CSIR to conduct fourth ocean experiment to explore climate sensitivities of the Southern ocean

A 14 day cruise will depart from Cape Town this Friday, along with 40 scientists and students covering a wide range of research e.g. ocean physics, primary production, chemical pollutants weather and sea bird observations from a multitude of national and international institutions that include the CSIR, South African Weather Services, BirdlifeSA and various universities. The multi-disciplinary and multi-institution research conducted on this winter cruise, as part of Southern Ocean Seasonal Cycle Experiment (SOSCEx IV), will greatly enhance South Africa's contribution to the understanding of this globally important and understudied oceanic region.

The SOSCEx IV will commence on 15 July 2016 when the SA Agulhas II embarks on its annual winter voyage. The fourth experiment will explore new questions about the climate sensitivity of carbon and ecosystem dynamics and how these processes are parameterized in models.

"The primary objective of this experiment is to understand how ocean eddies and fronts interact with seasonal heating and transient storms and how these processes impact on large-scale carbon-climate sensitivities," said CSIR Oceanographer, Dr Sandy Thomalla. She explains that modelling approaches use a hierarchy of medium to ultra-high resolution forced ocean model domains to test our understanding of the links between surface boundary layer physical drivers and the biogeochemical response scales. This study will allow for an enhanced characterisation of the seasonal cycle of upper ocean physics, CO_2 fluxes and Marginal Ice Zone dynamics, which together drive phytoplankton primary production and associated carbon export.

The fourth seasonal cycle experiment builds on the experience gained during previous SOSCEx expeditions. The observational approach of SOSCEx IV employs the SA Agulhas II together with

robotics-based continuous year-round, high-resolution observations of the upper ocean.

SOSCEx IV will be focused on three seasonal ship-based cruises of the Atlantic Sub-Antarctic zone (SAZ) and the Polar Frontal Zone (PFZ) of the Southern Ocean in winter 2016, summer 2016 and autumn 2017 spanned by continuous high resolution robotics-based observations.

The multiple ship occupations facilitate biogeochemical measurements that resolve seasonal differences in biogeochemistry (e.g. phytoplankton community structure and primary production), while the robotics platforms sample continuously and at high resolution between ship visits for a full seasonal cycle.

The Southern Ocean is a key component of the earth system through its regulation of atmospheric carbon dioxide (responsible for 50% of ocean CO_2 uptake and 30% of carbon export flux) and the global heat budget. SOSCEx is a CSIR driven initiative which uses a combined observational and modelling programme to deliver an enhanced understanding of the sensitivity of the Southern Ocean biological carbon pump to seasonal, subseasonal and mesoscale forcing features (i.e. storms).

The Seasonal Cycle is the mode of variability that couples the physical mechanisms of climate forcing to ecosystem response in production, diversity and carbon export. The combined high-resolution approach to both observations and modelling experiments in SOSCEx IV will address key questions relating to the physical nature of the Southern Ocean and its carbon cycle. “Through this understanding we aim to make a significant contribution to improving the way global climate models reflect CO_2 and primary productivity climate sensitivities in the Southern Ocean,” said Thomalla.

Journalists interested in covering the departure of SA Agulhas II can go to East Pier, V&A Waterfront. The ship will depart at 16h00.