

**Raffaele Bernardello, Ph.D. - December 10, 2014**

**Position/Contact Information:**

Research fellow  
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**Research Interests:**

Physical-biological interactions in the sea. The influence of climate variability on oceanic primary and export production. Impact of climate change on ocean ventilation, ocean carbon storage, plankton community structure. Modeling of ocean biogeochemical cycles and optimization of parameters. Detection of deep water formation from remote sensing data.

**Academic Background:**

- Ph.D. 2005-2010.** Universitat Politècnica de Catalunya - Barcelona TECH, Barcelona, Spain  
Program: Marine Science  
Advisor: Dr. Antonio Cruzado  
Excellent *Cum laude*.  
Thesis: A 3D high resolution coupled hydrodynamic-biogeochemical model for the Western Mediterranean Sea. Interannual variability of primary and export production.
- B.S. 1996-2003.** Faculty of Science, Università degli Studi di Genova, Genova, Italy  
Program: Marine Environmental Science

**Positions held:**

- Feb. 2014 – present.** Research fellow, Ocean Biogeochemistry and Ecosystem, National Oceanography Centre, Southampton, UK.
- Jan. 2011 – Jan. 2014.** Postdoctoral researcher, Ocean Biogeochemistry and Climate Change group, Department of Earth and Environmental Science, University of Pennsylvania, Philadelphia, USA.
- Sep. 2003 – Dec. 2010.** Graduate intern, graduate student, postdoctoral research assistant, Centre d'Estudis Avançats de Blanes (CEAB), Operational Oceanography and Sustainability Unit, Spanish National Research Council, Blanes, Spain.

**Apr. 2007 - Aug. 2007.** Graduate student, School of Mathematics and Statistics, Climate and Environmental Dynamics Laboratory, University of New South Wales, Sydney, Australia.

**Peer-Reviewed Publications:**

**Bernardello, R.**, Marinov, I., Palter, J.B., Galbraith, E.D., Sarmiento, J.L. Impact of Weddell Sea deep convection on natural and anthropogenic carbon in a climate model. *Geophysical Research Letters*, 2014, 41, doi:[10.1002/2014GL061313](https://doi.org/10.1002/2014GL061313).

Cardoso-Mohedano, **Bernardello, R.**, Sanchez-Cabeza, J.A., Ruiz-Fernandez, A.C., Alonso-Rodriguez, R., Cruzado, A. Thermal Impact from a Thermoelectric Power Plant on a Tropical Coastal Lagoon. *Water, Air, & Soil Pollution*, 2014, 226, doi:10.1007/s11270-014-2202-8.

**Bernardello, R.**, Marinov, I., Palter, J.B., Sarmiento, J.L., Galbraith, E.D., Slater, R.L. Response of the Ocean Natural Carbon Storage to Projected Twenty-First-Century Climate Change. *Journal of Climate*, 2014, 27, 2033-2053, doi:<http://dx.doi.org/10.1175/JCLI-D-13-00343.1>.

de Lavergne, C., Palter, J.B., Galbraith, E.D., **Bernardello, R.**, Marinov, I. Cessation of deep convection in the open Southern Ocean under anthropogenic climate change. *Nature Climate Change*, 2014, 4, 278-282, doi:10.1038/nclimate2132.

Ahumada-Sempoal, M.A., Flexas, M.M., **Bernardello, R.**, Bahamon, N., Cruzado, A. Northern Current variability and its impact on the Blanes Canyon circulation: A numerical study. *Progress in Oceanography*, 2013, 118, 61-70, doi:10.1016/j.pocean.2013.07.030.

**Bernardello, R.**, Cardoso-Mohedano, J.G., Bahamon, N., Donis, D., Marinov, I., Cruzado, A. Factors controlling interannual variability of vertical organic matter export and phytoplankton bloom dynamics a numerical case-study for the NW Mediterranean Sea. *Biogeosciences*, 2012, 9, 4233-4245, doi:10.5194/bg-9-4233-2012.

Bahamon, N., Aguzzi, J., **Bernardello, R.**, Ahumada-Sempoal, M. A., Puigdefabregas, J., Cateura, J., Muoz, E., Velsquez, Z., Cruzado, A. The new pelagic Operational Observatory of the Catalan Sea (OOCs) for the multisensor coordinated measurement of atmospheric and oceanographic conditions. *Sensors*, 2011, 11(12), 11251-11272, doi:10.3390/s111211251.

**Manuscripts submitted:**

Ahumada-Sempoal, M.A., Flexas, M.M., **Bernardello, R.**, Bahamon, N., Reyes-Hernández, C., Cruzado, A. Shelf-slope exchange in the Blanes submarine canyon (NW Mediterranean Sea): A numerical study. Submitted to *Continental Shelf Research*.

Cardoso-Mohedano, **Bernardello, R.**, Sanchez-Cabeza, J.A., Molino-Minero-Re, E., Ruiz-Fernandez, A.C., Cruzado, A. Accumulation of conservative substances in a tropical coastal lagoon with anti-estuarine circulation. Submitted to *Estuarine, Coastal and Shelf Science*.

### **Manuscripts in preparation:**

Cabre, A., Marinov, I., **Bernardello, R.** Oxygen Minimum Zones in the tropical Pacific across CMIP5 models: mean state differences and climate change trends. In preparation for *Climate dynamics*.

**Bernardello, R.**, Bahamon, N., Ahumada-Sempoal, M.A. Detection of deep water formation from remote sensing chlorophyll in the NW Mediterranean Sea. In preparation for *Geophysical Research Letters*.

### **Selected Presentations at Scientific Meetings:**

**Bernardello, R.**, Marinov, I., Palter, J.B., Galbraith, E.D., Sarmiento, J.L., Slater, R.D. Impact of Southern Ocean deep convection on natural and anthropogenic carbon uptake and storage in an Earth System Model. Ocean Sciences Meeting, Honolulu (Hawaii, USA), 23-28 February, 2014. Oral presentation.

**Bernardello, R.**, Bahamon, N., Ahumada, M.A., Donis, D., Cardoso, G., Cruzado, A. Dependence of new primary production estimates on the choice of the mixed layer depth criterion: a 3D modeling study for the Western Mediterranean. Integrating New Advances in Mediterranean Oceanography and Marine Biology, Barcelona (Spain), 26-29 November 2013. Poster Abstract.

**Bernardello, R.**, Marinov, I., Palter, J.B., Sarmiento, J.L., Galbraith, E.D., Slater, R.D. Decomposition of climate change effects on ocean natural and anthropogenic carbon uptake. European Geosciences Union, General Assembly 2013, Vienna (Austria), 7-12 April, 2013. Oral presentation.

**Bernardello, R.**, Cardoso, J.G., Bahamon, N., Donis, D., Marinov, I., Cruzado, A. Factors controlling interannual variability of vertical organic matter export and phytoplankton bloom dynamics. A numerical case-study for the NW Mediterranean Sea. European Geosciences Union, General Assembly 2013, Vienna (Austria), 7-12 April, 2013. Poster Abstract.

**Bernardello, R.**, Cabre, A., Leung, S., Marinov, I. Response of phytoplankton community structure to climate change: an IPCC AR5 Earth system model intercomparison. 2nd ICES/PICES Conference for Early Career Scientists. Calvia, Majorca (Spain), 23-27 April, 2012. Oral presentation.

**Bernardello, R.**, Marinov, I., Palter, J., Sarmiento, J. L. Response of the ocean carbon pumps to changes in ocean circulation in 21st century climate change simulations. Ocean Sciences Meeting. Salt Lake City, UT (USA), 20-24 February, 2012. Poster Abstract.

**Bernardello, R.**, Cardoso, G., Donis, D., Bahamon, N., Marinov, I., Cruzado, A. Spring bloom dynamics and variability of export production: A Mediterranean Sea case study. Ocean Carbon & Biogeochemistry Summer Workshop. Woods Hole, MA (USA), 18-21 July 2011. Poster Abstract.

**Bernardello, R.**, Baird, M.E., Ahumada, M., Cruzado, A. Two Different 3D Pelagic Ecosystem Models for the NW Mediterranean Sea. Validation with MERIS data and Intercomparison. 6th European Conference on Ecological Modeling. Trieste, Italy, 27-30 November 2007. Poster abstract.

**Bernardello, R.**, Ahumada, M.A., Cruzado, A., Cardoso, J.G. Biogeochemical modeling of the northwestern Mediterranean Sea. 1st Symposium GLOBEC-IMBER. Valencia, Spain, 28-31 March 2007. Poster abstract.

### **Non-Peer-Reviewed Publications/ Technical reports/ Book chapters:**

Bahamon, N., **Bernardello, R.**, Velasquez, Z., Kreutzer, S., Cruzado, A. Meris Mission: Validation and calibration in the NW Mediterranean Sea. Final Report 2004. ENVISAT-A0290. Funded by: European Space Agency.

Cruzado, A., Bahamon, N., **Bernardello, R.**, Ahumada, M.A., Donis, D., Cardoso, J.G. Operational Observatory of the Catalan sea (OOCs). Instrumentation Viewpoint 2009, 8, 75.

Bahamon, N., Cruzado, A., **Bernardello, R.**, Ahumada, M. A. The CEAB's marine observatory in the Catalan Sea: consolidating long time series observations? Instrumentation Viewpoint 2011, 11, 42.

Cruzado, A., **Bernardello, R.**, Ahumada, M. A., Bahamon, N. Modelling the Pelagic Ecosystem Dynamics: The NW Mediterranean. In: Marine Ecosystems, Ed. InTech 2012, 35-60.

### **Teaching Activities:**

#### Developed and taught computer labs for:

- 2011-2012** ENVS 204-001 Global Climate Change. University of Pennsylvania.
- 2011-2012** ENVS 312-401 Ocean-Atmosphere Dynamics and Implications for Future Climate Change. University of Pennsylvania.

#### Visiting lectures:

"General circulation models for climate change predictions" for ENVS 204-001, Fall 2011, 2012, UPENN.

"General circulation dynamics in the Ocean" for ENVS 312-401, Spring 2011, UPENN.

"Hurricanes and models. What does the future hold?" for ENVS 204-001, Fall 2012, UPENN.

#### Supervision of graduate students:

**2013-2014** Raghavendra Prasad Palle. University of Pennsylvania. Co-supervised with Dr. I. Marinov.

**2014** Charlie Gaborit. Université d'Aix Marseille. Co-supervised with Dr. Valérie Michotey and Dr. Nixon Bahamon.

### **Fellowships and awards:**

- 1999** ERASMUS Undergraduate Fellowship. Competitive fellowship awarded by the European Union Undergraduate Student Exchange Program (ERASMUS) to study at the University of Barcelona, Spain, 1,550€.
- 2003** LEONARDO Graduate Fellowship. Competitive fellowship awarded by the European Union Lifelong Learning Program to conduct early stage research at the Center for Advanced Studies of Blanes (CEAB-CSIC), Blanes, Spain, 3,000€.
- 2005-2009** Catalan Government Ph.D. Fellowship. Competitive fellowship funded by the Catalan Council of Research. 50,000 €.
- 2007** Visiting Research Assistantship at UNSW, Sydney, Australia. Competitive award funded by the Catalan Council of Research. 5,600€.

### **Invited talks:**

- Feb. 2013** “Response of the ocean carbon pumps to predicted 21<sup>st</sup> century climate change”. AOS seminars, Princeton University, Princeton, USA.
- Sep. 2013** “Response of the natural ocean carbon storage to projected 21<sup>st</sup> century climate change.” GEOMAR, Kiel, Germany.

### **Technical Skills:**

Broad experience with unix systems, parallel computing. Good knowledge of Fortran, Matlab, Ferret, LaTeX. Developer of marine biogeochemical models, hydrodynamic model settings. Extensive experience with models: CM2Mc (GFDL); POM (Princeton U.); NEMO (European Consortium UK/France/Italy). Broad experience with remote sensing data (levels 2 and 3). Experience with oceanographic instrumentation and autonomous mooring systems.

### **Seagoing Experience:**

- 2003-2006** R/V Itxasbide, Catalan Sea.
- 2004** Ship of opportunity Isabella, Barcelona-Arzew.
- 2006-2010** R/V Dolores, Catalan Sea.
- 2010** R/V Garcia del Cid, Catalan Sea.

### **Synergistic Activities:**

Development of a user-friendly graphical user interface (SATPRO) for the processing and selection of data from remote sensing level-2 products. Contributed in the update and improvement of the Stony Brook Parallel Ocean Model (sbPOM). Reviewer for Journal of Plankton Research, Biogeosciences, Journal of Climate.