

**ERATOSTHENES Centre of
Excellence (ECoE)**



1st virtual EXCELSIOR International Technical Workshop

15 July 2020

**EO activities in Malta and future opportunities for collaboration
with Excelsior for the benefit of Med region**

@excelsior2020eu



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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857510



This project has received funding from the Government of the Republic of Cyprus through the Directorate General of the European's Programmes, Coordination and Development

CONSORTIUM





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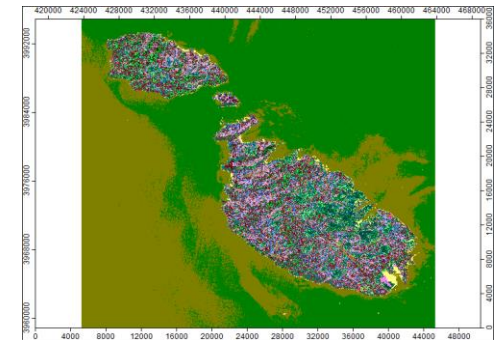
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Research interests: Meteorology & NWP, Climate change and impacts, EO technology (atmosphere, marine, land), Geographic Information System

Application of space activities related to natural resource management

Use of space data to improve and validate weather forecasting for the Maltese Islands.

This research is aimed at improving boundary conditions of numerical weather prediction models. One example is the improvement of land cover types as per space imagery. A more realistic rendition of land cover type results in improved weather forecasts of convective weather processes.



The Maltese Islands: 316 km²

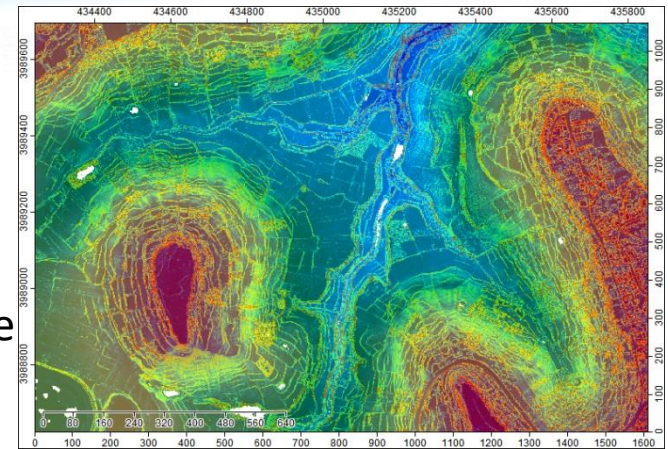
Agius A, Galdies C, Bonnici A, Azzopardi J (2017) *Improving weather forecasts by updating the surface boundary conditions of a numerical weather prediction model for the Maltese Islands*. In book: *Emergent Realities for Social Wellbeing: Environmental, Spatial and Social Pathways* (2017). University of Malta, Msida and Malta Environment and Planning Authority, Floriana, Malta. Editors: S. Formosa
https://www.researchgate.net/publication/315460518_Improving_weather_forecasts_by Updating_the_surface_boundary_conditions_of_a_numerical_weather_prediction_model_for_the_Maltese_Islands

Busuttill R, Galdies C, Cacciottolo J and Yousif C (2020) *Climatological Global Solar UV Index: Measurement and Health Issues in Malta*. DOI: 10.1007/978-3-030-36875-3_13 In book: *Handbook of Climate Services. Climate Change Management*. Springer Nature Switzerland AG 2020 Edition: *Climate Change Management* Publisher: Springer Nature Switzerland AG

Application of space activities related to natural resource management

A preliminary investigation of the erodibility of the catchment systems in Malta using EO data

- The issue of soil erosion is becoming a serious problem worldwide. Very few studies have been conducted in the Maltese Islands to identify soil erosion hotspots.
- EO data: **IKONOS**
- Ancillary: aerial **orthophotography** and **LIDAR** data
- Technique used was able to identify problematic areas. This study is recommending a holistic agricultural practice assessment, as well as the extension of similar studies in other catchment areas in Malta and Gozo.



Galdies C, Azzopardi D, Sacco A (2015). Large scale erosion mapping using LIDAR and RUSLE technique for landscape management in the island of Gozo, Malta. RSPSoc, NCEO and CEOI-ST Joint Annual Conference 2015. The University of Southampton (8-11 September 2015)

Application of space activities related to natural resource management

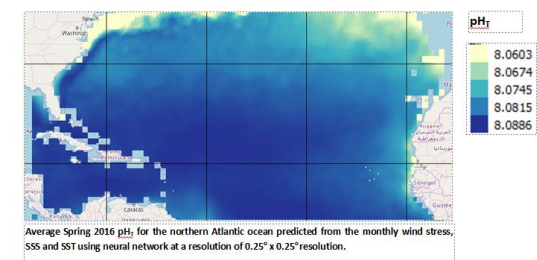
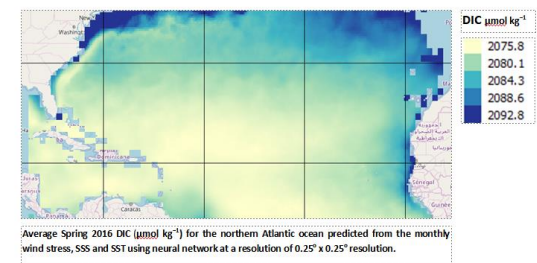
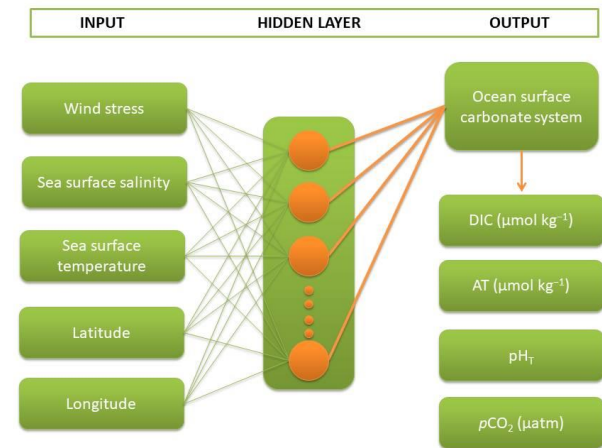
Variability in oceanic CO₂ parameters (ocean acidification) using machine learning based on multi-platform EO data.

Using ANN to derive the variability of the ocean carbonate system from monthly:

- satellite-derived wind stress (**ASCAT**),
- sea surface salinity (**SMOS**) and
- sea surface temperature (**OISST**) fields over the oceans.

The predicted variables were dissolved inorganic carbon (DIC), total alkalinity (AT), pH and partial pressure of ocean surface carbon dioxide (pCO₂).

Using this approach the components of the seawater carbonate system for and validated against published observations from research cruise missions.



Conference Poster: Galdies C, Garcia-Luque E, Guerra R (2018). Variability in oceanic CO₂ parameters in the North Atlantic Subtropical gyre: a neural network approach. Ocean Carbon and Biogeochemistry (OCB) Summer Workshop. Woods Hole Oceanographic Institution. June 25-28, 2018

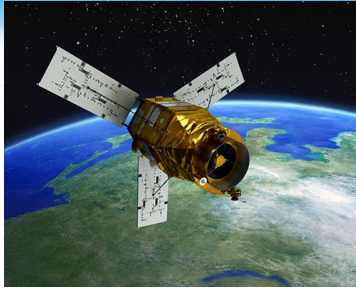
Application of space activities related to urban resource management



EO for Historic Building Conservation and Sustainability

- ***Building capacity in the downstream Earth Observation Sector; take-up of EO data by private and public organisations***
- Our study on how the 'traditional roofs' of Malta's historical buildings can be seen as **Cool Roofs** - benefiting historic buildings and its occupants by being more energy efficient.
- The United States and the Europe are at the forefront of this research.
- Traditional roofs are made of permeable materials (limestone and lime-based layers), also result in a cooling evaporative effect on drying. Typical occurrence for historic buildings along the Mediterranean shores
- As part of conservation practices, membranes are installed (making them modified roofs), usually results in heat accumulation and hence the continuous use of air-conditioning.

Seasonal modelling of the physical behaviour of traditional roofs (reflectances → physical properties)



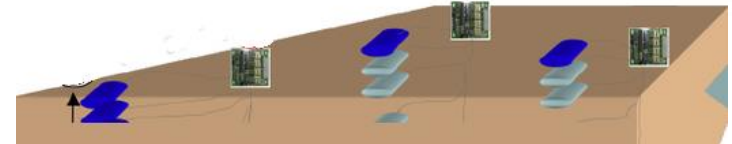
KOMPSAT (hires) data
RGBN
SENTINEL data
RGBN-TIR



AUV RGBN-TIR



FLIR



In situ sensors
T, H, GSR, etc

Vittoriosa sacristy of St Lawrence Church: 1436 AD



St Angelo: 1530 AD



Inquisitor's Palace: established in 1574

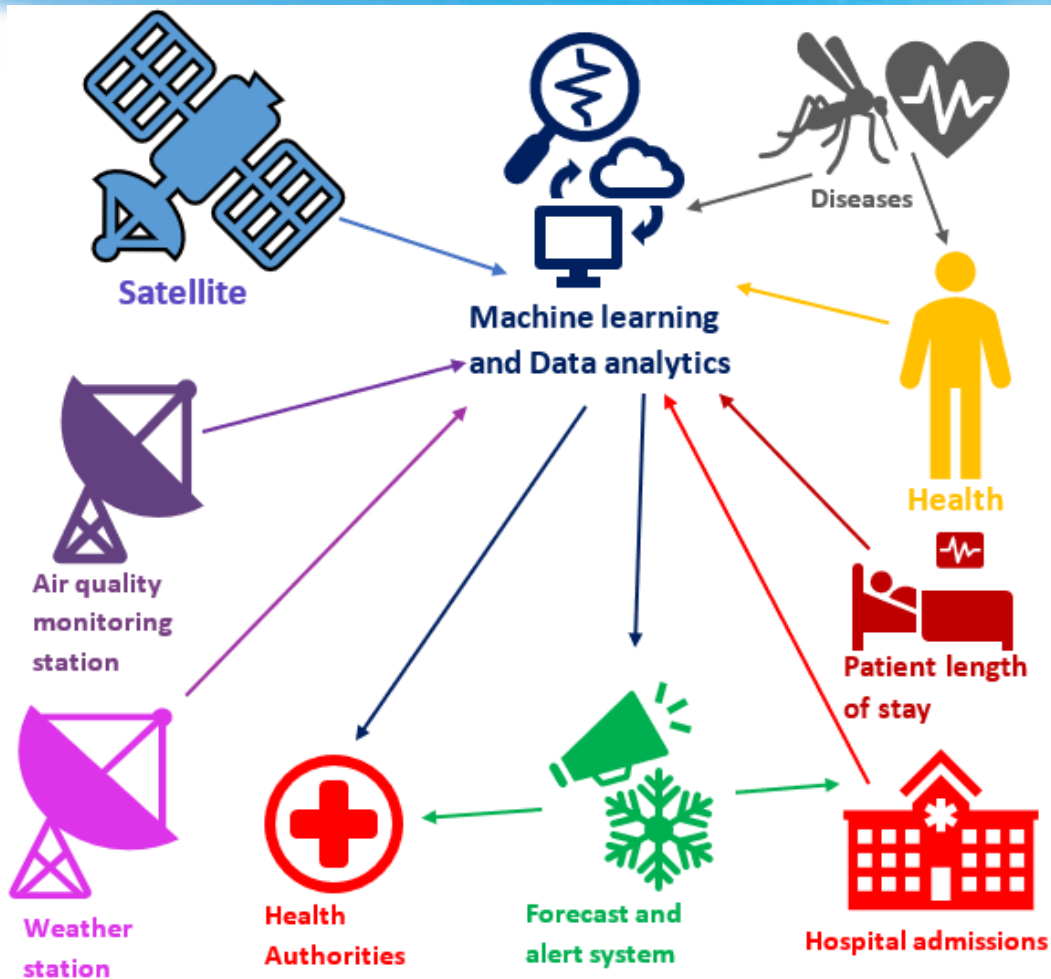


Bighi: since 1675 AD



Use of satellites for public health alerting and forecasting system

- Selection of best EO data to identify primary **environmental and climatic factors** influencing public health
- Model correlation between the **COPERNICUS multiplatform satellite imagery data**, weather stations and air monitoring stations data
- To characterise the impact of environmental and climatic factors on the hospital admissions and patient length of stay
- To develop public **prototype health monitoring** and resource requirement forecasting tools to develop policies for disease prevention and control and estimating and monitoring their effectiveness.
- Tools that can **promptly detect a disease upsurge or outbreak**
- Innovation that can potentially become a pioneer in health informatics and translational medicine.



- Currently looking for research consortia
- Interested to develop health data-collection frameworks at National level in Europe and elsewhere
- Technology transfer envisaged as a primary deliverable

THANK YOU FOR YOUR ATTENTION

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Proposal acronym: EXCELSIOR



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