



# JERICO

## Application for Transnational Access to Coastal Observatories





**Description of the project (to be provided in pdf format)**

*Please contact the manager of the infrastructure/installation you wish to use before writing the proposal*

**PART 1: User group details**

Indicate if the proposal is submitted by

- an individual  
 a user group

**Information about the applicants (PI and project partners)**

**Principal Investigator (user group leader)**

Title Dr. Name and Surname Giuseppe Zibordi

Gender  Male  Female

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## PART 2: Additional information about the applicant(s) expertise

### **Expertise of the group in the domain of the application**

The team submitting the proposal has consolidated experience in the collection, handling and exploitation of in situ data for the development and assessment of satellite ocean color products in European seas. This includes the application of marine bio-optical data in the generation of algorithms applicable to satellite primary radiometric products for the determination of the concentration and optical properties of seawater constituents relevant to climate studies and water quality monitoring (i.e., chlorophyll-*a* - a proxy for phytoplankton-, suspended sediment, colored dissolved organic matter).

### **Short CV of the PI**

**Giuseppe Zibordi** received the *Laurea* in Physics from the University of Modena, Italy and the *Ph.D.* in Oceanography from the University of Southampton, United Kingdom.

He was a researcher at the Italian National Research Council in Modena from 1984 to 1992, where his work focused on quantitative remote sensing of coastal and polar regions. Since 1993 he is with the Joint Research Centre of the European Commission, Ispra (Italy), working on ocean color development and validation activities. His research interests include: remote sensing techniques for the determination of atmospheric and marine optical properties, protocols for *in situ* measurements, and methods for the absolute calibration of optical instruments. He is author (or co-author) of more than 70 papers in peer-review international journals.

### **A list of 5 recent, relevant publications of the participant(s) in the field of the project**

1. G.Zibordi, J.-F.Berthon, F.Mélin, D. D'Alimonte and S.Kaitala. Validation of satellite ocean color primary products at optically complex coastal sites: northern Adriatic Sea, northern Baltic Proper and Gulf of Finland. *Remote Sensing of Environment*, 113, 2574-2591, 2009.
2. F.Mélin and G.Zibordi. Vicarious Calibration of Satellite Ocean Color Sensors at Coastal Sites. *Applied Optics*, 49, 798-810, 2010.
3. G.Zibordi, B.Holben, D.D'Alimonte, F.Mélin, J.-F. Berthon, I.Slutsker, D.Giles. AERONET-OC: An Overview. *Canadian Journal of Remote Sensing*, 36, 488-497, 2011.
4. G.Zibordi, J.-F. Berthon, F. Mélin and D. D'Alimonte: Cross-site consistent in situ measurements for satellite ocean color applications: the BiOMaP radiometric dataset. *Remote Sensing of Environment*, 115, 2104-2115, 2011.
5. F.Mélin, G.Zibordi, J.-F.Berthon, S.Bailey, B.Franz, K.Voss, S.Floria and M.Grant. Assessment of MERIS Reflectance Data as Processed with SeaDAS over the European Seas. *Optics Express*, 19, 25657-25671, 2011.





### PART 3: Detailed scientific description of the project

#### **List the main objectives of the proposed research**

The proposed activity is intended as the continuation of a measurement program named *Coastal Atmosphere and Time-Series (CoASTS)*, started in 1995 with the objective of creating a time series of comprehensive in situ measurements to support satellite ocean color multi-mission programs. Primary objective of the proposed activity is the comprehensive collection of seawater apparent (i.e., reflectance, diffuse attenuation coefficient, normalized water leaving radiance, Q-factor) and inherent (total seawater absorption, attenuation and scattering coefficients) optical properties, together with the contemporaneous collection of water samples for the determination of pigments concentration through High Performance Liquid Chromatography (i.e., chlorophyll a, chlorophyll b, chlorophyll  $c_1+c_2$ , chlorophyllide a, fucoxanthin, diadinoxanthin, beta-carotene, zeaxanthin, alloxanthin, 19'-butanoyloxyfucoxanthin, 19'-hexanoyloxyfucoxanthin and diatoxanthin), and additionally absorption coefficients of colored dissolved organic matter and particulate matter through spectro-photometric techniques.

Application frameworks of the collected in the situ time series are: 1. the development of bio-optical algorithms applicable to primary satellite ocean color radiometric data for the generation of derived quantities of relevance for climate and environmental studies; and 2. the validation of derived satellite ocean color product (both primary and derived products).

#### **Give a brief description of the scientific background and rationale of your project**

The term satellite *ocean color* generically identifies remote sensing of the sea in the visible and near infrared to primarily determine the radiance emerging from the sea, the so called *water leaving radiance*, from the top-of-atmosphere radiometric signal. By exploiting the spectral distribution of of the water leaving radiance (or its derived product so called normalized-water leaving radiance) satellite ocean color allows for the determination of the concentration and optical properties of those seawater constituents absorbing and scattering light.

In situ measurements have a fundamental position in satellite ocean color activities. In fact, they are essential for the development and assessment of the bio-optical algorithms required for determining quantitative information on seawater optically significant constituents from satellite radiometric data. Additionally in situ truth measurements are also needed for the assessment of the accuracy of remote sensing products. It is pointed out that CoASTS already overlaps several satellite ocean color missions starting from SeaWiFS (launched by NASA in 1997 and operated since 2010) MODIS-terra and MODIS-Aqua (launched in 1999 and 2002 respectively) and MERIS (launched in 2002). As a consequence, in agreement with the accuracy requirements for the Global Earth Observation System of Systems (GEOSS), the CoASTS activities strengthen the capability to trace uncertainties in products from different remote sensing systems through time-series of highly consistent *in situ* data at a coastal site exhibiting a variety of water types.

It is finally reported that CoASTS has been funded through a variety of sources: Institutional Programs from the Joint Research Centre (1995-1997, 2011-2012), Shared Cost Actions through Marine Science and Technology (1998-2000), International Grants through the US National and Aeronautics Space Administration (2001-2002) and the European Space Agency (2003-2010).







**Present the proposed experimental method and working plan**

The measurement program is composed of two complementary parts. The first, CoASTS, comprises manned activities performed every two months for a few days and aims at producing comprehensive and accurate (SI traceable) measurements of seawater apparent and inherent optical properties in addition to concentration of major pigments. The second relies on an autonomous radiometer system performing continuous radiometric measurements for the determination of seawater apparent optical properties (i.e., normalized water leaving radiance) and atmospheric aerosol optical properties (i.e., aerosol optical thickness, single scattering albedo). This second component is considered complementary to the first and aims at producing data bridging information on seawater apparent optical properties between CoASTS campaigns.

The AAOT access through JERICO is presently asked for:

- i. 70 days allowing for the continuous deployment of a JRC autonomous above water radiometer;
- ii. 8 days (included in the period of 70 days of continuous deployment of the JRC radiometer) allowing for the execution of two successive manned campaigns of 4 days each to collect in situ measurements in agreement with CoASTS requirements (see part 3).

**Indicate the type of access applied for**

- remote *(the measuring system is implemented by the operator of the installation and the presence of the user group is not required )*
- partially remote *(the presence of the user group is required at some stage e.g. installing and un-installing)*
- in person/hands on *(the presence of the user group is required/recommended during the whole access period)*

**Indicate the proposed time schedule including expected duration of access time**

The access to the AAOT should be granted during Spring 2013 for 70 days to allow for the deployment of the JRC autonomous radiometer system and carrying out manned measurements by three JRC scientists. The manned measurements will be performed during two periods of 4 days each indicatively at the beginning and end of the deployment period for the autonomous radiometer system.

**Host infrastructure**

**Indicate the type(s) of JERICO host facility(s) you are interested in**

*(Tick more than one if it is useful for your project)*

- ferrybox
- fixed platform
- glider
- calibration laboratory

**Indicate the specific JERICO host facility(ies) you wish to choose**

Acqua Alta Oceanographic Tower





**Explain briefly why you think your project will be best carried out at the specified host facility(ies)**

By recalling that the proposed activity aims at assuring continuity to an ongoing collection of bio-optical data at the Acqua Alta Oceanographic Tower, it is highlighted that the site is located in a transition region that can be characterized by different seawater optical types including oligotrophic/mesotrophic conditions typical of the open sea regions, alternated to cases representative of complex coastal waters dominated by sediments and on a lesser extend by colored dissolved organic matter. These conditions are ideal for the generation of data sets applicable for bio-optical modelling in coastal regions and the validation of satellite ocean color products in optically complex waters.

**If possible, list other JERICO facility(ies) where you think your experiment could alternatively be carried out**

**Additional information**

**Is there a facility similar to the one you wish to utilize in your country?**

Yes       No

**If yes, please indicate your reasons for requesting access to the JERICO facility you have chosen**

**Have you already submitted an Access Proposal to any of the participating facilities under this or previous EU Programs?**

Yes       No

**If yes, please indicate the name of the institution, submission date and reference number for each such proposal**

The Acqua Alta Oceanographic Tower was included in the “Coastal region long-term measurements for colour remote sensing development and validation (COLORS) project (ref. MAS-CT97-0087) funded by Marine Science and Technology, Strategic Marine Research, Coastal Engineering from 1998 to 2000.

**Is this a resubmission of a previously rejected proposal? (Select "yes" if this application is a revised version of a proposal submitted to JERICO before that was rejected by the Selection Panel)**

Yes       No





***If yes, please give the exact reference number and submission date. Kindly describe briefly the changes made in comparison to the rejected version.***

***Is this a continuation of an earlier project funded under a previous call for Transnational Access in JERICO at the same facility?***

Yes       No

***If yes, please give the exact reference number and submission date. Kindly indicate also what has been achieved in the previous experiment and the reasons why the objectives have not been fully met.***

#### **PART 4: Technical information**

***Wherever possible, please specify your requests regarding the use of your chosen facility's equipment/instruments/sensors, including any additional services, data or other requirements.***

The proposed activity requires access to the Acqua Alta Oceanographic Tower for the execution of the manned measurements (on average 4 days for two times in the period of 70 days in Spring 2013 during which the JRC autonomous radiometer will be deployed). Operations require transport from harbor to platform and back, with suitable boat. Onboard operations require availability of 220 AC volts for powering winches, data loggers and power supplies owned by the measurement team. Accessibility to meteorological data is appreciated.

***List all material/equipment you plan to bring to the JERICO facility (if any):***

- Multispectral microPRO profilers manufactured by Satlantic Inc. (Halifax, Canada) for the determination of seawater apparent optical properties (i.e., reflectance, diffuse attenuation coefficient, normalized water leaving radiance, Q-factor) in the 400-700 nm spectral region;
- Multispectral absorption/attenuation meter AC-9 manufactured by Wet Labs (Philomath, USA) for determining seawater absorption and attenuation coefficients in the 400-700 nm spectral region;
- Multispectral optical backscattering meter manufactured by HOBI Labs (Bellevue, USA) for determining seawater backscattering coefficient in the 400-700 nm spectral region;
- Above-water multispectral CE-318 optical system manufactured by CIMEL (France, Paris) for determining seawater normalized water leaving radiance and aerosol optical thickness;
- Filtration system to condition water samples for successive laboratory analysis of: pigments concentration through High Performance Liquid Chromatography, absorption coefficients of colored dissolved organic matter and particulate matter through spectro-photometry.



**Please provide a detailed and realistic budget for the expenses you expect to incur for travel/boarding and the shipment of equipment, if applicable in your case (note that a maximum of two travel grants will be assigned to each user group, depending on the length of the requested period of stay).**

No funding is requested for travel or shipment.

**Please tick the appropriate boxes and give detailed information for the kind of risks associated with your proposed activity**

- Chemical :
- Biological :
- Radiological :
- Other :

No peculiar risk is envisaged.

Date of compilation 05/03/2012

Signature of the PI

*Giuseppe Libardi*

Signature of Institute Director

*[Signature]*

Guido Schmuck

(Director of Institute for Environment and Sustainability)

***This section reserved to the JERICO TNA Office***

Date of proposal receipt by email

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Assigned reference number

\_\_\_\_\_

Signature of receiving officer

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