The 12th Ilan Ramon Conference

Panel and Workshop on EO applications for Maritime Applications

Focus on the Mediterranean Sea

January 30th - 31st,2017

IAF Center
15 Jabotinsky St.

Herzliya, ISRAEL

ISERD (Israel Europe R&D Directorate) in cooperation with COSMOS (Horizon 2020 Space NCP Project) have organized a workshop on EO applications for the Mediterranean Sea.

This workshop, to be held in conjunction with the Ilan Ramon space international conference on January 30-31, 2017 in Herzliya, Israel, is the 2nd of a series of three workshops. The Former workshop (held in Portugal) focused on the Atlantic Ocean and the next workshop will focus on the North and Baltic Seas.

The objective of the workshop (jointly supported by NCPs from Portugal, Italy and Greece), is to bring closer industry and academia to discuss the state of the art, the future trends and opportunities in the Mediterranean maritime context, bearing in mind the specific challenges of today in the Mediterranean Sea: protecting human lives at sea, monitoring maritime borders, and sustaining maritime resources through their scientific exploration.

Agenda

Day 1: 12th Ilan Ramon Conference

	Panel	Speakers
17:00-17:30	**Opening: Session Goals**	ISERD
	The evolution of remote sensing: from data to solutions	Yoav Ben-Shem, VP, Head of Geospatial Intelligence, **ImageSat**
	Academic aspects of monitoring the Mediterranean Sea	Dr. Tamir Caras **Ben Gurion University**

Yoav Ben-Shem,

VP, Head of Geospatial Intelligence, ImageSat

The evolution of remote sensing: from data to solutions

Main **messages** from the presentation:

- Waters are, more than ever before, becoming critical assets
- Economical Exclusive Zones have broadened borders of countries and created new borders far away from the territorial waters.
- Terror, immigration, Piracy
- All creating new challenges in monitoring and defending the oceans at much larger distances than territorial waters.
- The availability of more and more data from space combined with deep learning and artificial intelligence algorithms that can process multiple resources is the most efficient way to monitor the largest part of earth and provide insightful information.

Dr. Tamir Caras

Ben Gurion University

Monitoring water quality of the Southeastern Mediterranean sea using remote sensing

Since 40% of the world's population live close to water sources such as lakes, rivers, and coastline, the pressures on these environments is very high. Loss of habitats, anthropogenic related stresses are exacerbated by the growing needs for water supply. Conservation of these continental-size environments requires a generalized and large scale monitoring programs that can cover vast areas independent of geographical, municipal, or state borders .

Remote sensing has the ability to cover a very large area regularly and assess water quality based on three key elements – chlorophyll, sediments, and dissolved organic carbon. In this presentation the potential for water quality monitoring via remote sensing will be reviewed, examples will be demonstrated, and the potential for improvement performance expected using the new VENµS sensor will be discussed.

Day 2: Workshop on EO applications for the Mediterranean Sea

	Panel	Speakers
09:00	Registration	
09:15	Welcome note	Ms. Nili Shalev, **ISERD**
09:20	Introduction and Workshop Goals	Dr. Nili Mandelblit, **ISERD**
09:30	COSMOS2020 Network of the National Contact Points	Mr. Constantine Karamanis, **PRAXI Network, COSMOS 2020**
09:40	The EU Copernicus Program Overview	Mrs. Cristina Ananasso **European Commission**
10:15 - 11:15	**Session A: Challenges for Mediterranean Sea monitoring**	
	• Use of EO for integrated coastal management (ICZM)	Prof. George Zalidis, **Aristotle University of Thessaloniki**
	• Use of EO for Mediterranean port cities	Mrs. Betty Vasiliki Charalampopoulou, **Geosystems Hellas S.A.**
	• Monitoring water contamination - Surface mixing and stirring based on satellite data	Prof. Hezi Gildor, The Institute of Earth Sciences **The Hebrew University**
	• Use of EO for validation of modelled velocity fields in Mediterranean Sea	Dr. Isaac Gertman, Israel Oceanographic and Limnological Research (**IOLR**)
11:15 - 11:45	Coffee Break	
11:45 - 12:45	**Session B: Answering the challenges**	
	• The vision of total maritime awareness	Mr. Ori Zeisel, **ImageSat International**
	• ODYSSEA - Operating a Network of Integrated Observatory Systems in the Mediterranean sea	Mr. Simon van Dam**, Agora Partners**
	• Water quality products of the SHALOM mission	Dr. Tal Feingersh, **Israel Aerospace Industries Ltd.**
	• SISCAL Project - Satellite-based Information System on Coastal Areas and Lakes	Dr. Gideon Tibor Israel Oceanographic and Limnological Research (**IOLR**)
13:00	Lunch	

Constantine Karamanis
PRAXI Network, COSMOS 2020

COSMOS2020 Network of the National Contact Points

Presenting COSMOS 2020, the network of EU National Contact Points (NCP) for Space in the H2020. COSMOS 2020 provides networking opportunities, information provision, training and consortium building services to SMEs and organizations interested in participating in the H2020.

Cristina Ananasso

European Commision

The EU Copernicus Program & Maritime Applications - Overview

Main **messages** from the presentation:

- Copernicus: Earth Observation program of the European Union is covering different thematic domains, marine domain is one of those with the Copernicus Marine Environment Monitoring Service.
- Continuity of satellite data and earth observation products. Continuity until 2030 with a free full and open data policy.
- Strictly linked with H2020 research program
- Some example of applications and projects.

Session A: The challenges for the Mediterranean monitoring

Prof. George Zalidis

Aristotle University of Thessaloniki (AUTh) Faculty of Agriculture

Use of EO data and services for achieving integrated coastal management (ICZM)

The aim is the continuous water quality monitoring and coastal surveillance services based on EO data and improved through novel in-situ data from different sources. The presentation is threefold firstly focusing on results from Coastal Habitat Mapping in the Mediterranean and the Thermaikos Gulf in particular. Secondly, showcasing a "state of the art" Fully Autonomous Water Telemetry Sensing System for in situ spatial monitoring and integration of space borne and earth in situ EO data. Thirdly, showing the way for using remote sensing for marine litter, illustrating a conceptual design of a remote sensing methodology utilizing hyperspectral technology.

Betty Charalampopoulou
Geosystems Hellas S.A.

Copernicus use for Mediterranean port cities

Mediterranean ports are supporting the economic life and urban expansion of the port cities. Maritime monitoring in the port area can give environmental indicators using data content provided by Copernicus Sentinels and support the urban planning at local and regional scales. Sentinels and their contributing satellites have good revisiting times and are open and free data and can be used for monitoring the port city areas and marine areas - coastline and set indicators for ports urban areas climate and changes that affects the people life / health and wellbeing. This is related to socio-economic benefits of the Mediterranean countries citizens and helps for decisions in port urban areas

Prof. Hezi Gildor

The Institute of Earth Sciences, The Hebrew University

Monitoring contamination - Surface mixing and stirring based on satellite data

Ocean mixing and stirring processes play a major role in ocean dynamics and in the dispersion of larvae, pollutants, etc. Accidental or intentional release of contaminants in the Levantine Basin, in which the residence time of tracers is very long and coastal areas densely populated, poses a major threat.

In recent years, the advancements in observations of ocean currents (from both remote sensing and in situ platforms) has paired with the development of powerful theoretical tools, capable of extracting information on the geometry and rate of dispersion patterns for advected tracers. One of the most robust theoretical tool that has emerged has been the concept of Lagrangian Coherent Structures, in practice invisible lines at the ocean surface that can be extracted from the currents with advanced mathematical methods and that shape the pattern of tracers released in their vicinities. A typical counter intuitive phenomenon often seen is that some regions close to a spill source may be shielded from the contaminant by some features of the circulation (such as vortices), while more distant regions (100s-1000s km far away) may be reached by the contamination in a relatively short time (~days to weeks) because of the presence of directional currents like jets.

In this talk I will present how we can combine remotely-sensed data with analytical tools for the estimation of dispersion pathways in the oceans.

Dr. Isaac Gertman

Israel Oceanographic and Limnological Research (IOLR)

Use of Copernicus for validation of modelled velocity fields

The South Eastern Levanitine Israeli Prediction System (SELIPS) is a forecasting system for sea water temperature, salinity and currents. The system has been developed in IOLR and runs daily. SELIPS results are used for forecasting oil spill propagation and weathering. A novel validation technique which uses Copernicus service remotely-sensed Chlorophyll product to estimate the accuracy of the velocity field is presented.

Session B: Answering the challenges

Ori Zeisel

ImageSat International

The vision of total maritime awareness

The challenges in the Mediterranean sea are diverse and changing constantly. In order to have a total understanding of the operational situation there is a need for a comprehensive maritime domain awareness solution. ImageSat International believes that by integrating multi layers of data and using a combination of algorithms and human research there can be a sufficient operational solution.

Simon van Dam
Agora Partners

ODYSSEA - Operating a Network of Integrated Observatory Systems in the Mediterranean sea

ODYSSEA will develop, operate and demonstrate an interoperable and cost-effective platform that fully integrates networks of observing and forecasting systems across the Mediterranean basin, addressing both the open sea and the coastal zone. The platform will collect its data from the many databases maintained by agencies, public authorities, and institutions of Mediterranean EU and non-EU countries, integrating existing earth observation facilities and networks in the Mediterranean Sea building on key initiatives such as Copernicus, GEOSS, GOOS, EMODNet, ESFRI, Lifewatch, Med-OBIS, GBIF, AquaMaps, Marine IBA e-atlas, MAPAMED and others with marine and maritime links. Through ODYSSEA's end-user centred approach, in which the various groups of end-users and stakeholders, within and external to the Consortium, will be involved from Day 1 of the project in the design, development and operation of the platform, including identification of gaps in data collection and accessibility. High priority gaps will be filled through multiple approaches that include developing a network of coastal observatories, deploying novel in-situ sensors at sea (a.o. microplastic sensors), oceanographic modelling and integrating existing mobile apps for citizen scientist networks. Applying advanced algorithms to organise, homogenise and fuse the large quantities of data in common standard type and format as well as other types of formats, the ODYSSEA platform will provide both primary data and on-demand derived data services, including forecasts, from ALL Mediterranean countries through a SINGLE PUBLIC PORTAL to various end-user groups and stakeholders. End-user requirements will drive the creation of secondary data sets which the platform will provide as new and packaged services matching the specialised information needs of users. ODYSSEA will improve accessibility to existing data as well as increase the temporal and geographic coverage of observational data in the Mediterranean.

Dr. Tal Feingersh
Israel Aerospace Industries Ltd.

Water Quality Products of the SHALOM mission

SHALOM is the first Space-borne Hyper-Spectral system that opens opportunities for a commercial Hyperspectral mission. SHALOM is a joint collaboration between the Italian and Israeli space agencies (ASI & ISA). SHALOM is providing products from a sun-synchronous orbit of 640km, high ground resolutions (10m Hyperspectral, 2.5-5.0m Panchromatic) a daily area coverage of 200,000 km^2, 4-days revisit time, precise geo-location of up to 15m, and distribution of scientifically validated added value products to end-users, within 7 days.

The SHALOM system will provide over 70 added value product layers at panchromatic ground resolution, supporting a variety of decisions. In between these, a specially challenging product is made of the group of information layers called “Marine and aquatic quality and productivity indicators”. These interpret the following parameters useful for the characterization of inland, coastal and marine waters:

- Phytoplankton Chlorophyll Concentration Map;
- Harmfull Algal Blooms Map;
- Cyanobacterial Phycocyanin Concentration Map;
- Suspended Particulate Matter Concentration Map;
- Turbidity Map;
- Colored Dissolved Organic Matter Absorption;
- Submerged Vegetation Species Map;
- Spills Map.

It is obtained by processing geolocated surface reflectance data, or georeferenced surface reflectance data if required for accuracy purposes.

The product is relevant to environmental water studies as well as to water resource management, providing a synoptic view of the spatial distribution of different biological, chemical and physical variables of both the water column and, if visible, the substrate. SHALOM will assist the task set by the European Union Water Framework Directive (termed “WFD 2000”) for inland and coastal water monitoring, which requires the member states to take actions in order to reach a good ecological status in inland and coastal waters by 2015. This task involves characterization of the specific trophic category of aquatic systems and implementation of monitoring systems to verify the ecological status.
Currently, the limited radiometric and spectral resolution of commercial multi-spectral sensors and the limited spatial resolution of the superspectral spaceborne missions restrict water quality monitoring strategies to field and airborne imaging spectrometers.

Further research and development of information extraction is on-going, in support of SHALOM mission's products and their quality.

Dr. Gideon Tibor

Israel Oceanographic and Limnological Research (IOLR)

SISCAL Project - Satellite-based Information System on Coastal Areas and Lakes

The use of Satellite-based Information System on Coastal Areas and Lakes (SISCAL) to study and monitor the Israeli water bodies

SISCAL is an Internet based service that provides users with information on the aquatic environment derived from Earth Observation data. SISCAL goal is to close the gap between satellite-data providers of Earth Observation (EO) Data, the know-how that exist mostly in the scientific community and the end-users that do not specialize in EO processing but can benefit from using them. SISCAL enables simple access to Earth Observation (EO) data products in Near-Real-Time, it use state of the art algorithms and can also integrate user defined algorithms for assessing aquatic parameters (e.g. SST, Chl-a, TSM, SEC. etc.). SISCAL output can be presented both on SISCAL Web-GIS and/or on a “tailor made” End User GIS that is based on ESRI ArcGIS platform.

SISCAL was developed as a research project (2002-2004) financed by IST (Information Society Technology) under the F5 program of the European Community and is implemented since 2005 in the Israeli monitoring program of the Eastern Mediterranean coastal area and in the Sea of Galilee. SISCAL is also used around the world for reconnaissance studies of extreme water conditions prior to planning the location of water desalination plant.