

On board Research Vessel *Meteor* in the equatorial North Atlantic, Sunday 7 October 2012

Dear all,

In the morning of Wednesday 4 October we left Las Palmas de Gran Canaria and set sail towards the South to the working area of Traffic. Traffic is the NWO (Dutch NSF) funded project that aims at monitoring and collecting Saharan dust along a transatlantic transect at 12°N. Along this transect we will deploy five moorings consisting of two sediment traps each and a fair number of other instruments including current meters, temperature- and salinity loggers, and instruments to measure the amount particles sinking towards the ocean floor.

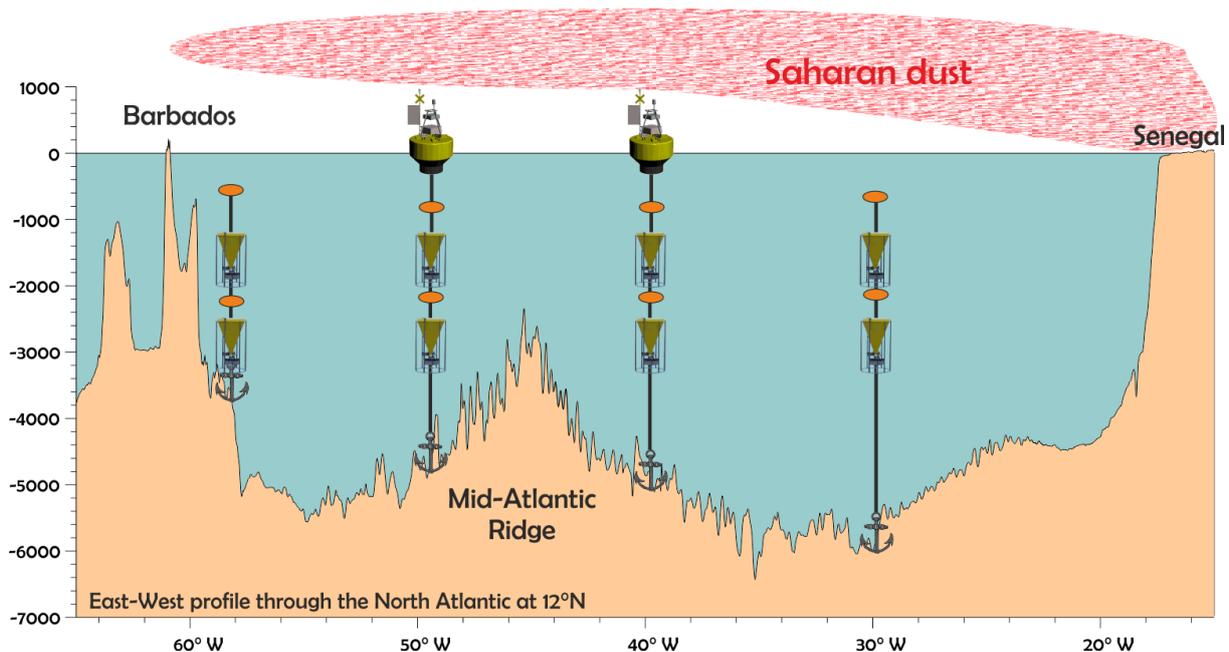


Figure 1) eventual layout of the Traffic Transatlantic array of sediment traps and dust-collecting buoys.

As Gran Canaria lies at about 28°N, we had about four days of transit time ahead of us. This gave us the time to unpack the container, prepare the labs, test the instruments, and prepare the first mooring.

On the early morning of Sunday 7 October we reached the easternmost station of the transect at 12°N/23°W where we first sailed a small multibeam- and parasound survey to get an impression of the seafloor topography. After that, we deployed a water sampler equipped with a CTD to measure the temperature and salinity of the ocean under the ship down to the sea floor at 5100 m. Thirdly, a multicorer was deployed to sample the sea floor, and finally, the first mooring was deployed.

For an idea of what our moorings look like, please have a look at Figure 1. Each mooring has sediment traps (yellow) at 1200 and 3500 m water depth, kept upright by big floats (orange). The sediment traps consist of a huge funnel, collecting anything sinking through the water column, which ends in a cup fixed to a carousel. This carousel contains 24 of these cups, and it rotates the cups underneath the funnel on a pre-programmed scheme. This way we'll not only continuously collect Saharan dust deposited on the ocean surface and sinking towards the sea floor, we'll also collect the remains of plankton and algae that live in the surface ocean and which also sink to the ocean floor. Next year, during the second cruise (of at least four) we hope to deploy two floating dust collectors, also shown on Figure 1. With these we can collect dust from the atmosphere on the same temporal resolution as the sediment traps in the water. This way, we can compare the nutrient composition of 'dry' dust travelling through the atmosphere, with 'wet' dust, sinking through the water column.

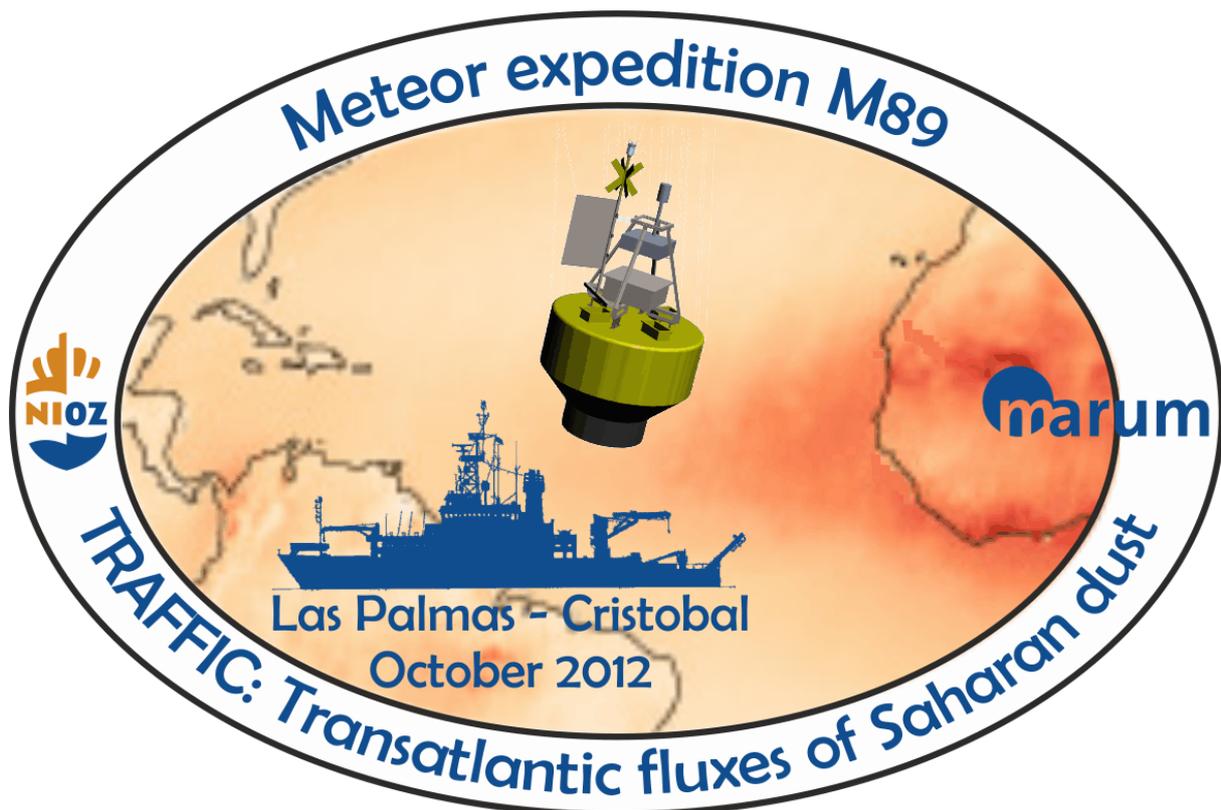
Why!?

The big hypothesis we'd like to test is: do Saharan dust outbreaks have a fertilising effect on the Atlantic Ocean? And if so, can dust fertilisation be used to sequester CO₂ from the atmosphere?

After three years and four cruises, we hope to have quantitative answers to these questions. For the moment we are recovering from a long but very successful first day on station, while already on our way to the second station. The smooth deployment of all instruments today is the result of a close-, very efficient-, and pleasant collaboration with officers and crew on board this great ship. In addition, we very much enjoy the fantastic hospitality of the support staff in the mess and pantry that spoils us with excellent food! Finally, we are very pleased to be in this warm part of the Atlantic where the ocean is calm with a temperature of 29°C, and the sun is shining bright.

For more info on our cruise, please have a look at www.stuut.tv/html/jbatsea.html The blog can be read both in Dutch and English. A German version will be made available on the MARUM website at: www.marum.de/Expeditions-Logbuecher.html

Many greetings to all of you from the Meteor in the equatorial North Atlantic!
On behalf of the ship's- and scientific crew,
Jan-Berend Stuut



On board Research Vessel *Meteor* in the equatorial North Atlantic, Sunday 14 October 2012

Dear all,

Almost two weeks have passed since we left Las Palmas and so far, things have been going really well! To start with, until today we have had really favourable winds, causing the ship to sail much faster than anticipated (up to 12.7 instead of 10.5 knots!), which provides a lot of slack in the program. Time and again we arrived much earlier at the stations than planned, giving us the opportunity to spend more time on mapping the different study areas using the vessel's multi-beam system and thus to locate the best spot to deploy the moorings.

In addition to coming from a favourable direction, the winds also carried a LOT of dust, which was completely unexpected as "the dust season" usually does not start until November/December. However, already on the 4th of October reports came from Mindelo, Cape Verde speaking of reduced visibility due to atmospheric dust. Later, a huge dust outbreak on the border of Mauritania and Western Sahara on 8 October made sure that the air around the ship was loaded with dust almost continuously for a week. This is really the best scenario we could have imagined, as the dust is obviously the main reason why we are here. With the two dust samplers that are located on the deck above the aerosol lab on top of *Meteor's* bridge, we have been able to collect a lot of material along the transect we are sailing. These samples provide us with the opportunity to already start studying downwind dispersal gradients in the dust, which is exactly the goal of our mooring transect. In addition, at mooring stations where we usually stay for about 12 hours, the ship is always orientated facing the wind so that at stations M2 and M3 we collected beautiful samples at single locations.

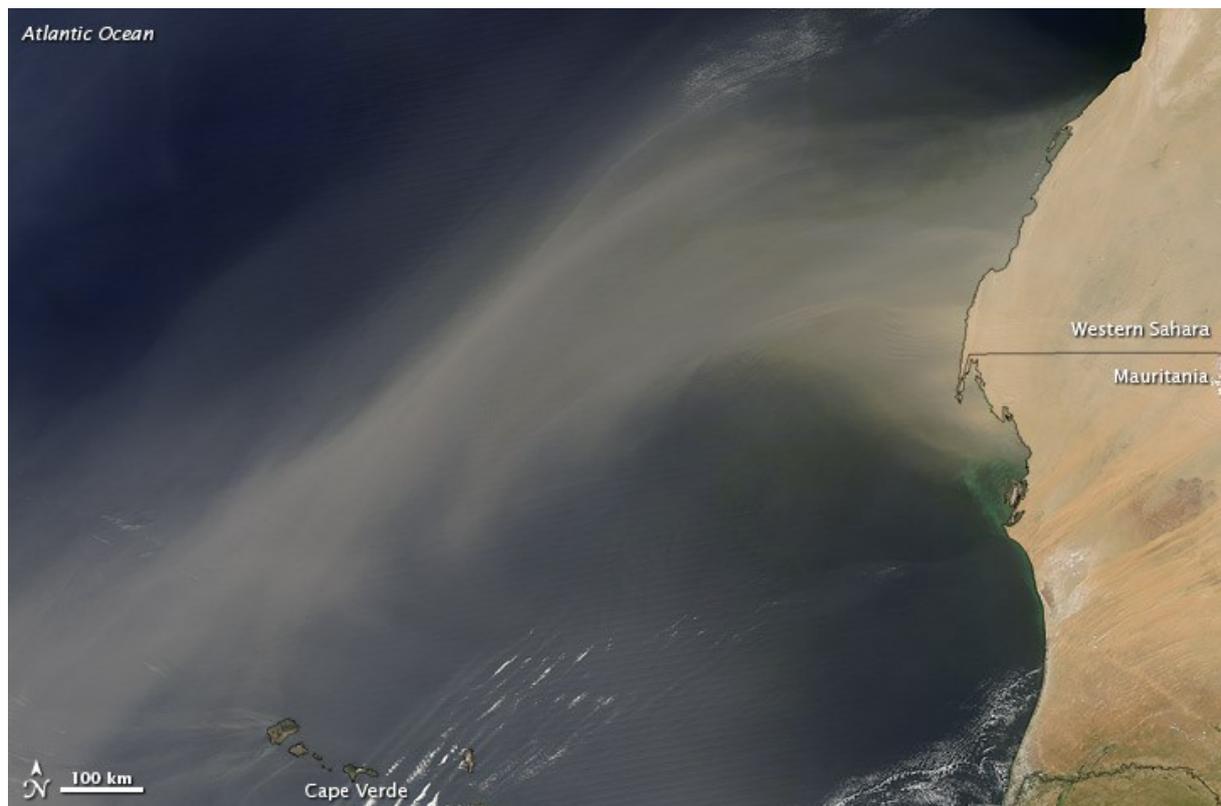


Figure 1) satellite image (courtesy of NASA's visibleearth website) showing how a huge amount of dust is entrained into the atmosphere and blow towards the West and Southwest, right in the direction where we were sailing. Our estimated position at this moment was just Southwest of the Cape Verdian islands.

The weather has been extremely nice as well and although the DWD (German Meteorological Survey) representatives warn us every day that rain showers may occur this close to the ITCZ (InterTropical Convergence Zone, the region where winds from northern and southern hemispheres meet), so far we have been enjoying the sun –minimally obscured by Saharan dust— and tropical temperatures most of the time. Also the two meteorology students from Hamburg are quite pleased with these favourable weather conditions; both cloud- and aerosol observations are going very well.

Further, the deployments of the three moorings and all the rest of the water- and sediment collections at the stations so far have been very successful. This is mostly the effect of the very pleasant working environment resulting from the very smooth collaboration between the scientific and ship's crew both on deck as well as on the bridge. A special remark should be made for station M3 where the mooring landed less than 10 meters from its intended position; an absolutely fabulous achievement given the water depth of about 5km!

The kitchen- and support staff keep treating us very well. As an example of how we are spoiled please have a look at this picture showing Yvo standing next to the buffet of fresh fruits and salads, and you will understand why he is looking so happy.



All the best to all of you from the Meteor in the equatorial North Atlantic!
On behalf of the ship's- and scientific crew,
Jan-Berend Stuut

For daily updates about our cruise, please have a look at www.stuut.tv/html/jbatsea.html The blog can be read both in Dutch and English. A German version is made available on the MARUM website at: www.marum.de/Expeditions-Logbuecher.html

On board Research Vessel *Meteor* in the Caribbean, Monday 22 October 2012

Dear all,

It is very hard to recall leaving Las Palmas, now almost three weeks ago; so many things have happened the last few weeks! In the previous weekly bulletin I reported on the successful deployments of stations M1 to M3, the following M4 and M5 were also very successful. Especially at station M4 we had some troubles finding a good spot for the multicore, but the good old “Bremer Recht” applied once more: the third attempt resulted in a nice catch of about 30cm sediments and a beautifully preserved sediment-water interface.

The last sediment sample taken with the multicore at station M5, located just inside the Exclusive Economic Zone (200 miles) of Barbados, was put on deck on Thursday 18 October at 5:00 UTC. With the help of Akio and Matthias –who discovered on board that they really appreciate “digging in the dirt”!– we sliced and sub-sampled the 35-cm cores while already setting sail towards Cristobal. Since last Friday we are hence in the Caribbean, sailing our transit towards Panama.

All in all we are very happy with the great success of this cruise: all five deployments went very smooth, we found good locations to drop the moorings and managed to position them really well. The collaboration between Yvo, Barry, and Bob and boatswain Peter and his team went smoother and smoother throughout the cruise leading to shorter and shorter deployment times.

Now that most of the scientific tasks have been fulfilled, there is a bit more room for other duties on board, such as practicing emergency situations. Last Tuesday we had an “abandon ship” exercise, meaning that everybody collects on deck carrying a life vest and wearing sun-protective clothing. The scientific crew was directed towards one of the life boats for a short instruction on how to act and behave in an emergency situation. The ship’s crew practiced a fire drill. We sure hope the *Meteor* will never have to put these rehearsals into practice but it is very good to see how well prepared everybody is.



The scientific crew prepared to enter the life boats. From left to right: Akio Hansen, Matthias Brück, Bob Koster, Jan-Berend Stuu, Yvo Witte, Michèle van der Does, Barry Boersen.

Although all around us tropical depressions develop into real tropical storms, we have been very lucky to sail right in between them. The two DWD meteorologists keep us well informed about the potential of these depressions and how they influence our weather. In the weblog about our cruise you’ll find a small animation of 3-hourly satellite images showing nicely the developments of tropical storms during our cruise.

Our cruise track took us very close to the Dutch Antilles; we saw the light house of Curaçao in the dark and now and then we get a glimpse of Colombia. During the last few weeks the horizon was mostly empty of life in all directions. Now it is clear that we are approaching the civilized world again by the amount of passing ships. Other signs of getting close to land again are the large amount of gannets that plummet into the water to catch (flying) fish.



On the horizon one can just see the northern shores of Colombia

As we are approaching Panama we have already started packing our instruments, cleaning the labs, and writing the reports. These are the last words I write to you as Fahrtleiter, please keep an eye on the weblog for further updates.

Last but not at all least I would like to thank Captain Michael Schneider and his excellent crew for a marvellous trip. We hope to be back soon!

All the best to all of you from the Meteor in the Caribbean!
On behalf of the ship's- and scientific crew,
Jan-Berend Stuut



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