.

3.6 LEGAL ISSUES

1. Law, especially maritime law is complicated and is not contained in a single source. Early liaison with legal staff is essential and SHAPE and/or JFC Legal Branch should be contacted for further guidance.

Diplomatic clearance (DIPCLEAR). DIPCLEAR or a SOFA (Status of Forces Agreement) for assets conducting Cat 2 REA will be required over and above the more general exercise DIPCLEAR due to the nature of collecting data inside the territorial integrity of a nation. Wherever possible exercise DIPCLEARs should include Cat 2 REA requirements. Liaison via SHAPE with appropriate government departments/chiefs of defence (CHODS) will ensure that both military and government departments are aware of the REA (data collection) activity.

2. **Data use and release.** Release and use of collected REA data during exercises or non-combat operational deployments (such as humanitarian mission or disaster relief) within NATO, should be agreed with the HN in advance of the REA. In many cases the Cat 2 REA will be conducted and data collected by the HN. In exercises where data is collected by NATO forces, the decision on use and dissemination should be agreed early on in the planning cycle. Particular note should be made of data use post any exercise or operation and data ownership.

3. As an example, the following generic release statement may be used:

“Environmental data collected during *(name of Exercise)* in the territorial sea/area of (*name of Coastal State hosting exercise*), described as the operating area for this exercise, may be maintained and used for military purposes by NATO and NATO nations. The data may not be further released, or used for commercial or non-military purposes, without the written approval of (*name of HN*)”.

4. Such statements should be agreed in consultation with legal staff, SHAPE, JFC, LN, the HN(s) and CoN on a case-by-case basis.

3.7. LESSONS LEARNED

The JALLC maintains the lessons learned database and REA lessons identified should be forwarded there for validation and inclusion, coordinated by the REAC. Additionally, all related identified issues should be forwarded to SHAPE J2

GEOMETOC Branch, which has responsibility to exploit this information in the REP context.

ANNEXES:

A. REA Procedures

ANNEX A REA PROCEDURES	

A.1. REFERENCES

a. AMETOCP-4 Vol II, Ed A, V1 NATO METOC Codes manual, dated 24 May 2019
b. Bi-SC 075-003, Collective Training and Exercise Directive, 02 October 2013
c. AMETOCP-3.1 ACOMEX Handbook**,** 20 February 2018

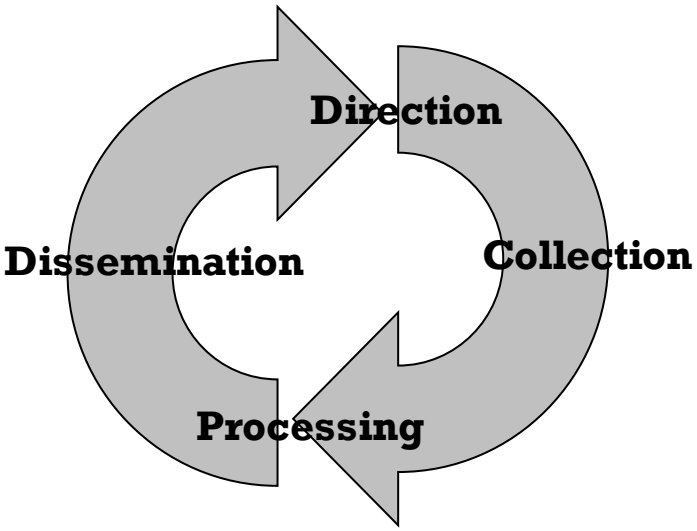

Figure 2: REA Procedures

A.2. DIRECTION

A.2.1. REA

REA is a military capability and, as such, assets are treated in exactly the same way as other assets in a task organisation. Operational command (OPCOM) is usually retained by the national authority providing the asset.

A.2.2. APPLICATION OF REA CATEGORIES TO MILITARY OPERATIONS

In a permissive scenario the HN will assist with operations. In a non-permissive situation the level of denial or risk in the JOA will determine the conduct and nature of forces utilised for REA. Risk and asset availability will be the driving factors for the conduct of the required data collection.

A.2.3. PLANNING

1. The REAC will ensure overall coordination for REA support. Decisions on the employment of REA operations sensors for the particular operation should be conducted at the earliest stage possible. Details on REA will be embedded into the Environmental Support Annex to the corresponding OPLAN or EXOPLAN. Guidelines for environmental operational planning are contained in Reference B.

2. REA requires considerable planning, not only for the allocation of collection assets, but also for identifying the data needs, formats and dissemination capabilities. Although in the majority this will be coordinated through the REAC, each layer of command has its unique role and responsibility, which will vary according to the structure of the operation or mission and size of force. Strategic, operational and tactical commanders and staff each have their role to achieve the following planning considerations:

a. Provide environmental support products for use by planners following REA Cat 1 search.
b. Liaise with specialist operators to establish their support requirements, and likely CCIR.
c. Coordinate and submit information requirements and request for environmental information (RFI) to higher commands.
d. Identify commanders requiring support but without NS or MS connectivity.
e. Confirm standard data formats and detail the data transfer process between data collectors, IMETOC LN, geospatial CoN, and, where applicable, HN.
f. Identify communications requirements and protocols.
g. Identify and deconflict water and airspace management issues related to the deployment of REA sensors.
h. Identify REA fusion and processing capability.
i. Identify augmentation requirements.
j. Identify need for and allocation of liaison officers.
k. Prioritise data collection for product generation and required time scales.
l. Establish releasability criteria for products if required.
m. Identify REA contributions to the NCOP.
n. Integrate any research & development (R & D) advanced demonstrator requirements.
o. Contribute to OPLAN Annex T/ EXOPLAN Annex W and coordinate Annex Y requirements.
p. Identify DIPCLEAR requirements.
q. Establish JALLC and lesson identified requirements, as applicable.

r. Review the REA planning in the light of lessons learned.
s. Produce a survey plan.
t. Identify need for liaison officers.
t. Identify requirements for mobile survey if applicable.

3. The COPD and JIPOE process conducted in an HQ will inform the need for a data search to be conducted in order to evaluate suitable data holdings and the likelihood of either missing data or the need to conduct further REA prior to any operation. The subsequent data search activated by SHAPE, will search through the national data holdings in the designated JOA or operating area and contact nations directly for information on data of potential use. The OPLAN development will identify any need to conduct further REA and these requirements will then be detailed in the OPLAN and form part of the force generation process. The subsequent OPTASK REA, detailed by the REACdr, will provide specific policy and procedures.

4. The absence of up to date data does not imply the requirement to data collect. The nature, speed and risk of an operation will dictate the necessity to conduct REA operations. The risk of a mission to any missing or old data and the attitude to risk by the command will be factors to be considered before planning further REA activity.

5. In exercise planning the REAC should be a member of the exercise core planning team, to ensure that potential REA activity is included in the exercise specification and plan. This may involve listing REA as an exercise-supporting objective in the exercise specifications (EXSPEC) which may require participation at the planning conferences. The REAC continues to monitor REA EXOPLAN issues until the final coordination conference where, if required, the detailed REA Cat 2 plan should be issued.

6. Crisis Planning. Owing to the short lead-in time for crisis response operations, the requirement for REA has to be assessed against the time available and the nature of the operation. SHAPE has an essential role to approach nations for exploitable and relevant data holdings and to request their timely release.

7. Once in theatre the tactical situation may rapidly change. The REACdr must therefore be aware of any changes to the mission and flow of the operation. Liaison with the tactical commanders, such as both supported and supporting commanders, may then require adjustment to the mission priorities and tasks, including the introduction and coordination of previously unforeseen REA activities.

A.3. COLLECTION

A.3.1. DATA AND PRODUCTS

1. The initial step towards developing a product is gathering data. Data is derived primarily from sensors in the form of raw signals.

2. The output of any REA is a tailored product to support a particular mission or task. The product may contribute to the NCOP via the REP. Products may include output such a Ships Tactical Oceanographic Information Chart (STOIC), Additional Military layers (AML), S57 chart products or map updates. These products may be hard copy or form part of an update to AIS.

A.3.2. DATA COLLECTION

1. Data for REA falls into 2 main areas: static (climatology, topography, and bathymetry) and dynamic (meteorology and oceanography). Static data can be collected in advance of an operation. The Cat 1 search will highlight data gaps and inform data collection priorities. This search will be undertaken by the REAC in co-ordination with the LN and HN. Dynamic data may be exploited by the warfare commander for tactical advantage, and its timely collection during operations may also improve forecast models.

2. Surveys and mapping. Route surveys, bathymetric surveys and topographic mapping contribute to the quality and resolution of any foundation layers. Cat 2 and 3 REA builds on this part of the picture. Data may be collected by any available means, by either in-theatre assets or from remote sensors that are intra- or extra-atmospheric. National assets will provide this data, but it should not be assumed to be unclassified. The data may well contain sensitive information as well as locations of military interest and should be protected whenever necessary. The format of this data is also critical to timely processing and forwarding and as such formats must be in accordance with agreed NATO standards.

A.4. PROCESSING

Processing and analysis of collected REA data is conducted to close identified data gaps and mitigate CCIRs in support of NATO operations. Processing of collected data may be conducted in-theatre or by reach back, depending on organic capabilities. Output maybe a standalone or fused product to be ingested into the NCOP. An essential fusion tool is a Geographic Information System (GIS), of which the NATO system is CoreGIS. Any subsequent product that may be utilised within the NCOP should be ingestible by current NATO C2 systems, unless the final product is designed only for tactical use.

A.5. DISSEMINATION

1. Processed products and data will need to be disseminated throughout the NCS and NFS in a timely manner. Distribution in-theatre of processed products is the responsibility of REACdr and will be detailed in the OPTASK REA. Products maybe electronic or hard copy as required by the operational situation and organic capabilities. Coordination of REA products and data at the operational and strategic level is the responsibility of the REAC, as directed by the relevant OPLAN.

2. Web services. Within the NCS these products and data can be distributed at the NS or MS classification via secure NSWAN. Distribution of environmental data to the NCOP will depend on the C2 setup for the specific exercise/operation. It is worth noting that NSWAN connectivity is generally only available within larger C2 platforms or headquarters within the NFS. Internet access, using password protection to provide smaller assets with an unclassified sub set of the products available from any classified REA web site, details of which will be provided in the OPTASK REA and dependent on the assets nominated in the CJSOR process.

3. Data sets from any surveys are typically large and the mechanism of forwarding them to the REAC in a timely fashion needs careful consideration. Further, finished products may well be of large file sizes that are beyond the capabilities of email traffic. Due to this file size issue it is usual to distribute geospatial products via removable hard disk or external drive. Hand delivery in theatre of drives is to be expected and the REACdr will have to ensure that all required users receive any data set updates. ACO Meteorological and Oceanographic Information Exchange (ACOMEX). METOC data and products will normally be disseminated by the NATO owned ACOMEX IAW Reference C. This network also may be used to disseminate REA products and data under the coordination of the REAC and SHAPE CMO.

APPENDICES

1. Support products
2. Categories of data set types and associated sub-sets and parameters for different scenarios

Appendix 1 SUPPORT PRODUCTS

The following is a list of support products that an IMETOC LN NRF or GISN (Including HISN and TISN) would be expected to provide. The rationalised list for the Cat 1 data search would be provided by the REAC.

Acoustic propagation
Bathythermograph and/or sound profiles
Cloud ceilings and/or layers, bases and tops
Currents speed and direction, from surface to bottom
Ducting and/or refractivity index
Electro-Optical ranges
Freezing level
Gale warnings
Geo-acoustic conditions
Geomagnetic conditions
High seas warnings
HF, Radar, and/or Radio Propagation forecasts
Humidity
Icing levels, intensity and type
Illumination
Jet stream (location and strength)
Lightning
CBRN Downwind Report (CDR) includes both CBRN Downwind Message (CDM) and CBRN Downwind Forecast (CDF)
Ocean bottom composition
Precipitation (type and amount)
Ocean fronts and eddies
Optimal track ship routing and weather advisories
Sea height (combined)
Sea ice information
Soil surface temperature
Synoptic analysis
Synoptic discussions
Synoptic forecast
Surf conditions
Temperature (ground)
Temperature (throughout atmosphere)
Turbulence
Tidal information
Thickness (1000-500mb)
Thunderstorms

Tropical storm location and prediction
Tropopause heights and/or winds
Upper air charts
Upper air observations
Visibility
Waves (wind)
Waves (swell)
Weather observations and forecast
Winds from surface to 100mB

A.1.1. MINE WARFARE (MW) SPECIFIC

Bottom Type
Clutter Density
Bottom Composition
Shallow Water Bathymetry
Mine Burial
Range Prediction (Acoustic Prop Loss)
Tides
Currents at depth
HF Reverberation
Unmanned Underwater Vehicle (UUV) Buoyancy
UW Visibility/Turbidity
Route Survey

A.1.2. AMPHIBIOUS WARFARE SPECIFIC

Surface Currents
Currents at Depth
Tides
Shallow Water Bathymetry
Seabed Characteristics
Waves
Beach Gradient
Surf
Transportability
Beach Composition
Back of Beach Survey

A.1.3. ANTI-SUBMARINE WARFARE (ASW) SPECIFIC

Prop Loss BB

Prop Loss NB
Reverberation BB
Reverberation NB
Ambient Noise
Seabed Characteristics
Magnetic Anomalies
Sun Spot Activity
Fronts and Eddies
Sea Surface Temperature
Temperature profile
Sound Speed Profile
Salinity profile
Thermocline
Shallow Sound Channel
Deep Sound Channel
Bathymetry
Waves
Sea State
Sea Ice
UW visibility/Turbidity

A.1.4. UUV SPECIFIC

Surface Currents
Currents at Depth
Tides
Shallow Water Bathymetry
Seabed Characteristics
Waves
Sound Speed Profile
Salinity profile
Underwater vegetation
Fisheries (nets/ traps etc.)
UUV Buoyancy
UW Visibility/Turbidity
Waves (wind)
Waves (swell)
Route Survey

Appendix 2 . CATEGORIES OF DATA SET TYPES AND ASSOCIATED SUB-SETS AND PARAMETERS FOR DIFFERENT SCENARIOS

DATA SET TYPE **SUB-SET (REFERENCE. NUMBER) PARAMETER**

1. ATLASES/EBDS/CHARTS

1.10. Environmental Briefing Dockets (EBDs)
1.20. Oceanographic Atlases/Guides
1.30. Ocean Climate Studies
1.40. OC. Exercise Reports
1.50. MW Pilots
1.60. Air Radar Charts
1.70. AEW Charts
1.80. Other Literature
1.90. STOICS
1.100. GIS eg. REACT type
1.110 AML (or equivalent)
1.120 RNC (eg ARCS or BSB)
1.130 ENC or DNC

2. BATHYMETRY

2.10. Survey
- 2.11Single beam
- 2.12 Multi-beam
- 2.13 LIDAR
- 2.14 Other Remote

2.20. Gridded
2.30. Navigational (Charts)
2.40. Depth Contours
- 2.41 GEBCO

2.50. GEBCO/SOOP Lines
2.60. Digital Elevation Models (DEMs)
Suffix : D = Deep, S = Shelf, L = Littoral

3. SEABED

3.10. Bottom Texture (Natural) and Colour
3.20. Bottom Contacts and Fouls;
- 3.21 Wrecks
- 3.22 Mine-like objects
- 3.23 Biological
- 3.24 Non Mine-like objects

3.30. Sediment Type/Thickness/Roughness

3.40. Route Survey Information

4. BEACHES

4.10. Beach Gradients
4.20. Beach imagery (Panoramic)
4.30. Trafficability (Beach hinterland)
4.40. Surf
4.50. Intelligence Reports

5. PHYSICAL PROPERTIES

5.10. Sound Speed Profiles
5.20. Sea State
    5.21 Waves
    5.22 Swell
5.30. Water Colour/Transparency (visibility)
5.40. Tides and Currents
    5.41 Tidal Heights
    5.42 Tidal Streams
5.50. Water Temperature;
    5.51 Surface
    5.52 Deep
    5.53 Profiles
5.60. Water Salinity
5.70. Water Density
5.80. Water Conductivity
5.90. Sea Ice extent and Iceberg occurrence

6. OCEAN FEATURES/CURRENTS

6.10. Fronts and Eddies
6.20. Mixed Layer Depth
6.30. Internal Waves
6.40. Ocean Currents

7. MARINE BIOLOGY

7.10. Hazardous Marine Life
7.20. Biological Growth
    7.21 Kelp
    7.22 Posidonia
7.30. Environmental impact
7.40. Marine Mammals (False Targets)
7.50. Bioluminescence

8. AMBIENT NOISE

- 8.10. Omni-directional
- 8.20. Directional

9. GEOPHYSICS

- 9.10. Magnetic Environment
  - 9.11 Natural
  - 9.12 Wreckage
  - 9.13 Anomalies

10. ACOUSTICS

- 10.10. Acoustic Propagation
  - 10.11 Through water
  - 10.12 Through sediment
- 10.20. Acoustic Imagery
- 10.30. Reverberation

11. CLIMATE

- 11.10. Atmospheric Climatology
- 11.20. Oceanographic Climatology

12. ANTHROPOMORPHIC

- 12.10. Fishing
  - 12.11 Methods
  - 12.12 Areas
  - 12.13 Vessels
- 12.20. Pollution
- 12.30. ROV Buoyancy
- 12.40. Territorial Waters Information
- 12.50. Geodetic Data
- 12.60. Shipping
  - 12.61 Types
  - 12.62 Lanes
  - 12.63 Densities

13. OTHERS

- 13.10. Topographic Mapping
- 13.20. Remote Sensing Information
  - a) Landsat/Spot
  - b) Other
- 13.30. Protected Areas
- 13.40. Restricted Areas
- 13.50. Communication Frequencies

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CHAPTER 4 ACRONYMS

ACO	Allied Command Operations
ACOMEX	ACO METOC information exchange
AIS	Automatic Identification System
AML	Additional Military Layer
AN	Assisting Nation
ASRM	Active Sonar Risk Mitigation
ASW	Anti-Submarine Warfare
ATP	Allied Tactical Publication
Bi-SC	Bi Strategic Command
CBRN	Chemical, Biological, Radiological and Nuclear
CCIR	Commander Critical Information Requirements
CJSOR	Combined Joint Statement of Requirements
CJTF	Combined Joint Task Force
CMO	Chief METOC Officer
CPOE	Comprehensive Preparation of the Operational Environment
CoN	Coordinating Nation
COP	Common Operational Picture
DIPCLEAR	Diplomatic Clearance
[DMGIC	Defence Maritime Geospatial Intelligence Centre]
[DSA	Defence Situational Awareness]
EXOPLAN	Exercise Operational Plan
GISN	Geospatial Information Supporting Nation
HISN	Hydrographic Information Supporting Nation
HN	Host Nation
[IAW	In Accordance With]
IDA	Integrated Decision Aid
IMETOC	Integrated METOC
JALLC	Joint Analysis Lessons Learned Centre
JFC	Joint Force Command
JMC	Joint Meteorological Centre (Canada)
JOA	Joint Operations Area
LN	Lead Nation
MARCOM	Allied Maritime Command
MC	Military Committee
[MCWG	Military Committee Working Group]
METOC	Meteorological and Oceanographic
MILOC	Military Oceanography
NAC	North Atlantic Council
NCOP	NATO Common Operating Picture
NCS	NATO Command Structure
NFS	NATO Force Structure
NSODB	NATO Standard Oceanographic Data Base

NSWAN	NATO Secret Wide Area Network
OML	Outline Mark-up Language
OPCOM	Operational Command
OPLAN	Operation Plan
OPP	Operations Planning Process
PN	Participating Nation
[RAP	Recognised Air Picture]
REA	Rapid Environmental Assessment
REAC	REA Coordinator
REACdr	REA Commander
[REA DH	REA Data Hub]
REASCL	REA Support Cell
REP	Recognised Environmental Picture
[RLP	Recognised Land Picture]
[RMP	Recognised Maritime Picture]
SHAPE	Supreme Headquarters Allied Powers Europe
[SLOC	Sea Lines of Communication]
SMO	Staff METOC Officer
SSC	Single Service Command
TDA	Tactical Decision Aid
TISN	Topographic Information Supporting Nation
UAS	Unmanned Aerial System
UKHO	United Kingdom Hydrographic Office
UNCLOS	U.N. Convention on the Law of the Seas
UUV	Unmanned Underwater Vehicle

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