

ATMOSPHERIC RESEARCH IN SOUTHERN AFRICA AND INDIAN OCEAN : A SOUTH AFRICA – FRANCE BILATERAL COLLABORATIVE PROGRAMME

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1. INTRODUCTION

In the present context of global changes, atmospheric and climatic research should be more organized in the framework of international collaborations and research networks. During recent years, the importance of systematic monitoring of the atmospheric structure, dynamics and composition has been confirmed by numerous satellite and surface observations. Together with land use change, the aerosol burden perturbs the surface/atmosphere radiative balance, as well as cloud properties, ensuing regional climatic impacts. Over Southern Africa and the neighbouring oceanic regions of the Indian Ocean, these regional impacts are influenced by dynamical variability and play an important role in global climate change. Compared to developed regions of the northern hemisphere, the tropical and austral regions of the southern hemisphere are poorly documented even though they are important components of the global atmosphere.

Several cooperative projects in atmospheric research between French CNRS laboratories and South African universities or institutes are still on the way but they often rely on individual initiatives between two research groups and would certainly benefit from a general collaboration framework that could be provided by an international research consortium (GDRI). In this context, we have put-forth potential research topics/issues that could be developed in the framework of the GDRI called ARSAIO (Atmospheric Research in Southern Africa and Indian Ocean) along with laboratories and scientists that would be involved in this project. The project focuses on following scientific themes aimed at obtaining a better understanding of southern tropics/sub-tropical areas, such as;

- Atmospheric pollution and climate change in Southern Africa
- Troposphere ozone and aerosol studies over Indian Ocean Region
- Greenhouse gas measurements
- Middle atmosphere dynamics and thermal structure: comparative studies from LiDAR datasets
- Water vapour cycle study in the Upper Troposphere-Lower Stratosphere
- Stratospheric ozone variability, transport and mixing processes in the southern tropics: a

French-South African observation and research network

In this paper, we shall provide details about the instrument to be employed, University/Institutes involved and French and South African co-ordinators for investigating the structure and dynamics of the atmosphere by utilising different in-situ, space-borne and model simulation techniques.

2. INSTRUMENTS

Ground based measurement systems that could be operated for the various scientific purposes of the GDRI-ARSAIO project are summarized in the following table:

UV-visible spectrometers	<i>place</i>
Dobson at Irene	South Africa
Dobson at Springbok	South Africa
Dobson at Maun	Botswana
Dobson at Cape-Town	South Africa
SAOZ at Durban	South Africa
SAOZ at Reunion	France
SAOZ at Bauru	Brazil
LiDARs	
Rayleigh LiDAR at Durban	South Africa
Raman LiDAR at Durban	South Africa
Rayleigh LiDAR at Reunion	France
Raman LiDAR at Reunion	France
Ozone LiDAR at Reunion	France
Mobile LiDAR at Pretoria	South Africa
Balloon-Sondes	
Ozone-sondes at Reunion	France
Ozone-sondes at Irene	South Africa
Ozone-sondes at Natal	Brazil
Ozone-sondes at Kerguelen	France
Sun Photometer (AERONET)	

Réunion	France
Marion Dufresne (AERONET Maritime aerosol Network)	France
AERONET Network in South Africa and Zimbabwe	South Africa
In-situ measurements	
Aerosol and chemical composition of rainwater at South African IDAF sites	South Africa
Green House Gas (GHG) Measurements at Cape Point	South Africa
Aerosol measurements at Cape Point	South Africa
Trace gases measurements at Amsterdam and Crozet Island	France
GHG measurements at Amsterdam	France
Ozone at Reunion	France
Aerosols sampling at Réunion	France
GHG concentrations at Réunion (CO ₂ , CH ₄ , H ₂ O)	France
Mobile Tool: R.V. Marion Dufresne	
Mobile aerosol lidar O ₃ -NO ₂ Column (SAOZ) O ₃ Sounding Station UV Spectrometer Sun photometer Microtops	France
Ozone at Reunion	France
Aerosols sampling at Réunion	France

3. LABORATORIES INVOLVED IN THE GDRI – ARSAIO

Council for Scientific and Industrial Research, National Laser Centre (CSIR-NLC), Pretoria, South Africa
Council for Scientific and Industrial Research, National Resources and Environment (CSIR-NRE), Pretoria, South Africa
University of Pretoria (UP), Pretoria, South Africa
University of Kwa Zulu Natal (UKZN), Durban, South Africa

North West University (NWU), Potchefstroom, South Africa
University of Witwatersrand (WITS), Johannesburg, South Africa
South Africa Air Weather Service (SAWS), South Africa
Hermanus Magnetic Observatory (HMO), South Africa
Laboratoire d' Aérologie (LA), Toulouse, France
Laboratoire d' Atmosphère et des Cyclones (LACy), Université de la Réunion (UR), Réunion, France
Laboratoire des sciences et de l' environnement (LSCE), France
Service d' Aéronomie (SA), Paris, France

4. CO-ORDINATORS

South Africa
Prof. Venkataraman Sivakumar (U.P/CSIR) Prof. Piketh Stuart (WITS) Dr. J.P (Paul) Beukes (NWU) Dr. Sandile B. Malinga (HMO) Prof. Hannes Rautenbach (UP) Mr. Gerrie Coetzee (SAWS) Dr. Caradee Wright (CSIR)
France
Prof. Robert DELMAS (LACy) Dr. Catherine Lioussé (LA) Dr. Jean Luc Baray (LACy) Dr. Michel Ramonet (LSCE) Prof. Hassan Bencherif (LACy) Dr. Philippe Keckhut (SA)

The main objective of the GDRI project is to coordinate research actions and to provide a framework to build cooperative projects in response to call for proposals from the European Union (EU), or other funding agencies. Meetings of French and South African scientists for preparing scientific projects could be necessary. In addition the GDRI would support the expenses of research stays in French Laboratory for South African scientists and students.

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