

GEOTRACES Mediterranean Meeting 2

October 5th 2011 in LEGOS, Toulouse France

L.Coppola & C.Jeandel

1-NIOZ section (Micha Rijkenberg)

To cover the whole Mediterranean and the Black Sea, 50 days over 3 scientific legs are planned for the NIOZ cruise with the R/V Pelagia in the summer of 2013 (Figure 1). The first scientific leg between Cadiz and Istanbul will be the priority. The Pelagia can take 20 scientists onboard. The hyper-stations are not fixed yet and this could change depending on scientific questions, weather conditions and coordination with the planned UAB cruise. The cruise track may also change if they don't get the authorization to sample in the EEZ of certain countries. A list of parameters with potential names has been planned, but most of them as well as additional suggested scientists should be contacted. Involved scientists should have their dataset ready within a year after completion of the cruise.

At the moment, in situ pumps are not included onboard which may limit the sampling to the seawater collection only (with ultra-clean methods). However suspended particles from bottles may be collected from the ultraclean CTD. C.Jeandel suggested also measuring PO₄ concentrations by using the low-PO₄ method due to the very oligotrophic conditions in summer in the Mediterranean Sea (see the BOUM cruise and T.Moutin from LOPB Marseille).

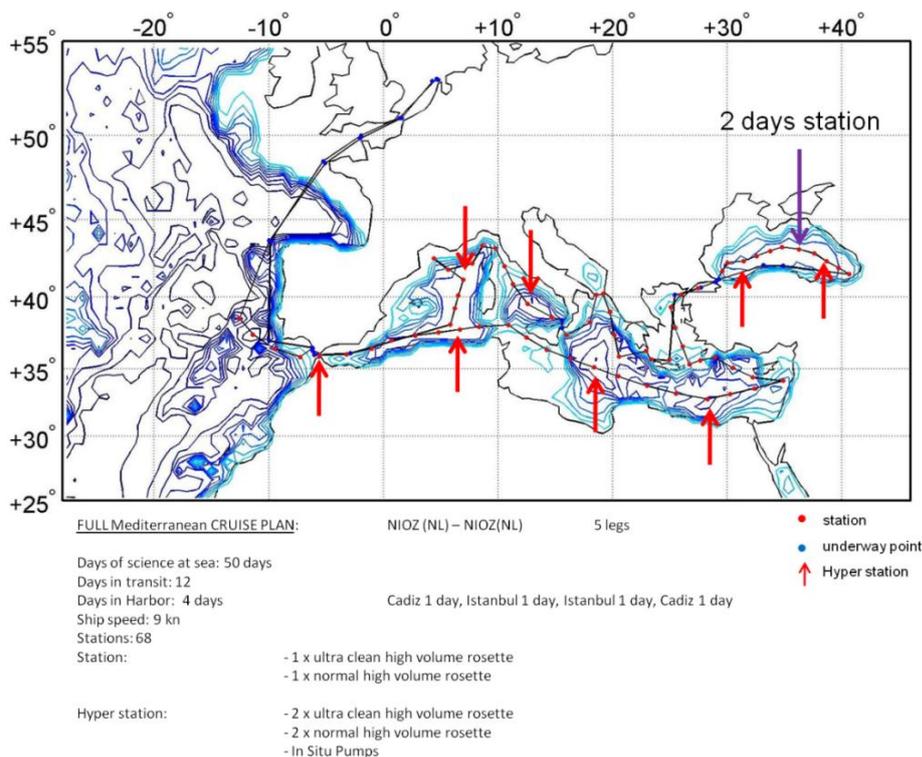


Figure1. Planned cruise track for R/V Pelagia in the Mediterranean and Black Sea for the summer 2013.

2-UAB section (Jordi Garcia-Orellana)

This section is planned through the EU project MedSea. The cruise (from W-E) is planned for spring 2013, before the NIOZ cruise. Large volume sampling is possible during this cruise as well as core parameters and Geotraces TEIs. The cruise is planned on 30 days with 2 legs including 24 stations. The expected vessels are Hesperides or Sarmiento de Gamboa (new).

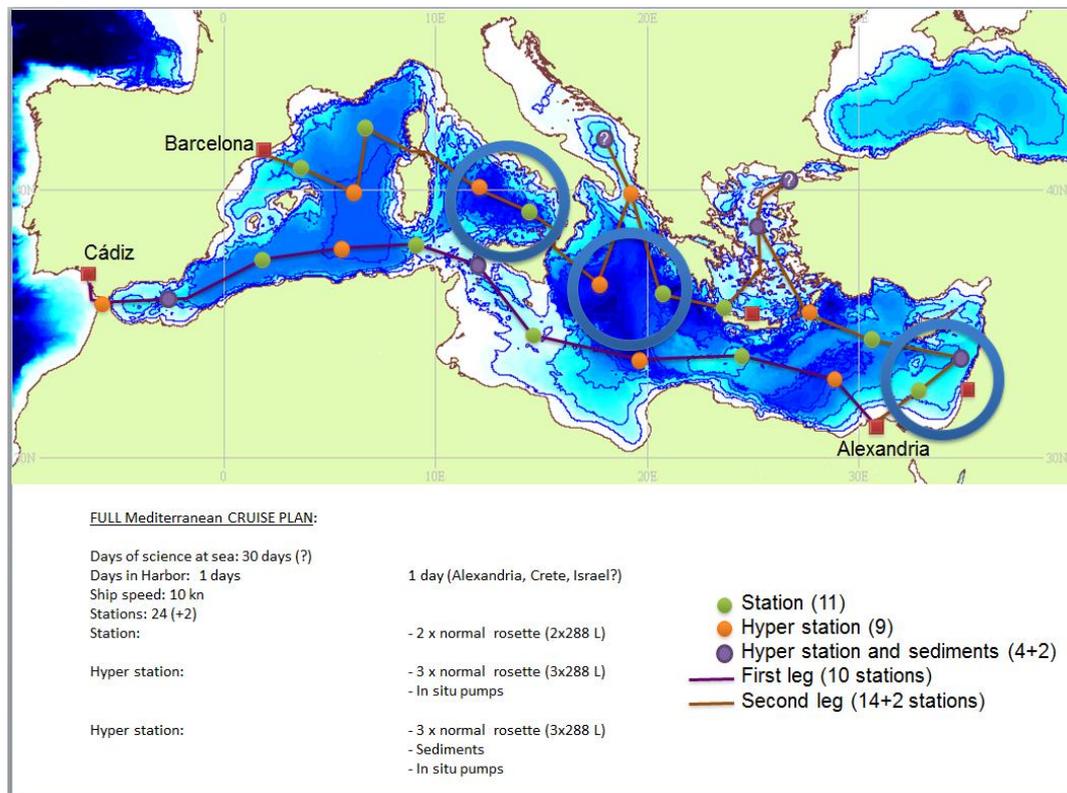


Figure 2. The planned UAB cruise for the spring 2013.

3- NW process studies (L.Coppola, C.Jeandel, MA Sicre)

L.Coppola presented the DeWex cruise planned in February and April 2013. The proposal involved the French MerMeX community (biogeochemical studies) with the aim to study the role of the deep offshore convection (in the center of the Gulf of Lion) on the biogeochemical budget and its impact on planktonic community. The MerMex project is supported by national funds (MISTRALS-CNRS/INSU). In addition to MerMex parameters, some radio-isotopes (short lived Ra isotopes and ^{7}Be) will be measured by P.Van Beek (LEGOS) to trace the deep water convection flux (^{7}Be) and water mass trajectories coming from the shelf (223 , 224 , 226 and ^{228}Ra).

C.Jeandel showed her project called CLION with the objective to study the weathered lithogenic material deposited along the coast, the processes that yield particle to dissolve transfer and its impact on the land-to-ocean fluxes (contaminants, bio-disponibility, bio-accumulation). This project plans to study specific geochemical and biological processes through particle reactors. Fluxes will be also constrained with aircraft or satellite observation and field studies (sgd, coastal fluxes).

MA Sicre presented the PaleoMex project (MISTRALS) which aims to study climate and environmental changes (SSTs, IWTs, DWTs, salinity, ventilation, pH, productivity changes, and anthropogenic) inputs from natural archives. Strategy is based on the field sampling (coring for corals, surficial sediments) for calibration and independent validation, routine measurements of DIC, alkalinity, pH during cruises, sediment trap time-series (eg. With Dyfamed and the French project COMET) and culture experiments, plankton tows for process studies. This can be planned on different legs or cruises, or two ships because of cleaning constrains. A better synergy with the permanent station parameters is also necessary. Links to modeling for improving calibration (RCMs)(Nd, Pa/Th, ^{14}C , He, river inputs,...) are also considered: river inputs (damming, Suez channel opening for the Nile,...) and paleo-dust measurements versus riverine inputs (Sr and Nd isotopes, Pb..).

A dedicated cruise is planned with R/V Urania in spring/summer 2012 in Ionian Sea, South Adriatic and Sicily Strait (Cofimed) to reconstruct the shallow, intermediate and bathyal Mediterranean water variability in the past through a novel geochemical approach. They intend to use a multi-proxy strategy that integrate an array of geochemical tracers (minor/trace elements, U/Th, ^{14}C , Nd and B isotopes) obtained from fossil coral skeletons and foraminifera shells retrieved from the same sediment cores. This exercise will enable to build absolutely dated records of paleo-temperature, salinity, pH and water mass circulation, providing a comprehensive interpretation of the Mediterranean climate evolution.

4- Process studies in the Adriatic Sea (F.Spanoli)

The Adriatic Sea is an area where the deep water formation (DWF) influences the local water circulation but also a large part of the Mediterranean Sea as well. The Po river inputs and this DWF influence the sedimentation fluxes especially in the southern Adriatic Sea where cascading events impact on the sediment transport. Adriatic and Ionian Seas are linked by the water mass circulation and in particular by the Bimodal Oscillating System (BIOS). Through GEOTRACES F.Spanoli proposed to characterize the surface and bottom incoming water versus the outcoming water (LIW vs. Atlantic water) in the Otranto Strait (Southern Adriatic). C.Jeandel suggested conducting dedicated process studies identical to those in the Gulf of Lion to study the shelf and river influence on sediments (paleo proxies).

5- Process studies in the Aegean Sea (E.Kaberi)

Two areas with DWF are present in the north and the south of the Aegean Sea with some cascading events in the south. Particle concentrations are higher in the north and ^{137}Cs measurements show higher concentrations in the deep waters after 1984 in the south and in the north and also in surface waters of South Aegean Sea. E.Kaberi proposed to study through GEOTRACES: the enrichments in TEI's observed in the North Aegean, the role of particles in the North Aegean Sea in uptake and regeneration of TE's and the extent of the deep water formation, taking place in the North Aegean, and its influences on the TEI distribution in the Cretan Sea and subsequently in the Eastern Mediterranean sea. A cruise is planned in 2013 through the EU project PERSEUS (carbon fluxes,

biological activity and contaminants) in the eastern part of the Mediterranean Sea with a Greek vessel (20 scientists) to perform such cruise.

6- Intercalibration procedures (G.Cutter)

Intercalibration is an active process between laboratories that includes all steps from sampling to analyses, with the goal of achieving the same accurate results regardless of the method or lab. As defined in the GEOTRACES Science Plan, intercalibration is an integral part of the program and in fact was the first phase before actual field work began. It includes both dissolved and particulate phases.

During all GEOTRACES cruises, it's important to use the GEOTRACES protocols (www.GEOTRACES.org) for accurate sample acquisition and handling with appropriate reference materials during analyses. This includes occupying 1-2 Baseline and/or Crossover (same station on a different cruise) stations during the cruise. Dyfamed station (Ligurian Sea) could be one of them for the Mediterranean sections. If Baseline or crossover stations cannot be occupied, at 2 stations and 3 depths per station, acquire replicate samples for distribution to various labs to evaluate sample storage and analytical accuracy.

The SAFe program (Ken Bruland) collected 500+ samples from the "deep" and surface N. Pacific Ocean for worldwide distribution to labs doing trace metal analyses. This has created consensus values for a suite of key GEOTRACES TEIs. They are not certified reference materials (CRMs). These are excellent for improving analytical accuracy, but do not evaluate sampling or handling. The Protocols suggest/demand that Intercalibration (e.g., SAFe) samples be analyzed regularly to assess accuracy (i.e., like the use of a CRM) but, there are no equivalent samples for radionuclides (for obvious reasons), particles (working on this), or large volume TEIs.

So far, the dissolved fraction have been well intercalibrated for different TEIs (Nd, Fe, Th, Pa, ...). Twenty six papers have been submitted to L&O: Methods for a special volume on intercalibration. For the particulate fraction, the ocean time series DYFAMED can be a good spot to collect a large quantity of particles by using onboard continuous centrifuge from AWI (ship visits are performed every month at the Dyfamed site). These particles could be used in the future for the GEOTRACES intercalibration procedures like the SAFe waters.

Discussions about the Mediterranean sections and process studies (L.Coppola/C.Jeandel)

Discussion point: the two large proposed sections

The NIOZ cruise is as good as confirmed. The R/V Pelagia will try to realize 3 legs: one will have the priority (the southern W-E spine of the Med Sea) and the 2 others are more uncertain, depending on budget constraints. To follow the intercalibration procedures, the cruise needs to stop at a baseline or crossover station (with the planned UAB cruise and/or with the US section on the Atlantic site of the Strait of Gibraltar during the transit from Texel to Cadiz) in order to perform intercalibration analyses (Dyfamed site should be included in one the leg). There are still some questions about the

legs in the eastern part. For example, an interest for the Nile margins has been shown but any stations have been planned in the NIOZ proposal as yet.

The issue of the countries authorization has been also evoked especially in this part of the world where political situation is sensitive. N.Zaaboub specified that for the Tunisia area, there will be no difficulty if Tunisian scientists are involved in the project. For the French NW area, L.Coppola added that the French Navy is delivering the authorization for the different zonex (http://www.dt.insu.cnrs.fr/flottille/cartes_marines.php). Laurent will be the contact to require the French authorizations.

All the key GEOTRACES parameters will be covered. The list of the potential scientists involved for the NIOZ cruise has been reviewed during the meeting and Micha will contact some of them to confirm or not their participation. For Th/Pa measurements, a good spatial resolution is needed. Only 5 labs in EU are able to do Pa measurements (difficulty to make a Pa spike). Particles collection is also needed and in situ pumps should be present onboard. So far, only seawater and suspended particles collection can be expected onboard. Micha will also consider the seawater volume necessary for each parameter in order to decide if all TEIs could be performed during the NIOZ legs. Others isotopes have been suggested to include on the list as Si isotopes (D.Cardinal) and B isotopes (LSCE).

The UAB cruise will realize a "tour" of the Mediterranean Sea with a larger resolution than the NIOZ cruise. Dyfamed site should be also included in one of the leg. If not, at least one station, identical than the NIOZ cruise, has to be included in order to follow the GEOTRACES intercalibration rules (see above). This cruise will be shared with biologists (MedSea community) and for TEIs mainly dedicated to radionuclides and very large volume. In situ pumps should be also included onboard. The French technical division from INSU (DT-INSU in Brest) possesses several McLane pumps available for the scientific community. If those pumps are required during the cruise, a dedicated technician will be also required to facilitate their deployment. The participant propose to prepare a draft of a Mediterranean project with Malta scientists, Elena will prepare the possibility of program preparation, Nouredine and other participant present an interest to this action.

Discussion point: Sediment-core

For the Mediterranean process studies, Italian, French and Greek will mainly propose land-to-ocean process studies in the Adriatic, Gulf of Lion and Aegean Sea respectively.

Most of the participants were interested in the sediment cores (Paolo, Eleni, Nouredine, Frederico). Zaaboub Nouredine proposes the extraction of core sediment in some stations. This position will be discussed with Micha and the entire group interested to sediment analysis. The analysis depends on core sediment fractions amount. Other potential scientists to have interest on them could be Kazuyo Tashikawa and François Lacan. Frederico Spagnoli would like to discuss with François Lacan about the possibility to analyse Fe isotopes in the sediments, because of strong recycling. Paolo Montagna is interested in proxy calibration. Frederico and Paolo to talk to each other.

Discussion point: Intercalibration procedures

Eleni Kaberi requested information on how to get the samples.

Greg Cutter detailed the process and explained that the details are also available on the GEOTRACES site:

To obtain any of the metal reference samples, contact Geoffrey Smith or Ken Bruland. There is no cost for the reference samples (but a Fed Ex, UPS or DHL account number must be provided to cover shipping costs). Results of trace metal concentrations from analyses of all these reference samples and the baseline profiles are reported to Ken Bruland.

He remarked that it's very easy to get the samples. The samples, however only cover a set of all parameters (metals).

For other parameters he recommended to look at the list of laboratories analyzing them and send several samples to them to analyse (duplicate).

What about particles? Greg explained the on-going discussions about it.

Several methods were also discussed. Greg mentioned that Christoph Quetel in Belgium is a good laboratory for this in Europe. Catherine suggested recommending Laurent Coppola to create a particle standard reference collected at Dyfamed site.

Discussion point: Process Study in the Adriatic Sea

Frederico Spagnoli intends to submit a Process Study with Urania (with Paolo Montagna). They will submit a proposal but cannot commit 100% at the moment, they need internal discussion first.

They believe that submitting the cruise under the GEOTRACES umbrella will reinforce the project.

They agree on including some stations to connect with other GEOTRACES cruises (R/V Pelagia).

Catherine explained that by undertaking a section you do not have the intercontinental impact that is very important in the Mediterranean, so it is necessary to complement the section by the process studies.

Discussion point: Contact persons

Catherine Jeandel requested participants to consider being the GEOTRACES contact person in his/her respective country. This is very important for the GEOTRACES International Project Office (IPO).

The following contact persons were agreed:

The Netherlands: Micha Rijkenberg

Spain: Jordi Garcia-Orellana

Tunisia: Nouredine Zaaboub

Italy: Paolo Montagna

Greece: Eleni Kaberi and Eleni Stathoupolou (on behalf of Michael Scoullou)

Elena will include all the participants in the GEOTRACES International mailing list. If necessary a GEOTRACES Mediterranean mailing list can also be set up. Elena also explained that there exists already a GEOTRACES website dedicated to the Mediterranean. The website is maintained by Laurent Coppola: <http://www.cybaes.org/gtmed/index.html>

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