

*Project Circular*

# THROUGHFLOW

Cenozoic evolution of the Indonesian Throughflow and the origins of Indo-Pacific marine biodiversity: Mapping the biotic response to environmental change

*A Marie Curie Initial Training Network*

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For more information, see <http://ipaeg.org/throughflow>

Opportunities for 11 Early Stage Researchers

**Application deadline 30 March 2010**



## Project Overview

Coral reefs and associated shallow-water habitats support the most diverse and productive marine ecosystems on Earth and are of enormous socio-economic value. However, coral reef systems are under increasing threat from a range of natural and man-made disturbances, and determining the response of marine ecosystems to anthropogenic environmental change is a critical research priority for both Life and Earth Scientists. Ecologists studying modern reefs are faced with the dilemma that they have no baseline data to model the impact of predicted environmental change. However, some useful baseline information is available in fossil record. Environmental change is a pervasive part of earth history, and modern reef-building corals have survived repeated and varied episodes of past environmental change. Documenting the ancient dynamics is essential to the understanding of tropical ecosystems and requires a large-scale interdisciplinary approach.

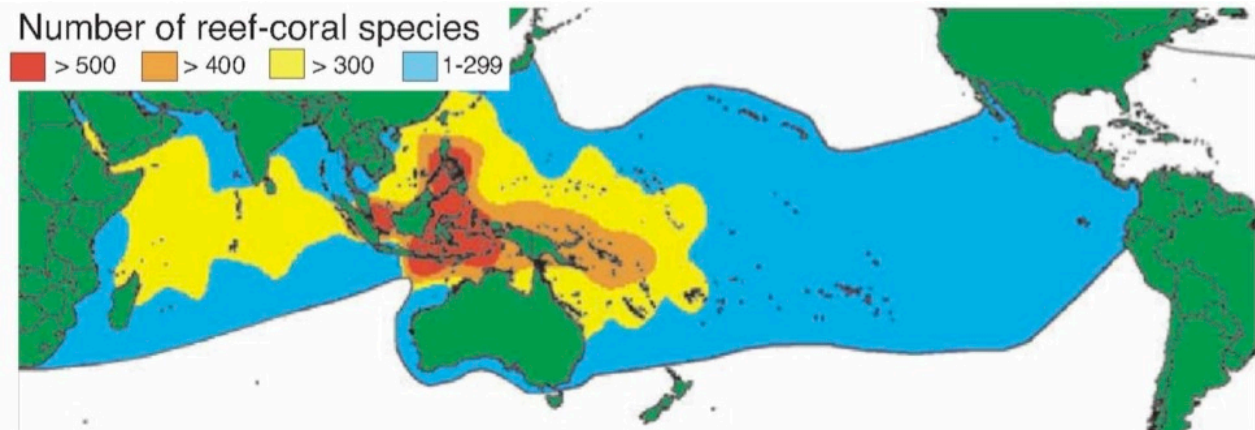


Figure 1. Contours of species diversity of reef-corals in the Indo-Pacific. Limited data suggest that the diversity of most other marine groups follow a similar pattern (Bellwood *et al.* 2005).

SE Asia contains the most diverse terrestrial and shallow marine biota on Earth, yet the factors responsible for the origins and maintenance of this diverse biota remain unknown. Molecular phylogenetic studies suggest that most extant taxa evolved during the Miocene. However, the fossil evidence currently available to document this pattern and its geographic context is sparse, and primarily consists of small collections of fossils and publications from the late nineteenth and early twentieth centuries. The existing data demand taxonomic and stratigraphic revision to accommodate advances in these fields over the past century, but most importantly there is a crucial need to collect new data.

SE Asia contains the modern-day Indonesian Throughflow (ITF). The ITF is the last remaining equatorial oceanic gateway, allowing heat transfer as water flows from the Pacific into the Indian Ocean, and is a major influence on global climate. The long-term history of the ITF is controlled by the complex plate tectonic history of the region. Throughout the Cenozoic era, SE Asia has been characterized by convergence of the Indo-Australian and Philippine-Pacific Plates with the stable Asian Craton, and at around the Oligocene-Miocene transition (~25 Ma) the Australian Plate impacted on the Philippine Sea Plate resulting in restrict deep throughflow and initial constriction of the ITF

Is it a coincidence that the most diverse biota on earth occurs in a geologically dynamic region that also contains a major control of the global climate? There is evidence that these phenomena are related via long-term changes in coral reef ecosystems in the region. Previous studies suggest that three important changes occurred near the Oligocene-Miocene transition in SE Asia (1) constriction of deep-water flow through the ITF, (2) onset of extensive regional coral reef development, and (3) formation of the ancestral centre of diversity by increased speciation or immigration. The overall aim of the THROUGHFLOW research programme is to determine the precise relationship among these three events using a multidisciplinary approach.

## THROUGHFLOW

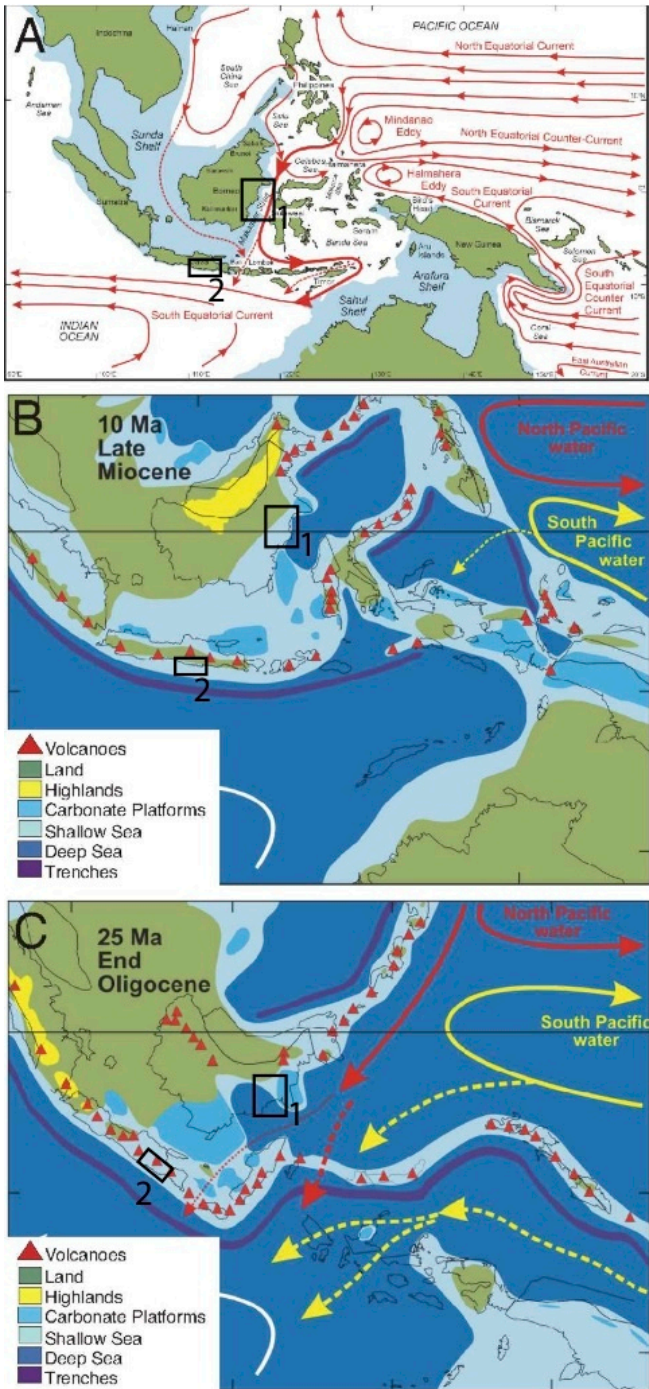


Figure 2. (A) Recent geography of Southeast Asia showing main ocean currents, including the highly constricted flow along the ITF. (B) and (C) show reconstructed palaeogeography and position of ITF during the Late Miocene (B) and Late Oligocene (C) modified from Hall (2002). The positions of

### Project Objectives

The scientific objective of THROUGHFLOW is to reconstruct the biological and environmental history of shallow marine habitats of a part of southeast Asia. This region includes the most diverse extant marine biota in the world as well as the Indonesian Throughflow (ITF) - the sole tropical ocean gateway and a significant influence on global climate. However, the origins of this biodiversity 'hotspot', and the significance of the ITF as a control on regional diversity remain to be fully understood. As a novel association of earth and life scientists from academic institutions and industry, THROUGHFLOW will be able to complete a multidisciplinary study of key sections in Central Java and Eastern Kalimantan that will integrate data from geology, geochemistry, ocean modelling, and paleontology to understand the Neogene history of the region. This work will require the development of a new integrated methodology for collecting, analyzing, and synthesizing the disparate range of information needed to document the geological record of environmental and biotic change in coral reefs and other highly diverse tropical marine ecosystems. Besides reconstructing the history of diversity in the region, we aim to improve awareness in the broad scientific and general community of the value of ancient biotic response to environmental change to aid the prediction of outcomes of ongoing anthropogenic global environmental change on coral reefs and associated ecosystems.

The training objective of THROUGHFLOW is to combine leading researchers with unique experiences of field and laboratory research on the geology, stratigraphy, and paleontology of SE Asia with experts in global change research to provide a unique training experience for eleven early stage researchers (ESR) in field, laboratory, and transferable skills combining the highest level of specialist skills development with the ability to work productively in a multi-disciplinary environment, as is increasingly essential to pursue high-level careers in industry

or academia. The ultimate aim is to provide a cohort of European researchers with a strong professional network that will allow Europe to take the lead in studies of the geologic history of diverse tropical ecosystems.

### **Participating Organizations**

1. Natural History Museum, London, United Kingdom (coordinator)
2. Christian-Albrechts-Universität zu Kiel, Institute of Geoscience, Germany
3. Nationaal Natuurhistorisch Museum Naturalis, Netherlands
4. Royal Holloway University of London, Department of Earth Sciences, United Kingdom
5. Universität Bremen, Department of Geosciences, Germany
6. Universidad de Granada, Departamento de Estratigrafía y Paleontología, Spain
7. Universiteit Utrecht, Paleomagnetic Laboratory "Fort Hoofddijk", Netherlands

### **Associated Institutions**

1. Curtin University of Technology, Department of Applied Geology, Australia
2. Palynova, Ltd., UK
3. Pusat Survei Geologi, Indonesia
4. Smithsonian Tropical Research Institution, Panama
5. University of Queensland, Centre for Marine Studies, Australia

**We seek highly qualified candidates for eleven Early Stage Researchers (ESRs)** within THROUGHFLOW. These projects are described in the following pages, applicants should contact host institutions for more information regarding particular posts and for application information. To be considered, all candidates must meet mobility and recruitment requirements imposed by Marie Curie Actions. Citizens and residents of non-EU countries are encouraged to apply as long as they meet these requirements. We especially encourage applications from women researchers.

### **Fellowships**

1. Environmental impact of the Cenozoic history of the Indonesian Throughflow: High-resolution environmental proxies of microsampled corals and foraminifera (London, UK).
2. Shallow marine palaeoenvironments and the evolution of the Indonesian Throughflow (Granada, Spain).
3. Neogene circulation patterns and biogeography of foraminifera in SE Asia (Kiel, Germany).
4. Impact of changes in the ITF on global climate evolution – a modelling approach (Bremen University, Germany)
5. Building a chronostratigraphic framework for key Cenozoic sections in Java and Eastern Kalimantan (Utrecht, Netherlands).
6. Inter- and intra specific variation in large benthic foraminifera and biostratigraphy of Cenozoic of SE Asia (Leiden, Netherlands).
7. The Oligocene/Miocene transition on SE Asian coral reef ecosystems (London, UK).
8. Cenozoic history of bryozoan diversity in the Indo-West Pacific (London, UK).
9. The origins and evolution of the modern Pacific reef algal flora (Granada, Spain).
10. 25 Million years of diversity and taxonomic turnover of mollusks in SE Asia (Leiden, Netherlands)
11. Quaternary history of the Makassar Strait: A base-line for Cenozoic reconstructions (Kiel, Germany).

### **Compensation**

As defined by the Marie Curie Actions, Early Stage Researchers will receive generous living and mobility allowances (these depend on the location of the host institution and the family situation of the ESR), an annual travel allowance and one-time career exploratory allowance. Funding is available for research expenses and to allow participation in all network activities

### **Eligibility and Mobility Requirements**

ESRs are defined within the Marie Curie Actions as those who are, at the time of selection by the host institution, in the first four years (full-time equivalent) of their research careers. This is measured from the date when they obtained the degree which would formally entitle them to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the research training is provided, irrespective of whether or not a doctorate is envisaged.

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Eligible candidates are normally required to move from one country to another when taking up their appointment. Two general rules apply:

- Researchers can be nationals of any country other than the country of the premises of the host organisation where they will carry out their project; however nationals of countries outside the EU and Associated States can only be recruited by hosts that are located in Member States or Associated States.
- Researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of the host for more than 12 months in the 3 years immediately prior to their recruitment. This rule does not apply in cases where a researcher is subsequently appointed in another node of the same network within the same country.

For more information about these criteria, please consult the [2008 Framework 7 People Work Programme](#)

### ***Application Deadline 30 March 2010***

For more information regarding THROUGHFLOW, go to our website (<http://ipaeg.org/throughflow>) or contact us at [tflowitn@gmail.com](mailto:tflowitn@gmail.com)



**Natural History Museum London (NHM)** is the premier biodiversity research institute in the UK, with more than 350 scientists and curators researching and caring for over 70,000,000 specimens.

**NHM invites applications for Two Early Stage Researchers (ESRs)** in biodiversity of reef corals and bryozoans as part of the Throughflow Marie Curie Initial Training Network.

**ESR 1:** *The Oligocene/Miocene transition on SE Asian coral reef ecosystems.* The aim is to document in detail the distribution and abundance of reef coral species to determine the rate and mode of biodiversity change in reef-coral communities across the Oligocene-Miocene transition in the region (Lead Supervisor: Kenneth G. Johnson).

**ESR 2:** *Cenozoic history of bryozoan diversity in the Indo-West Pacific.* Almost nothing is known about the fossil bryozoans from the Cenozoic of the IWP although they are occasionally recorded in the literature. This project will pioneer the study of Cenozoic bryozoans, adding these colonial animals to the range of organisms from which biotic responses to changing environments through time can be assessed (Lead Supervisor: Paul D. Taylor).

The SE Asian region today contains the global centre of maximum diversity of shallow marine invertebrates, yet the fossil record of this diversity remains poorly documented. The fellows will work with existing museum collections as well as extensive new collections obtained during two field seasons in Indonesia. The majority of the fossil biota of the region remains to be described, so the Fellows will have the opportunity to perform taxonomic research required to describe the distribution of biota across sampled sections. The Resulting compilation of taxon occurrences will be analyzed using quantitative methods and integrated into biodiversity informatics networks for extinct and extant marine invertebrates. The fellows will have the opportunity to collaborate with ESRs pursuing parallel studies on the biodiversity of molluscs (NNM) and calcareous algae (UG).

**Compensation:** Salary, allowances, and benefits as defined within the Marie Curie programme, including £26,022 per annum plus benefits.

**Selection Criteria:** The successful candidates will have experience of geological or biological fieldwork, proven ability to perform independent scientific research and in particular relating to biodiversity or paleobiodiversity. Previous experience working with natural history collections and demonstrated ability to work as part of a team. The successful candidates should have a command of spoken and written English, strong quantitative and computing skills, and demonstrated ability to present scientific information to specialist and more general audiences.

**Eligibility and Mobility Requirements of Marie Curie Actions apply.**

**Application:** For a full job description and to apply online go to <http://www.nhm.ac.uk/jobs> and search for jobs in Palaeontology.

**Application deadline:** 30 March 2010.

**Contact:** For more information, see <http://ipaeg.org/throughflow> or contact Gill Sandford at [g.sandford@nhm.ac.uk](mailto:g.sandford@nhm.ac.uk) or +44-207-942-5302

The **Nationaal Natuurhistorisch Museum Naturalis** is a leading national institute carrying out research and education in all aspects of natural history. Naturalis cares for some of the world's largest natural history collections from Southeast Asia.

Naturalis invites applications for **2 Early-stage Researchers (ESR)** in stratigraphy and paleoecology

The fellowships are sponsored by the 7th Framework Programme of the European Community as part of the Marie Curie Initial Training Network "THROUGHFLOW". The ESR fellows will join the geology department in Naturalis.

**ESR 1** will (1) Quantify the changes in large benthic foraminifera (LBF) assemblage composition with time, and (2) produce a detailed map of external and internal morphospace occupied by LBF. Secondary goals, in cooperation with other projects, will be to place these in a highly resolved chronostratigraphic and environmental framework.

**ESR 2** will study the development of and turnover in shallow marine mollusk communities during the Oligocene and Neogene in order to understand the emergence of modern communities. The palaeocommunities include mangrove, estuarine as well as seagrass faunas. The research is taxonomy and taphonomy based and includes multivariate numerical approaches.

**Compensation:** Salary, allowances, and benefits as defined within the Marie Curie programme.

**Eligibility and Mobility Requirements of Marie Curie Actions apply.**

**Application:** Submit by mail a letter of interest, their curriculum vitae, and the name, address, email and telephone number of two referee.

**Application deadline:** 30 March 2010.

**Contact:** Dr. Willem Renema, Nationaal Natuurhistorisch Museum.Naturalis, PO Box 9517, 2300RA Leiden, the Netherlands. [Renema@naturalis.nl](mailto:Renema@naturalis.nl)

## THROUGHFLOW



The Department of Earth Sciences at Royal Holloway University of London (RHUL) is internationally-renowned for the quality of both its teaching and research, and was ranked equal 6<sup>th</sup> in the most recent UK-wide Research Assessment Exercise (RAE 2008).

The Department of Earth Sciences at Royal Holloway University invites applicants for a:

- Research Assistant in Palaeoclimatology/Palaeoceanography/Geochemistry for 3 years as an early stage Researcher (ESR) at the PhD student level.
- Salary £35,381 or £38,526 (dependant on mobility allowance - £436 per month without family or £699 per month with family) per annum plus travel allowance. These costs include employer's national insurance and superannuation costs as applicable.

The fellowship is part of the Marie Curie Initial Training Network "THROUGHFLOW", funded by the 7<sup>th</sup> Framework Programme of the European Community (<http://ipaeg.org/throughflow>).

The research project at RHUL will focus on extracting reliable palaeoclimate / palaeoceanographic proxy data using (isotope) geochemical techniques. Specifically, well-preserved molluscs, corals and foraminifera - sampled in close collaboration with the Natural History Museum (NHM, London) and the Nationaal Natuurhistorisch Museum Naturalis (NNM, Leiden) - will be utilized to reconstruct past sea-surface temperatures (SST), sea-surface salinity (SSS), variations in riverine runoff, or palaeo-pH. Using high-spatial resolution sampling via laser-ablation mass spectrometric analysis (LA-ICPMS), the time-series contained in corals, mollusks or foraminifera can be extracted at very high-time resolution, thus providing seasonality of key palaeoceanographic parameters. Examples include combined Sr/Ca ratio and oxygen isotope records from coral time series to disentangle effects of SST and rainfall, or Mg/Ca ratios of single foraminiferal chambers to constrain the temperatures of either top or bottom ocean waters (planktonic or benthic foraminifera).

Training in analytical techniques will be provided via our regular PG training course in geochemistry and via individual project-specific training sessions. Furthermore, RHUL Earth Sciences run a tailored PG induction programme for each year's new PhD student cohort.

The successful candidate will have a sound background in (isotope) geochemistry and palaeontology, experience with geological or biological fieldwork, ideally previous experience with in-situ analytical techniques such as LA-ICPMS and demonstrated ability to work as part of a team. The successful candidate should have a command of spoken and written English, strong quantitative and computing skills, and demonstrated ability to present scientific information to specialist and more general audiences.

**Eligibility:** following the EU recruitment and mobility regulations you are eligible to apply for the Research Assistant at the Department of Earth Sciences at Royal Holloway University if;

- You are a UK national and have legally resided and had your main activity outside the UK and the EU (i.e. in a non-associated third country) for at least 3 of the last 4 years immediately prior to your appointment;
- You are not a UK national and have not resided or carried out your main activity in the UK for more than 12 months in the 3 years immediately prior to their appointment (short stays as holidays are not taken into account);
- You hold a Master degree in a relevant field and are in the first 4 years (full-time equivalent) of your research career, including the period of research training, starting at the date of obtaining the degree which formally entitles you to enter a doctorate;

**Contact:** Informal inquiries can also be directed to Dr Wolfgang Müller [w.muller@es.rhul.ac.uk](mailto:w.muller@es.rhul.ac.uk)

**Applications:** Further details and an application form are available from our website <http://rhul.ac.uk/personnel/jobvacancies.htm> or contact Human Resources on 01784 414241 Email: [recruitment@rhul.ac.uk](mailto:recruitment@rhul.ac.uk). Please submit you application form to this email address.

**Application deadline:** 30 March 2010.

We positively welcome applications from all sections of the community

## THROUGHFLOW



Bremen University (UB) is a world leader in the fields of marine geosciences, marine biology, marine chemistry, and physical oceanography. The closely networked research fields of marine, climate, and polar investigation represent the largest topic in natural sciences in Bremen.

**One ESR position is available at UB** within the Throughflow Marie Curie Initial Training Network.

The ESR will explore the influence of tectonic changes (e.g., Australian Plate drift, closure of the Tethys Seaway) on the Indonesian Throughflow (ITF) by means of climate modelling. The role of ITF changes in shaping the global ocean circulation and its influence on climate will be studied using the comprehensive Community Climate System Model, version 3 (CCSM3). To this end, the climate model will be set up with paleogeographic configurations based on plate tectonic reconstructions for Oligocene-Miocene time slices.

The ESR will be trained in physically-based climate modelling and scientific computing in a parallel supercomputing environment as well as statistical analysis of large (model-generated) data sets. The project will be performed in close cooperation with the University of Kiel.

**Selection criteria:** Applicants should have a Diploma or M.Sc. in physical oceanography, meteorology, geosciences, physics or a related discipline. Experience in numerical modeling and scientific computing (UNIX/LINUX, FORTRAN) is helpful. The successful candidate will have strong capabilities in team work, is fluent in English and has a disposition to publish results in internationally relevant journals.

**Eligibility and Mobility Requirements of Marie Curie Actions apply.**

**Application:** Complete applications will include a CV, a statement of research interests and accomplishments, and names/addresses of two referees (all combined within a single PDF document).

**Application Deadline: March 30, 2010**

**Contact:** Dr. Matthias Prange ([mprange@marum.de](mailto:mprange@marum.de)) or Prof. Michael Schulz ([mschulz@marum.de](mailto:mschulz@marum.de)) at the University of Bremen, Germany.

As the University of Bremen intends to increase the proportion of female employees in science, women are particularly encouraged to apply.

In case of equal personal aptitudes and qualification, disabled persons will be given priority.



**The University of Granada (UG)** is a major centre for postgraduates in Spain, which attracts students from all over the world. The Departamento de Estratigrafía y Paleontología (Department of Stratigraphy and Palaeontology) is one of the 3 departments of Earth Sciences at UG. The Department maintains active research programs in stratigraphy, palaeontology, sedimentology and isotope geochemistry and offers laboratory and computational facilities for research in these areas.

**Positions are available at UG for 2 Early Stage Researchers (ESRs).**

**ESR 1: The origins and evolution of the modern Indo-Pacific reef algal flora.** The aim is to document the timing and patterns of the diversification of Indo-Pacific reef-building coralline algae, the second most important builders in modern Indo-Pacific reefs, which appeared in Oligocene-Miocene times in the IWP area. The work includes to study published literature and existing collections of fossil calcareous algae; to perform field work in Java and Kalimantan, including collecting new material from study sections; to prepare and identify collections using a working taxonomic framework, including a project biodiversity database; and to compare palaeodiversity from Indonesia with extant diversity from the region and with fossil faunas from outside of SE Asia. The UG offers taxonomic training in fossil and modern calcareous algae, including preparation and curation techniques, quantitative morphology, and analytical palaeoecology.

**ESR 2: Shallow marine palaeoenvironments and the ITF.** This project focuses on shallow-water non-reefal carbonate palaeoenvironments during the Oligocene-Miocene transition and their response to the initial constriction of the ITF reducing deep-water circulation. The work includes the study of published literature on the Paleogene and Neogene geology of the Indo-West Pacific region; to perform field work on Cenozoic sections in Java and Kalimantan, including lithostratigraphy and facies recognition, identification of major fossil components and taphonomic analyses in selected sections; analyses of sedimentological, geochemical, and paleontological data to interpret ancient environments and to understand the spatial and temporal evolution of shallow water palaeoenvironments in the area directly related to the ITF. The UG, in collaboration with NNM and CU, offers training in quantitative taphonomic and palaeoecological analysis with a focus on environmentally-informative taxonomic groups and field and laboratory training in analysis and interpretation of sedimentology of shallow water carbonates.

**Compensation:** Salary, allowances, and benefits as defined within the Marie Curie programme.

**Qualifications:** Applicants will have a degree in Earth Sciences, Biology, or Environmental Sciences. A MSc (or similar) degree in any of these or related disciplines will be a significant plus. Applications will be evaluated with particular attention to the quality of previous education. A statement of purpose and letters of recommendation are required.

**Eligibility and Mobility Requirements of Marie Curie Actions apply.**

**Application Deadline: March 30, 2010**

**Further information:** Prof. Juan C. Braga, Departamento de Estratigrafía y Paleontología Universidad de Granada, Campus Fuentenueva s/n, 18002, Granada, Spain, [jbraga@ugr.es](mailto:jbraga@ugr.es)

## THROUGHFLOW



The Faculty of Geosciences at Utrecht University offers a wide spectrum of education and research concerning the geosphere, biosphere, hydrosphere, atmosphere and antroposphere. The Faculty is committed to interdisciplinary and cross-institutional collaboration, and plays a key role in the Dutch national research school structure. In the Netherlands, the Faculty is the largest institute in its field, and has received the highest rating in international assessments of geosciences in the Netherlands.

The Utrecht University Department of Earth Sciences **invites applications for one Early Stage Researcher (ESR)** to join the Marie Curie Initial Training Network "THROUGHFLOW".

The ESR will work on the construction of a chronostratigraphic framework for the Oligocene-Miocene successions of SE Asia by applying integrated stratigraphic dating techniques such as magnetostratigraphy, radiometric dating and isotope stratigraphy.

**Qualifications:** We are seeking for promising motivated students with solid scientific, laboratory and fieldwork skills – and a relevant degree – in areas of (bio)geology, geophysics, paleomagnetism, stratigraphy, palaeontology, sedimentology, or stable isotope geochemistry. The candidates we are looking for, like to be abroad for fieldwork in Indonesia. The successful candidates will work in association with a multidisciplinary international working group and should therefore preferably have significant social skills and must show significant interest to act in an integrated multi-disciplinary team.

**Eligibility and Mobility Requirements of Marie Curie Actions apply.**

**Application:** Applicants submit by mail a letter of interest, their curriculum vitae, and the name, address, e-mail and telephone number of two referees.

**Application Deadline: March 30, 2010**

**Contact:** Dr. Wout Krijgsman, Paleomagnetic Laboratory "Fort Hoofddijk", Utrecht University, Dept. Of Earth Sciences, 3584 CD Utrecht, The Netherlands. E-mail: [krijgsma@geo.uu.nl](mailto:krijgsma@geo.uu.nl) or Dr. Willem Renema, Nationaal Natuurhistorisch Museum Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands. E-mail [Renema@naturalis.nl](mailto:Renema@naturalis.nl)