Plankton-derived emissions of trace gases and aerosols in the Southern Ocean - Highlights of the PEGASO 2015 cruise to Antarctica

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Summary

The oceans are strong and pervasive sources of tiny airborne particles (called aerosols) with important implications for the regulation of atmospheric chemistry, optics, cloudiness and, therefore, climate. The PEGASO project aims to investigate the plankton-derived production of aerosol-forming substances, mainly trace gases, microgels and biological particles (viruses, bacteria). Its sister project BIO-NUC seeks to investigate aerosol formation, ageing and cloud-seeding activity over the oceans. To these aims, the PEGASO cruise on board the RV Hesperides visited, during 6 weeks, the regions of South Georgia Island, South Orkney Islands and Anvers Island in the Southern Ocean and Antarctic Peninsula. The cruise departed from Ushuaia on 2 January 2015 and returned to the same port on 11 February 2015. Regions with contrasting plankton abundance and composition were visited and studied with a lagrangian approach, deploying and following drifters. Underway measurements were also conducted along transits between regions. Surface ocean physical, chemical and biological measurements were conducted in parallel to atmospheric measurements of oxidants and aerosol chemistry and physics. Also, simulations of sea spray particle formation by wave breaking were conducted using a seawater bubbling chamber on board. Between 18 and 20 November, the PEGASO post-cruise meeting is held at the ICM, with attendance of the international research groups involved in the cruise, from NUI Galway (Ireland), Univ. Birmingham and PML Plymouth (UK), CNR Bologna (Italy), Univ. Mainz (Germany), FMI Helsinki (Finland) and IQFR-CSIC Madrid. The talk will describe the cruise activities, report the main scientific achievements, and outline plans for the future.

Brief biography

Rafel Simó is Senior Researcher at ICM, interested in biogeochemical cycles and ocean biosphere – atmosphere interactions, and how they are shaped by plankton physiology and ecology. PhD in Chemistry (UB, 1995) after completing his thesis at the IDAEA-CSIC. After a postdoc at the UEA, Norwich (UK), he joined the ICM-CSIC in 1997, where he got a permanent position in 2000. He has been member of the Steering Committee of SOLAS (a daughter project of IGBP, WRCP, SCOR and IGACC) and vice-Chair of COST Action 735, with 18
participant countries. He has led oceanographic expeditions to the Equatorial Pacific, Southern Ocean and the Mediterranean, and has participated in other field studies in the Mediterranean, Atlantic, Arctic and Antarctica.

Manuel Dall’Osto is a Ramon y Cajal scientist at ICM covering multidisciplinary aspects of atmospheric science, particularly focusing on marine new particle formation events, organic marine aerosols and air quality in urban coastal areas. He got his PhD in Chemistry at the University of Birmingham (UK) in 2006. Between 2006 and 2008 he was a permanent fellow at the National Centre for Atmospheric Science (UK), before moving for a postdoc in NUI Galway (Ireland). In 2010 he got a Marie Curie fellowship at IDAEA-CSIC (Barcelona), and in 2013 he joined the ICM-CSIC.

Average of MODIS-satellite images of chlorophyll a concentration in the PEGASO region for the entire January 2015. The red line shows the cruise track, and the circles indicate the approximate location of the four regions where intensive lagrangian studies were carried out.

The PEGASO scientists and the RV Hesperides in Deception Island.