

**Contact Person / Applicant:**

*Prof. Dr. Douglas Wallace*  
Forschungsbereich Marine Biogeochemie  
Leibniz-Institut für Meereswissenschaften  
Düsternbrooker Weg 20, 24105 Kiel  
dwallace@ifm-geomar.de  
Phone: +49-(0)431-600-4200

**Lead Institutions:**

*Leibniz-Institut für Meereswissenschaften, Kiel, Germany (IfM-GEOMAR Kiel)*  
*Max-Planck-Institut für Biogeochemie, Jena, Germany (MPIB Jena)*  
*Instituto Nacional de Desenvolvimento das Pescas, São Vicente (INDP)*  
*Instituto Superior de Engenharia e Ciências do Mar, São Vicente (ISECMAR)*  
*Instituto Nacional de Meteorologia e Geofísica, São Vicente (INMG)*

**West Africa Network:**

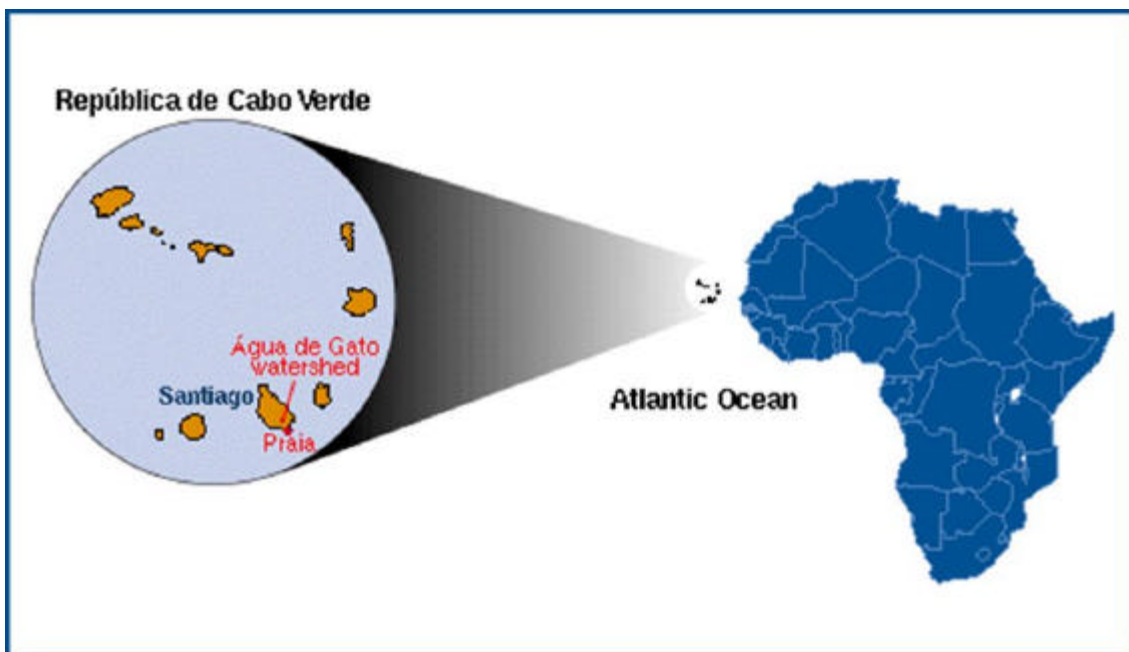
*To include institutions from  
Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea*

**International Partner Institutions:**

*The University of the Azores, Portugal*  
*The University of Massachusetts, Dartmouth, U.S.A.*

## **Summary:**

It is proposed to establish scientific and educational collaboration between Germany and the Cape Verde Islands, in the context of long-term scientific programmes of the IfM-GEOMAR (Kiel) and the MPI for Biogeochemistry (Jena) that are focussed on the tropical Eastern Atlantic. Academics and students from Cape Verde would participate in areas of common research extending from marine geology and volcanology, marine and fisheries ecology, through chemical and physical oceanography to atmospheric science and climate research. The proposed collaboration in training and research, together with existing regional cooperations of Cape Verde scientists, would be used as the basis for developing knowledge transfer and scientific collaboration with other West African countries. A long-term goal of the collaboration is to develop and staff a 'West African Science Logistics Centre' in the Cape Verde Islands. The Centre would be designed to support multi-disciplinary science, and related training activities, within West Africa and the Tropical and Equatorial Atlantic Ocean. Such a base would also be a regional asset for international research activities and allow for close contact of West African students and researchers with the international research community.



## **Partners and Project Areas:**

The project is a collaboration between the following institutions:

- *Leibniz-Institut für Meereswissenschaften (IfM-GEOMAR Kiel)*
- *Max-Planck-Institut für Biogeochemie (MPIB Jena)*
- *Instituto Nacional de Desenvolvimento das Pescas (São Vicente)*
- *Instituto Superior de Engenharia e Ciências do Mar (São Vicente)*
- *Instituto Nacional de Meteorologia e Geofísica, São Vicente (INMG)*

Additional international partners with whom discussions have taken place include:

- *The University of the Azores, Portugal*
- *The University of Massachusetts, Dartmouth, U.S.A.*

Networking within Africa will initially be built upon existing cooperations of the Cape Verde partners and includes scientific institutions in Mauritania, Senegal, Gambia, Guinea-Bissau, Guinea

Research areas are to include:

- Oceanography
- Marine Ecology, Biogeography and Fisheries Science
- Water chemistry
- Meteorology and Atmospheric Science
- Marine Geology and Volcanology

## **The Tropical Eastern Atlantic and International Earth System Science**



Surface chlorophyll as observed from SeaWiFS satellite. Cape Verde is strategically situated close to the important West African upwelling region off Mauritania.

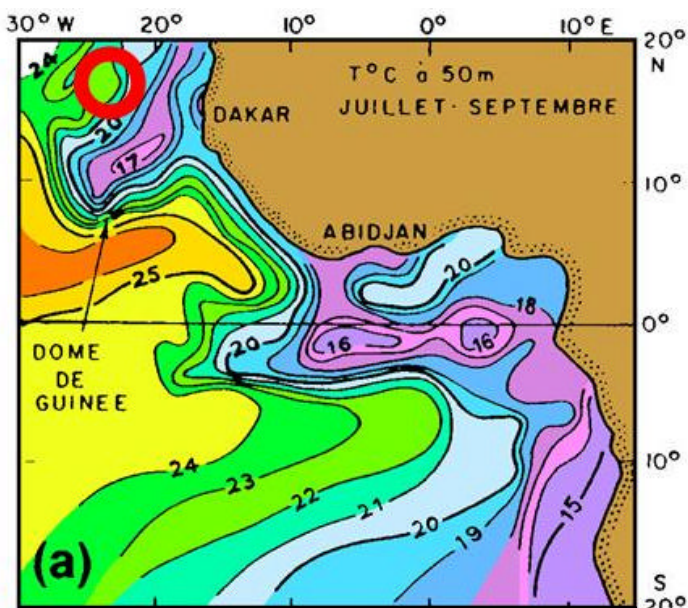
Cape Verde, an island state of sub-Saharan Africa, has a very large Exclusive Economic Zone (742.438 km<sup>2</sup>) that covers key regions of the tropical Atlantic Ocean. The tropical Atlantic Ocean is of central importance for the climate, ecology and biogeochemistry of the Earth with an influence that extends far outside the region. The islands themselves are a region of high biodiversity and endemism. Thus, Cape Verde is strategically located in a region of high scientific interest for the international scientific community. The ocean surrounding Cape Verde

is highly productive, supporting large, commercially important fish stocks that are at present mainly exploited by artisanal fisheries, but increasingly threatened by international fishing interests. In turn, large-scale climate, oceanographic and ecosystem variability as well as natural hazards associated with volcanic activity have significant influences on the economies and living conditions within Cape Verde and the region as a whole.

Geologically, Cape Verde consists of a horseshoe-shaped archipelago of volcanic islands with a general age progression from east to west. Fogo is the only island in the archipelago where historical eruptions took place (ten events between 1500 and 1995). Most eruptions are from flank vents and include moderate explosions. Brava is the island with the highest rate of seismic activity, and in 1963 and 1981 two important seismic crises occurred. In Brava the Quaternary volcanic products are dominated by phonolitic tuffs, indicating an explosive eruptive style. Fogo is seismically less active, and the dominating lava flows indicate a more effusive type of volcanism, leaving lava flows as the main geological hazard.

## ***Cape Verde as a Strategic Location for Earth System Science***

### **– Scientific Issues –**



Oceanographic Setting: Cape Verde is an ideal location from which to study open ocean upwelling associated with the Guinea Dome and equatorial current systems.

The IfM-GEOMAR in Kiel has a long-term interest in maintaining research programmes in this general region of the tropical Atlantic, including Cape Verdean waters. These interests extend to conducting research on the islands themselves (atmospheric and geological research). The interests include:

- Climate and physical oceanographic research under the auspices of the international CLIVAR project of the World Climate Research Program;
- Studies of the impact of dust deposition on phytoplankton productivity and trace gas exchange in the SOLAS project of the International Geosphere-Biosphere Program.

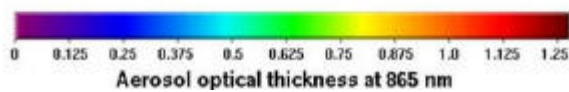
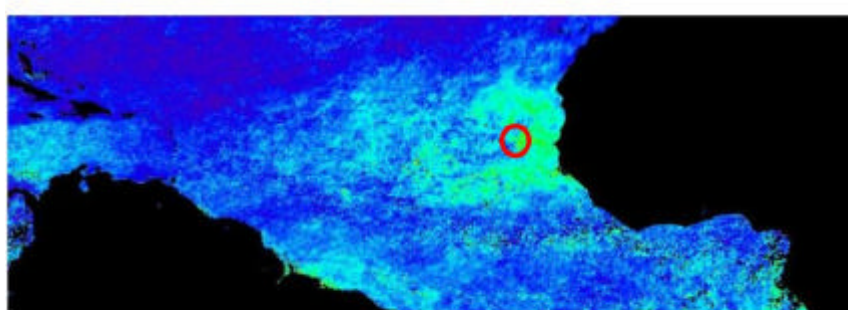
This would include a whole suite of meteorological observations relevant physical, biological, and chemical processes from automated measurements;

- Plans for a new long-term research project on nutrient cycling in tropical oceans;

- Interest in long-term studies of the tropical marine ecosystem including the cascading effects of fisheries on benthic communities including macro-algae and the special ecology of seamounts;
- Climate and fisheries impacts on structure and functioning of the tropical high-sea ecosystem relevant to the international GLOBEC programme (e.g. Lobster survey programme);
- Biogeography, biodiversity and speciation on isolated topographic features (applying molecular biological methods) under the auspices of the Census of Marine Life Initiative;
- Geochemical studies of Jurassic oceanic crust that is uniquely exposed on land in Cape Verde;
- Research into natural hazards associated with marine with marine and subaerial volcanic activity, including seismic and chemical surveillance. This could include installation of a volcanic monitoring station (gas composition) on Pico de Fogo, Fogo Island.



Satellite picture of the Cape Verde islands showing an approaching sand storm from the adjacent continent.



Satellite retrieval of aerosol distribution showing dust cloud over the Cape Verde Islands

Within the Max-Planck Institut for Biogeochemistry in Jena, there is interest in establishing a long-term atmospheric sampling site for trace gases. The Cape Verde location is ideal for studying the chemical composition of dust that is deposited in the ocean, and for monitoring the effect of biomass burning and oceanic upwelling on atmospheric chemistry. Further, modelling analyses have identified Cape Verde as an ideal site for long-term studies of CO<sub>2</sub> and O<sub>2</sub> in the atmosphere.

The pursuit of these long-term goals and long-term research activities would benefit greatly from regional scientific cooperation and will require access to scientific infrastructure and, most importantly, well-trained scientific collaborators in the Cape Verde Islands. For example, an atmospheric monitoring station should ideally be staffed by

Cape Verdean scientists, and there will be additional requirements for local field studies and long-term maintenance of oceanographic and climate observations including logistical support of campaigns with research vessels and aircraft. Similarly, combined chemical and seismic studies of volcanic activity depends upon local data acquisition and system maintenance. Presently, there is no such suitable infrastructure available in the entire West African region.

### – Logistical Considerations –

The Cape Verde Islands are an ideal geographical location from which to study and research the phenomena and processes listed above. There are also favourable logistical considerations. German scientists have had good experience in running research cruises from the Cape Verde Islands (e.g. with R/V *Meteor* and R/V *Poseidon*) and there is even a long-term diplomatic agreement between Germany and Cape Verde allowing German research vessels to work within the Cape Verde Exclusive Economic Zone. Logistically, Cape Verde is readily accessible for both sea- and air-transport and is well-suited for the staging of oceanographic and geological expeditions. There are regular flight connections with Germany, including flights from Munich and weekly charter flights from Hamburg.



Marine biology teaching at ISECMAR (picture from Rui Freitas)

Most importantly, Cape Verde is politically stable and safe, and already has the elements of the necessary scientific and educational infrastructure on which to build. Notably, São Vicente is home to a research institution for the development of fisheries (INDP), a meteorological and geophysical institute (INMG) and a Polytechnic-level teaching institution that offers undergraduate training in marine biology (ISECMAR). Basic laboratory equipment for marine sciences is available and there is a resident staff that is both well-trained in marine sciences and enthusiastic.

## **Proposal**

### **– Short term –**

Our initial goal is to develop a scientific collaboration between Germany and the Cape Verde Islands in the context of long-term research projects of the IfM-GEOMAR (Kiel) and the MPIB-Jena. Included in the collaboration would be training activities of three types:

- On-site involvement of Cape Verde scientists and students in the research projects. This would include participation in marine research expeditions and on-island field campaigns as well as assistance with surveys and long-term measurement programs;
- Selection of junior academics and students from Cape Verde and regional partners for further academic training and research in Kiel and/or Jena (students would be registered at the University of Kiel);
- Training activities (e.g. practical classes, lecture series), including thematic ‘Winter Schools’ to be conducted in the Cape Verde Islands. We would attempt to obtain international participation and support for such ‘Winter Schools’ in collaboration with international research programs such as CLIVAR, SOLAS, DIVERSITAS, GLOBEC, etc. The ‘Winter Schools’ would open up useful training opportunities and international contacts for scientists from other countries in the region. One such opportunity already exists to host the 3rd International SOLAS Summer (Winter?) School in 2007 (see attached letter).

We envision the collaboration being centred on the Cape Verde Islands for both scientific and logistical reasons but the program would also develop networks with other countries in the region based initially on existing regional collaborations and the needs of individual projects. The initial collaboration would extend to the following West African Nations with which scientific and educational links already exist:

- Mauritania
- Senegal
- Gambia
- Guinea Bissau
- Guinea



The existing links are primarily with marine science institutions and are mainly in the area of fishery research and marine ecology. We will use the existing contacts and the proposed workshop (see below) to investigate whether additional contacts and interactions can be established in the other scientific areas covered by this proposal.

The 'Winter Schools' and similar training activities would be a primary means of networking. Assistance and cooperation in the training and research activities will be coordinated with other international institutions with a strong interest in the region: notably the University of Massachusetts, Dartmouth (USA) and the Universities of the Azores.

It is envisaged that the exchange of personnel would involve, Kiel/Jena participants travelling to Cape Verde to conduct research and teach/involve student groups. Promising students from Cape Verde and other West African nations could travel to Kiel to pursue their studies. Kiel/Jena would benefit from access to sampling platforms and cooperating scientists in West Africa. The benefits for the West African community would be access to the Kiel/Jena infrastructure, expertise and knowledge and participation in relevant projects.

### **– Long term –**

Our longer-term vision is to start building on the existing Cape Verdean expertise in marine science, and the unique scientific and logistical value of Cape Verde itself, to establish a Science Logistics Centre for the support of oceanographic, climate, atmospheric, geological and biological research in the West African region. Our models for the long-term development of the Science Logistics Base include the Bermuda Biological Station for Research ([www.bbsr.edu](http://www.bbsr.edu)), the Canadian Polar Continental Shelf Project Centre in Resolute Bay, N.W.T ([http://polar.nrcan.gc.ca/index\\_e.html](http://polar.nrcan.gc.ca/index_e.html)), and the Ny-Ålesund International Arctic Environmental Research and Monitoring Facility, Svalbard, Norway (<http://npolar.no/nyaa-lsf/>). The Mission Statement of the Bermuda Biological Station for Research seems particularly relevant as a goal:

*BBSR's mission is to conduct research and science education of the highest quality from the special perspective of a mid-ocean island and to provide well-equipped facilities and responsive staff support to visiting scientists, faculty and students from around the world.*

Whereas such science logistic bases are now quite common for the study of high-latitude processes in both the Arctic and Antarctic, there is a severe lack of such logistics and long-term monitoring facilities in critical tropical regions such as West Africa. We consider that the Cape Verde Islands could fill this gap and become both a regional and international resource. The Logistics Base could serve not only research needs but also provide a critical infrastructure for mounting of regional oceanographic, fisheries, biological and geological research and training. Our proposal would move in

this direction through the training of staff and the establishment/improvement of some basic infrastructure, and through bringing the benefits of such research infrastructure to the attention of the international scientific community.

The intention would be that Cape Verdean scientists and technicians both maintain such a base, and play significant roles in the associated research projects. With respect to this longer-term goal, additional international support and long-term funding would be required: we foresee possibilities for support from international research organisations (e.g. World Climate Research Program and the International Geosphere-Biosphere Program) and through partnering with other countries (e.g. European Union and the U.S.A.). With this longer-term goal in mind, and recognizing the need to develop long-term scientific and funding support from European and North American sources, we have made contact with two international partners who would have an interest in long-term cooperation in this region:

- The University of the Azores: marine scientists in the Azores have conducted prior research with the Cape Verdeans and have a natural interest in long-term collaborations.
- The University of Massachusetts, Dartmouth: the interest of marine scientists in this part of the USA is stimulated by the presence of a large local Cape Verdean community and significant cultural and political links.

### **Infrastructure:**

Our contacts with Cape Verde to-date reveal that the human infrastructure is available but that the required physical infrastructure is limited. Clearly such a scientific cooperation must address not only training aspects but also the issue of physical infrastructure, equipment, etc. The short-term infrastructure needs must be evaluated. Required infrastructure would consist of a basic environmental observatory, consisting of offices, lecture rooms and a teaching laboratory. The laboratory should be equipped in order to teach and conduct basic techniques as they apply to fisheries ecology, biological oceanography, chemical oceanography and atmospheric chemistry. It should also be capable of hosting more specialised 'Winter Schools' using custom equipment brought to the islands for that purpose. The laboratory would therefore serve the needs of both Cape Verdean and international scientists, ideally working in collaboration.

Also desirable would be a science logistics capability in Mindelo that is suited for the staging and support of interdisciplinary research expeditions (e.g. warehouse facilities, freezers, but also including assistance with customs and logistical/transportation issues). In addition, we envision establishing a sampling tower suited for meteorological and atmospheric chemistry research (aerosols and dissolved gases) including rain sample collection. For several atmospheric research projects, logistical support for research aircraft operations from the local airport would be desirable.

## Addressing Program Goals and Themes:

The objectives of the Knowledge for Tomorrow program of the VolkswagenStiftung are:

- *Enhance the international competitiveness of the academic world in Africa and thus strengthen its prospects for self-sustaining progress:*

Our proposal addresses this goal directly. In the short term we envision conducting training and collaborative research. The long-term goal is to build upon this collaboration to establish a regional centre for international Earth System Science research and training. We believe that the region and the scientific issues are of sufficient scientific interest and importance, that such a centre has a very good possibility of becoming self-sustaining.

- *Address questions and issues of central significance for the future development of African societies;*

Many of the scientific areas addressed are of direct relevance to not only the Cape Verde Islands but also the entire region: climate change; meteorology; ecosystems; fisheries; geo-hazards. In other areas (e.g. environmental chemistry), the specialist training obtained in the context of basic research can contribute either to the proposed development of scientific infrastructure or be applied to addressing other relevant issues (e.g. water quality). Furthermore, the Cape Verde Islands can benefit directly from biological and fisheries research. The islands are highly dependent on sustainable use of marine resources, as food supply and economic factor.

- *Make purposeful use of local resources and assets.*

One basis for this proposal is the significance of the tropical Atlantic for scientific issues of global as well as regional importance. In order to be able to research such issues, we propose to make use of, expand and develop the existing scientific capabilities, enthusiasm and regional research networks in the region.

With these objectives in mind, two thematic categories are under consideration:

- *Research projects dealing with highly topical, trend-setting and internationally competitive themes aimed at making a substantial contribution to sustainable development and reinforcement of competencies and capacities of the academic world in Africa.*
- *Research issues which are of particular relevance to Africa*

We consider that our proposal addresses both themes. Certainly, climate change and the effect of climate change and other human intervention (e.g. fishing) on marine ecosystems and biodiversity is highly topical and a theme of considerable international interest. These issues are of direct relevance to sustainable development: both in terms of water resources (rainfall patterns; effect of climate change on future rainfall) and food resources (climate and fishery impacts on fish stocks). In this region, some surprisingly complex interactions between climate, human development pressures and natural resources are possible. For example, land-use and climate change within continental Africa alter dust generation and transport and hence deposition in the ocean. This in turn can affect ocean productivity in the region by altering the supply of the micronutrient, iron (this is an active topic of research within the IFM-Geomar, Kiel and MPI Jena). On the other hand, climate change can also directly affect regional upwelling dynamics and ocean productivity. Both processes impact on the dynamics of the entire ecosystem including stock dynamics of large, predatory fish of high commercial value. Similarly, the unique geological characteristics of the Cape Verde Islands are of great interest from a purely scientific perspective. However geological issues, including natural hazards arising from tectonic activity and volcanic eruptions are also of direct relevance for this region of Africa.

# Workshop

The full details of the cooperation need to be discussed in detail with full consideration of the existing facilities. Plans are likely to evolve according to jointly perceived opportunities, common interests and needs. In order to move forward, we propose to hold a workshop on June 8-10 to establish contact between the two scientific groups and make assessments of work required. The workshop will be held in the Cape Verde Islands in conjunction with a visit of the IfM-GEOMAR research vessel *Poseidon* and an associated training course to be offered by IfM-GEOMAR personnel. A proposed list of invitees and detailed description of the workshop are appended to this proposal together with a budget.

## *Goals of the Workshop*

- outline the scientific interests of the German partners (IfM-GEOMAR and MPIB Jena) concerning research in the tropical eastern Atlantic region.
- identify opportunities, including educational opportunities, for Cape Verde and other West African scientists to interact and participate in these projects.
- evaluate the possibilities for setting up long-term research infrastructure and collaboration in Cape Verde.
- discuss/plan broader educational and training needs and opportunities, including the possibility of using Cape Verde as a science logistics base for international researchers and as the core of a training network in modern environment-related science for West Africa.

## *Timetable for the Workshop*

The workshop will be held in conjunction with a visit to Mindelo by the IfM-GEOMAR's research vessel, FS *Poseidon*, a multi-disciplinary, medium-size vessel (60.8 m, 12 scientists, 18 crew).

1. May 31: Arrival of R/V *Poseidon* to Mindelo
2. June 2-6: A training course will take place on board R/V *Poseidon* for local scientists and students (day cruises from Mindelo). This will include training in fishery biology, marine ecology, and basic oceanography.
3. June 7: A reception for local and government officials will be hosted on board R/V *Poseidon*
4. June 8-10: Scientific and educational workshop
5. Following the workshop: A group of atmospheric scientists who are interested in establishing an atmospheric monitoring site will discuss their needs and perhaps tour potential sites with their colleagues from Cape Verde.

### ***Training Course***

The training course on R/V *Poseidon* will be funded primarily by IfM-GEOMAR through the provision of ship-time, personnel and equipment. Only travel costs and some necessary freight shipments are requested from the VolkswagenStiftung. We have specifically reserved time in *Poseidon's* schedule (Cruise no. P312, May 27 – June 7) to transit the ship to Mindelo and allow the training course to take place. We see the course as being a useful opportunity for scientists from Germany to come into close contact with their counterparts and potential students in Cape Verde. Through the course, which will focus on marine ecology and fisheries science, the German scientists and educators will obtain first-hand information about the educational background and needs of Cape Verde and other West African nations.

### ***Reception on board Poseidon***

We are aware that there is considerable interest amongst government officials in the proposed project. We welcome such interest, and have already made some contacts via diplomatic and official channels (e.g. a visit to Kiel in November 2003 by the Secretary of the Cape Verde Embassy in Berlin). Nevertheless, the main goal of the Workshop is to focus on science and education needs and opportunities. We therefore propose holding a reception and initial presentation of project ideas for government and diplomatic officials on board R/V *Poseidon* on Monday June 7, prior to the start of the workshop. This should allow the workshop itself to focus on science and education matters. To this reception, we will invite:

- Government officials
- Institution heads
- Embassy and Consular Representatives from Germany and other West African Nations
- Local port officials
- Representatives of airlines and other transportation companies (future potential sponsors)

## **Workshop/Project Planning:**

### Germany:

Douglas Wallace, Gerd Kraus, Thor Hansteen, Arne Körtzinger and Martin Heimann

### Local Workshop Organizing Committee

Oversight: Mr. Oscar Melicio (President, INDP)

Mr. Vito Ramos (Director of Research Department, INDP)

Mr. Edério Almada (technical and organizational issues, INDP)

Mr. Jorge Nascimento, (public relations, information and documentation, INDP)

Mr. José Ramos (ISECMAR)

Mrs. Corrine Almeida (ISECMAR)

Mr. Ester Brito (INMG)

## **Proposed Workshop Participants:**

### **Cape Verde Participants**

#### Instituto Nacional de Desenvolvimento das Pescas, São Vicente (INDP)

- Mr Melício, Óscar Fonseca– Chairman
- Mr. Ramos, Vito – Director of Research
- Mr. Almada , Ederio Oliveira – Oceanographer/Fishery Biologist
- Mr. Medina, Aníbal Delgado – Oceanographer/Fishery Biologist
- Mrs. Tariche, Oksana – Fishery Biologist
- Mr. Vito Melo – Fishery Biologist
- Mrs. Monteiro, Vanda Marques – Fishery Biologist
- Mrs. Merinho, Sónia – Biologist
- Mrs. Gominho, Vera – Marine biologist
- Mr. Monteiro, Carlos – Marine biologist
- Mrs. Costa, Márcia – Biological oceanographer

#### Instituto Superior de Engenharia e Ciências do Mar, São Vicente (ISECMAR)

- Mr. Fortes, Manuel – Chairman
- Mr. Ramos, José – Director of Aquatic Resources Technology and Fisheries
- Mr. Barbosa, Antunio – President of Cientific Comitee
- Mrs. Corrine Almeida – Biological oceanographer
- Mrs. Lopes dos Santos, Raquel – Microbiologist

#### Instituto Nacional de Meteorologia e Geofísica, São Vicente (INMG)

- Mr. Moreno, José - Chairman
- Mrs. Brito, Ester – Marine meteorologist
- Mr. Bruno Faria – Volcanologist
- Mr. Soares Emanuel – Meteorologist
- Mr. Daniel Graça - Meteorologist

#### Other Capverdean Institutions

- Mrs. Carvalho, Maria Edelmira (Directorate of Fisheries)
- N.N. (Directorate of Fisheries)
- N.N. (Directorate of Fisheries)
- Mr. Fortes, Zeferyno (General Director, Marine Administration)
- Directorate of Science and Tecnology
- Mrs. Almeida Fatima (ONG APROCIVITA)

- Mr. Correia,Valdemar (Civil Aeronautic Institut)
- Mr. Faria, Amiro (Special invitee)
- Students

## **German Participants**

### Leibniz Institute of Marine Sciences, Kiel, Germany (IFM-GEOMAR)

- Prof. Dr. Peter Herzig (Director, IfM-GEOMAR)
- Prof. Dr. Reinhold Hanel (Fishery Biology) → also instructor in training course
- Dr. Gerd Kraus (Fishery Biology) → also instructor in training course
- Dipl.-Biol. Rabea Dieckmann (Fishery Biology) → also instructor in training course
- N.N. (Fishery Biology) → also instructor in training course
- Prof. Dr. Dietrich Schnack (Fishery Biology)
- Prof. Dr. Martin Wahl (Experimental Ecology)
- Prof. Dr. Ulrich Sommer (Experimental Ecology)
- Prof. Dr. Karin Lochte (Biological Oceanography)
- Dr. Peter Croot (Chemical Oceanography)
- Prof. Dr. Arne Körtzinger (Chemical Oceanography)
- Prof. Dr. Douglas Wallace (Chemical Oceanography)
- Dr. Peter Brandt / Dr. Jürgen Fischer (Physical Oceanography)
- Prof. Dr. Andreas Macke (Maritime Meteorology)
- Dr. Thor Hansteen (Volcanology & Petrology)
- Prof. Dr. Kaj Hoernle (Volcanology & Petrology)

### Max-Planck-Institute for Biogeochemistry, Jena, Germany

- Dr. Martin Heimann (Biogeochemical Tracers)
- Dr. Corinne LeQuéré (Palaeoclimatology & Global Ecology)
- Dr. Andrew Manning (Biogeochemical Tracers)
- Dr. Ina Tegen (Palaeoclimatology & Global Ecology)

### Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Eschborn, Germany

- Dr. Uwe Scholz

## **West African Participants**

### Centre De Recherches Océanographiques Dakar-Thiaroye, Senegal (C.R.O.D.T)

- M. Birane Samb
- Dr. Djiby Thiam

### National Centre for Fishery and Oceanographic Research, Mauritania (CNROP)

- M. Mika Diop

### Guinea-Bissau : Centro de Investigação Pesqueira Aplicada, Guinea-Bissau

- Mrs. Virginia Pires

### Department of Fisheries, Gambia

- Mr. Asberr Natoumbi Mendy

### Centre National des Sciences Halieutiques de Boussoura, Guinea (CNSHB)

- Mr. Samba Tenin Diallo

**Other International Participants:**

Graduate School of Marine Sciences and Technology, University of Massachusetts, Dartmouth, USA

- Prof. Brian Rothschild (Univ. Massachusetts, Dartmouth, USA)

Department of Oceanography and Fisheries, University of the Azores, Portugal

- Prof. Ricardo Santos (Univ. Azores, Portugal)

## ***Agenda Cape-Verde Workshop (tentative)***

Tuesday, 8 June 2004

08:30 – 09:00	Registration	
09:00 – 09:30	Opening of the Workshop Welcome to participants Local arrangements	Mr. O. Melicio
09:30 – 09:50	Introduction to the West Africa Program of the VolkswagenStiftung	D. Hanne
09:50 – 10:10	Background to the Workshop Introduction to the planned IFM-Geomar / MPI Jena Cooperation with West Africa	D. Wallace
10:10 – 10:30	Very brief self-introduction of Workshop participants	
10:30 – 11:00	<i>Coffee break</i>	
11:00 – 11:45	Introduction of Cape Verdean project partners ISECMAR INDP IMNG	} Chairmen
11:45 – 12:15	Introduction of German project partners IfM-Geomar Kiel MPI für Biogeochemie, Jena	P. Herzig M. Heimann
12:15 – 14:00	<i>Lunch break</i>	
14:00 – 14:20	Science Theme presentation I Climate, Satellites and Dust	A. Macke / I. Tegen
14:20 – 14:30	Discussion and response from CV partners, (e.g. status of CV research, facilities, projects)	E. Soares
14:30 – 14:50	Science Theme presentation II Geology, vulcanology and hazards	K. Hoernle / T. Hansteen
14:50 – 15:00	Discussion and response from CV partners, (e.g. status of CV research, facilities, projects)	B. Faria
15:00 - 17:00	Tour of the INDP, INMG, and ISECMAR / Meet with students  <i>End of first day</i>	

Wednesday, 9 June 2004

09:00 – 09:30	Introduction of international partner institutions The University of the Azores The University of Massachusetts, Dartmouth	R. Santos B. Rothschild
09:30 – 10:00	Science Theme presentation III Fish and Fisheries science	R. Hanel / G. Kraus
10:00 – 10:30	Discussion and response from CV partners, (status of CV research, facilities, projects)	V. Ramos
10:30 – 11:00	<i>Coffee break</i>	
11:00 – 11:30	Fisheries Research in West Africa status and interests of West African partners (Senegal, Mauritania, Gambia, Guinea, Guinea-Bissau)	B. Samb
11:30 – 11:40	Discussion and response from German partners, potential interests	
11:40 – 12:05	Science Theme presentation IV Atmospheric science and monitoring	M. Heimann
12:05 – 12:15	Discussion and response from CV partners, what is the status in CV research, potential interests	E. Brito
12:15 – 14:00	<i>Lunch break</i>	
14:00 – 14:20	Science Theme presentation V Marine Ecology	M. Wahl / U. Sommer
14:20 – 14:30	Discussion and response from CV partners, what is the status in CV research, potential interests	C. Almeida
14:30 – 17:00	Break out into working groups Working group I: Atmospheric and Geological Science - long term monitoring and remote sensing facilities - Vulcanology and geology - Chemistry of the atmosphere - Meteorology, climate and dust Working group II: Marine Ecology and Ocean Science - Oceanography - Ocean Productivity - Fish and Fisheries - Benthic and plankton ecology	
	If necessary, the groups can break out into smaller sub-groups	
17:00	<i>End of second day</i>	

Thursday, 10 June 2004

09:00 – 09:15	Plenary	
09:15 – 12:15	Break out into working groups Prepare Workshop report if necessary in small sub-groups	
12:15 – 14:00	<i>Lunch break</i>	
14:00 – 14:45	Plenary, Summary of working groups and sub-groups, future plans and agreements for co-operation achieved	WG chairs
14:45 – 15:15	Possibilities for training and mobility of researchers within the frame of the research interests	TBA
15:15 – 16:00	Perspectives from Cape Verdean project partners General discussion	
16:00 – 16:15	Summary of the Workshop Future perspectives for German – Cape Verdean Scientific cooperation	P. Herzig
16:15	Closing remarks	O. Melicio
	<i>End of final day</i>	