



CleanSeaNet Service

**Conference “Celebrating 10 years of the CleanSeaNet
service and cooperation between ESA and EMSA” Minutes**

V1.0

Date: 21/12/2017

Document History

Version	Date	Changes	Prepared	Revised	Approved
1.0	21/12/2017	Initial version	IPA, SAN	PLO, HRJ	BAL

Table of Contents

1. Introduction.....	3
2. Welcome and opening	4
2.1 10 years of CleanSeaNet	4
3. Testimonials from Coastal States.....	5
3.1 Portugal	5
3.2 Finland.....	5
3.3 The Netherlands	6
3.4 Italy	6
4. Industry presentations.....	7
4.1 Airbus DE	7
4.2 Airbus FR.....	7
4.3 CLS.....	7
4.4 EDISOFT	8
4.5 e-GEOS	8
4.6 EUSI	8
4.7 KSAT	9
4.8 MDA.....	9
5. ESA-EMSA collaboration.....	9
5.1 Keynote speech: ESA ESRIN	9
5.2 ESA Earth Observation	10
ESA	11
5.3 ESA-EMSA projects and initiatives	11
6. EMSA's involvement in the Copernicus Programme	13
6.1 The Copernicus Programme (DG-GROW)	13
6.2 Copernicus Maritime Surveillance service	13
7. Defining the future.....	14
7.1 Opening Speech.....	14
7.2 Keynote speech: ESA ECSAT	14
7.3 Break-out sessions: 'The future of space-based services for the maritime sector'.....	14
7.4 S-Keynote speech: European Commission (DG-MOVE).....	17
8. Conference conclusions.....	18
Appendix A List of Annexes	19
Annex 1 Acronyms and abbreviations	20
Annex 2 Agenda.....	22
Annex 3 Participant list	24
Annex 4 List of presentations	27

1. Introduction

CleanSeaNet (CSN) is the European satellite-based Oil Spill Monitoring and Vessel Detection service, launched ten years ago, in April 2007, and supports Member States' actions to combat deliberate or accidental pollution in the marine environment. The service was developed and is operated by the European Maritime Safety Agency (EMSA).

The CSN service supports the Member States on the identification and tracking of ship-sourced discharges on the sea, monitoring of accidental pollution during emergencies and contributes to the identification of polluters. The service is based on the regular ordering of Synthetic Aperture Radar (SAR) images, which provide day and night coverage of maritime areas independent of fog and cloud cover. Extracted information includes among others: spill location, area, length and confidence level of the detection, and estimates of the wind and swell obtained from the SAR data. Optical images can be ordered to extend the type of products provided to the users, in particular to support emergency situations. CSN services are delivered to European Coastal States, European Neighbourhood Policy (ENP) countries and other Specific Projects.

In order to celebrate the 10 years of CleanSeaNet service and cooperation with the European Space Agency (ESA), a Conference was hosted at EMSA's premises in Lisbon, on 14-15 November 2017. The event comprised testimonials from the Coastal States, presentations from the Industry representatives, key-note speeches from ESA and the European Commission representatives, and specific break-out sessions on relevant topics with plenary feedback.

The celebrating conference was accompanied by a '10 year Anniversary Publication' on the CleanSeaNet service and Info Sheets dedicated to the EU Member States with their perspective on the service and description of relevant use cases¹.

The Conference aimed to gather policy makers, users, industry service providers, and EMSA's operational staff to share experiences and discuss the current needs and technological applications for future developments of the CleanSeaNet service. In total, 80 participants attended the conference. Representatives from 24 European Coastal States administrations were presented, as well as European Commission (DG-GROW and DG-MOVE), European Space Agency (ESA) and the European Fisheries Control Agency (EFCA). Moreover, EMSA's Industry service providers participated, namely Airbus Defence and Space (DS), MacDonald, Dettwiler and Associates (MDA), Kongsberg Satellites Services (KSAT), Collecte Localisation Satellites (CLS), European Space Imaging (EUSI), e-GEOS, and EDISOFT.



Figure 1 ESA, European Commission (DG GROW) and EMSA

¹ The CleanSeaNet 10 year Anniversary Publication and the dedicated info sheets are available to the public in this [link](#).

2. Welcome and opening

Leendert Bal, Head of Operations, EMSA, opened the Conference by welcoming the participants and acknowledging ESA's participation to the 10 year Anniversary celebration. He acknowledged as well the presence of the Coastal States and Industry, and their contribution in building and developing the service along these years.

The purpose of the event was explained as an opportunity to share experiences and discuss future developments for the CleanSeaNet service during the dedicated break-out sessions. The agenda was presented to the participants. The Conference was divided in three main sessions: the first was entitled "CleanSeaNet 10 year anniversary celebration"; the second was dedicated to the ESA-EMSA Collaboration, where the Copernicus Programme was also presented and discussed, and the third session, entitled "Defining the future", focused on the future of the CleanSeaNet service.

2.1 10 years of CleanSeaNet

Leendert Bal delivered a presentation providing an overview of the early days of the CleanSeaNet. A reference was made to the importance of pre-operational projects, which were precursors to CleanSeaNet service, namely ESA MarCoast², among others. During 2005, several meetings took place with the Member States, in order to understand the users' requirements, and with Industry companies to clarify 'what to ask' from the technical perspective. These meetings were the starting point for the tender specifications draft. By the end of 2006, KSAT became the first CleanSeaNet contractor, and the service became operational in April 2007.

A brief overview of the services CleanSeaNet provided to the users was given. Routine monitoring of all European waters for ship-source discharges and support to emergencies were the main points, where the near-real time (NRT) delivery time capacity was particularly highlighted. Until the date, 31 emergencies were supported by CleanSeaNet.

The continuous expansion of the service coverage has been noted: from the initial coverage of the European coastal waters to 3rd countries, through the neighbourhood policy and other projects. Current figures regarding the service were presented, as well as the statistics for 2016. Until the date, 641,000,000 km² were monitored by CleanSeaNet, with a total of 3,057 images delivered and 3,168 possible oil spills detected.

The decreasing number of detections was highlighted, the long term deterrent effect in European waters was deemed evident and its positive effect on oil pollution prevention activities was also emphasized.

The trainings provided in these years and the organisation of the yearly User Group meeting was acknowledged as a mean for continuous improvement of the service, taking feedback from EU Member States through sharing of experiences and suggestions.

In addition, EMSA's Head of Operations announced a new tender for Earth Observation services, to be launched in 2018, referring to the contractors and thanking them the support given so far, expressing EMSA's high expectations for the coming 10 years of service and cooperation.

² The MarCoast project, standing for MARine & COASTal environmental information services, is part of the GMES Service Element (GSE) programme, managed and funded by the European Space Agency (ESA). The MarCoast consortium is composed of more than 30 partners from almost all European countries, and gathers all key actors in the field of marine and coastal applications. MarCoast aims at scaling up services which have been previously consolidated. MarCoast targets to deliver a single portfolio of marine and coastal services at the European scale, composed of: Oil spill surveillance and customised information; Oil spill drift forecast; Water quality monitoring and alert; Harmful Algae Bloom monitoring evolution and forecasting; Water quality assessment service; and Met-Ocean data.

Ref: https://earth.esa.int/envisatsymposium/authors/CXNL_07A03_461230.html



Figure 2 - 10 year Anniversary Conference participants

3. Testimonials from Coastal States

3.1 Portugal

Joana Jerónimo, Head of Division of Studies and Planning at the Portuguese Maritime Authority Directorate General, provided a brief overview of the Portuguese perspective of the service, and described use cases where CleanSeaNet value adding was particularly high.

During 2008, a total of 59 images were ordered for Portugal, with 101 detected potential spills and 1 confirmed oil spill. The Portuguese area covered by CleanSeaNet increased from 304,000 km² to 1,700,000 km² with the entering into operation of the antenna in Santa Maria (Azores). This enabled increasing the number of monthly acquisitions to circa 30. The reliability of CleanSeaNet service was noted, with a rise in confirmed oil spills over time. The service for Portugal is particularly high due to the extent of its Exclusive Economic Zone (EEZ) area. The straightforward correlation of vessel(s) and identification of potential polluters contributes to a better exploitation of the service.

The Portuguese representative has listed the different national entities that have access to the CSN platform, and how they liaise functions and coordinate tasks to better serve the maritime surveillance purposes. The process carried between the CSN alert and the administrative penalty and/or criminal process was also explained to the participants, focusing on the actions taken following the alert.

The trends on potential oil spills detection were demonstrated per year and per month, and also their geographical distribution within the Portuguese EEZ area. It was concluded that in the last two years more possible oil spills were detected, and that these were more recurrent in the Centre, South and Azores coastal areas.

Finally, the improvement of the CleanSeaNet service and cooperation with Portugal over the last ten years was highlighted, with high expectations for the next generation of the service.

3.2 Finland

Heli Haapasaari, Senior Adviser in the Pollution Response Unit at the Finnish Environment Institute (SYKE), presented on behalf of the Finland. A brief description of the SYKE's maritime surveillance procedures and how the CleanSeaNet service is linked into their operational chain was given. The User Group meetings were outlined as highly appreciated as they provide a platform for interaction between the Member States and EMSA experts.

The planning of activities for the Baltic Sea was presented as well as how the functions of each intervenient are coordinated. The aerial surveillance working group HELCOM³ defines the number of satellite images necessary, and the flight planning is also coordinated with Estonia and Sweden. The Finish Boarder Guard cooperates on pollution response and pollution surveillance.

Results for the year of 2016 were presented. The Baltic Sea was monitored for oil and other spills with almost 4,300 flight hours, and, in the same year, CleanSeaNet detected 270 possible spills 30 of which were confirmed to be mineral oil or other substance.

Finally, the trend in the number of observed oil spills and the number of flight hours over the last 30 years was shown to the participants. It was noted that the number of observed oil spills has been decreasing gradually, which is related among others to a high number of flight hours: if the aerial surveillance is frequent, the polluters will be more aware of the risks they are taking when conducting illegal discharges.

3.3 The Netherlands

Michiel Visser, Maritime Response Advisor at the Rijkswaterstaat Directorate Zee & Delta (RWS ZD) within the Ministry of Infrastructure and Environment, presented on behalf of the Dutch users.

The presentation started with a general description of the surveillance activities performed before the existence of CleanSeaNet. The CSN service was integrated within the Netherlands Coastguard aerial surveillance program in 2007, with 100% coverage of the Netherlands EEZ. The operations were briefly described and how the Netherlands users are now, in cooperation with RWS and Coastguard, able to react fast towards possible oil spills and the corresponding polluters.

The EO scenes trends over the last 10 years were presented. It was possible to conclude that the number of detections has been decreasing in general. The number of images covering the Dutch EEZ (fully or partially) has increased to around 300 images per year. The speaker also pointed out that the number of mineral oil slicks has been decreasing in the last 10 years, however more unknown detections (e.g. chemical tanker washing residues) have been detected.

The use case described in the *Anniversary Coastal States Users* info sheets was presented as an example of pollution offence where the full chain of means was put into operation. This case was a good example of the cooperation between CSN (EMSA), EU Member States and the long existing cooperation within the Bonn Agreement. The surveillance video captured during the operations was displayed during the presentations and showed a chemical vessel tank washing.

Finally, further developments ahead of the Netherlands surveillance program were announced, following the development of Unmanned Aircraft Vehicle (UAV). The presentation concluded with Netherlands acknowledging EMSA for the services and support provided to the Member States through CleanSeaNet.

3.4 Italy

The last Coastal State testimony was from Italy, represented by Dario Cau, Head of the Maritime Monitoring Unit at the Italian Coast guard. The presentation focused on two use cases: the sinking of 'Costa Concordia' and the 'Gelso M' grounding in Sicily Island. It was noted that CleanSeaNet was crucial for the monitoring of both wrecks, by providing both optical and SAR images in areas of increased environmental risk.

The presentation ended with the discussion of the service results trends in Italy.

³ HELCOM (Baltic Marine Environment Protection Commission - Helsinki Commission) is the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, known as the Helsinki Convention. For more information, please see www.helcom.fi/about-us.

4. Industry presentations

The Coastal states testimonies were followed by the contribution from the industry representatives. Giving the floor to the industry, the service providers had the opportunity to present the future developments in terms of technology and services provided to EMSA.

4.1 Airbus DE

Alexander Kaptein, Head of Future SAR Programs of the Intelligence department of Airbus Defence and Space, acknowledged EMSA and KSAT for the past 10 years of cooperation. The services provided to CleanSeaNet were described, addressing in particular the substantial improvements achieved in 2017 in terms of time of delivery of the products and the evaluation of the corresponding imaging modes (including dedicated maritime monitoring products).

The mission of Airbus DS for the next years was mentioned: quicker access to the information and analytics for near-real time operational support. Further evolution of the ground segment is considered necessary, with more receiving stations and antennas forecasted for the near future improving global near-real time data access. An increase in the number of SAR satellites flying in constellation with the existing satellites TerraSAR-X and TanDEM-X (e.g. Hisdesat's PAZ for 2018, and HRWS for after 2022) and the addition of small sat missions for a tip and cue service is also planned.

4.2 Airbus FR

Olivier Surly, Sales director of the Maritime Intelligence Communications, Intelligence & Security department of Airbus Defence and Space, presented the structure of the company and its evolution since 1982, highlighting some of Airbus' milestones.

The multi-sensor and multi-resolution satellite constellation was presented (10 optical, 3 SAR plus partner satellites), enabling the possibility to task different satellites accordingly to the users' needs, showing Airbus' contribution to EMSA over the last years and for the next two. The action plan for the future was also addressed, where it was ensured to the users the continuity of the service until 2030 and the development of new data sources and platforms.

Airbus' ambition is to become a reference in the maritime domain awareness as solutions provider (services and systems). The combination of Intelligence and situational awareness was referred to as effective and essential to all maritime activities. The presentation finished with the demonstration of the integration of several platforms for the benefit of the EU coastal areas maritime surveillance.

4.3 CLS

Gaetan Fabritius, Head of Maritime Surveillance, CLS, presented the perspective as service provider, starting with a brief overview of the services provided and main applications in the maritime surveillance, followed by a timeline of the milestones of CLS-EMSA cooperation which started in 2007. It was stated that CLS's mission was the continuous improvement of the quality of the data provided to the users.

Two use cases where CLS's services were crucial to the outcome were presented, and are described below.

- The first use case presented, a major oil spill in 2012, was the first case in Europe where a maritime pollution prosecution used SAR imagery as primary evidence. The image was processed by VIGISAT station.
- The second case was the detection of small vessels carrying migrants in distress in the Mediterranean Sea, on 6 October 2015. The satellite imagery was captured by Radarsat-2 and processed by VIGISAT, and allowed the rescue of 370 migrants.

It was stated that, after 2010, CLS became the only French provider of maritime surveillance services for the EMSA and the European Border Agency (FRONTEX), playing a key role in Copernicus. It was also mentioned that 78% of

EMSA areas are covered by the CLS stations network, providing 14 different types of images with 81% confirmed oil spill notifications.

Finally, CLS expressed the commitment to continue providing expertise knowledge regarding data, and supporting the EU Member States in the maritime surveillance domain.

4.4 EDISOFT

Teresa Cardoso, Defence and Security Systems Manager of EDISOFT, started the presentation with a brief introduction to the company and its areas of expertise.

Ms Cardoso outlined the vision of the company to build a Portuguese Ground Segment Infrastructure with worldwide visibility and acknowledged that EMSA and the Portuguese authorities were very supportive and crucial to the materialisation of this objective.

The trends in oil pollution, with decreasing detections in EU waters, were presented and followed by a use case: the sinking of 'Oleg Naydenov' in the Canary Islands on 14 April 2015, leaking circa 1,400 tonnes of fuel. EDISOFT's involvement in the monitoring of the leakage upon EMSA request was highlighted.

The features of the Santa Maria Ground Station (Azores) were explained, as well as CleanSeaNet processing chain, which was fully developed by EDISOFT. Several projects of research and development were also presented, including the construction of a new 15 meters antenna in Santa Maria. Future trends regarding the current issues (e.g. illegal immigration, preservation of protected areas), and the use of innovative technologies were also addressed.

The long cooperation between EDISOFT and EMSA was highlighted, along its value to Portugal and the EU community.

4.5 e-GEOS

e-GEOS Chief Executive Officer Massimo Comparini started the speech by providing an overview of the company and thanking for the invitation to participate in the conference. Following Mr Comparini brief speech, Federica Mastracci, Head of Product Management and Innovation, presented the priority market segments, focusing on maritime surveillance.

It was mentioned that the first image of CleanSeaNet was acquired by the Telespazio Matera ground station (now part of e-GEOS), with the company being a service provider as from the beginning of the service, operating a NRT ground station for multi-mission earth observation operations.

The value added products provided complementing the maritime services were explained, namely the state-of-the-art algorithms to detect oil spills (within minutes of processing), and the resources available to successfully deliver these products to CleanSeaNet and the users.

The future of the services provided was also addressed. It was stated that continuous improvement is needed in order to comply with the requirements of CleanSeaNet. For example, pattern identification from big data analytics and deep learning techniques have the potential to be used in the future for vessel classification and potential identification. The reliability and long term operational continuity of COSMO-Sky-Med mission for maritime surveillance in the arctic areas and along the shipping routes was also mentioned, as just an example of the value contribution that this unique European radar constellation can bring to CleanSeaNet. e-GEOS closed the presentation by referring to CleanSeaNet as the first operational EO based service for Maritime Surveillance, building competitiveness and pushing towards evolution of the technologies at the service level.

4.6 EUSI

Adrian Zevenbergen, Managing Director of European Space Imaging (EUSI), preceded his presentation by highlighting that the German company has been providing very high resolution optical satellite images (<50cm) to EMSA since 2013 followed by an overview of the company and its successes to date.

Of particular interest was the company's ground station located in Munich. This facility is enabled with dedicated direct satellite tasking to the WorldView satellite fleet. The supply chain process between image order requests including value adding and the final product delivery in near-real-time to EMSA was also detailed.

The future WorldView-Legion constellation was presented to participants as a follow up constellation allowing the 30cm collection capacity to double. Furthermore, examples of relevant developing projects in the maritime domain were presented addressing the improvement of vessel detection, monitoring of ports, coastlines, activities at sea, and pollution, among other EU coastal states' needs.

4.7 KSAT

Line Steinbakk, Programs Director of Kongsberg Satellites Services (KSAT), started the presentation by describing the early years of the Norwegian company, with the development of the near-real time oil monitoring service, more than 20 years ago. KSAT is responsible for the world's biggest and northernmost ground station, and the dedicated user group that led to this achievement was also presented at the conference.

In order to fulfil EMSA's requests regarding the setting up of CSN, it was explained that initially a consortium was established with e-GEOS and EDISOFT to provide the satellite oil spill detection services needed. It was stated during the presentation that the company provides global services using satellites with ascending and descending orbits covering large areas of the planet.

KSAT finished the presentation showing the improved/new services that they can provide to the new generation of CleanSeaNet.

4.8 MDA

Wayne Hoyle, Director of Business Development at MacDonald, Dettwiler and Associates (MDA) Geospatial Services, held the last industry presentation and introduced Maxar Technologies, a leader in space and technology created by the combination of MDA and DigitalGlobe. Maxar Technologies now comprises SSL, MDA, DigitalGlobe and Radiant Solutions.

The statistics regarding the number of RADARSAT images delivered over the past ten years were presented to the participants. The need for higher resolution imagery in the product delivery trends was highlighted, as a result of the increase in requests for vessel detection services in 2016, when Sentinel 1A/1B became online.

The future trends regarding the vessel identification were mentioned, namely the utilisation of machine learning and artificial intelligence. The last topic addressed was the chain of operations as SAR image acquisition and delivery, then vessel tracking and finally optical image caption.

The presentation ended with an acknowledgement to EMSA for 10 years of service and for over than 20,000 images delivered to the users.

5. ESA-EMSA collaboration

5.1 Keynote speech: ESA ESRIN

Nicolaus Hanowski, Head of Mission Management & Ground Segment Department, ESA, opened the second session of the day. The presentation started with a brief overview to the participants of ESA's Earth Observation missions and programmes, and its advantages towards the global trends and the United Nation's Sustainable Development Goals (SDGs).

Space-based data can have a strong role in the UN SDGs' implementation, namely in the following targets⁴:

- *Zero Hunger*, to optimise agriculture and livestock management;
- *Clean Water and Sanitation*, for water management, water detection, and water pollution monitoring;
- *Affordable & Clean Energy*, for renewable energy management;

⁴ Information retrieved from ESA ESRIN's powerpoint presentation.

- *Sustainable Cities and Communities*, for pollution monitoring, urbanisation, and land use planning;
- *Responsible Consumption and Production*, for optimised supply management, energy management, and natural resources management;
- *Climate Action*, for climate change monitoring and definition of mitigation strategies;
- *Life Below Water*, for monitoring the health of oceans and other water systems, for fisheries management and policing;
- *Life on Land*, for bio-diversity monitoring, pollution monitoring, land usage management and policing.

The challenges of Earth Observation data were mentioned, such as the ability to store and process large amounts of data, the constant innovation to keep up with the technological developments, the synergies created between different mission types, among others. The user perspective, regarding their specific needs when performing their tasks, was mentioned as well.

The ESA's Earth Observation (EO) open data policy, where the repository of data ready for analysis is open and free of charge to the users, was highlighted during the conference. A network of infrastructures that will fully exploit the data stored in this repository was presented, as well as a pool of five different types of users, namely: public services, R&D, commercial organisations, geosciences and general public, including media and education. The objective is to create a network of exploitation platforms utilizing Cloud-Infrastructure to better extract value from these resources.

The cooperation between ESA and EMSA was noted as a very good example of the usage of the produced EO data; The Member State testimonials are considered critical by ESA for the rationale for the extension of the Copernicus in the future, and for the integration of new space in the system/service.

5.2 ESA Earth Observation

Pierre Potin, Sentinel-1 Mission Manager, presented ESA's EO projects involved with maritime surveillance, specifically those linked to oil spill detection.

The presentation with the introduction of the initial maritime surveillance applications thought for EO satellites and the ESA exploitation projects that preceded CleanSeaNet. Two specific maritime surveillance projects based on remote sensing data were precursors to CleanSeaNet: CoastWatch and ROSES. Together these two projects led to the pre-operational service MARCOAST, which started in 2005, and built the basis for EMSA's CleanSeaNet service.

The speaker mentioned ESA's SAR missions used in maritime surveillance, Sentinel-1 satellites, owned by the European Commission, developed and operated by ESA, and ENVISAT, which provided wide range data and enabled the start of operational services in the scope of GMES/Copernicus. Also the MARISS project, focusing on vessel detection using remote sensing, was described, and its value for CleanSeaNet outlined.

The presentation continued with some key past events that motivated the implementation of SAR missions to prevent further disasters similar to Prestige (Galicia, 2002 – ENVISAT imagery was used for oil slick detection and monitoring) and for ship detection (example of Strait of Gibraltar monitoring, 2007 – ASAR imagery).

The Sentinel-1 Mission and the technical support provided to EMSA's activities were explained. An example of an image containing an oil spill in the Black Sea, just few days after the Sentinel 1-A satellite's launch, was shown, as well as a few other examples of detected oil spills. The operational use of Sentinel-A in CleanSeaNet started during the second half of 2015. Approx. 75% of the satellite imagery used by CleanSeaNet in 2017 came from Sentinel-1.

The European Data Relay System (EDRS) and its operational use for the Sentinel-1 mission were presented, with highlight to some its value adding features, namely the increased data download capacity, the increased coverage and enhanced timeliness. The speaker also mentioned the potential support Sentinel-1 mission would be able to provide regarding EMSA's quasi or near-real time activities outside Europe, in order to fully exploit this constellation's potential.

Mr Potin finished his presentation highlighting the excellent cooperation between ESA and EMSA regarding the service domain and the provision of EO data over the past years, and also expressing the importance of the formulation by EMSA of observation needs for the design of future EO mission concepts by

5.3 ESA-EMSA projects and initiatives

5.3.1 Mr Andreas Schöenberg

Andreas Schöenberg, Head of the Study and Project Management Office, Telecommunications and Integrated Applications (TIA) Directorate, at ESA ESTEC, started his presentation with a brief overview of ESA's programmes and activities. With a budget of circa 5.75 B€, ESA designed, tested and launched over 80 satellites in order to support the activities of 22 Member States, plus other EU states and Canada under long-standing Cooperation Agreements, over different domains. The Integrated Applications Promotion (IAP) programme promotes the short-term space-based commercial applications, making use of space assets such as SatEO, SatNav and SatCom.

The speaker presented the EMSA-ESA projects and initiatives, namely the S-AIS and the VHF Data Exchange System (VDES). The advantage of S-AIS over terrestrial AIS is the fact that it is possible to detect AIS messages from anywhere, giving users a global picture of the maritime traffic.

The Data Processing Centre (DPC) was also mentioned, and referred to as a platform that aims to 'collect S-AIS messages and ancillary information for generating and distributing enhanced data services to the maritime community'. Through this platform, EMSA is able to operate several systems dedicated to the monitoring of vessels approaching EU waters, namely LRIT⁵, SSN⁶, THETIS⁷ and CSN, to support the Member States and enhance the national capacity in maritime surveillance functions.

Some examples of IAP activities in the maritime domains were briefly introduced, namely:

- Next Generation – Recognised Maritime Picture (NG-RMP), service developed in cooperation with Skytek[®] to support the early identification of illegal fishing, drug trafficking, search and rescue activities as well as environmental monitoring;
- IceCast, service developed in cooperation with TESTLAB[®] for navigation planning in ice covered areas;
- MULTi-mission Data and Information service for ARctic OperationS (MULDIARCOS), service developed in cooperation with KSAT[®] that allows users to access, order, and visualise information on relevant multi-mission data;
- Satellite assets Integration for Maritime situatiON Awareness (SIMONA), service developed in cooperation with Engineering Ingegneria Informatica[®] to complement and improve existing Maritime Situation Awareness services by providing an enhanced Common Operational Picture (eCOP).

The presentation ended with a reference to the VDES workshop to be held early 2018, on 16 January, in ESA ESTEC premises (Netherlands), with the objective of providing an overview of the current status on the VDES development, regulatory aspects, potential maritime applications (e-Navigation) as well as other planned or on-going pilot activities.

5.3.2 Ms Rita Rinaldo

Rita Rinaldo, Head of Institutional Projects Section, Telecommunications and Integrated Applications (TIA) Directorate, at ESA ESTEC, continued the presentation on the ESA-EMSA projects and initiatives, by addressing Remotely Piloted Aircraft Systems (RPAS), RAPSODY and STEAM.

The speaker started the presentation with a brief overview of the potential RPAS applications to support the Member States on maritime surveillance functions. The main advantages of RPAS over the existing manned aircrafts or satellite infrastructures presented are capability of operating in a less cost-efficient and/or less safe conditions, in activities such as crisis management, maritime/land surveillance, border control or fire-fighting. The several areas of intervention as well as the main application areas for RPAS were also presented in the session.

Three projects with RPAS - RAPSODY, LUMEN and STEAM - were presented:

- Remote Airborne Platform with Satellite Oversight DependencY (RAPSODY), a project developed by ESA in cooperation with EMSA and with the involvement of Portuguese maritime safety authorities, aimed to provide

⁵ LRIT identifies and tracks EU flagged vessels worldwide and integrate them into the wider international LRIT system.

⁶ SSN is a vessel traffic monitoring and information system, linking together maritime authorities from across Europe.

⁷ THETIS was developed to support the New Port State Control Inspection Regime (NIR), and facilitate planning of inspections in ports, and is linked to the SSN system which provides information on ships in, or expected at, all ports of the Member States.

Search & Rescue and maritime environment response supporting services using RPAS with payload in accordance with the operations' needs, flying in BRLOS⁸.

- Light UAS in non-segregated airspace for Maritime and ENvironmental surveillance (LUMEN) is a project that uses light RPAS combined with GNSS⁹ for navigation and geo-correction of the acquired data, as well as real-time satellite communication to transfer the acquired data from the Ground Control Station to the users. The objective is the support of Maritime surveillance and Environmental (Flood) monitoring.
- Ships' Sulphur Trails Emissions Aerial Measurements (STEAM) is a feasibility study that started in 2015 about the potential of a future service that resorts to RPAS equipped with sniffing sensors, aiming to measure the amount of sulphur oxides (SOx) components emitted by vessels travelling inside the Emission Control Areas (ECAs) defined by the International Maritime Organisation (IMO). The objective is to support EU Maritime Authorities to enforce the IMO regulation.

In the second part of the presentation, the potentialities of High Altitude Pseudo satellites (HAPS) were explained, starting by defining them as 'unmanned aircraft positioned above 20 km altitude, in the stratosphere, for very-long-duration flights counted in months and even years', which could be airplanes, airships or balloons.

Following the introduction on HAPS, the ESA HAPS initiative was presented, where the Agency initiated several activities to understand the technological gaps, the users' needs, the industry expectations, regulatory risks, etc., in order to prepare a program for HAPS to present at the next Council Ministerial in 2019.

Aiming to define and assess technically and economically potentially sustainable services relying on HAPS complemented by satellites, ESA launched a study with the collaboration of EU Satellite Centre (SatCen), FRONTEX and EMSA to provide user requirements and guidance to the team for the services of their request, such as Support to Intelligence, Surveillance and Reconnaissance activities, Border surveillance, and Maritime situational awareness and maritime surveillance, respectively.

⁸ BRLOS – Beyond Radio Line Of Sight

⁹ GNSS – Global Navigation Satellite System

6. EMSA's involvement in the Copernicus Programme

6.1 The Copernicus Programme (DG-GROW)

Rui Meneses, representative of the European Commission DG-GROW, presented the Copernicus programme, its scope and missions. The presentation started with the challenges faced in the beginning of the programme and how the Commission exploits Earth Observation today through the provision of six dedicated services and free and open distribution of data from the Copernicus Sentinel satellites. A brief description of Copernicus was delivered, stating that the programme, implemented in 2014, and formerly known as Global Monitoring for Environment and Security (GMES), is an EU-led initiative for an autonomous and operational European Earth monitoring programme. It provides geospatial information support across a broad range of policy areas, based on Earth Observation and *in-situ* (non-space) data analyses.

Copernicus was referred to as a 'User-Driven Operational Programme' where the involvement of users and stakeholders is crucial to develop the operational specifications required to implement the programme.

The speaker then focused on the Copernicus Security Service and the three application areas: support to EU External Actions, Maritime Surveillance, and Border Surveillance. These are operated through Delegation to FRONTEX, EMSA and SatCen, respectively. The services and functions areas of each of these Agencies were briefly explained to the participants of the event.

To conclude, DG-Grow highlighted the success of the implementation of Earth Observation technologies towards EU policies monitoring, such as fisheries control and maritime pollution monitoring, among others. It was also mentioned the necessity of revisiting policy needs and to assess how services are contributing to fulfil the user needs, recalling the importance of data fusion to generate value-added information. Other technologies mentioned during the conference can complement the service, narrowing the gap between requirements and observation needs, but it is mandatory to understand how these can be integrated in Copernicus, under a programmatic point of view. DG-Grow thanked EMSA for the good cooperation in the frame of Copernicus and congratulated the CleanSeaNet team for the excellent work in the last 10 years.

6.2 Copernicus Maritime Surveillance service

Pedro Lourenço, Head of Sector Earth Observation Services, EMSA, presented the Copernicus Maritime Surveillance (CMS) service developed and implemented by EMSA. The presentation started with the contextualisation of EMSA's activities within the services components of Copernicus.

All the function areas the CMS serves were described, namely fisheries control, maritime safety and security, law enforcement, customs, marine environment monitoring and others such as defence or anti-piracy. The objective is to aggregate as much information as possible to support the users in accomplishing their tasks. As regards of maritime safety and security support, CMS can be of great value in search and rescue operations, in finding safe navigation routes, or in the compilation of extended maritime pictures allowing the users to have a global view of the area. In the context of law enforcement, the CMS service is able to support the monitoring of ports and shores for suspicious vessels detection, and to search for non-cooperative targets. Detection of potentially suspicious vessels, monitoring of ship-to-ship transfers and movement of goods, and identification of trafficking are examples of Customs activities that can be supported by Copernicus. Likewise CleanSeaNet, CMS can support the users regarding pollution detection and monitoring; in this case, the service can be used beyond European waters, i.e. in overseas territories.

It was highlighted the fast implementation of the services, counting with almost 2,000 products delivered to more than 430 users, since operations started in September 2016. The speaker finished the presentation with an overview of the users that already benefited from the services and of the Copernicus Maritime Surveillance Product Catalogue for those who might be interested.

7. Defining the future

Leendert Bal, Head of Operations at EMSA, opened the third session of the Conference with a brief presentation of the agenda for the second day of the event, mentioning Mr. Schönenberg's presentation on ESA ECSAT, the dedicated break-out sessions and respective moderators, and finally Ms Magda Kopczynska (Director for Waterborne Transport, DG MOVE) speech on the cooperation between EMSA and the EU Commission.

7.1 Opening Speech

Markku Mylly, Executive Director at the European Maritime Safety Agency, started his speech mentioning the monitoring operations developed by Finland, before CleanSeaNet implementation, and how they preceded EMSA's activities.

After implementation, and ten years of operations, the CSN service was referred to as an effective system that brings added value to the Member States, and also a useful resource to monitor coastal areas.

The Prestige accident, which affected Portugal, Spain and France, and required the mobilisation of resources, human and services, was again referred to as one of the major motors for the development of pollution monitoring services.

The cooperation with the European Space Agency was noted as crucial for the implementation of CSN, since it enabled EMSA to provide EU Member States pollution detection measures and monitoring.

The speaker also stated that CleanSeaNet is the "cornerstone of the services provided by EMSA". It has been in operations since the early years of the Agency, after a fruitful and successful trial. The following ten years were highlighted as promising and better for maritime monitoring.

7.2 Keynote speech: ESA

The last presentation of the first part of the session was carried out by Mr Schönenberg and focused on the new role of space and new instruments to tackle challenges and respond to new users' needs for maritime safety and surveillance. The speaker highlighted the importance of space to enable/support the evolution and new trends in the shipping and navigation sector, e.g. smart vessels, autonomous vessels.

It was explained that enhancing S-AIS towards VDES-SAT and adding new technologies as 5G will offer relay capacities for the secure transfer of 'big data' between ships and ship-shore, but also the new precise satellite navigation systems are key enablers for future marine applications.

The speaker addressed as well the importance of input from EMSA and marine users to ensure that future space based services are oriented towards their needs.

7.3 Break-out sessions: 'The future of space-based services for the maritime sector'

7.3.1 Break-out session: What next for CleanSeaNet?

The break-out session 'What next for CleanSeaNet?' moderated by Michiel Visser and Sónia Santos, aimed to discuss future improvements to the service and to the meetings and workshops provided by EMSA to the Member States users.

This session started with 'New functionalities' that could be relevant to improve the CSN service. The participants suggested the following:

- Feedback provision via notification e-mail;
- Generation of vessel detection reports;
- Display of MS GIS layers if interest in User Interface (e.g. PSSA areas);
- GUI with pop-up informing that a new alert is available in the User AOI;
- SSN Enrichment (e.g. cargo information, voyage destination) information;
- Availability of vessel traffic layers (LRIT and VMS information);

■ Visualisation of drifting models.

The session also addressed and proposed further parameters and types of relevant information that might be missing from the alert reports or User Interface.

The Bulgarian representatives stated that it is important to be able to estimate the aging of the spills in order to have a starting point of the investigation, and improve the identification of the possible polluters.

The Danish representatives, who receive more than 600 satellite images per year, mentioned the necessity of improving the criteria to identify 'possible oil slicks', suggesting the development of a technique or approach to determine the type of pollution. Industry representatives intervened to mention the possibility, in the future, to include hyperspectral or multispectral sensors in the satellites, in order to give more precise information on the carbon constitution of the spill and, therefore, identify the type of oil that was leaked. The estimation of the oil spill age was also mentioned during the session, possible through the integration of new sensors.

The panel asked the participants for their opinion on the CSN service's area and temporal coverage, for instance on their interest for more availability on short notice. The UK representatives intervened to mention their specific case on receiving a more even coast coverage (west vs. east coast) at different acquisition times, to search for hot spots.

Comments regarding service provision included:

- Member States consider that the CSN provides a sufficient number of services per year (over 3,000 images)
- Near real time delivery is a fundamental element. Any increase of the number of delivered services should not impact the delivery time;
- Different acquisition times (i.e. mid-morning or mid-afternoon) would be beneficial (only possible with new satellite constellations). In this case the number of delivered services per year could potentially increase;
- Use of higher resolution imagery in specific areas should be assessed (e.g. hot spots of areas of ship to ship transfer, wreck removals, etc....);
- cross-queuing of different satellite assets could also benefit the service (combination of different satellite assets to optimize its use (i.e. radar with high resolution optical))

Finally, the panel asked the participants their opinion regarding the CSN meetings and workshops provided by EMSA. Participants suggested a follow-up action every six months (e.g. video conference) for User Groups and new system functionalities. Service Feedback Meeting's bringing together CSN users, and the Service providers were also suggested. The UK representatives noted that one physical meeting is sufficient plus six months of follow-up actions.

7.3.2 Break-out session: Developments in satellite AIS and VDES

The break-out session 'Developments in satellite AIS (S-AIS) and VDES' moderated by Andreas Schönenberg and Lawrence Sciberras aimed to unveil the potential of this technology in the future of the CleanSeaNet service.

The panel started with a brief explanation of how high quality S-AIS data is provided to EMSA users. The participants were then asked if the provision of S-AIS data has been beneficial, which improvements could add value to the service, and also in what terms this type of data could complement their other data sources.

The group agreed that S-AIS can be used for Coastline applications and for security purposes, providing Administrations with data from all flag state vessels. The potential to be used for Safety of Navigation was also mentioned as well as the need to ensure better coverage for remote areas where terrestrial AIS data is not available.

The participants suggested the assessment of the utilisation of S-AIS data for Unmanned and Manned vessels, and the improvement of the update rates (time it takes to receive two consecutive positions of a single vessel). The S-AIS was also referred to as a possible substitute for LRIT, with the participants suggesting the intervention of IMO in this matter.

The second topic of the session was dedicated to the VDES and how the VHF data exchange of maritime information services can support the users. Later, the participants were questioned on the types of services that could be transferred using the high speed digital data exchange, between terrestrial stations and satellites, with

worldwide coverage. Regarding this, the group mentioned the exchange of voyage plans (ship to ship, shore-ship, navigation warnings, search and rescue), and the exchange of information between manned and unmanned vessels for safety of navigation.

Finally, the participants were also asked regarding the space component of the service, i.e. two-way communications from ship to shore and vice-versa, and the purposes for what this could be used, who agreed that this feature can serve as basis for extended navigational aids (e.g. eNavigation).

7.3.3 Break-out session: The potential of RPAS

The break-out session 'The potential of RPAS' moderated by Pedro Galache and Olaf Trieschmann aimed to discuss the applicability of Remoted Piloted Aircraft Systems (RPAS) to maritime surveillance, as a complement to the CleanSeaNet service.

The moderators started the break-out session presenting four seed questions to the participants. This was followed by a brief overview on the services RPAS can provide to the EU MS and to complement the coast guard functions.

The first topic discussed was the existing gaps and visions to be filled by RPAS. The group started by stating that satellites, RPAS, manned aircrafts and in-situ systems are complementary in the maritime surveillance domain, and not replacing each other. Some of the gaps RPAS can fill are the availability to provide long term surveillance of a specific spot, where satellites cannot stay in one location due to their orbits, the rapid response to emergencies (e.g. search and rescue, pollution response, natural catastrophes...), and also the ability of RPAS to fly below the clouds, providing visible and IR imagery in cloudy atmospheres. High Altitude Pseudo Satellites (HAPS) were referred to as the next step for long endurance operations.

The second topic addressed was the capabilities and unique advantages of RPAS to compliment maritime surveillance. The discussion on this subject resulted in three main advantages which are:

- Continuous monitoring of area of interest (e.g. high-risk areas for fishing, hot spots for irregular migrants, or for duration of large SAR operations), due to the RPAS long endurance, large range, and possibility to operate 24/7, which is not possible with manned aircrafts;
- Operations in dangerous areas (e.g. over fires or radioactive areas, linked with anti-terrorism actions, etc.), with suitable payload; for instance, reconnaissance with RPAS (e.g. 3D analysis) of a ship could help in the decision making process and preparation of response actions;
- Optionally Piloted Aircraft System (OPAS) operations; these can be rapid deployment services where crew and ground equipment fly the aircraft to the base location of RPAS operations, or flexible operations based on the need for unmanned missions.

The MS users requested the integration of RPAS and other data sources by real time fusing of information and geo-projection of data/video on maps for operational purposes. The participants agreed that the RPAS should be included in the civil protection mechanisms of each MS as well as inspection regime, such as THETIS. The participants also proposed the open source of data for dissemination and fusion, stating that data should be exchanged respecting the INSPIERE directive.

The last topic addressed in the session was the issues that still need to be tackled for RPAS to complement of the maritime surveillance of the MS. The suggestions and comments made by the participants are listed below:

- Standardized management and use of segregated air space is necessary to make RPAS operations work seamlessly;
- Harmonized procedures at the EU level are required for permit-to-fly requests (including common risk analysis);
- RPAS operational procedures in Member States need to be developed;
- EMSA should focus on larger RPAS to carry complex payload and operate them at a multinational lever, whereas smaller RPAS could be operated on national level;
- Data link for real time data availability is essential (RLOS up to 100km, SatCOM beyond);
- State of the art technology (software/sensors) to autonomously detect, identify and classify substances present in the ocean waters is needed;

- The capability of RPAS to take evidence (e.g. samples) should be analysed on national level, this could prove helpful in court cases.

7.3.4 Break-out session: New ideas and technologies

The break-out session 'New ideas and technologies' was moderated by Pierre Potin and Pedro Lourenço. The session had the purpose of brainstorming new ideas, requirements and needs linked with space based services that can drive or have an impact in future satellite missions and applications, supporting operational maritime surveillance.

The moderators started with a presentation on the user requirements for earth observation services, such as the delivery time, the coverage area, the product level and resolution, among others.

In terms of technologies/applications for Earth Observation services, the participants highlighted the relevance of the following:

- Regarding electronics signal intelligence, the detection of satellite phones used on board of migrant ships and of ship radars of non/reporting vessels;
- The ability to detect, track and characterise simultaneously a high number of migrant ships;
- For oil spill monitoring it was agreed that the ability to detect the substance and the volume of the spill is crucial, hyperspectral sensors can be used to retrieve information about nature of the spill through a Sentinel expansion mission for example;
- The combination of satellite information with other assets, i.e. the detection of vessels using satellites, and further characterisation of targets through other resources (e.g. RPAS, HAPS, etc.);
- Persistent monitoring (which requires constellations, geostationary assets and/or a combination with non-space assets), tasking time and revisiting time (as well as daily pass time), quality of the derived information (in terms of accuracy of speed, heading, length), as well as detection reliability (false positives and false negatives) were considered key elements linked with multiple use cases for Maritime Surveillance.
- Drift modelling for search and rescue, oil spill monitoring, etc., was considered relevant.
- Regarding maritime safety purposes, there is a need to have precise ice mapping for navigational purposes in specific areas of the Baltic (Gulf of Riga);

7.4 S-Keynote speech: European Commission (DG-MOVE)

The last speech of the Conference was delivered by Ms. Magda Kopczynska, Director for Waterborne Transport, DG MOVE. Ms Kopczynska referred to the CleanSeaNet (CSN) as a well-functioning and recognised satellite service, based on the EU ship-source pollution Directive from 2005 in the wake of the two major oil spill disasters and has since then developed, providing significant support to Member States in their surveillance and pollution response activities.

The speaker emphasized the importance of a strong cooperation between EMSA, Industry, Member States and ESA in the successful launch and operation of CleanSeaNet. Moreover the integration with other EMSA services in the EU-Wide Integrated Maritime Services (IMS) portfolio, including vessel related information in SSN (i.e. for polluter identification purposes) was a key development.

Overall the long term deterrent effect of CleanSeaNet was considered by Ms. Kopczynska as unquestionable, demonstrated by the significant reduction trend in the total number of potential spills detected. The user group for CleanSeaNet was also identified as a good communication channel with stakeholders furthering the work and services developed by EMSA supporting surveillance and pollution preparedness and response.

Finally, Ms Kopczynska emphasised the importance of enhanced cooperation between concerned EU Agencies, particularly in fields linked with surveillance and pollution monitoring, underlining the clear need to continue to build on space and satellite services. This cooperation involves not only earth observation services and IMS including CleanSeaNet, but also the use of RPAS for e.g. monitoring of marine pollution (oil spill detection and characterization) and air emissions from ships (SOx sensors in order to measure the sulfur content in the plume).

8. Conference conclusions

Leendert Bal initiated this session with a short summary of the subjects presented and discussed, highlighting new technologies and, consequently, new/improved services that EMSA can provide to EU MS users in the maritime domain.

The presentations of the first session demonstrated the sustainability of the service, its maturity and the fact that it is EU wide harmonised, strongly integrated in the Coastal States pollution response chains, optimising the use of resources for maritime surveillance.

Enabled by a strong cooperation with the Earth Observation Industry, the Coastal States speakers highlighted the long term deterrent effect of the CleanSeaNet service in European waters. The service was also referred to as the backbone of EMSA's Earth Observation Services.

The second session, focused on the cooperation of the European Space Agency (ESA) and the European Maritime Safety Agency (EMSA), showed the strong synergies between the Agencies, where ESA's research activities and pre-operational demonstrations supported EMSA operations, and the close partnership in EO for the maritime domain. The potential for future cooperation between both Agencies, as regards to RPAS and SAT-COM, satellite components (VDES, data processing, applications, etc.), HAPS and vessel traffic management of unmanned vessels, was also highlighted. ESA acknowledged the dedication of EMSA in providing EO services to the EU coastal states, reiterating the commitment for further future cooperation between both agencies.

In terms of future developments the feedback from participants of the break-out sessions was clear in term of the priority aspects for improvement. These should be focused on integrating new technologies to improve and expand the maritime information collection, in order to support Member States authorities in their response activities. Moreover the integration of difference sources of information (satellite based, vessel reporting, RPAS, HAPS, etc.) is critical to provide users with a broad and in depth maritime situation picture that fulfils their operational requirements.



Figure 3 Group photo with the Conference participants

Appendix A List of Annexes

Annex 1	Acronyms and abbreviations
Annex 2	Agenda
Annex 3	Participant list
Annex 4	List of presentations

Annex 1 Acronyms and abbreviations

Name	
Airbus DS	Airbus Defence and Space
BRLOS	Beyond Radio Line Of Sight
CLS	Collecte Localisation Satellites
CMS	Copernicus Maritime Surveillance
CSN	CleanSeaNet
DG GROW	European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SME (Small and Medium Enterprises)
DG MOVE	European Commission's Directorate-General for Mobility and Transport
EC	European Commission
EEZ	European Economic Zone
EFCA	European Fisheries Control Agency
EFTA	European Free Trade Association
EO	Earth Observation
EODC	Earth Observation Data Centre
EMSA	European Maritime Safety Agency
ESA	European Space Agency
EU	European Union
EUSI	European Space Imaging
FRONTEX	European Border Agency
GMES	Global Monitoring for Environment and Security
HAPS	High Altitude Pseudo satellites
IMDatE	Integrated Maritime Data Environment
KSAT	Kongsberg Satellites Services
LRIT	Long Range Identification and Tracking
MARPOL	International Convention for the Prevention of Pollution from Ships
MDA	MacDonald, Dettwiler and Associates
NRT	Near Real Time
QRT	Quasi Real Time
RLOS	Radio Line Of Sight
RPAS	Remote Piloted Airborne Systems
S-AIS	Satellite Automatic Identification System
SatCen	EU Satellite Centre
SAR	Search and Rescue
SAR	Synthetic Aperture Radar (satellite sensor)
SEG	SafeSeaNet Ecosystem GUI

SSN	SafeSeaNet
VDES	VHF Data Exchange System

Annex 2 Agenda

Tuesday, 14 November 2017 EMSA Conference Centre

Session 1: CleanSeaNet 10 year anniversary celebration

Time	Agenda Item	Speakers
09:00-09:30	<i>Registration and coffee</i>	
09:30-09:50	Welcome and opening remarks	Markku Mylly, Executive Director, EMSA
09:50-10:10	10 years of CleanSeaNet	Leendert Bal, Head of Department C: Operations, EMSA
10:10-11:00	Testimonials from the Coastal States	Joana Jerónimo (Portuguese Navy) Heli Haapasari (Finish Environment Institute) Michiel Visser (Rijkswaterstaat Zee en Delta, Netherlands) Dario Cau (Italian Coastguard)
11:00-11:30	<i>Coffee</i>	
11:30-13:00	Industry presentations <ul style="list-style-type: none"> Airbus DS GEO GmbH Germany Airbus DS GEO SA France Collecte Localisation Satellites (CLS) Edisoft E-GEOS S.p.A European Space Imaging (EUSI) Konigsberg Satellite Services SA (KSAT) MacDonald Dettwiler and Associates Ltd (MDA) 	Industry representatives <ul style="list-style-type: none"> Alexander Kaptein Olivier Surly Fabritius Gaetan Teresa Cardoso M. Comparini/F. Mastracci Adrian Zevenbergen Line Steinbakk Wayne Hoyle
13:00-14:30	<i>Buffet lunch offered by EMSA</i>	

Session 2(a): ESA-EMSA collaboration

Time	Agenda Item	Speakers
14:30-14:50	Keynote speech: ESA ESRIN	Nicolaus Hanowski, Head of the Mission Management & Ground Segment Department, ESA ESRIN
14:50-15:10	Earth Observation <ul style="list-style-type: none"> Earth Observation support from ESA ESA's Sentinel Satellites 	Pierre Potin Sentinel-1 Mission Manager, ESA ESRIN
15:10-15:40	ESA-EMSA projects and initiatives <ul style="list-style-type: none"> Satellite AIS VHF Data Exchange System (VDES) 	Andreas Schöenberg, Head of the Study and Project Management Office, Telecommunications and Integrated Applications (TIA) Directorate, ESA ESTEC
15:40-16:00	ESA-EMSA projects and initiatives <ul style="list-style-type: none"> Remotely Piloted Aircraft Systems - RHAPSODY and STEAM 	Rita Rinaldo Head of Institutional Projects Section, TIA Directorate, ESA ESTEC
16:00-16:30	<i>Coffee</i>	

Session 2(b): EMSA's involvement in the Copernicus Programme

Time	Agenda Item	Speakers
16:30-16:50	The Copernicus Programme	Rui Meneses, Copernicus Service, DG-GROW
16:50-17:10	Copernicus Maritime Surveillance Service	Pedro Lourenço, Earth Observation Services, EMSA
17:10	<i>Cocktail</i>	

Wednesday, 15 November 2017 EMSA Conference Centre

Session 3: Defining the future

Time	Agenda Item	Speakers
09:00-09:20	Introduction to break-out sessions	EMSA
09:20-09:40	Keynote speech: ESA ECSAT	Andreas Schöenberg, Head of the Study and Project Management Office, Telecommunications and Integrated Applications (TIA) Directorate, ESA ESTEC
09:40-11:00	Break-out sessions: The future of space-based services for the maritime sector <ul style="list-style-type: none"> What next for CleanSeaNet? (Conf. Room) Developments in satellite AIS and VDES (Room 01.12) The potential of RPAS (Room 01.13) New ideas and technologies (Room 0.41) 	<p>Michiel Visser and Sónia Santos Andreas Schöenberg and Lawrence Sciberras</p> <p>Pedro Galache and Olaf Trieschmann Pierre Potin and Pedro Lourenço</p>
11:00-11:30	Feedback to the plenary	Rapporteurs
11:30-12:00	<i>Coffee</i>	
12:00-12:20	Keynote speech: European Commission	Magda Kopczynska, Director for Waterborne Transport, DG MOVE
12:20-13:00	Conference conclusions	

Annex 3 Participant list

Name	Organisation	Country
Ward Van Roy	RBINS-MUMM	Belgium
Guido Fidlers	FPS Health, Food Chain Safety and Environment	Belgium
Veneta Georgieva	Executive Agency Maritime Administration	Bulgaria
Kostadinka Markova Bourgas	Executive Agency Maritime Administration	Bulgaria
Lukša Cicovacki	Ministry of the Sea, Transport and Infrastructure	Croatia
Soeren Moenster	Defence Command Denmark	Denmark
Mart Orro	Police and Boarder Guard Board	Estonia
Heli Haapasaari	Finnish Environment Institute (SYKE)	Finland
Melaine Loarer	Direction des Affaires Maritimes	France
Yves Damay	Jobourg Pollution Monitoring Centre	France
Frank Deutcher	Ministry of Transport	Germany
Bjorn Baschek	Federal Institute of Hydrology (BfG)	Germany
Konstantinos Mangidas	Hellenic Coast Guard	Greece
Dario Cau	Italian Coast Guard	Italy
Tommaso Pisino	Italian Coast Guard	Italy
Ojars Gerke	Latvian Coast Guard Service	Latvia
Kristaps Zidens	Latvian Port Administration	Latvia
Deniss Bickovs	Latvian Coast Guard Service	Latvia
Igor Kuzmenko	MRCC of Lithuanian NVEY	Lithuania
Mevric Zammit	Authority for Transport in Malta	Malta
Steve Azzopardi	Authority for Transport in Malta	Malta
Vladan Radonjic	Maritime Safety Department of Montenegro	Montenegro
Sendi Sinanovic	Ministry of Transport and Maritime Affairs	Montenegro
Michiel Visser	Rijkswaterstaat Zee en delta	Netherlands
Martin Oosse	Rijkswaterstaat Zee en delta	Netherlands
Bert Hollanders	Netherlands Coastguard	Netherlands
Ove Njoten	Norwegian Coastal Administration	Norway
Geir Emilsen	CSN NCA	Norway
Jaroslaw Bomba	Maritime Office of Gdynia	Poland
Joana Jerónimo	Portuguese Maritime Directorate General - Marine Pollution Response Service	Portugal
Nuno Pires Rodrigues	Portuguese Maritime Directorate General - Marine Pollution Response Service	Portugal

Name	Organisation	Country
Diana Pinheiro	Portuguese Maritime Directorate General - Marine Pollution Response Service	Portugal
Dumitru Bucuresteanu	Romanian Naval Authority	Romania
Paul Neicu	Romanian Naval Authority	Romania
Marko Perkovic	University of Ljubljana	Slovenia
Jadran Klinec	SMA	Slovenia
Nestor Perales	SASEMAR	Spain
Anders Litzen	Swedish Coast Guard	Sweden
Per-Arne Strand	Swedish Coast Guard	Sweden
Neil Chapman	Maritime and Coastguard Agency	United Kingdom
Rui Meneses	Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)	
Magda Kopczynska	Directorate-General for Mobility and Transport (DG MOVE)	
Calle Borg	European Fisheries Control Agency (EFCA)	
Pedro Galache	European Fisheries Control Agency (EFCA)	
Markku Mylly	European Maritime Safety Agency (EMSA)	
Leendert Bal	European Maritime Safety Agency (EMSA)	
Helena Ramón Jarraud	European Maritime Safety Agency (EMSA)	
Pedro Lourenço	European Maritime Safety Agency (EMSA)	
Sónia Santos	European Maritime Safety Agency (EMSA)	
Sónia Antunes	European Maritime Safety Agency (EMSA)	
Olaf Trieschmann	European Maritime Safety Agency (EMSA)	
Lawrence Sciberras	European Maritime Safety Agency (EMSA)	
Nicolaus Hanowski	European Space Agency (ESA)	
Pierre Potin	European Space Agency (ESA)	
Andreas Schönenberg	European Space Agency (ESA)	
Rita Rinaldo	European Space Agency (ESA)	
Alexander Kaptein	Airbus Defence and Space (DS)	
Olivier Colaitis	Airbus Defence and Space (DS)	
Olivier Surly	Airbus Defence and Space (DS)	
Ingrid Hassan	Airbus Defence and Space (DS)	
Gaetan Fabritius	Collecte Localisation Satellites (CLS)	
Christophe Vassal	Collecte Localisation Satellites (CLS)	
Guillaume Hajduch	Collecte Localisation Satellites (CLS)	
Teresa Cardoso	EDISOFT	

Name	Organisation	Country
Massimo Comparini	e-GEOS	
Federica Mastracci	e-GEOS	
Paola Nicolosi	e-GEOS	
Adrian Zevenbergen	European Space Imaging (EUSI)	
Melanie Rankl	European Space Imaging (EUSI)	
Henning Götz	European Space Imaging (EUSI)	
Line Steinbakk	Kongsberg Satellites Services (KSAT)	
Marte Indregard	Kongsberg Satellites Services (KSAT)	
Wayne Hoyle	MacDonald, Dettwiler and Associates (MDA)	
Susan Nykoluk	MacDonald, Dettwiler and Associates (MDA)	
Gerard Margarit Martín	GMV	

Annex 4 List of presentations

Session	Speaker	Presentation title	Country/ Organization
Session 1	Leendert Bal	Celebrating 10 years CleanSeaNet service	EMSA
Session 1	Joana Jerónimo	CleanSeaNet 10 Years Anniversary – Portuguese Testimonial	Portugal/Autoridade Marítima Nacional
Session 1	Heli Haapasaari	Use of the CleanSeaNet service in 2007-2017	Finland/Finnish Environment Institute (SYKE)
Session 1	Michiel Visser	10 years CSN Service Netherlands	Netherlands/ Ministry of Infrastructure and Waterstaat Rijkswaterstaat
Session 1	Dario Cau	Italian Coast Guard 10y CSN Presentation	Italy/Italian Coast Guard
Session 1	Alexander Kaptein	TerraSAR Imaging Services: 10 Years EMSA CleanSeaNet	AIRBUS
Session 1	Olivier SURLY	Celebrating 10 years of the CleanSeaNet service and cooperation between ESA and EMSA	AIRBUS DS
Session 1	Gaetan Fabritius,	Industry perspective: CLS - CleanSeaNet 10 year anniversary celebration	CLS
Session 1	Teresa Cardoso	CleanSeaNet	EDISOFT
Session 1	Massimo Comparini	Oil spill monitoring and vessel detection services for EMSA - European Maritime Safety Agency	e-GES
Session 1	Adrian Zevenbergen	Very High Resolution Satellite Imagery for Customers in Europe	EUSI
Session 1	Line Steinbakk	EMSA Celebrating 10 years of the CleanSeaNet	KSAT
Session 1	Wayne Hoyle	10 years of CleanSeaNet with MDA RADARSAT Past – Present – Future	MDA
Session 2(a)	Nicolaus Hanowski	Celebrating 10 years of the CleanSeaNet service and cooperation between ESA and EMSA	ESA
Session 2(a):	Pierre Potin	Earth Observation support from ESA & Sentinel Missions	ESA
Session 2(a):	Andreas Schönenberg	Celebrating 10 Years of EMSA / ESA Cooperation	ESA
Session 2(a):	Rita Rinaldo	Celebrating 10 Years of EMSA / ESA Cooperation	ESA

Session	Speaker	Presentation title	Country/ Organization
Session 2(b):	Rui Meneses	The Copernicus Security Service	DG-Grow
Session 2(b):	Pedro Lourenço	Copernicus Maritime Surveillance Service	EMSA

European Maritime Safety Agency

Praça Europa 4
1249-206 Lisbon, Portugal
Tel +351 21 1209 200
Fax +351 21 1209 210
emsa.europa.eu

