THROUGHFLOW ITN Midterm Training Report

December 2011

THROUGHFLOW includes several mechanisms for providing training in research, transferable and complementary skills based on a combination of local specialist training and network-wide training activities. Local Training within each participating institution and external institutions covers specialist skills required by each ESR as they complete the reserch training projects described in the *Research Report*. Institutional training is be supplemented with a series of six NetworkTraining Activities (NTAs). NTAs 1 through 4 are complete and summarised below, two NTAs are planned for 2012. Each NTA includes a complementary and transferrable skills training component in addition to training programmes provided for ESRs at their host institutions Finally, in March 2013 we will host an international symposium on the geological, environmental, and biotic history of SE Asia will be held that will provide venues for ESRs to obtain broad overview of current research topics in the region as well as encouraging the development of professional networks between the ESRs and experts from industry and academia in specialist research areas.

Summary of Network Training Activities (NTAs)

NTA-1. An introduction to the Geology of SE Asia

Royal Holloway University of London, UK

July 5-10, 2010 (Month 7)

Theoretical Training the ESRs were introduced to the regional tectonic setting of Southeast Asia, including the definition of key tectonic units, an introduction to the structural geology, a brief stratigraphic outline, and the distribution of main facies in key basins. The content was provided by Prof. Robert Hall of the RHUL Southeast Asia Research Group, a well-known expert in most aspects of the Geology of SE Asia.

Applied Training/Complementary/Transferable Skills "*Geographical Information Systems and the visualisation of spatial data in the Earth Sciences*". ESRs had a brief introduction to the use of GIS systems using ArcGIS.

NTA-2. High-resolution Chronostratigraphy in clastic and carbonate settings

Indonesian Geological Agency, Bandung

November 15-December 18, 2010 (Months 11-12)

Theoretical Training ESRs and external participants joined a short course taught by THROUGHFLOW staff. Topics covered introduction to stratigraphy, including modules on lithostratigraphy, biostratigraphy, and sequence stratigraphy. Brief workshops were also organized on field methods, logistics, and the geology of the field study area. The introduction to the geology of the area was presented by Irfan Cibaj of Total Indonesia, a petroleum geoscientist working in the local industry and expert in the local geology and stratigraphy. In addition, all ESRs presented their planned research training projects.

Complementary/Transferable Skills "*Live from the field- communicating science to wider audiences*": The effective and meaningful communication of science beyond academic peers is imperative. Members of the NHM and NCB staff led a 1/2-day workshop to provide ESRs experience with public engagement. Project blogs were established on the public websites of the Natural History Museum, London and NCB Naturalis and all ESRs were encouraged to contribute at least one blog entry during the NTA.

Field Training During the field training component of NTA-2, the ESRs gained practical experience in advanced field techniques appropriate to their area of specialty. Specific

objectives include measuring and describing the study sections, collection and proper documentation of samples, and the curation of material. We established a project field bases near Samarinda and Bontang, East Kalimantan. In ESRS, core staff, and external partners were deployed as small teams to work on local rock exposures. ESRs gained training appropriate to their existing expertise and development needs in all aspects of field sedimentary geology. At the end of each day, the project team met to discuss the day's progress and update plans for ongoing work. Overall, the ESRs worked on 65 sections and collected 1490 samples. All this material was shipped back to Europe and will be the basis for ESR research training projects.

Highlight ESRs with little previous geological experience measured their first stratigraphic sections in which we located rich fossil bearing sediments.

NTA-3. Bioinformatics and geoinformatics: new approaches to integrating research data using the world wide web.

Natural History Museum, London

February 28- March 4, 2011 (Month 14-15)

Theoretical and Applied Training Advances in information sciences and the wide availability of networked computers have caused a revolution in the management, integration, and analysis of large volumes of diverse data in the Earth and Life Sciences. The main objective of the workshop was to bring together all data resulting from research training activities into a single repository to share within the network during the course of the project and then to allow dissemination of project data and results to the wider research community at the close of the project. To achieve this, our project website (www.ipaeg.org/throughflow) is based on the scratchpad software produced by project Vibrant (www.vbrant.eu) for the use of virtual research communities. Vibrant team members were on hand to assist the ESRs with issues arising as information was compiled. We worked together on geospatial data, stratigraphic sections, images, and specimen-based data to develop standard protocols that will be applied during the coming years. We also took advantage of the meeting to undertake some planning for the NTA-4 field training activities including an overview presentation of the regional stratigraphy of East Kalimantan by Visiting Scientist Robert Morley, and a presentation of preliminary stratigraphic results from NTA-2 by Willem Renema. All ESRs presented progress reports on their work. We were joined by Prof. Fauzie Hasibuan and Rahkmat Fachruddin from the Indonesian Geological Agency and continued discussion of how to establish closer ties between their institutions and the THROUGHFLOW ITN.

Complementary/Transferable Skills *"IPR policies and practices for research scientists"*. Dr. Vince Smith, a cybertaxonomist at the NHM and project coordinator of Vibrant led a discussion on the role of IPR management in biodiversity research.

Highlight NTA-3 ESRs set up the project website to keep track of the THROUGHFLOW data.

NTA-4. Palaeoecology, geological analysis, and the interpretation of past environments

June 12-July 17, 2011 (Month 18-19)

Indonesian Geological Agency, Bandung

Theoretical Training A one-week long workshop was lead by THROUGHFLOW team members emphasizing the interpretation of palaeoenvironments in clastic and carbonate rocks from the perspective of both lithofacies and ichnofacies, through sedimentological study and biofacies, using a combination of marine and terrestrially derived microfossils (foraminifera, nannofossils, pollen, spores, algal palynomorphs). The biofacies part of the

course placed particular emphasis on the benefits of understanding modern faunal and floral ecology and biogeography in interpreting biofacies data in terms of past environments.

Complementary/Transferable Skills *"Life on the other side: Opportunities and pitfalls for research careers in the petroleum industry"*. The complementary and transferable skills component for NTA-4 was concerned with careers for geoscientists in the petroleum industry, and we were fortunate to be invited for a visit to the Core Laboratories offices in Jakarta. CoreLab is a leading provider of services to the petroleum industry and we were able to meet with their biostratigraphic and sediment processing teams and learn more about working in the petroleum industry.

Applied Training Applied training was provided through field-based resarch in the Kutei Basin, East Kalimantan. We visited many of the same sections studied during NTA-2 as well as newly discovered exposures. The exposed units contain numerous well-preserved fossils, and some classic publications on coral, mollusc, echinoid, and larger benthic foraminifera faunas are based on material from this region. All these studies were based on limited sample sets collected during pioneering geological mapping of the area because of the hydrocarbon potential of the area. Late Oligocene reorganization of plate boundaries resulted in uplift in central Kalimantan and the deposition of large sets of prograding deltaic sediments in the Kutei basin. Framework reefs also deposited in the distal part of this deltaic system, and very similar environments are thus available for study from the proximal to distal part of the basin. Oligocene sections are available in the Balikpapan area and on the Mankalihat peninsula, while Early Miocene to Late Miocene sections, deposited in a variety of environments were studied to the north of Samarinda and into the Sangkuliran Bay. As it was done in NTA-2, training was provided within a set of small teams, with team membership based on the past experience, research programme and training needs of the ESRs. 2071 samples were collected from 126 outcrops, and all material shipped back to Europe to provide material for research training projects. Each ESR presented a progress report summarising fresh results of their research activities.

Highlight ESRs learned how to measure and apply environmental proxies in geological sections.

Upcoming Network Training Activities

NTA-5. Palaeoceanographic proxies and biogeochemical modelling

Christian-Albrechts University Kiel, Germany

June 24-29, 2012 (Month 29)

ESRs will receive a short lecture series on the use of palaeoceanographic proxies and an introduction to biogeochemical modelling. The goal of the workshop will be to introduce the fundamentals of palaeoceanographic proxies and biogeochemical modelling. In addition, the ESRs will join a Baltic Sea Cruise on the R/V Littorina including an introduction to oceanographic sampling methods such as box core and multiple core sampling of marine sediments in the Kiel Bight and in-situ oxygen measurements. Initial sample preparation will be completed onboard the research vessel, followed by post-cruise laboratory training including sampling techniques of marine cores, non-invasive core analysis (X-Ray, magnetic susceptibility, colour scanning), sample processing, micropalaeontological analyses (microscopy), and data analysis (calculation of accumulation rates, multivariate statistics). Complementary/Transferable skills component will be *"Marine Resources and Risks: the development, implementation, and assessment of global and regional ocean management options*" run by the Kiel Excellence Cluster “Future Ocean”.

NTA-6. Sedimentology, biostratigraphy, and palaeoecology at a seismic scale

University of Granada, Spain

October 2012 (Month 32)

ESRs will receive training on sequence stratigraphy in the well-exposed deposits of southern Spain. Sequence stratigraphy offers the best theoretical framework to integrate data and interpretations from different fields into a single scheme of temporal-spatial relationships of sedimentary rocks. Signals from regional to global scale can be decoded to understand the spatiotemporal distribution of local depositional environments and correlate these signals among different areas in the world. The Neogene Almeria basins in southern Spain provide one of the world's finest 'natural laboratories' for the study of sedimentation at a seismic scale. Exposures of Upper Miocene carbonates allow any sampling/observation site to be placed in a sequence-stratigraphic framework and original 3D physical gradients such as palaeodepth. Sealevel changes observed in shallow water reefs can be correlated with palaeoceanographic signals (temperature and in a lesser degree productivity) at the Milankovich time scale. The complementary/transferable skills component will be *"Geotourism: Sustainable tourism activities focused on geoheritage"*.

Local Training for Each ESR

Emanuela Di Martino, Natural History Museum, London UK

Training received at local institution

- Palaeontological field techniques with my supervisor Dr. P. D. Taylor during fieldwork atScarborough (Yorkshire), 18-26 March 2011..
- Taxonomy of fossil bryozoans, through the examination of some NHM collections from Malaysian Borneo, with my supervisor Dr. P. D. Taylor.
- Palaeoenvironmental significance of bryozoans and application of MART (Mean Annual Range Temperature) method, with my supervisor Dr. P. D. Taylor and participation in a seminar held at Imperial College by Dr. Tanya Chong.
- Laboratory techniques, including how to process different types of samples and cleaning methods.
- Introduction to SEM (Scanning Electron Microscope), with Alex Ball.
- Workshop on “The art of writing a successful scientific paper”
- Workshop on “Scientific illustration”
- Workshop on “Planning for publication”

Complementary and transferable skills training

- English course held at Imperial College.

Future training

- Workshops offered by the Post Graduate Department at the Natural History Museum, including a workshop in “Digital Image Manipulation” and a workshop titled “Thinking about Statistics”.

Nicholas Fraser, Christian-Albrechts-University, Kiel, German

Training received at local institution

- Laboratory techniques, including: (1) preparing samples for stable isotope analysis, (2) preparing and measuring samples using MC-ICPMS (Multicollector-Inductively Coupled Plasma Mass Spectrometer) techniques for Mg/Ca ratios, (3) scanning cores for XRF (X-Ray Fluorescence) analysis, and (4) preparing and measuring samples for organic chemistry, specifically $U^{k'}_{37}$ analysis.
- Micropalaeontological techniques, focused on the identification of key foraminiferal taxa and their importance in different geochemical methods. This has been undertaken by training with supervisors, as well as participation in a Master's course focused on collection and identification of foraminifera from the North Sea.
- Short course in time series analysis and the use of associated software (Analyserie).
- Techniques used aboard research vessel RV Sonne, taking cores from the Makassar strait, including (1) deployment and recovery of water samples, multi-cores and piston cores using appropriate equipment, and (2) processing of cores, including sampling, core descriptions, magnetic susceptibility and spectrophotometry techniques.
- Geological field techniques, such as stratigraphic logging and sampling of outcrops.

Complementary and transferable skills training

- I have improved my German language skills by attending twice-weekly classes held at a local language institution.
- Presentation skills: presentations both at Network Training Activities in the Throughflow Project, and in Kiel.
- Public outreach: training received in how to write a blog as part of NTA2, and application of this in producing blog entries for the Natural History Museum whilst undertaking fieldwork.

Future training

- Aim to attend several courses offered by the Integrated Ocean Sciences department in Kiel, including a course in scientific writing, a course in statistical methods (specifically using the computer program R) and a course in giving presentations.
- During the Summer of 2012, I will act as a mentor to an intern student and oversee a small project, gaining skills in teaching and leadership.

Amanda Frigola Boix, University of Bremen, Germany

Training received at local institution

I took part in the following courses organized by the Graduate School in Marine Sciences GLOMAR:

- Introductory course to Marine Sciences: Physical Oceanography and Climate (February 28-March 4, 2011). Lecturers: Dr. Torsten Bickert, Prof. Dr. Reiner Schlitzer, Dr. Thomas Felis, Dr. Dagmar Kieke, Dr. Stefan Mulitza, Dr. Jürgen Pätzold, Dr. Andre Paul, Dr. Jan-Berend Stuut.
- Introduction to statistical methods in Geosciences (August 22-25, 2011). Lecturer: Dr. Maria José Ruiz Chancho.

Additionally, I received training from my supervisors in the use of:

- The comprehensive global climate model CCSM3 ("Community Climate System Model version 3").
- The parallel supercomputer system at the HLRN ("Norddeutscher Verbund für Hoch- und Höchstleistungsrechnen") supercomputing center.
- Linux shell scripting languages.
- NCL ("NCAR Command Language") and Ferret, two interpreted programming languages for access, analysis, and visualization of climatic data.

Complementary and transferable skills training

I attended the following soft skills courses organized by GLOMAR:

- Scientific writing for natural scientists (4-6 April, 2011). Lecturer: Dr. Rebecca Rendle-Bühring.
- Presentation skills course (20-21 June, 2011). Lecturer: Sabine Lerch.

Future training

I will participate in the following courses organized by GLOMAR:

- An introduction to the data library PANGAEA & to the access to GeoB material (31 January, 2012). Lecturers: Dr. Jürgen Pätzold, Dr. Hans-Joachim Wallrabe-Adams, Lydia Gerullis.
- Introductory Course to Social Sciences in the Marine Realm (19-23 November, 2012). Lecturers: Prof. Dr. Michael Flitner, Prof. Dr. Ingo Heidbrink, Prof. Dr. Sabine Schlacke, Prof. Dr. Achim Schlüter.

Furthermore, I will visit foreign institutions to learn new techniques directly related to my project:

- The first research stay will be a two-month stay at the "EarthByte group" (University of Sidney). There I will create bathymetric and topographic data for 30 and 20 Ma.
- The second stay will be a one-month stay at the "Laboratoire de Physique des Oceans" (University of Brest). The aim of this residence will be tracing potential dispersal patterns of marine organisms in the Indonesian region using the computational tool *Ariane*.

Note: both these stays need further confirmation.

Elena Lo Giudice Cappelli, Christian-Albrechts-University, Kiel, Germany

Training received at local institution

At the very beginning of my PhD, my supervisors and colleagues taught me new techniques to sample sediment cores and collect the samples for my work. Next, I have learnt how to pick foraminifera and prepare the foraminiferal samples for geochemical analysis. In particular, I have been shown how to use an ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometry) for Mg/Ca paleothermometry. Additionally, I attended three workshops and I participated in one cruise:

- XRF core scanning workshop, NIOZ (Texel, Netherlands).. Back in Kiel, I applied what I learnt and used the XRF core-scanning machine in our laboratory.
- 3rd Biannual Symposium FUTURE OCEAN, Kiel (Germany).

- Marine Climate Research Workshop, Otto-Bagge-Kolleg, Sehlendorf (Germany).I met other PhD students, post-docs and researchers and had discussions about data andpapers and exchanged feedback about presentations.
- 25 July-16 August 2011 Oceanographic cruise "MAJA" on board the R/V Sonne to Makassar-Singapore. During the cruise sediment and water samples were collected at 32 stations along the Makassar Strait, Indonesia.

Complementary and transferrable skills training

In January I attended a course offered by Kiel University about German culture. It was a nice experience to see how foreign students react to the so-called "cultural sock". In March I started learning German and I'm still attending the course. I participate in weekly meetings with other PhD students where we present our research to each other improving our presentations skills and our capacity to deal with different scientific topics. I'm attending "Wattkurs" at the Kiel University. It's a course about foraminifera populations living in the Baltic and North Sea and it will give me a better knowledge of the local foraminiferal fauna. Also, I have applied for the RISE project (*http://www.daad.de/rise/de/)* to have a master student working with me next summer.

Future training

I'm planning to attend two courses offered by Kiel University, including (1) Writing a scientific publication, and (2) academic presentations.

Nathan Marshall, Utrecht University, The Netherlands

Training received at local institution

Since joining the paleomagnetic research team at Utrecht University I have advanced my training as a field geologist and stratigrapher and have been trained in many new skills related to magnetostratigraphy. In the field I have learned techniques related with taking samples for magnetic studies and biostratigraphy. Also, through working in a large group of earth scientists I have learned good teamwork skills and group logistics. In Utrecht, I have attended lectures and have participated in several seminars covering the theoretical background in geophysics and uses of magnetic minerals in earth sciences, Earth's magnetic field and the measure minute magnetic fields. I also have been taught lab techniques related to paleomagnetic studies including sample preparation and use of the lab equipment for determining magnetic mineralogy, magnetic susceptibility and magnetic vector analysis. Finally, I have been trained in the interpretation of paleomagnetic samples using specialty computer software in order to pick out multiple events in a sample's magnetic history.

Complementary and transferrable skills training

Working as a team within a diverse group of geologic and biologic expertise from both academia and industry has been a growing experience in organizing and relating various specialties to an overall project and both relying on and helping others. Furthermore, working with people from different countries has also been a great experience in bridging differing schools of thought on the same subject and different temperaments..

Future training

In 2012 I plan on visiting Royal Holloway University to be trained in analysis of geologic samples for Strontium dating. I will also have the opportunity to work with both masters students and undergraduates on side projects related to my work, that will both aid my research and provide a valuable experience for me to guide a student through a small research project.

Overall, the training I have/will receive on this project will be indispensable on paper and in person to either a career in academia or industry. Regardless of whether I will work in the US or Europe, this project has opened the door to collaboration with no boundaries.

Vibor Novak, NCB Naturalis, Leiden, The Netherlands

Training received at local institution

- usage of UNIPREC TOG G 700 cutting machine, NCB Naturalis.
- usage of multifocus microscope camera software (Leica), NCB Naturalis.
- CT scan introduction, NCB Naturalis.

Future training

- March 2012 - Course on preparation of isolated specimens of LBF (Istanbul, Turkey)
- April 2012 - WOLF, Larger benthic foraminifera atlas preparation (Wien, Austria)
- April 2012 - EGU (Wien, Austria)
- June 2012 - International School on Foraminifera, (Urbino, Italy)
- July 2012 - Sr isotope analysis techniques, RHUL, (London, UK)

Sonja Reich, NCB Naturalis, the Netherlands

Training received at local institution

Guided studies of molluscan species have highly improved my skills of species identification. I have learned the use of the Leica M 65 C photo-microscope and the additional software Leica Application Suite to take stacked photographs of small specimens. I have been introduced in the basics of collection management and learned how to organize own collections of specimens (e.g. storage and correct labeling). I have a more extensive knowledge of techniques of sample treatment (e.g. washing, sieving, application of the right technique on different samples). I have acquired basic knowledge of the use of statistical methods in palaeobiology (e.g. biodiversity indices, rarefaction) including the use of the program PAST (PAlaeontological STatistics). Additionally, I have a better understanding of sedimentary environments and taphonomy by guidance in the field.

Complementary and transferrable skills training

My English skills improve by daily use, oral presentations, and writing of scientific texts. I have achieved a basic knowledge of the Dutch language by attending a language course. My scientific writing skills have improved by writing several abstracts under supervision. I have good command on the use of Adobe Photoshop and Adobe Illustrator by editing photographs, production of photo plates, and design of scientific posters. My presentation skills have improved due to several presentations on NTAs, conferences, and meetings. In addition, the ability of taking part in scientific discussions is trained by informal paper discussion meetings. Also, I have learned the use of the program SedLog.

Future training

I will attend a workshop on the use of statistical methods in paleontology. Training on the use of the SEM (Scanning Electron Microscope) will be provided in the next months. Training in writing of proposals will be provided by attending a workshop. During the next year I may have the opportunity to co-supervise a master student. Furthermore, I will participate in the

training on species identification of one of our counterparts from Indonesia.The improvement of my knowledge of geochemical and isotope systems is expected due to a planned cooperation in this field.

Anja Roesler, University of Granada, Spain

Training received at local institution and other institutions

I have received intensive training in Coralline algae taxonomy, general topics of geology and sedimentology, paleoecology of coral reefs, taphonomy and field methods from my supervisor Juan Carlos Braga and colleagues. My supervisor of the Genetics department Francisco Perfectti and his colleagues introduced me to genetic laboratory techniques like DNA extraction, amplification of specific genetic markers by PCR, DNA purification, the use of the computer programme "geneious" to analyze the obtained sequences and prepare them for the use in phylogenetics and last but not least the acquisition of laboratory material.

In the seminar "Young Researchers" I gave a talk of 25 minutes in February 2011 about my PhD thesis and related topics; it is a weekly seminar of PhD Students in Biology. I have also taken part in a weekly journal club of evolutionary biology where we discuss recent scientific publications of high interest.

Complementary and transferable skills training

As I am German and work in Spain I learned to express myself in spoken and written Spanish, including giving scientific presentations in this language. For the successful collection of living material of coralline algae I learned scuba diving and obtained the Open Water certification (PADI).. Also, I am improving my communication skills (in English and in general) in my role as the ESR representative of the second year of our contract.

Training provided to others

Under the umbrella of the yearly-celebrated science week of science in the Faculty of Science in Granada I gave a talk to high school students about the history of life.

Future training

In the coming year I will take part in other public outreach events in schools, I will learn techniques for Scanning Electron Microscopy, how to write scientific publication and reactivate my fourth language Russian.

Nadiezhda Santodomingo, Natural History Museum, London, UK

Training received at local institution and other institutions

- In addition to the NTA's training workshops, I have received training at the Natural History Museum, directly related to my research topic:
- Geological field techniques for coral collections, by Ken Johnson.
- Curation of fossil coral specimens for the museum, by Jill Darrell and Ken Johnson
- Scanning Electron Microscope (SEM) training sessions, by Alex Ball. Emma lab.
- Techniques for cutting and polishing rocks (corals), by Ken Johnson & Palaeontology conservation Unit.
- Improvement of my current skills on coral taxonomy by examination of fossil coral types, in collaboration with the Geology Department, Naturalis Museum.

Complementary and transferable skills training

I have improved my skills on presentations, public outreach, scientific communication, and planning and project management through the following additional courses:

- InDesign 1 bespoke. Natural History Museum. 30-Sep-10
- Personal Development Plans. Posgraduate Office, Natural History Museum. 14-Oct-2010.
- Effective Communication Skills. Human Resources Department, Natural History Museum. 19-Oct- 2010
- E-resources training Library, Natural History Museum.
- Project Management 26-Jan-2011
- History of the NHM, Rules and Regulations, and Pest Control Management. Natural History Museum. 9-Mar-2011
- Writing Scientific Papers. Posgraduate Office, Natural History Museum. 9-Feb-2011
- French Intermediate Level. Imperial College & Posgraduate Office, NHM. 19-Oct-2011to 14-Mar-2011
- Multiple presentations and interaction with the general public at the Natural History Museum, in events such as Science Uncovered (FP7,NHM), Biodiversity Day, and Nature Live, among others. Guided visits to the Palaeontology Department to explain the aims and main results of the Throughflow project.
- Writing a blog, for the IPAEG web-site and Nature Live.

Training given to others

I am part of two different initiatives to train volunteers and a Master student on different aspects such as the taxonomy, ecology, collection, and curation of Scleractinian corals:

- V-factor: Training of volunteers in fossil process techniques, including public engagement activities. Coordinated by Ali Thomas (Human Resources Volunteers, NHM). I am a research leader together with Lindsey Douglas. Planning started on 1-May-11. Recruitment of volunteer leader took place in September 2011. From 20 January to 30 March 2012, we will develop an open weekly training of fossil specimens curation at the Specimen Preparation Area (SPA) in the Darwin Center of the NHM.
- Training on identification of macro- and micromorphological characters of scleratinian corals to the MRes Student Lisa-Marie Braun (Imperial College & NHM. From the 30 Oct 2011 to 30 Jan 2012.

Future training

Some additional training is planned for the next year:

- Microstructural Characters of Scleractinian corals under the guidance of Prof. Ann Budd, University of Iowa
- Acropora identification with Dr. Carden Wallace, Museum of Tropical Queensland (MTQ), Australia.
- Examination of fossil coral collections in Queensland (MTQ, and University of Queensland), Australia.
- Examination of fossil coral types at Naturalis Museum, The Netherlands.

Viola Warter, Royal Holloway University of London, UK

Training received at my local institution

1 week course at Earth Science Department at Royal Holloway University of London: "Analytical Methods Training for Trace Element and Isotope Geochemistry" This course involved lectures and hands-on experience, including data handling practical classes and the use of laboratory equipment. Key focus of the course was to show how to produce quality assured data. It was aimed primarily at early stage PhD students and delivered by internationally renowned geochemical analytical scientists. The Training course included:

- Solution analysis by Quadrupole ICP-MS (Nathalie Grassineau);
- Principles of XRF for rock analysis (Matthew Thirlwall)
- Introduction to radiogenic isotope geochemistry and principles of TIMS analysis (Matthew Thirlwall)
- Principles of Multicollector TIMS and Multi-Collector (MC)- ICP-MS (Matthew Thirlwall)
- In-situ elemental and isotopic analysis by laser ablation (MC)- ICP-MS (Wolfgang Müller)
- Oxygen isotope analysis by laser fluorination (Dave Lowry);
- Stable isotope analysis of carbonates (Dave Lowry)

Additionally, detailed introduction on an individual basis concerning:

- Sample preparation (e.g. sawing, polishing) and analytical technique of LA-ICP-MS
- Sample preparation (e.g. handrill, computer-operated micromill device) and analytical technique of XRD on carbonates, with the focus to distinguish between calcite and aragonite
- Sample preparation (e.g. acid digestion, column-chromatography, isotope dilution, filament preparation) and analytical technique of TIMS

Complementary and transferable skills training

- Presentation given:
    - "Preliminary results of $^{87}Sr/^{86}Sr$ analysis from corals and molluscs, East Kalimantan, Indonesia"
    - (04.10.2011: Throughflow Meeting at University of Utrecht, Netherlands: Origins of the South East Asian Marine Biodiversity Maximum)
    - "Overview of Preliminary Results ($^{87}Sr/^{86}Sr$, Trace Element Analysis, XRD), Outlook on Upcoming Analysis and Intended Aims - Critical look on the Major Obstacle: Diagenesis"
    - (26.11.2011: ESR Meeting at University of Granada, Spain)
- Participation at "Science Uncovered" at Natural History Museum, London (23.09.11)
- Generic skill courses attended: "Using Microsoft Word for producing your thesis, "Teaching Skills for Demonstrators", and "Managing your Research"

Training provided to others

- Demonstrator for undergraduates in the Geochemistry class of Dr. W. Müller (at least 2.5 hours per week)
- UCAS-Lab facilities presentation

Upcoming Training

- Generic skill courses: “Writing the doctoral thesis”, “Poster presentation”, “Communicating your research”
- Individual Training for working with the SEM (at NHM) and stable isotope analysis
- Further demonstrating
- In the course of collaboration – supervision of 3 other ESR of the Throughflow projects in regards to TIMS, XRD and Stable Isotope analysis (including sample preparation an analytical technique) at the lab-facilities of the Earth Sciences Department
- Attending further conferences and actively presenting at conferences