

**SAFARI 2000 Meeting – May 2001: Progress of South African LEAD Projects**

Project title	Analysis of campaign data	Outputs		Work still to be done	Data requirements
		Data products	Papers/ Conferences		
General SAFARI LEAD		<ul style="list-style-type: none"> <li>▪ Quarterly reports on the progress of all LEAD projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Numerous presentations on SAFARI</li> <li>▪ SAJS submissions – Science plan (Annegarn); Wet (Otter et al.) and dry (Swap et al.) season campaigns</li> </ul>	<ul style="list-style-type: none"> <li>▪ Need to bring all the data together and discuss the implications of N and S emissions and deposition for southern Africa</li> </ul>	
Data management		<ul style="list-style-type: none"> <li>▪ Website fully functional</li> <li>▪ User registration forms developed, and registration information kept on database</li> <li>▪ 96 registered users</li> <li>▪ Geospatial server is up and running</li> </ul>	<ul style="list-style-type: none"> <li>▪ <a href="http://www.safari2000.org">www.safari2000.org</a></li> </ul>	<ul style="list-style-type: none"> <li>▪ Move website to NDMC</li> <li>▪ Convert webpage to fully database driven entity and improve search ability (2 months)</li> <li>▪ Make MODIS download available</li> <li>▪ Put MAS data on geospatial server</li> <li>▪ Put upper atmosphere trajectories onto the website</li> <li>▪ Set up separate student registration database to</li> </ul>	

				<ul style="list-style-type: none"> <li>▪ protect student database</li> <li>▪ Create listing of papers/ conferences relevant to SAFARI</li> </ul>	
Anthropogenic emissions	N/A	<ul style="list-style-type: none"> <li>▪ Monthly driver surfaces</li> <li>▪ Monthly emission surfaces of greenhouse gases and SO<sub>2</sub></li> </ul>	ESRI 2000 User Conference	<ul style="list-style-type: none"> <li>▪ Incorporate inventory and driver surfaces from other African countries</li> </ul>	Improved spatial and temporal driver surfaces
Domestic biofuel emissions	Field work complete and data analysis 100%	<ul style="list-style-type: none"> <li>▪ National activity level for all trace gases</li> </ul>		<ul style="list-style-type: none"> <li>▪ Gridded emission inventory (End July)</li> <li>▪ Write paper (End Aug)</li> </ul>	National population data from southern African countries
Pyrogenic emissions		<ul style="list-style-type: none"> <li>▪ Modification of SAFIRE model for predicting emissions</li> </ul>		<ul style="list-style-type: none"> <li>▪ Acquisition of weather data 2000-2001</li> <li>▪ Download MODIS burned area maps</li> <li>▪ Run model (August 2001)</li> </ul>	MODIS burned area from Umd; Daily rainfall data July 99-June 2001 from NOAA
Species composition	N/A	<ul style="list-style-type: none"> <li>▪ Gridded data base of woody species composition for southern Africa</li> </ul>		This project is complete	
Leaf area index	Almost 100% of campaign data analyzed	<ul style="list-style-type: none"> <li>▪ Detailed measurements at 6 Kalahari sites (March 2000)</li> <li>▪ Bi-monthly measurements at Skukuza site (2000/01)</li> <li>▪ Modeling of leaf area optimization</li> </ul>	<ul style="list-style-type: none"> <li>▪ Paper submitted to J. Veg. Science</li> <li>▪ Paper in preparation for GCB</li> <li>▪ 2 posters to be presented at IGBP Open Science Conf.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Downloading and validation of MODIS LAI product (July 2001)</li> </ul>	LAI data using TRAC, LICOR and photography from other KT participants

Vegetation VOC emissions	90% of campaign data analyzed	<ul style="list-style-type: none"> <li>▪ Southern African vegetation categorized according to emissions</li> <li>▪ Basal emission factors for about 200 species</li> <li>▪ VOC data from Skukuza and Maun towers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Paper to be submitted to Atmos. Environ. in June</li> </ul>	<ul style="list-style-type: none"> <li>▪ Complete monthly LAI and PAR data for southern Africa for the study period (end June)</li> <li>▪ Integrate this into emission tables (July)</li> <li>▪ Produce gridded monthly VOC emissions for southern Africa (July/August)</li> </ul>	Climatic data
Soil NO emissions	100% of campaign data analyzed	<ul style="list-style-type: none"> <li>▪ NO emission factors for campaign sites (Kalahari, Nylsvley, Skukuza)</li> <li>▪ Soil nitrogen data for campaign sites</li> </ul>	<ul style="list-style-type: none"> <li>▪ JAE - submitted</li> <li>▪ GCB – to be submitted at end of May</li> <li>▪ Paper to be presented at IGBP Open Science Conf.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Complete development of regional NO emission model (end July)</li> <li>▪ Complete NO emission factor tables for southern Africa (end June)</li> <li>▪ Produce monthly soil NO emission data for the region (August/September)</li> </ul>	Climate data and more emission factors
Canopy NO fluxes		<ul style="list-style-type: none"> <li>▪ No progress has been made with this project due to unforeseen circumstances</li> </ul>			
Mineral aerosols					
Sunphotometer	Sunphotometry at			<ul style="list-style-type: none"> <li>▪ Complete analysis of</li> </ul>	

data	Sutherland ('98/'99) 100% analyzed; De Aar only about 30% analyzed			<ul style="list-style-type: none"> <li>▪ 2000 data (June)</li> <li>▪ Submit paper on 1998/9 data (June)</li> <li>▪ Submit paper on 2000 data (Dec)</li> </ul>	
Ground aerosol sampling		▪		▪	
Airborne aerosol sampling	Four campaigns and 100% of data has been analyzed	<ul style="list-style-type: none"> <li>▪ Aircraft aerosol data for March '99, Sept '99, Aug '00, and March '01</li> </ul>		<ul style="list-style-type: none"> <li>▪ Vertical distribution of aerosols over southern Africa</li> <li>▪ Cloud microphysical processes as derived from aircraft measurements and satellite</li> <li>▪ Parametrisation of cloud processes</li> <li>▪ Spatial distribution and characteristics of atmospheric aerosols over southern Africa.</li> </ul>	
Wet deposition	Continuous monitoring with 80% of samples analyzed	<ul style="list-style-type: none"> <li>▪ Precipitation chemistry at the Skukuza site and other remote sites</li> <li>▪ Daily precipitation data for these sites</li> </ul>		<ul style="list-style-type: none"> <li>▪ Obtain data from other sources.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Gaseous and chemical aerosol composition</li> </ul>
NO <sub>2</sub> , SO <sub>2</sub> , NH <sub>3</sub> , O <sub>3</sub> concentrations	Continuous sampling with	<ul style="list-style-type: none"> <li>▪ Tables of monthly mean NO<sub>2</sub>, SO<sub>2</sub>, NH<sub>3</sub>, O<sub>3</sub></li> </ul>		<ul style="list-style-type: none"> <li>▪ Measurements will continue until Dec</li> </ul>	

	60% analyzed	<ul style="list-style-type: none"> <li>▪ concentrations at 12 sites in southern Africa</li> <li>▪ Intercomparison between passive and active samplers</li> </ul>		2001 and data will be verified with in three months of that	
Transport modelling		<ul style="list-style-type: none"> <li>▪ Data from ECMWF and ETA data from the Weather Bureau are available for the study periods</li> <li>▪ Trajectory model has been modified to operate with both the input data sets</li> </ul>		<ul style="list-style-type: none"> <li>▪ Compile a trajectory climatology of transport from the Zambian Copperbelt</li> <li>▪ Compile comprehensive transport fields for every day of the intensive flight campaign during August and September 2000</li> </ul>	
Meteorological data		<ul style="list-style-type: none"> <li>▪</li> </ul>		<ul style="list-style-type: none"> <li>▪</li> </ul>	<ul style="list-style-type: none"> <li>▪</li> </ul>
N and S dispersion and deposition	N/A	<ul style="list-style-type: none"> <li>▪ Meteorological surfaces and upper air data in model format for SA weather stations</li> <li>▪ Prepared anthropogenic emissions in model ready format</li> </ul>		<ul style="list-style-type: none"> <li>▪ Configure CALPUFF to read MM5 data (end June)</li> <li>▪ Include biogenic and pyrogenic emissions (July/August)</li> <li>▪ Produce monthly average dispersion and deposition plots (Aug/Dec)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Biogenic, pyrogenic and biofuel emission data</li> </ul>

<p>Atmospheric chemistry modeling of N and S</p>	<p>70% of campaign data is analyzed</p>	<ul style="list-style-type: none"> <li>▪ Developed atmospheric chemistry model</li> <li>▪ Linked this with trajectory models</li> <li>▪ Data collected during campaign</li> <li>▪ Trained student in the use of SCAPE model</li> </ul>		<ul style="list-style-type: none"> <li>▪ Collect emission data from other projects</li> <li>▪ Modify a LED model and couple it with the atmospheric chemistry model</li> </ul>	<ul style="list-style-type: none"> <li>▪ Emission data for the region</li> <li>▪ Aerosol composition data</li> <li>▪ Meteorological data</li> <li>▪ Field data for model validation</li> </ul>
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## **Submitted papers**

1. Feral, CJW, Epstein, HE, Otter L, Aranibar, JN, Shugart, HH, Macko, SA, and Ramontsho. Carbon and nitrogen in the soil-plant system along rainfall and land-use gradients in southern Africa. Submitted to Journal of Arid Environments

The nearly homogenous substrate of the Kalahari Transect allows examination of changes in nutrient concentrations along a climatic gradient and two land use gradients. We anticipated finding changes in foliar and soil nutrients that were consistent with vegetation shifts resulting from decreasing rainfall and increasing land-use. Soil organic carbon and the C:N ratio decreased as the climate became drier. High soil nitrogen was associated with two sites used by animals; another exhibited low soil nitrogen. Ammonium and nitrate were higher in the north (wetter) and beneath tree canopies. 'Fertility islands' may be forming on heavily used sites.

## **To be Submitted**

1. Otter, LB, Scholes, RJ, Dowty, P, Privette, J, Caylor, K, Ringrose, S, Mukelabai, M, Totolo, O, Frost, P, and Veenendaal, E. The SAFARI 2000 Wet season campaigns. To be submitted to SAJS

The Southern African Regional Science Initiative (SAFARI 2000) is an experiment designed to investigate the emission, transport, transformation and deposition of trace gases and aerosols in southern Africa. This project involved two wet season and one dry season campaign and this paper discusses the wet season campaigns. The first field campaign was conducted at five sites along the Kalahari Transect in Zambia (Kataba Forest) and Botswana (Pandamatenga, Maun, Okwa River Crossing, Tshane) during February 2000 and concentrated on characterization of the land surface with respect to exchanges of matter and energy with the atmosphere. The second campaign, conducted in February 2001, was focused around canopy fluxes at Maun, Botswana and at Skukuza in the Kruger National Park, South Africa. Brief site descriptions, measurements made and the methods used are given in this paper. Some preliminary results, particularly from the first campaign, are also highlighted. The final stages of the SAFARI 2000 project are outlined.

2. Aranibar, JN, Otter, LB, Macko, S, Feral, CJW, Dowty, P, Shugart, HH, and Epstein, H. Nitrogen cycling along the KT transect. To be submitted to Global Change Biology. Also to be presented at the IGBP Open Science Conference in Amsterdam in July 2001.

Nitrogen cycling is affected by precipitation and both can limit primary productivity. In this study, nitrogen cycling is analyzed along a rainfall gradient in the Kalahari region of Southern Africa. Stable isotope signatures integrate all the N cycling processes and were determined for plant samples. Soil-plant N pools, biogenic N inputs and NO soil emissions were also analyzed. Nitrogen is more <sup>15</sup>N enriched in arid than in humid areas, indicating higher losses or lower inputs, relative to turnover as precipitation decreases. Soil organic carbon and nitrogen decrease with aridity, and soil nitrogen heterogeneity is determined by the influence of different plant functional types. Biogenic N inputs are given by symbiotic and cyanobacterial N fixation, which are more important in humid and dry areas

respectively. Symbiotic N fixation, as indicated by foliar  $\delta^{15}\text{N}$ , is almost absent in arid areas, even though Mimosoideae species dominate. Soil NO emissions increase with temperature and moisture and are therefore NO fluxes are estimated to be slightly lower in drier areas. The lower organic matter and N fixation in arid areas can explain the high  $\delta^{15}\text{N}$ , and seem to have a stronger effect than NO emissions, although other soil N emissions could also affect the isotopic signatures.

3. Otter, LB, Guenther A, and Greenberg, J. Seasonal and spatial variations in biogenic hydrocarbon emissions from southern African savannas and woodlands. To be submitted to Atmospheric Environment.

Biogenic VOC emissions are an important component of the global VOC budget, contributing more than 90%. Emissions vary with species and vegetation type, therefore to produce accurate global budgets data is required from different vegetation types. This study investigates VOC emissions from savannas, Kalahari woodlands and Mopane woodlands in southern Africa. VOC emission samples from individual species were collected using leaf cuvettes and the VOC concentrations were determined by GC-FID/MS. Ten of the 14 woodland species measured were high isoprene emitters, while 2 showed high monoterpene emission capacities. Landscape average isoprene emission capacities were estimated to be  $0.59 - 8.7 \text{ mg C m}^{-2} \text{ h}^{-1}$  for savannas,  $0.69 - 8.23 \text{ mg C m}^{-2} \text{ h}^{-1}$  for woodlands and  $0.7 \text{ mg C m}^{-2} \text{ h}^{-1}$  or shrublands. The monoterpene emission capacity for Mopane woodlands were estimated between  $2.4$  and  $3 \text{ mg C m}^{-2} \text{ h}^{-1}$ , while for other landscapes it varied between  $0.04$  and  $3.0 \text{ mg C m}^{-2} \text{ h}^{-1}$ . Isoprene and monoterpene emissions at a savanna site in South Africa showed a seasonal variation, which is more pronounced for isoprene. During the winter (June to September) estimated emissions were  $<5 \text{ mg C m}^{-2} \text{ d}^{-1}$ , with peak emissions occurring during the summer months (December to March) when foliar density peaked. The total VOC emission from southern African (south of the equator) savannas was estimated to be in the range of  $17.6$  and  $73.9 \text{ Tg C yr}^{-1}$ .

## INDIVIDUAL PROJECT PROGRESS AND SUGGESTED COLLABORATIONS

LEAD SAFARI 2000 Quarterly  
Progress Report

Prepared by Leon Herbert 20 May  
2000 as subsection of projects of Wits  
– HJ Annegarn

Title of Project

**Data Management and Web Page  
Safari 2000.**

Principal Investigators

Prof Harold Annegarn, Mr. Leon Herbert, Dr  
Robin Harris

What has been done so far on your  
project?

The website is fully functional all data that  
has been made available up to date has been  
placed on the web page. A user registration  
form exists that keeps all the registration  
information in a database. Up to date there  
are 96 registered users. The geospatial  
server is serving the data that was obtained  
during the Safari 2000 intensive campaign.  
The web page is divided into a users section  
and a visitor's section. Both section give  
detailed descriptions of the SAFARI 2000  
project.

Which, if any, field campaign did you  
take part in?

Dry season campaign, August September  
2000. I was based at the Pietersburg Airport  
during this period, responsible for the  
network of all computers at the airport and  
running of the web page, collection of MAS  
data and AVHRR satellite downloads.  
Less than 1%

What percentage of your data from  
these campaigns have you analyzed?  
What are the actual outputs (data  
sets/reports/publications/conferences  
attended) so far?

The full Safari 2000 web page at  
[www.safari2000.org](http://www.safari2000.org) This includes all the MAS  
data that was processed during and after the  
intensive. AVHRR data that was received  
during the intensive and placed on the web  
site.

What still has to be done and when  
will it be done by?

The web site will be migrating to the National  
Disaster Management Center in Pretoria,  
which has far better facilities for handling the  
large amounts of data that we will be  
receiving in the future. The web page will be  
converted to a fully database driven entity  
that will allow quicker and better access to  
data, improved search ability. This process  
should take approximately 2 months to  
complete in total. The daily MODIS  
downloads that will be starting shortly will be  
incorporated into the website shortly and  
users will be able to search this data and  
order it as well. It will take approximately 2  
months to get this procedure in place. When  
the MAS data from the campaign is delivered  
to us, we will place it on the Geospatial  
database with the data that is residing there  
presently, this data will also be searchable  
and can be ordered by the wider Southern

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What, if any, information do you still need from other participants?

Suggestions/desires for future collaborations with other participants on scientific papers.

Other comments.

African community. The upper atmospheric air trajectories will be placed onto the website and users will be able to query different periods of the campaign and view the trajectories on the website in real time. This data will also be downloadable. Again at least a 2-month period is required to acquire catalogue and display this data. A separate student registration database will be set up to protect student data. This data will be viewable from the web page. A database viewable from the web will be created listing upcoming conferences, any presentations given and any publications that should arise from Safari 2000.

There are large amounts of data outstanding from all participants, but as the analysis and interpretation of this data takes time this is to be expected. We require actual figures of all data that was collected during the intensive as we only have approximations at present. The data also needs to be made available in a format that will be understood by all and this requires liaison between the data originators and the safari 2000 data management team,

Would like to write research papers into data management of large-scale scientific projects and how to improve on the data management process.

The efficient management of the data emanating from this project requires the skills of dedicated people and resources. I feel that there is an extremely urgent need to make available the resources necessary to ensure that this data is managed efficiently in the future. This requires further long term funding. If this is not done it will result in the loss of potentially very important data sources that can be used for many diverse purposes for at least the next two decades.

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<b>Title of Project</b>	<b>Anthropogenic emissions</b>
<b>Principle Investigator</b>	Gavin Fleming & Marna van der Merwe
<b>What has been done so far on your project?</b>	A model has been developed to create monthly driver surfaces and emission surfaces for anthropogenic emissions of various greenhouse gases and SO <sub>2</sub> from various point and area sources, extrapolating from 1990 Greenhouse gas inventory data..
<b>Which, if any, field campaign did you take part in?</b>	None
<b>What percentage of your data from these campaigns have you analyzed?</b>	N/a
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	I presented this paper at the ESRI 2000 User Conference in San Diego.  <a href="http://www.esri.com/library/userconf/proc00/professional/papers/PAP896/p896.htm">http://www.esri.com/library/userconf/proc00/professional/papers/PAP896/p896.htm</a>  The outputs are a model in ArcInfo AML and ArcInfo GRIDs of emissions.
<b>What still has to be done and when will it be done by?</b>	We held a workshop with APINA representatives from other southern African countries in August 2000. More inventory and driver data was obtained. Funding has been insufficient to work on that however. If there is funding then I would like to tie all that up as well as polish off deliverables to submit to the SAFARI data server.
<b>What, if any, information do you still need from other participants?</b>	This request is pointless unless there are funds to do more work – but improved inventory data and spatial and temporal driver data would improve the emission surfaces.
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	With anyone who wants to use these emission surfaces as model inputs
<b>Other comments</b>	

<b>Title of Project</b>	<b>Contribution of domestic biofuel combustion to Nox, Co, CO2 and CH4 emissions in southern Africa</b>
<b>Principle Investigator</b>	Lackson Tambaoga Marufu
<b>What has been done so far on your project?</b>	Field Work – Complete Data Entry & Analysis – Complete
<b>Which, if any, field campaign did you take part in?</b>	Biofuel burning activity level survey
<b>What percentage of your data from these campaigns have you analyzed?</b>	100%
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	National activity level data set
<b>What still has to be done and when will it be done by?</b>	-Creation of a grided emission inventory – 30/7/2001 -Write-up – 30/8/2001
<b>What, if any, information do you still need from other participants?</b>	- National population distribution from Botswana, Malawi, Mozambique, Namibia, RSA, and Zambia
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	Nil
<b>Other comments</b>	Nil

<b>Title of Project</b>	<b>Leaf Area Index in southern Africa</b>
<b>Principle Investigator</b>	Bob Scholes
<b>What has been done so far on your project?</b>	Detailed measurements at 6 Kalahari sites (March 2000). Bi-monthly measurements at Skukuza site, 200/2001. Modelling of leaf area optimisation
<b>Which, if any, field campaign did you take part in?</b>	Kalahari Feb 2000, Skukuza Jan 2001
<b>What percentage of your data from these campaigns have you analyzed?</b>	Close to 100%
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	Paper submitted J Veg Science Paper in Prep for GCB 2 posters to be at IGBP Open science meetin July 2001
<b>What still has to be done and when will it be done by?</b>	Downloading and validation of MODIS LAI product. July 2001
<b>What, if any, information do you still need from other participants?</b>	LAI data using TRAC, LICOR and photography from other KT participants (Privette, Yujie, Roberts)
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	The GCB papers should cover this
<b>Other comments</b>	

<b>Title of Project</b>	<b>Emissions from vegetation fires</b>
<b>Principle Investigator</b>	Bob Scholes
<b>What has been done so far on your project?</b>	Modification of the SAFIRE model for predicting emissions
<b>Which, if any, field campaign did you take part in?</b>	Sept 2000; participated in some fires (Tobi Landman was lead)
<b>What percentage of your data from these campaigns have you analyzed?</b>	Not applicable
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	None so far
<b>What still has to be done and when will it be done by?</b>	Acquisition of weather data 2000-2001 Download Modis burned area maps Run model August 2001
<b>What, if any, information do you still need from other participants?</b>	Modis burned area from UMD Daily rainfall data Jul 1999-Jun2001 from NOAA
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	Would like to collaborate with groups who have done atmospheric load measurements or models for fire products: especially CO, smoke particles.
<b>Other comments</b>	

<b>Title of Project</b>	<b>VOC emissions from southern African vegetation</b>
<b>Principle Investigator</b>	Luanne Otter
<b>What has been done so far on your project?</b>	
<b>Which, if any, field campaign did you take part in?</b>	Wet season campaigns in February 2000 and 2001
<b>What percentage of your data from these campaigns have you analyzed?</b>	80% of the emission data has been analysed
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	<ul style="list-style-type: none"> <li>▪ Paper on seasonal and landscape VOC emissions to be submitted to Atmos. Environ. in the next month</li> </ul>
<b>What still has to be done and when will it be done by?</b>	
<b>What, if any, information do you still need from other participants?</b>	LAI data; PAR data; Temperature data for the region.
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	Could possibly collaborate with researchers involved in land use change – look at future land use change prediction effects on emissions. Researchers who did any aircraft measurements.
<b>Other comments</b>	

<b>Title of Project</b>	<b>NO emissions from soils in southern Africa.</b>
<b>Principle Investigator</b>	Luanne Otter
<b>What has been done so far on your project?</b>	<ul style="list-style-type: none"> <li>▪ Set up a laboratory soil incubation chambers;</li> <li>▪ Determined soil nitrogen concentrations along Kalahari Transect;</li> <li>▪ Analyzed NO fluxes from soils along Kalahari Transect in the laboratory;</li> <li>▪ Obtained and assessed models for producing soil moisture and temperature maps over southern Africa;</li> <li>▪ Obtained some emission data (literature/ researchers) for other southern Africa sites;</li> <li>▪ Andrew Wogherin (student) has collected some soil NO flux data from the Skukuza site.</li> </ul>
<b>Which, if any, field campaign did you take part in?</b>	Wet season campaign in 2000 and in 2001
<b>What percentage of your data from these campaigns have you analyzed?</b>	100% but now I need to do the modelling
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	<ul style="list-style-type: none"> <li>▪ Paper on wet season campaigns – to be submitted in next month to SAJS;</li> <li>▪ Paper on soil nitrogen along the Kalahari transect was submitted to J. Arid Environments;</li> <li>▪ Paper on NO fluxes is to be submitted to GCB in the next month;</li> <li>▪ The above mentioned paper is to be presented at the IGBP Open Science conference in July.</li> </ul>
<b>What still has to be done and when will it be done by?</b>	<ul style="list-style-type: none"> <li>▪ Complete tables of emission factors for the various vegetation/ soil types in the region (mid June);</li> <li>▪ Complete the regional soil temperature, soil moisture and NO emissions program (end June);</li> <li>▪ Obtain climatic data from NOAA to run model (July);</li> <li>▪ Produce first NO emission maps for the southern African region (mid August);</li> <li>▪ Produce monthly NO emission surfaces for southern Africa between July 2000 and July 2001 (September).</li> </ul>
<b>What, if any, information do you</b>	Daily ambient temperature and rainfall data for the

<b>still need from other participants?</b>	whole region – can get this from other models but might obtain data from NOAA at the end of July.
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	Possibly collaborate with Ana Pinheiro with her soil moisture and temperature data; Collaborate with scientist who did NO measurements from the aircraft; General collaboration with pyrogenic and anthropogenic emissions people to determine over all emissions in the region.
<b>Other comments</b>	

<b>Title of Project</b>	<b>Sunphotometer Measurements at Bloemfontein</b>
<b>Principle Investigator</b>	Hartmut Winkler
<b>What has been done so far on your project?</b>	Sunphotometry at De Aar. Observations completed. Analysis of 1998/9 data completed. Analysis of 2000 data in progress.
<b>Which, if any, field campaign did you take part in?</b>	Sunphotometry from De Aar.
<b>What percentage of your data from these campaigns have you analyzed?</b>	1998/9 (Sutherland) data analysis complete. 2000 data analysis ~30% complete.
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	None.
<b>What still has to be done and when will it be done by?</b>	Completion of analysis of 2000 data (June). Submission of paper on 1998/9 photometry (June). Submission of paper on 2000 data (December)
<b>What, if any, information do you still need from other participants?</b>	N/A
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	Started aerosol sampling project with Antwerpen and Venda Universities and SAWB. Impactor sampling since November 2000. Intensive field campaign in July-August 2001.
<b>Other comments</b>	The site of the SA Weather Bureau station at De Aar was chosen instead of Bloemfontein for the 2000 measurements. Before 2000 measurements were carried out at Sutherland.

## **Airborne aerosol sampling**

All data collection with the aircraft have now been completed. Four field campaigns have been conducted in total, March 1999, September 1999, August 2000 and March 2001. All the data have been quality controlled and are available on CD. Data analysis is in progress. Current themes being investigated are:

1. Vertical distribution of aerosols over southern Africa
2. Cloud microphysical processes as derived from aircraft measurements and satellite.
3. Parametrisation of cloud processes
4. Spatial distribution and characteristics of atmospheric aerosols over southern Africa.

## **Transport modelling in southern Africa**

The aim of this project is to provide atmospheric transport information to interpret the chemical and other data collected on the airborne platforms and at the ground based sites. All the data has been acquired. Data from ECMWF and ETA data from the Weather Bureau are available for the study periods. The trajectory model has been modified to operate with both the input data sets. Currently work is underway to compile a trajectory climatology of transport from the Zambian Copperbelt as well as a comprehensive transport field for every day of the intensive flight campaign during August and September 2000.

<b>Title of Project</b>	<b>Wet deposition</b>
<b>Principle Investigator</b>	Mr JN Mphepya
<b>What has been done so far on your project?</b>	Data collection and synthesis
<b>Which, if any, field campaign did you take part in?</b>	None
<b>What percentage of your data from these campaigns have you analyzed?</b>	80%
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	Precipitation chemistry in a remote site of Southern Africa.
<b>What still has to be done and when will it be done by?</b>	Get data from other sources.
<b>What, if any, information do you still need from other participants?</b>	Gaseous and Chemical aerosol composition.
<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	
<b>Other comments</b>	SKUKUZI site will be closed as from 1 July 2001

<b>Title of Project</b>	<b>Atmospheric chemistry modelling of N and S deposition processes</b>
<b>Principle Investigator</b>	JJ Pienaar (Kobus)
<b>What has been done so far on your project?</b>	<ul style="list-style-type: none"> <li>▪ Atmospheric chemistry models (ACM) developed</li> <li>▪ ACM coupled to trajectory models</li> <li>▪ Two PhD students enrolled to perform most of the proposed work</li> <li>▪ PhD student trained in the use of the SCAPE model</li> <li>▪ Collecting of data for modelling initiated</li> </ul>
<b>Which, if any, field campaign did you take part in?</b>	Some data collecting was done during the August 2000 winter campaign
<b>What percentage of your data from these campaigns have you analyzed?</b>	About 70%
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	<ul style="list-style-type: none"> <li>▪ Computer models</li> <li>▪ Data from the August 2000 winter campaign</li> </ul>
<b>What still has to be done and when will it be done by?</b>	<ul style="list-style-type: none"> <li>▪ Report on August 2000 winter campaign has still to be written</li> <li>▪ Students have to fully familiarise them with models</li> <li>▪ Emission data has to be obtain from other projects</li> <li>▪ Modifying a Lagrangian Eulerian Diffusion (LED) model to be applicable for use under southern African conditions and updating it with the latest results in the non-local paramertization of the CBL</li> <li>▪ Coupling of the ACM to the LED model</li> </ul>
<b>What, if any, information do you</b>	<ul style="list-style-type: none"> <li>▪ All information on emissions in the region</li> </ul>

<p><b>still need from other participants?</b></p>	<p>from other collaborators.</p> <ul style="list-style-type: none"> <li>▪ Data on aerosol composition urgently needed for running the SCAPE model</li> <li>▪ All the available meteorology data for the modelled periods</li> <li>▪ Field data for comparison and evaluation purposes</li> </ul>
<p><b>Suggestions/desires for future collaborations with other participants on scientific papers.</b></p>	<p>Since modelling is a data hungry exercise, collaboration with many participants is envisaged</p>
<p><b>Other comments</b></p>	<p>Since significant progress in modelling can only be made once all the data has been collected, it is envisaged that this project will not be completed before the end of 2002</p>

<b>Title of Project</b>	<b>Monitoring NO<sub>2</sub>, SO<sub>2</sub>, NH<sub>3</sub> and O<sub>3</sub> gaseous concentrations at ten remote sites in southern Africa</b>
<b>Principle Investigator</b>	JJ Pienaar (Kobus)
<b>What has been done so far on your project?</b>	<ul style="list-style-type: none"> <li>▪ Manufacture passive samplers and sampler stands for a suitable network</li> <li>▪ Set up a network in southern Africa</li> <li>▪ Monitoring and reporting NO<sub>2</sub>, SO<sub>2</sub>, NH<sub>3</sub> and O<sub>3</sub> gaseous concentrations since November 1999</li> <li>▪ Perform intercomparison experiments between active and passive samplers</li> <li>▪ Perform data verifications on data collected for November 1999 to July 2000</li> </ul>
<b>Which, if any, field campaign did you take part in?</b>	Continues program initially proposed to run from July 1999 to December 2000 but being modified to run from December 1999 to December 2000
<b>What percentage of your data from these campaigns have you analyzed?</b>	About 60% of the overall project
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	<ul style="list-style-type: none"> <li>▪ Data sets (Monthly mean concentrations of selected atmospheric pollutants)</li> <li>▪ Data mainly intended to be use in combination with other projects but conference contributions and a final overview paper are planned</li> </ul>
<b>What still has to be done and when will it be done by?</b>	<ul style="list-style-type: none"> <li>▪ The measuring campaign will be completed by December 2001</li> <li>▪ Data verification are done within 3 months after samplers have been analysed</li> <li>▪ The envisaged date of complete data set is May 2002</li> </ul>
<b>What, if any, information do you still need from other participants?</b>	None, although comparison to all other available monitoring data would in the end be of value

<p><b>Suggestions/desires for future collaborations with other participants on scientific papers.</b></p>	<p>Since the aim of this project is mainly to provide data to other initiatives, access to other data sets and discussions with other participants in data synthesis workshops can be fruitful for determining possible collaborative scientific outputs.</p> <p>The added value of outputs from this initiative is to be found the comparison and synthesis of this data with emission data sets and modelling exercises.</p>
<p><b>Other comments</b></p>	<p>The withdraw of government support to the wet deposition project (KJV) impacted strongly on the logistic support for this project and although the monitoring will be carried out for an extended period (2 years instead of 18 months), not all the sites initially envisaged are operational.</p>

<b>Title of Project</b>	<b>Modelling of N and S dispersion and deposition</b>
<b>Principle Investigator</b>	Mark Zunckel
<b>What has been done so far on your project?</b>	<ul style="list-style-type: none"> <li>▪ Prepared model ready topographical and land for the study domain</li> <li>▪ Prepared 2000 meteorological surface and upper air data in model ready format for selected weather stations over South Africa.</li> <li>▪ Obtained NCEP Global Analysis data for 2000 to cover the data sparse areas over the remainder of the study domain.</li> <li>▪ Set up and tested the MM5 model to convert the coarse NCEP data to the required grid resolution for CALPUFF modelling. Test run for January 2000 has been satisfactorily completed</li> <li>▪ Prepared SO<sub>2</sub> and NO<sub>x</sub> data the emission inventory compiled in the sub-project (Gavin Flemming) into model ready format.</li> </ul>
<b>Which, if any, field campaign did you take part in?</b>	None
<b>What percentage of your data from these campaigns have you analyzed?</b>	N/A
<b>What are your actual outputs (data sets/reports/publications/conferences attended) so far?</b> <i>[Please attach a list of submitted abstracts or research titles for papers that are to be submitted in the next 6-8 months.]</i>	No outputs have been generated so far.
<b>What still has to be done and when will it be done by?</b>	<ul style="list-style-type: none"> <li>▪ Configure CALPUFF to read MM5 derived data (May/June).</li> <li>▪ Include biogenic SO<sub>2</sub> and NO<sub>x</sub> emissions data in the emission file (July).</li> <li>▪ Commence model runs to produce monthly average dispersion and deposition plots (Aug-Dec).</li> </ul>
<b>What, if any, information do you still need from other participants?</b>	Biogenic emission data.
	Possible collaboration with George Djolov on future

<b>Suggestions/desires for future collaborations with other participants on scientific papers.</b>	regional-scale modelling. Continued collaboration with scientists involved in determining emissions in the region.
<b>Other comments</b>	