BIG TC - BLUE ITALIAN GROWTH Technology Cluster

Newsletter

Nr. 2, 29 September 2021

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A note from the new President

Dear network,

first of all I would like to thank the members of BIG TC for the trust they have placed in me and in particular I would like to thank Roberto Cimino for having left an association at these levels in my hands: with its 93 members, BIG TC is in fact among the largest Technological Clusters in national level.

Presiding over it today represents a great challenge for me so that, during my mandate, the Association will increasingly become a point of reference for members and for those who work in the Blue Economy sector in general.

I fully share the vision that Mr. Roberto Cimino gives of the BIG TC in his end of mandate speech: "the home of all those who care about the harmonious and complementary development of the sea economy in our country, a space in which to also discuss with frank growth of the country system, without distinction and even less competitiveness of the reference sector and the legal nature of the shareholder"

And it is here that I would like to start, picking up the baton and making sure that this home can really exist, built thanks to the will and collaboration of all of us.

We are experiencing a time of passionate change and profound development for the Blue Economy. Its sustainable growth and that of the economies linked to it are, without a doubt, one of the greatest challenges for our country.

There are many entrepreneurial realities linked to the Blue economy, young and dynamic realities, which have been able to make themselves heard and will certainly know how to network to overcome the uncertainty brought about by this moment of profound change for all of us, in which the economy will have opportunities to growth and rebirth thanks to the new National Recovery and Resilience Plan. BIG TC will certainly be an important catalyst in the study of a harmonious development of the industrial sector and of public and private research.

BIG, by its nature, is made up of SMEs, large companies, including universities, research centres and trade associations, this cohabitation can be a force provided, of course, that each member makes available their skills and their ideas and is available for dialogue between all.

Precisely with this in mind, I consider it a priority to continue the dialogue with other National Technology Clusters, financial institutions, and other associations, in a new proposal phase that allows our sector to continue to improve and create new market and growth opportunities.

We have the opportunity and the privilege of being the engine of a new era, we must be proud of it.

I would also like to share with you part of my person and my path. I am a naval engineer born in Rome, but Genoese by adoption. I followed the main developments of the Fincantieri Group and of Cetena, of which I have been a manager since 2000, and since then there has been talk of the environment, sustainability, and the circular economy. Since 2019 I am also Director of the Ligurian District of Marine Technologies. I am a man of the sea, passionate about sailing and boats. I was involved from the earliest stages in the establishment of Cluster BIG, of which I have been vice-president since 2018, learning on the field the dynamics that distinguish.

With you, with the Vice President and with the Board of Directors, with the Technical Scientific Committee and with the association and its members or its Coordinator, I am sure that we will be able to overcome the important challenges we face.

Trusting in everyone's cooperation,

Giovanni Caprino

President of Blue Italian Growth Technology Cluster

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The MORSE Project in Senigallia: long-term monitoring of a coastal-estuarine-riverine environment

By Maurizio Brocchini Università Politecnica delle Marche

The MORSE project, "Modeling and Observation of River-Sea Exchanges at a microtidal estuary", aims at a long-term monitoring of a microtidal environment (i.e., with a limited tidal excursion) typical of Italian coasts. Italian beaches are characterized by both loose (e.g. sand, gravel) and cohesive sediment (e.g. clay). The latter allows for the transport of pollutant and nutrients throughout a river and across the nearshore region, thanks to its capability to aggregate with other potentially harmful substances such as metals, to form heterogeneous particles named flocs. The relevance of the project lies in understanding the interactions between sea and river actions in the estuarine region and their consequences on beach morphology, transport and release of substances into the sea, and nearshore protection planning.

The MORSE project is the natural continuation of EsCoSed project, run in 2013-2015. Both projects, developed at the estuarine region of the Misa river in Senigallia, Italy, have been funded by the Office of Naval Research Global (UK) and coordinated by the Marche Polytechnic University and the Naval Research Laboratory (Mississippi, USA).

While EsCoSed had the purpose of monitoring the region of the river estuary (about 1 km^2) in a short-term perspective (time frame of days) by means of field observational campaigns for hydro-morphodynamics measurement during intense storm events, MORSE aims at monitoring a wider region (about 50-100 km^2) for a longer time span, in the order of years.

The study region is limited landward by a H-ADCP river gauge employed for the measurement of stages and flow rates during river floods; the gauge is located about 1 km upriver to the mouth. About 20 m from it, a hydrometer maintained by the Marche Region is installed for the measurement of the river water level.

Wave and weather climate conditions are collected through a tide gauge and an ADCP. The tide gauge is located into the harbour of Senigallia and tracks the sea level oscillations due to astronomical tide and storm surges. The ADCP is integrated into the MEDA station, located in the open sea north of Senigallia and managed by CNR-IRBIM in Ancona, and measures local wave characteristics and offshore currents, among other relevant parameters.

A remote sensing system named SGS, "Sena Gallica Speculator", is installed to perform a continuous monitoring of a 1-km-longshore and 1-km-seaward stretch of coast from the river estuary, and allows for the reconstruction of wave characteristics and seabed profiles in the nearshore by the post-processing of recorded videos and images. Moreover, an X-band radar has been installed with the purpose of pushing waves and bed profile reconstruction capabilities even seaward, up to about 6 km from the coastline.

The previously described instrumentation allows for the collection of useful data to increase knowledge of a complex riverine-estuarine-coastal environment, influenced by tidal motions, beyond both rivercurrents and wave action, notwithstanding the relatively small tidal excursion of less than 50 cm along the coasts of the central Adriatic sea.

As a matter of fact, recent studies have demonstrated that the tide and other long waves, such as infragravity waves, can have a relevant role in defining the hydrodynamics of estuarine regions because of their capability to easily enter an estuary and run upriver for kilometers, whereas gravitational short waves break significantly and are dissipated before entering the estuary. Furthermore, the upriver propagation velocity of infragravity waves has been seen to be significantly influenced by the tidal stage also in rivers located in microtidal coasts.

The infrastructures of the MORSE project have also contributed to study the energy levels of several wave frequencies in the regions of the estuary and into the Senigallia harbour, showing the existence of long-period (25 min to 1 hour) oscillations of the water surface into the Misa river, possibly related to seiching motions in the Adriatic sea.

The wide set of collected information can be profitably used for scientific purposes, as well as for an efficient coastal management. From a scientific point of view, wave and current data can be employed as input for high-resolution numerical simulations through coastal circulation models, with the goal of favouring the study of dynamics that are usually difficult to investigate in the field, such as the evolution of long-shore currents and the mobilization of seabed and river bed sediment. Specifically, the instruments located into the river and at sea can be used to define initial and boundary conditions for a computational domain for which the knowledge of the relevant hydrodynamic and morphological processes is requested, for either high-energy events (storms and floods) or calm periods.

Simulated results may, therefore, be used for coastal management and administration to the benefit of local coastal communities. As an example, information on the evolution and migration of an existing river mouth bar desumed from the products of the SGS monitoring facility will be shared with the Municipality of Senigallia towards an efficient and informed regional planning. Measured river flow rates, moreover, will be shared with the Regional Civil Protection to give support to flood mitigation strategies and alert systems.

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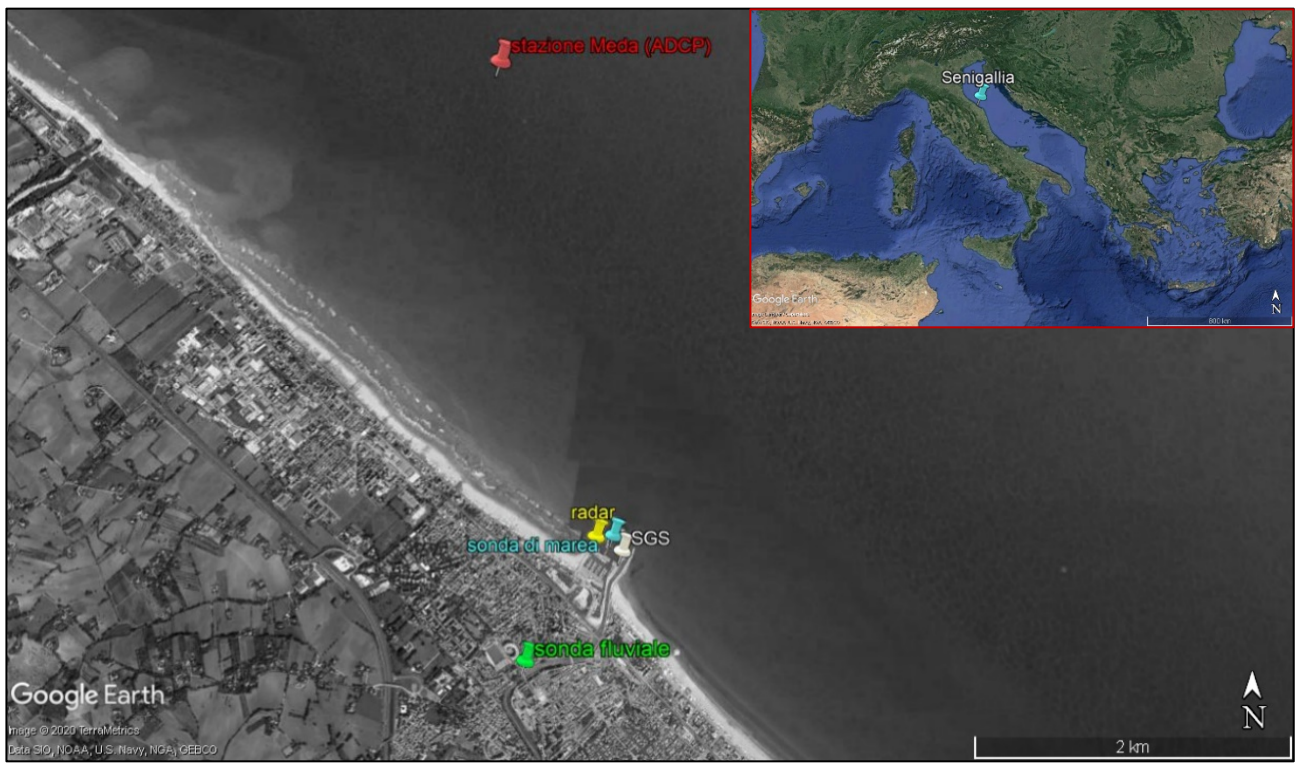

Figure 1: Italy map and position of the instruments in the Senigallia nearshore (source: Google Earth).

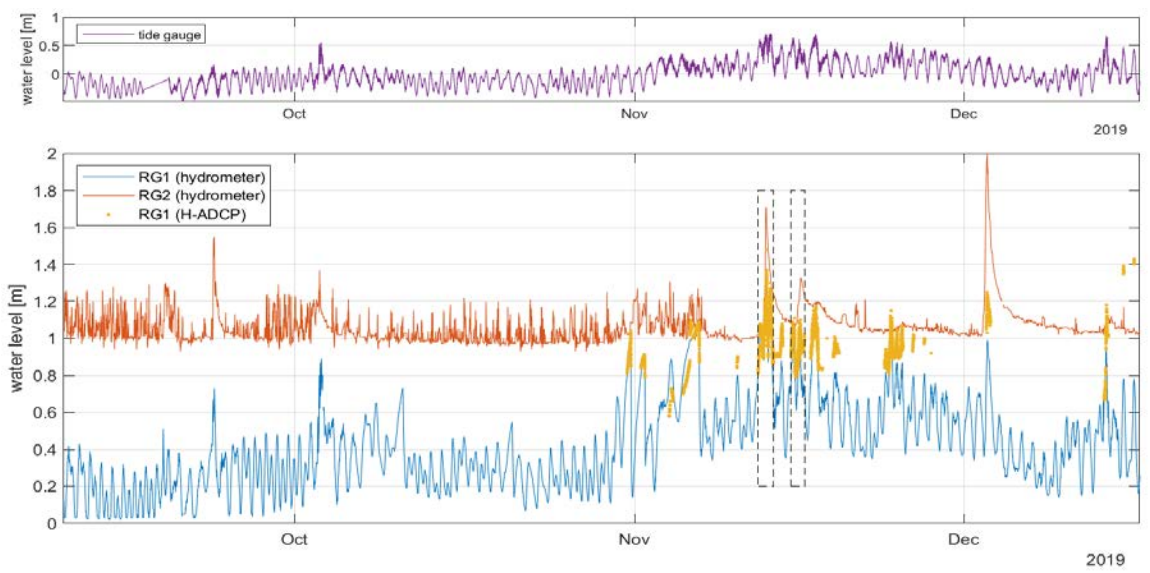

Figure 1 – Data collected by the tide gauge (purple), by the Civil Protection hydrometers placed along the Misa River (blue and orange) and by the H-ADCP river gauge (yellow).

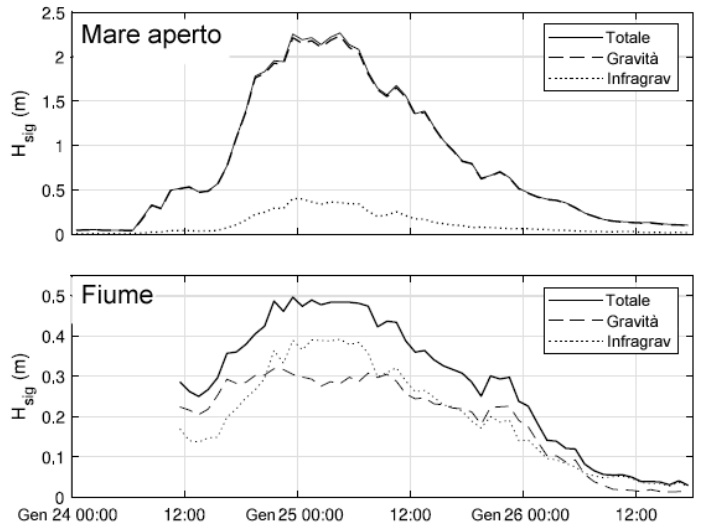

Figure 2: Timeseries of the signifcant wave height during a storm (24-26 january 2014) in the open sea (top panel) and in the Misa River mouth (bottom panel). Notice the dominance of the infragravity waves in the river.

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NEWSLETTER

Mission Starfish 2030: Restore Our Ocean and Waters

By Maria Cristina Pedicchio,
Mission Board Member "Starfish" – University of Trieste

The recent health emergency has clearly made us understand how much the alteration of ecosystems and the uncontrolled exploitation of the environment are damaging our planet. As a consequence, the environment is assuming an even more strategic and fundamental role on political agendas for all European countries. Just think of the recent creation of the Italian Ministry for Ecological Transition and above all of the European Green Deal, the new roadmap to make EU economy more sustainable and to transform climate issues and environmental challenges into opportunities, in order to get a fair and inclusive transition process.
When talking about the environment, seas and oceans play a primary role, hence to safeguard the Planet, we must start right from them. Remember Arthur C. Clark's famous comment: "How inappropriate to call this planet "Earth" when it is clearly "Ocean".

Oceans cover 71% of the earth's surface and the earth, seen from above, is simply a blue dot.

The importance of having healthy oceans, seas, coastal and inland waters is vital to our societies: they represent the lungs of the world, producing half the oxygen that we breathe; they are a source of food, providing 16% of the animal proteins we eat; absorb the 30% of greenhouse gases and 90% of the excess heat retained by the Earth; they host the richest biodiversity of our Planet; provide renewable energy and many benefits associated with human well-being; valorize cultural values, tourism, trade and transport. For Italy, with its 7.468 km of costal line, a marine strategy is absolutely necessary.

The European Commission has highlighted these aspects by proposing the ambitious project of the **Starfish Mission 2030**. Missions, based on the inspiration of the American Apollo Mission, intend to promote citizens' knowledge and awareness of threats to sustainable development and to implement environmental protection and regeneration actions. As Starfish Mission Board we produced a Report that analyzes problems and risks that are threatening our seas, rivers and inland waters and suggests the necessary actions to be activated for their "regeneration".

The priorities that emerge, as shown in the following image, concern 5 themes: decarbonization, protection of the ecosystems and of biodiversity; fight against pollution in its various forms (not only plastic, but also acoustic pollution or drugs pollution), governance (strongly important in a fragmented country like ours) and finally "overcoming the emotional and educational gap" in our society as a whole.

These priorities have been widely discussed on the 5th of May 2021, during the event **"The Starfish Mission 2030: for an Italian perspective to marine and maritime strategies".** The interesting debate has been jointly organized by the Ministry of University and Research, APRE – Agency for the Promotion of European Research, the Cluster Blue Italian Growth (BIG) and the National Institute of Oceanography and Applied Geophysics (OGS).

During the Meeting, the role of the Starfish Mission in the framework of the new Horizon Europe Programme was presented and discussed by experts. Then, different actors from both public and private stakeholders had the opportunity to express their view on technological innovation and ecological transition for the National marine and maritime sectors.

The concluding message highlighted, once again, that to achieve the ambitious Mission Goals it is necessary to carry out urgent, synergic and courageous actions and that, above all, each of us is called to personally contribute to the health of our blue planet for a more responsible and sustainable future.

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The role of the SMEs in the Blue Economy Technology Innovation

By Guglielmo Giannini - g-nous

Innovation and technology boast a solid and accredited relationship. Technologies should be intended as a vehicle for innovation, therefore considering their contribution toward new markets creation along with the exponential growth of human capabilities.

Companies strictly focusing on innovation achieve not only the aimed level of market competitiveness, but they are also capable of sustain it in the long-term.

In this context, small and medium-sized enterprises (SMEs) play the crucial role of "free innovators", whether compared to larger players carrying wider constraints in the technological innovation area.

Consequently, the relationship between SMEs and large industrial groups represents a virtuous model to be pursued, aimed at creating symbiotic visions and relationships capable of combining agility and innovation with capital and structure – elements strictly necessary for evolving markets' adaptation and scale-up.

All mixed with a silent and increasing request for collaborations among individuals having different, cross-sectoral, and horizontal skills and knowledge that is taking place in almost every market, and the Blue Economy makes no exception.

Likewise, entrepreneurs are well aware – or perhaps never enough – about the capability that the so-called sustainable development offers in terms of market opportunities for companies, crucial to achieve their most disparate ambitions through the acquisition of original mindsets, business models, and technologies.

Recognizing the economic value of blue economy strategies can, therefore, promote long-term national growth and employment in industries that depend on the sea. European SMEs should leverage on technological innovation to transform the protection of marine resources into opportunities and to implement an economic model that moves from resources exploitation to their sustainable management, toward profitable circularity.

In this respect, the development of industrial and business aggregations generating support initiatives represent a strategic contribution for the translation of sustainable objectives into ordinary business practice, along with increasing collaboration through partnership models

The spread of collaborative clusters plays a crucial role in driving this change in the blue economy sector, creating specific communities of innovators, in line with the now widely adopted UN SDGs objectives to revitalize the global partnership for sustainable development. In this spirit and with this objective in mind, a specific Working Group for SMEs was established within the BIG Technology Cluster.

A strategical strengthening of cooperation on a national and international scale is desirable, now more than ever, to ensure that European SMEs have the necessary means to contribute to the achievement of the Sustainable Development Goals. At the same time, national and European entrepreneurs shouldn't claim to generate internal value if the sustainable economic and social conditions for the involvement of identified stakeholders are not created. And SMEs can't create shared value if not in the condition to properly innovate.

A thorough translation of this process converges into the concept of innovability underlying two strategic and complementary meanings: the ability that SMEs should develop to regularly innovate and reinvent themselves with the convergence of concepts of innovation and sustainability.

From the exploitation of space technologies in support of terrestrial markets, g-nous made its strength out of the combination of innovation and sustainability. The real value lies in the involvement and cross-sharing of skills and technologies, which g-nous cultivates by acting as a multi-stakeholder project platform and by organizing and animating communities in different terrestrial verticals.

While easing the interactions among different sectors' players, g-nous involves a vast ecosystem of stakeholders in sustainable tech initiatives. Synergies would not have an impact without inclusion, an essential component of the Italian SMEs ecosystem looking at a steady growth in the blue economy sector.

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