STSM Report

Training in the development of programming routines for the numerical analysis of global DMS climatologies and related satellite data

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The purpose of the Short Term Scientific Mission was the training in different programming tools. These tools are Matlab programs made for the numerical analysis of global climatologies of DMS and associated variables.

The first main objetive of my PhD is the coupled study of the DMS dynamics in the ocean and its potential oxidation products in the atmosphere. This study needs some solid statistical tools, and an efficient way we found to work with so many data was the use of Matlab. During the first months of my PhD I have been working with the programs made by Dr. Sergio Vallina. He is now a postdoc researcher at the University of East Anglia, working with Dr. Corinne LeQuere's group.

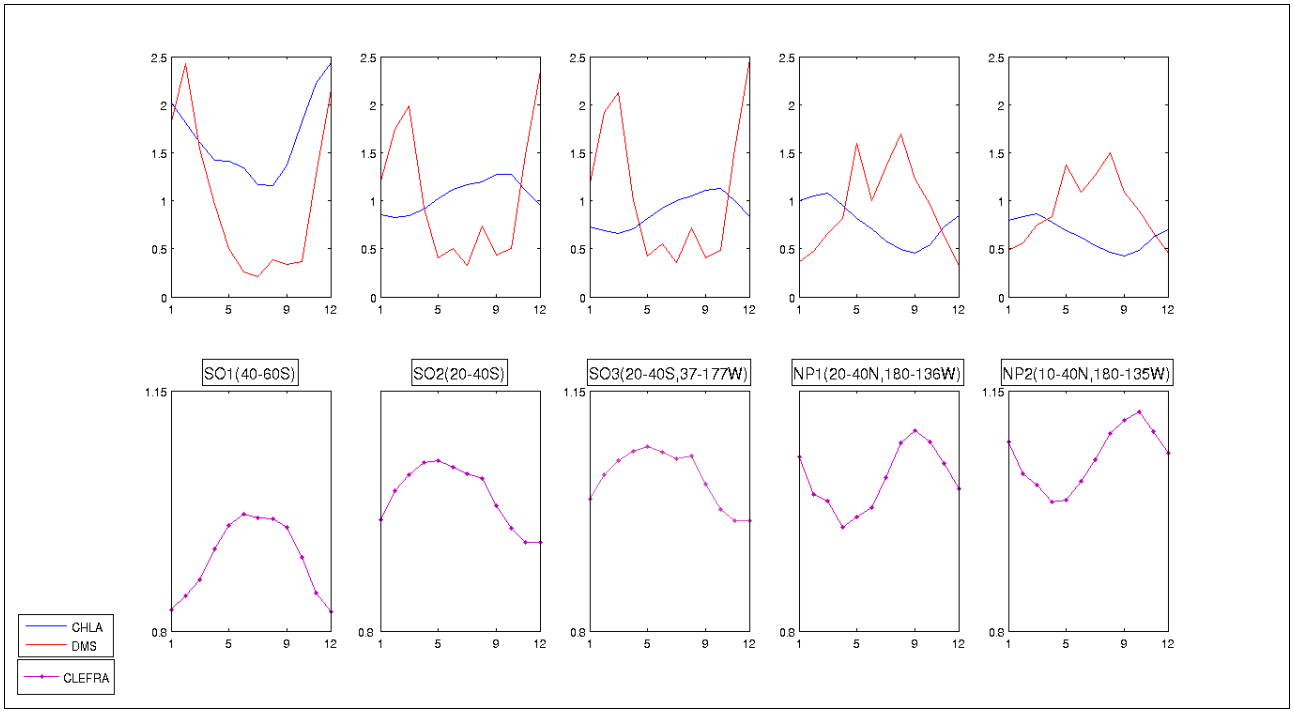
On the 2nd of May I arrived at the Laboratory for Global Marine and Atmospheric Chemistry, School of Environmental Sciences (UEA). This group's research covers a broad range of scientific issues with a common focus on the interactions between the atmospheric marine boundary layer and the upper layer of the ocean. My interest was to interact with the research group working on the air-sea exchange of a variety of trace gases that react in the atmosphere to form aerosols, because I am studying how biogenic aerosols contribute to cloud condensation nuclei and cloud albedo. I stayed with the Graduate Group, which gave me the opportunity to learn about their different projects and their PhDs subjects.

The first two days I was working under the direct advice of Dr. Sergio Vallina. He trained me on the use of a Matlab program made to compute the correlations between DMS and different satellite data. For this purpose we used DMS climatologies compelled and computed by Dr. A.J. Kettle, a researcher of the group. The program used during these days allows splitting the oceans in 15 regions. With the remote help of my PhD supervisor Dr. Rafel Simó, and that of Dr. Sergio Vallina, I computed the monthly variability of the Cloud Droplet Effective Radius (MODIS-Atmosphere product) and the chlorophyll-a concentration (SeaWiFS) for each region over the years 2002 to 2005. These time series were compared with the DMS climatology (Kettle & Andreae 2000).

The third day I attended a LGMAC seminar, “Atlantic meridional overturning circulation: heat engine or heat transport engine?”, by Dr. Remi Tailleux. A few days later I could also attend an informal seminar by Dr. Vallina, where the rest of the group discussed about the development and applicability of mechanistic DMS models, which was very insightful for my future research.

During the second week I was working with the ocean regions program, trying different data combinations in distinct regions. I put particular emphasis in regions where there is satellite evidence that the antropogenic influence is not very important and neighbor regions with distinct seasonal patterns. Some of the preliminary results are shown in Figs. 1 and 2.

Fig. 1. Monthly variability of Cloud Droplet Effective Radius (CLEFRA), Chlorophyll (CHLA), and DMS in the Southern and the Pacific Oceans.



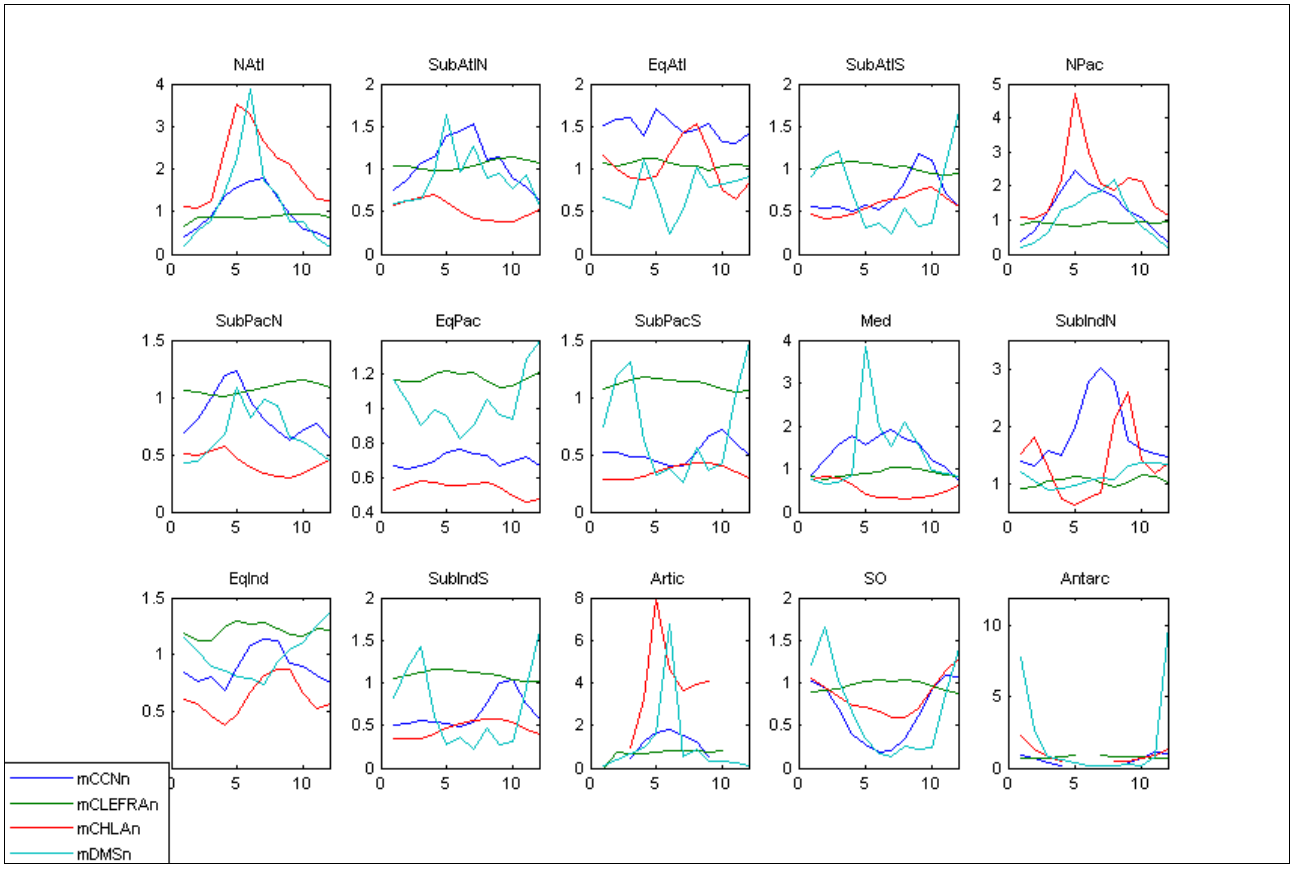


Fig. 2. Monthly variability of different data climatologies in different regions of the oceans.

mCCN: mean cloud condensation nuclei numbers

mCLEFRAn: mean cloud droplet effective radius

mCHLA: mean surface chlorophyll a concentration

mDMSn: mean surface DMS concentration