

DRAFT AS OF 7/28/00

OPERATIONS HANDBOOK

for

SAFARI 2000 Dry Season Campaign

12 August – 26 September 2000

Version 1.0

July 28, 2000

**SAFARI 2000 Dry Season Campaign
12 August – 26 September 2000**

OPERATIONS HANDBOOK

TABLE OF CONTENTS

- 1.0 OPERATIONS OVERVIEW**
- 2.0 CAMPAIGN ORGANIZATION**
- 3.0 PLANNING, AND COORDINATION MEETINGS**
 - 3.1 Daily Operations Planning Meeting**
 - 3.2 Flight-day Meetings**
 - 3.3 Periodic Reviews**
- 4.0 REPORTS AND SUMMARIES**
 - 4.1 Daily Reports**
 - 4.2 Daily Reporting Guidelines and Timeline**
 - 4.3 Mission Summaries**
- 5.0 AIRCRAFT OPERATIONS**
 - 5.1 Aircraft Platforms**
 - 5.2 Aircraft Schedules & Constraints**
 - 5.3 Generic Flight Plans**
 - 5.4 Aircraft Communications**
- 6.0 SURFACE OPERATIONS**
 - 6.1 Skukuza Airport**
 - 6.2 Skukuza Tower**
 - 6.3 Mongu Tower**
 - 6.4 Maun Tower**
 - 6.5 Etosha**
 - 6.6 Sua Pan**
 - 6.7 Prescribed Burns - –Mongu Box”**
 - 6.8 AERONET**
 - 6.9 Rawinsonde Network**
 - 6.10 Other Sites of Interest**
- 7.0 SATELLITE OBSERVATIONS**
 - 7.1 General Satellite Information**
 - 7.2 Terra**
 - 7.3 Satellite Acquisitions for Core Ground Sites**
 - 7.4 AVHRR Near Real time Fire Products**
 - 7.5 Meteosat**
- 8.0 COMMUNICATIONS**
 - 8.1 Overview**
 - 8.2 Telephones and Fax**
 - 8.3 Cellular Telephones**
 - 8.4 Internet**
 - 8.5 Telephone Policy**
 - 8.6 Satellite Phones (Iridium)**
 - 8.7 Web Pages**

9.0 DATA MANAGEMENT

9.1 Overview

9.2 Mercury

9.3 CD-ROMs

9.4 Data Responsibilities

9.5 Best Practices for Preparing Ground-based Data Sets

10.0 KEY CONTACTS AT PIETERSBURG OPS CENTER

(Complete list of contacts with itineraries is available in a separate document entitled "Master S2K Itinerary List")

APPENDICES

APPENDIX A -- DAILY MISSION SUMMARY -- LOG FORM

APPENDIX B -- WEATHER FORECAST -- LOG FORM

APPENDIX C -- SURFACE SITE -- LOG FORM

1.0 Operations Overview

The Southern African Regional Science Initiative (SAFARI 2000) is an international science project involving Australia, Belgium, Botswana, France, Germany, Lesotho, Malawi, Mozambique, Namibia, Portugal, South Africa, Swaziland, Sweden, the United Kingdom, the United States, Zambia, and Zimbabwe. The largest component of SAFARI 2000 is the regional field experiment to be conducted in southern Africa in August and September of 2000.

The main objectives of SAFARI 2000 are:

1. To provide in-situ data (from ground-based measurements and aircraft) that can be used to check the validity of various remote sensing measurements of the atmosphere and land surface obtained from the NASA EOS Terra satellite and the high-flying NASA ER-2 aircraft.
2. To obtain measurements needed to evaluate the contributions of emissions from biogenic, biomass burning and industrial sources to the sub-continental haze over southern Africa.
3. To study the evolution of the regional haze during its transports in a counter-clockwise atmospheric gyre over the sub-continent.
4. To study marine stratus clouds off the coast of Namibia

Given this overview, the Intensive Flying Campaign (IFC) will have three main spatial and temporal emphases: eastern southern Africa (Aug 13th – Aug 29th); central southern Africa (Aug 31st – Sept 6th) and western southern Africa (Sept 10th – Sept 23rd). Operationally, priority will be placed on the validation of the EOS Terra Satellite through the coordinated deployment of the ER-2, in-situ aircraft and validation core ground sites, within the conceptual framework of the scientific objectives of SAFARI 2000.

2.0 Campaign Organization

Lead Campaign Scientist(s) - King, Scholes, Annegarn, Swap, Privette

Daily Mission Scientist (& Deputy) – TBD on a daily basis

A/C Scientists – ER-2 (King, Platnick, Ackerman);
CV-580 (Hobbs);
Aero JRA (Piketh);
Aero JRB (Swap)
UKMO C-130 (Francis)

Surface/Fire Scientist – Otter, Privette, Ward

Data Management – Cook, Herbert, Nickeson, Landis, Ezigbalike

Operations Coordinator – Suttles, Annegarn

ER-2 Mission Managers – Shelton, Klein, Montoya, Jones

Meteorology Scientists – South African Weather Bureau, Botswana Meteorology Department, Zimbabwe Meteorological Services, Zambian Meteorological Department.

Satellite Coordinators –SAWB, GSFC, Rep from SAC,

3.0 Briefing, Planning, and Coordination Meetings

3.1 Daily Operations Planning Meeting

The Dry Season Campaign Operations Coordinator will convene and chair a daily operations planning meeting at the Pietersburg operations site. The initial meeting will occur after completion of the Final Readiness Review. These meetings will involve the lead scientists, principal investigators, science coordinators, aircraft managers, aircraft & instrument scientists, meteorology scientists, data managers, logistics coordinators, and other personnel that are at the operations site. The Daily Operations Planning Meetings will be open. The meetings will be held between at approximately 1400 on non-flight day and approximately 1500 on flight days. See section 5.2 for the daily schedules.

The agenda will include:

- 1) Reports
 - +general updates (Operations Coordinator)
 - +operations during previous 24 hours (Daily Mission Scientists for Prior day)
 - +status of platforms, instruments, and resources (Aircraft Managers, Instrument PIs, and Logistics Coordinators)
 - +evaluations of previous operations (Lead Scientists);
 - +reports from remote sites (Surface/Fire Scientist)
- 2) Weather and surface conditions
 - +weather briefing and forecast (SAWB)
 - +reports from ground sites on meteorological conditions (Surface/Fire Scientist)
 - +report on fire distribution patterns (Surface/Fire Scientist)
- 3) Proposed operations
 - +selection of Daily Mission Scientist (DMS)
 - +aircraft flight plans (including primary and alternate flight tracks) (DMS)
 - +operations at remote sites, including prescribed burns (Surface/Fire Scientist)
 - +instrument failures causing no-go (Aircraft Scientists)
- 4) Discussion
 - +compatibility among proposed operations plans (LCS)
 - +progress towards SAFARI 2000 objectives (LCS)
- 5) Recommendations
 - +operations for the next 24 hours, including primary and alternate mission.

3.2 Flight-day Meetings

A very brief GO/NO GO meeting will be held at least 3 hours (for the ER-2 operations) and 2 hours (for all other operations) before each flight to review the latest weather information, review the flight plans, instrument status, and make a go/no-go decision. This meeting will NOT be used to attempt major alteration to the prime flight plan. The following should be in attendance: Pilots, Mission Manager, Lead Forecaster (or delegate), Daily Mission Scientist and Deputy, aircraft facility personnel, and PI's that plan to be on the flight. The Daily Mission Scientist will chair the meeting.

After each flight a debriefing will be held to review all aspects of the mission from weather conditions to instrument performance. The following persons are expected to attend: Daily Mission Scientist, Operations Coordinator, ER-2 Pilot, Mission Manager, Aircraft Scientists, and PI's that were on the flights. The debriefing may be held inconjunction with the Planning Meeting for subsequent missions if appropriate.

3.3 Periodic Reviews

Before, after, and during the campaign, periodic review meetings will be conducted.

Final Readiness Review / Open House

There will be a Final Readiness Review at Pietersburg on 11 August 2000. This review will assess the readiness of the Dry Season Campaign airborne and ground-based platforms and instruments and assure coordination of plans and support arrangements with the participants. After the Final Readiness Review has established all systems readiness, the Initial Mission Planning Meeting will be conducted, if possible. A press conference and open house will be held on 12 August.

Interim Campaign Review

There will be an interim campaign review at Pietersburg on about 28 August 2000. This review will assess the progress of the campaign, including mission objectives attained, aircraft flights, resources remaining, and yet-to-be attained objectives. The review is estimated to last 2 to 3 hours. The principal investigator of each platform or major instrument, or a cognizant replacement, should plan to attend.

4.0 Daily Reports and Mission Summaries

4.1 Daily Reports

A Daily Operations Summary, prepared by the Operations Coordinator, will describe scheduled operations for that day, and will be distributed to all sites by e-mail/fax. The report will contain details of the aircraft operations, including overflights, times of satellite overpasses, and other pertinent information. To permit adequate preparation of the surface-based sensors, the status message should outline operations in advance to the maximum degree possible, or at least by 9:30 a.m.

All airborne platforms and sites are requested to submit by e-mail /fax a once-daily summary of instrument operations, instrument status, frequency of operations, observer notes, data acquisition etc. to the Pietersburg Operations Center by 10 a.m. local time the day following the mission using the format in Appendix A, B, & C.

All surface sites should submit a surface report to the Surface Scientist in Pietersburg by 12 noon. Information desired for that day includes: surface temperature, estimated visibility, cloud cover and heights, etc.

4.2 Daily Reporting Guidelines and Timeline:

To facilitate exchange of information, Pietersburg participants should use 'ZIP 100 MB Disks' initialized in DOS format. Briefing materials should be prepared in 'PowerPoint' with .ppt extension on the files. It is desirable that remote site inputs be submitted as e-mail attachments, if possible, and use regular e-mail/fax as alternate.

- 9:30 a.m. Daily Operations Summary distributed by Operations Coordinator, giving scheduled operations for that day to all sites by e-mail/fax.
- 10:00 a.m. Airborne/surface site daily summary for previous day giving instrument operations, instrument status, frequency of operations, observer notes, data acquisition etc. to the Pietersburg Operations Center

12 noon Surface sites e-mail a surface report to the Surface Scientist in Pietersburg. Follow up phone call at about 1:00 pm.

This information will provide the status information for the daily planning meeting in the afternoon/evening and will be included in the subsequent Daily Mission Summary. The Daily Mission Summary, prepared by the DMS, utilizing the once-daily summaries described above, will cover results of planned and unplanned operations for the prior day. Also to be included is an assessment of the degree to which planned and/or unplanned campaign objectives were accomplished.

4.3 Daily Mission Summaries

A Daily Mission Summary will be completed for each day there are aircraft flights and for non-flight days during which there are significant or noteworthy activities. The summary will include the mission objectives, mission description, meteorological conditions, description of operations for each participating aircraft, description of surface operations, significant platform/instrument problems, mission highlights, and evaluation of the success of the mission. In addition, satellite images, aircraft flight patterns, satellite overpass information and any other pertinent printed information concerning the mission will be attached to the summary. Appendix A gives the log form that will be used. The Daily Mission Summary will be prepared by the DMS, with assistance from the OC. It will be posted within 72 hours after operations and will become part of the Dry Season Campaign data archive.

5.0 Aircraft Operations

5.1 Aircraft Platforms

Aircraft (Sponsor)	Duration, hrs Range, nm	Altitude, ft	Base/ Flight Period	Flight Hrs No. Flights
NASA ER-2 (EOS)	6 - 7 2600	65,000	Pietersburg, RSA Aug 13 – Sept 26	100 14
UW Convair 580 (EOS/NSF)	5hrs, 300nm for 1_ hrs on station 3000		Pietersburg, RSA Aug 13 – 29; Sept 6 - 9	
			Aug 31 – Sep 5 Lusaka, Zambia	
			Sep 12 - 22 Walvis Bay, Namibia	
Aerocommander JRA			Pietersburg, RSA Aug 13 – Sept 9	
Ward/Jury Intensive			Kasane, Botswana Sept 11 – Sept 23	
Aerocommander JRB			Pietersburg, RSA Aug 13 – Sept 9	
C-130 (UKMO)			Windhoek, Namibia Sept 2 - 19	

5.2 Aircraft Schedules

DATE	ACTIVITIES				
	ER-2	CV-580	A-690A JRA	A-690A JRB	UKMO C-130
1 August					
2					
3	Deadline C-141 Pallet Loading				
4	C-141 Departs Dryden				
5					
6					
7		CV-580 Arrives Pietersburg			
8		CV-580 Installations			
9	C-141 Arrives Pietersburg	CV-580 Installations			
10	C-141 unloading	CV-580 Installations	JRA arrives Pietersburg	JRB arrives Pietersburg	
11	ER-2 Arrives Pietersburg	CV-580 Test Flight			
12	OPEN HOUSE Pietersburg	OPEN HOUSE Pietersburg	OPEN HOUSE Pietersburg	OPEN HOUSE Pietersburg	
13					
14	1 st Flight	1 st Flight	1 st Flight	1 st Flight	
15	Pietersburg Flights Cont.	Pietersburg Flights Cont.	Pietersburg Flights Cont.	Pietersburg Flights Cont.	
16	“	“	“	“	
17	“	“	“	“	
18	“	“	“	“	
19	“	“	“	“	
20	“	“	“	“	
21	“	“	“	“	
22	“	“	“	“	
23	“	“	“	“	
24	“	“	“	“	
25	“	“	“	“	
26	“	“	“	“	
27	“	“	“	“	
28	“	“	“	“	
29	“	“	“	“	
30	“	CV-580 transit to Lusaka	“	“	
31	“	1 st Possible Flight Lusaka	“	“	

DATE	ACTIVITIES				
	ER-2	CV-580	A-690A JRA	A-690A JRB	UKMO C-130
1 September	Pietersburg Flights Cont.	Lusaka Flights Continue	Pietersburg Flights Cont.	Pietersburg Flights Cont.	
2	“	“	“	“	1 st Windhoek Flight
3	“	“	“	“	Windhoek Flights Cont.
4	“	“	“	“	“
5	“	“	“	“	“
6	“	Lusaka to Pietersburg	“	“	“
7	“	Pietersburg Flights	“	“	“
8	“	“	“	“	“
9	“	“	“		“
10	“	Transit to Walvis Bay	“	End Pietersburg Flights	“
11	“	Setup at Walvis Bay	Transit to Kasane, Bots.		“
12	Namibian Stratus Flights	Walvis Bay Flights	Kasane Flights Begin		“
13	“	“	“		“
14	“	“	“		“
15	“	“	“		“
16	“	“	“		“
17	“	“	“		“
18	“	“	“		“
19	“	“	“		Last Windhoek Flight
20	“	“	“		
21	“	“	“		
22	“	“	“		
23	“	Transit to Pietersburg	Kasane Flights End		
24	Last Pietersburg Flight	Pack for return			
25	C-141 Arrives	Depart for U.S.			
26	Pallet Loading				
27	C-141 Departs				
28					
29					
30					

C-141 Pietersburg AIRLIFT schedule:

Ferry to Pietersburg South Africa from NASA Dryden

31 JUL – 4 AUG Palletize Equipment

***ALL SCIENTISTS MUST HAVE EQUIPMENT
PALLETIZED FOR LOADING NLT 4 AUG***

3 AUG Aircraft pallet loading (all Equipment)

5 AUG Depart NASA Dryden to Pietersburg South Africa

9 AUG Arrive Pietersburg South Africa

9 AUG Meet customs at 1200L

10 AUG Unload

12 AUG Depart Pietersburg

Ferry to NASA Dryden from Pietersburg South Africa

25 SEP Aircraft arrives Pietersburg

27 SEP Aircraft pallet loading (all equipment)

27 SEP Depart Pietersburg to NASA Dryden

29 SEP Arrive NASA Dryden

30 SEP Unload

POINTS OF CONTACT:

Walter Klein, NASA Dryden, 661-276-3243, walter.klein@dfrc.nasa.gov

Bob Jones, NASA Dryden, 661-276-2169, bob.jones@dfrc.nasa.gov

Betty Symonds, NASA Ames, 650-604-3495, bsymonds@mail.arc.nasa.gov

ER-2 OPERATIONS AND CREW CONSTRAINTS:

(a) Notified no later than 1600 Local time day prior to flight if ER-2 flight is requested. Detailed flight plan not required at this time, only requested takeoff time is needed.

(b) Maintenance crew and NASA ER-2 Mission Manager will report to hangar 3 to 4 hours prior to takeoff to begin instrument upload and maintenance preflight. Aircraft problems and instrument upload requirements will set actual report time.

(c) Approximately 3 hr.15 min. prior to takeoff, ER-2 pilot acquires takeoff/enroute/landing forecasts from SAWB weather detachment at Pietersburg.

(d) At 3 hours prior to takeoff, pilot briefing begins attended by Lockheed maintenance/life support, mission manager, and science representative from project. At this time the pilot requires final plan of science objective(s) to include desired flight track, any timing factors, checklist of science instrument operations

to include procedures for cockpit indications of instrument failure(s) and designation of critical instrument(s) whose failure would make continued data collection scientifically unproductive (i.e. pilot will abort mission on ground or, if airborne, return to base). Upon receipt of above, the pilot will plan the flight and file the flight plan. Any change to plan briefed at the 3 hr. pilot briefing could require replanning of the flight with accompanying takeoff delays and possible early return of the aircraft due to pilot duty limit.

(e) At 2 hours prior to takeoff, access to science instruments will cease as the crew will tow the aircraft for fueling and liquid oxygen servicing.

(f) At 1 hr. 15 min to 1 hr. prior to takeoff, pilot will begin pressure suit donning and prebreathing with 100% Oxygen. Power will be applied to the ER-2 at the engine start location so the other ER-2 pilot can begin cockpit preflight.

(g) After landing the aircraft is towed back to hangar for postflight, science data download and, if required, removal of requested science instruments.

h) Post flight debrief will occur approximately 30 minutes after landing

(i) Maximum duty day for pilot is 12 hrs. which begins at arrival at weather office or hangar.

(j) Crew and pilots require 12 hrs. off duty before reporting back to work.

Convair-580 SAFARI 2000 Schedule - 100 science flight hours

7 Aug	Arrive at Pietersburg, RSA
8 Aug-	
11 Aug	Installations & Test Flying
12 Aug	Open House Display
13 Aug-	
29 Aug	Science flights from Pietersburg, RSA
30 Aug	Transit to Lusaka, Zambia
31 Aug-	
5 Sept	Science Flights from Lusaka
6 Sept	Transit to Pietersburg
7 Sept-	
9 Sept	Science Flights from Pietersburg
10 Sept-	
11 Sept	Transit flight to Walvis Bay, Namibia & Set up
12 Sept-	
22 Sept	Science flights from Walvis Bay
23 Sept	Transit to Pietersburg, RSA to Unload
24 Sept	Depart Pietersburg for return to USA

SAWB Aerocommander 690-A (2 aircraft JRA & JRB)

Met Office C-130

UK C-130 aircraft will investigate aerosols and radiation in the western, continental outflow region of the SAFARI-2000 study area. These studies are being done in conjunction with a project called the SaHAran Dust Experiment (SHADE).

Aircraft will operate from Windhoek, Namibia during 2-19 September 2000.

Mission Scientists: Jim Haywood and Pete Francis, UK Met Office

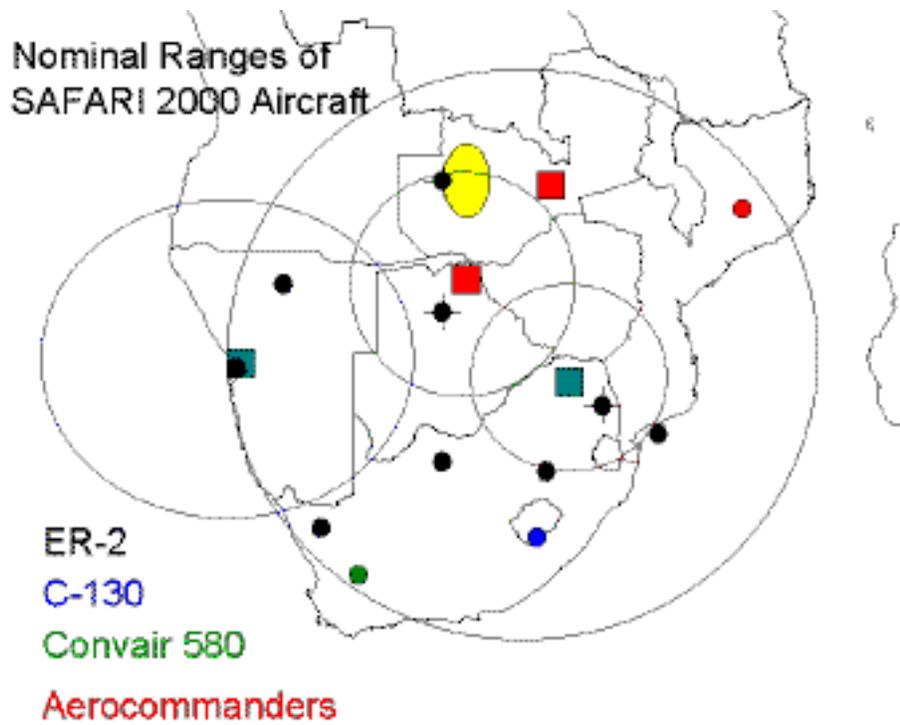
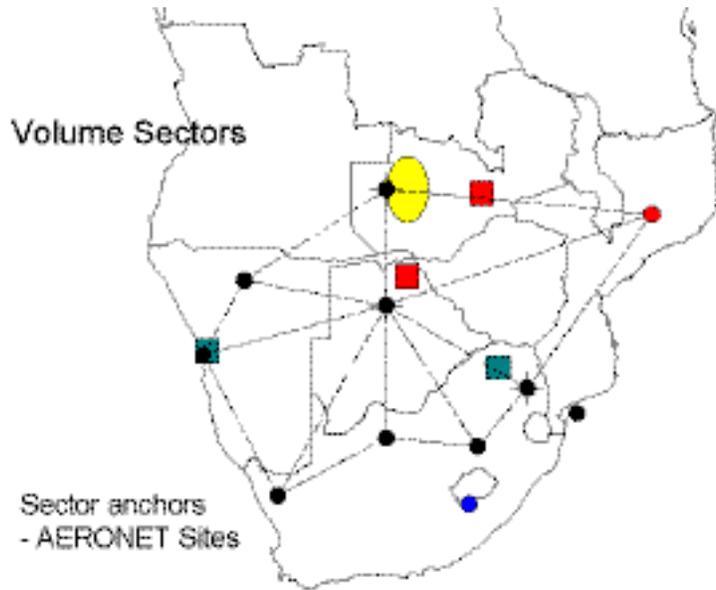
Typical planning for C-130 during SAFARI.

T = take-off time.

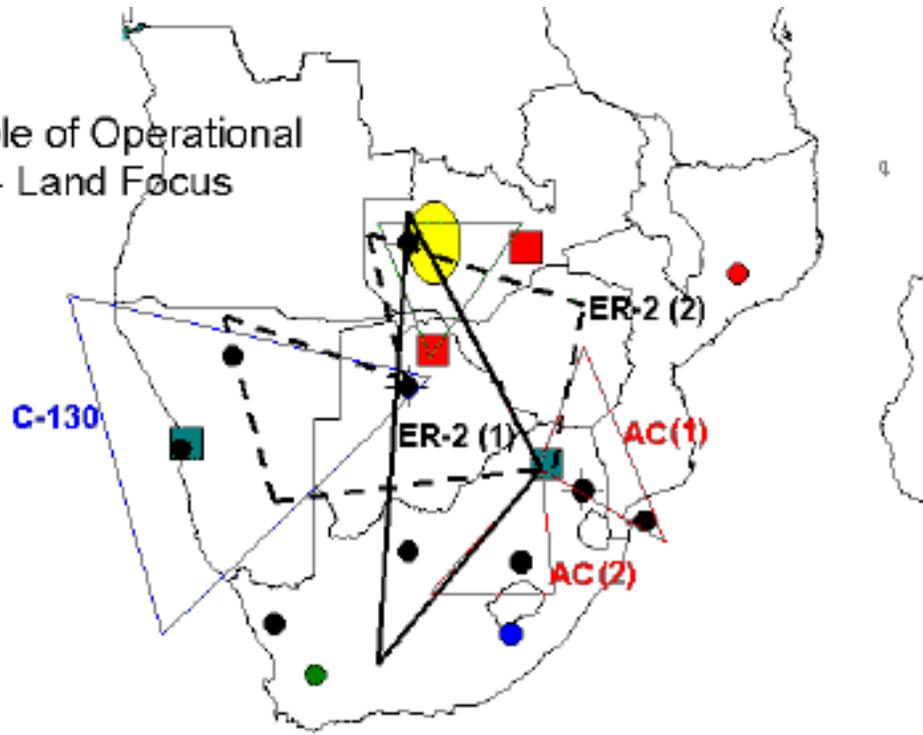
T-16 to T-14	1630L to 1830L	Make initial decision on flight for following day, based on information from WWW, local met support in W'k, and consultation with other SAFARI scientists at Pietersburg, Walvis Bay, etc.
T-3	0530L	Analyze latest weather information from the same sources. Go/no go decision made. Start of instrument power-up.
T-2.75	0545L	Mission scientists depart Windhoek for airfield.
T-2	0630L	Mission scientists brief aircrew at airfield. Provisional flight patterns finalized.
T-1.5	0700L	Aircrew files flight plans, and obtains their own weather info from airfield met service.
T-0.5	0800L	Walk to aircraft.
T+0	0830L	Take off.
T+8	1630L	Land.
T+11	1900L	Mission scientists complete reports, and initiate routine post-flight processing. Debrief.

Regarding communications, I'm afraid I still don't have anything specific to give to you. We are going to be equipped with GSM phones, and will also have dedicated phone lines at our ops centre, which is almost certainly going to be at our hotel in Windhoek, rather than at the airfield (will confirm this later). Our intention is to have internet access, but we haven't sorted out the mechanism for this yet. As a last resort, we can fall back on the GSM option for this, but I hope it will be possible to sort out an internet connection via a local ISP provider. Again, we'll confirm this when we know more details. Faxing us at the hotel will be no problem, I think - at the moment it's not clear whether we'll use the hotel's machine, or have a dedicated number for ourselves.

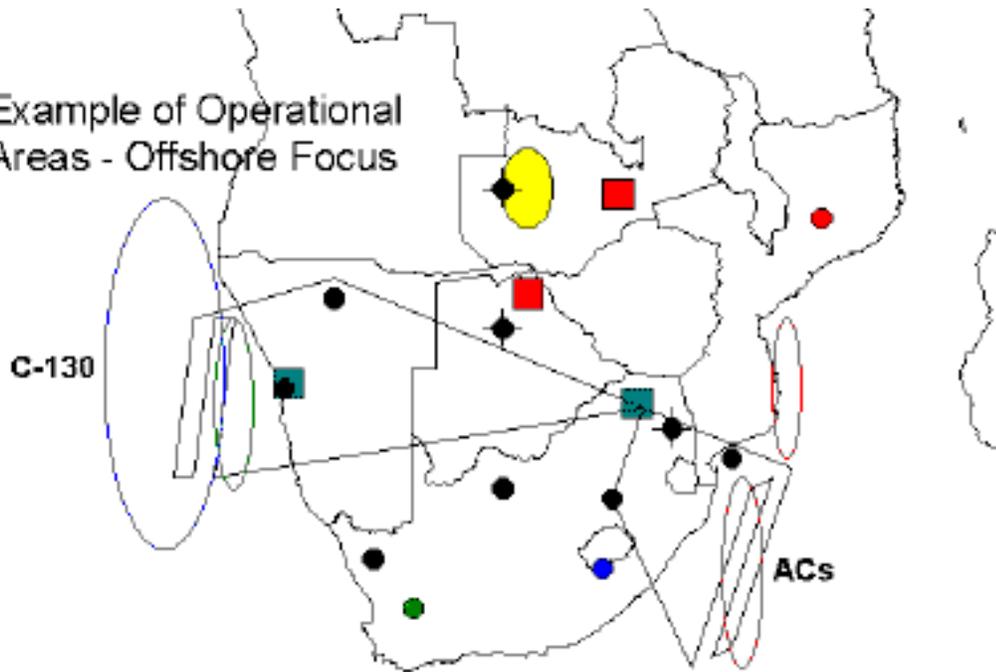
5.3 Generic Flight Plans



Example of Operational Areas - Land Focus



Example of Operational Areas - Offshore Focus



5.4 Aircraft Communications

Each airplane is equipped with transceivers for long and short-range communications. Long-range communications are generally from or to aircraft from the operations center. Short-range communications are generally between aircraft or from or to the aircraft and the ground sites. The ER-2, UW CV-580 and the two Aerocommander 690As will each be able to communicate with their base of operations and the CV-580 with the Mongu site. The UKMO C-130 will be able to communicate with its base of operations at Windhoek, Namibia, which will have telephone and fax communication with the Operations Center in Pietersburg.

SAFARI Operations will have a VHF radio for short-range aircraft communications. Communication to and from Pietersburg will be possible by the ER-2, UW CV-580, and Aerocommanders JRA and JRB. The ER-2 and CV-580 will have an Iridium Satellite Phone onboard and Iridium Phones will be available at several key ground sites, including Pietersburg.

Table 5.4 SAFARI 2000 Radio Frequencies

Platform	Call Sign	Radio Capability	Frequency
NASA ER-2	NASA 809	HF: 2-30Mhz VHF: 116-152MHz UHF: 225-400MHz *IRIDIUM Sat Phone	14.455Mhz 2.582Mhz 127.7MHz 138.9MHz 290.7MHz
NASA ER-2 Base Radio	NASA OPS	HF VHF UHF *IRIDIUM Sat Phone	14.455Mhz 2.582Mhz 127.7MHz 138.9MHz 290.7MHz
UW CV-580	N3UW	HF: 2-25MHz VHF: 118-152MHz UHF: 225-400MHz	2.582Mhz 127.7MHz 129.075MHz
Aerocommander JRA		VHF:	122.3 or 129.95
Aerocommander JRB		VHF:	122.3Mhz or 129.95Mhz
UKMO C-130			

6.0 SURFACE OPERATIONS

6.1 Skukuza Airport (Kruger National Park, South Africa)

Contacts:

NOTE: Must arrange visits with Holger Echardt

Holger Echardt

Kruger National Park South African National Parks

P/Bag X402, Skukuza, 1350

SOUTH AFRICA

Tel 27 13 7355611

Fax 27 13 7355611

E-mail: holgere@parks.sa.co.za

Stuart Piketh

Climatology Research Group

University of the Witwatersrand

Gauteng,

SOUTH AFRICA

Tel (office): 27 (0)11 716 2986 or + 27 11 716 3142

Fax: 27 (0)11 716 3161 or + 27 11 339 2144

Cell: 27 (0)82 806 3026

e-mail: stuart@crg.bpb.wits.ac.za

Alternative e-mail: piketh@schonlan.src.wits.ac.za

GSFC Radiation/MPL Measurements

*****Si-Chee to add details*****

MISR Radiation Measurements (Mark Helmlinger)

Contact:

Mark Helmlinger

Propulsion Laboratory

Mail Stop 169-237

4800 Oak Grove Drive

Pasadena CA 91109

Tel: (818) 354-0547

Fax: (818) 393-4619

Cell Ph: (Sept) 082 956 7844

E-mail: mch@jord.jpl.nasa.gov

MISR validation goals at Skukuza:

1. Make measurements necessary for MISR aerosol algorithm validation over a heterogeneous savanna canopy.
2. Make measurements necessary for MISR biophysical algorithm validation using local SAVE tower site placed in savanna canopy.
3. Enable aerosol closure experiment (requires appropriate in-situ sampling overflights) for both ground and space-based radiometric techniques.

Instruments:

PARABOLA, CIMEL, MFRSR, and Reagan sunphotometers.
Aircraft overflights at various altitudes are desired concurrent with the satellite overpasses.

Schedule:

9/04

to Strike Sua, transport to Skukuza & setup (3 days)

9/06

9/07 1st overpass Skukuza, X-track offset ~135km, view angle ~11deg.

9/09 2nd overpass Skukuza, X-track offset ~170km, view angle ~14deg.

9/16 3rd overpass Skukuza, X-track offset ~20km, view angle ~2deg.

9/23 4th overpass Skukuza, X-track offset ~135km, view angle ~11deg.

9/24

to Strike Skukuza, transport to Pietersburg (3 days)

9/26

9/27 C-141 loads at Pietersburg and departs.

6.2 Skukuza Tower (Kruger National Park, South Africa)**Contacts:****NOTE: Must arrange visits with Holger Echardt**

Holger Echardt

Kruger National Park South African National Parks

P/Bag X402, Skukuza, 1350

SOUTH AFRICA

Tel 27 13 7355611

Fax 27 13 7355611

E-mail: holgere@parks.sa.co.za

Bob Scholes
CSIR – Environmentek
P. O. Box 395
Pretoria, Gauteng 0001
REPUBLIC OF SOUTH AFRICA
PH: 27-12-841-2708
FAX: 27-12-841-3659
EMAIL: Bscoles@csir.co.za

Latitude:

25°01.2' S (August 1999)

Longitude:

31°29.8' E

Affiliated Programs:

AERONET, South Africa National Parks, ARREX. Much flora/fauna research.

Elevation:

396 m

Annual Precipitation:

650 mm

Seasonality:

Hot continental with majority of rain in summer. The Kruger climate is subtropical with summer rains between October and March. The annual rainfall varies from 700 mm in the south to 400 mm in the north. In winter, surface water is restricted to rivers and artificial watering holes and the animals tend to congregate there. Because the grass is dry and most trees are leafless, visibility is also much better. The days are normally sunny, warm and clear with little likelihood of rain.

Predominant Vegetation:

Semi-arid savanna woodland, about 40% canopy cover. Mosaic of *Combretum apiculatum* in the uplands and *Acacia negrescens* at the valley bottoms. The tower site is located in the *Acacia negrescens* area, with 10 meter tall canopy and 20-25% cover.

Geology:

Nelspruit granite.

Topography:

500 m below crest of gentle ridge.

Site Data Types:

Daily aerosol, occasional ozonesonde, manned government meteorological station is nearby; LAI, fAPAR, reflectance, shortwave and PAR albedo, and surface temperature. Fractional ground cover and land cover type. Eddy covariance instrumentation to be installed January, 2000 on 20 m tower.

Site Data Access:

Will use WWW (via Mercury) and ORNL DAAC. Ancillary data here

General Information:

The Skukuza site is a well-equipped, permanent scientific and tourist camp in the southern part of Kruger National Park in eastern South Africa. Facilities are excellent. The area has gently undulating landscape on Archaean granites. The camp includes a class 1 weather station and airport.

SAVE has installed a 22-m above-canopy tower at the site for semi-automatic and near-continuous measurement of canopy level radiation properties. These will be augmented with ground transects and aircraft imagery. Additional research leveraging off current infrastructure and data is welcome.

How to get there:**NOTE: Must arrange visits with Holger Echardt**

Take Doispan road (7km on Kruger Gate road) and drive for 4 km. Turn South on a dirt road. Drive 2 km on this road. At the top of a low ridge the track turns East to a gravel pit. The tower site is located 1.2 km along this track.

6.3 Mongu Tower (Mongu, Western Zambia)**Contacts:**

Mukufute M. Mukelabai (Muke)
Meteorological Department
PO Box 910144
Mongu, Zambia.
Telephone (W) 260 7 221441
(H) 260 7 221643
E-mail: <mmuke@zamnet.zm>

Jeff Privette
NASA Goddard Space Flight Center
Greenbelt, MD
E-mail: jeff.privette@gsfc.nasa.gov
Tel. 301-614-6630
Fax. 301-614-6695

Latitude:

15°26.3' S (July 1998)

Longitude:

23°15.2' E

Affiliated Programs:

AERONET, BIBBEX, EOS Fire Validation (Hao, Ward, Justice)

Elevation:

1013 m

Annual Precipitation:

910 mm; January has the highest mean monthly rainfall (mean temperature 23.1C)

Mean Summer Temperature:

25.5C Oct., the absolute high is about 38.5C

Mean Winter Temperature:

16.8 C Jun.

Seasonality:

Mean maximum temperature range is about 24 to 34 C.

Controlled by wet/dry cycles, not temperature. Max. temperature range is about 26-34 C. Max/min rainfall months are noted above (see also Lusaka climate)

Predominant Vegetation:

Kalahari/Miombo Woodland

Site Data Types:

Daily aerosol, occasional ozonesonde, manned government meteorological station is nearby. By August 1999, will include LAI, fAPAR, canopy reflectance, shortwave and PAR albedo, and surface temperature.

Site Data Access:

Will use WWW (via Mercury) and ORNL DAAC. Ancillary data here

General Information:

The Mongu site located in a local woodland that undergoes some primitive harvesting for subsistence. The area is flat, and adjacent to the massive Zambezi River flood plain. Miombo-related species are about 16-18 m tall, and grow in the Kalahari Sands. Kalahari woodlands cover approximately 6.3 million ha in Western Province of Zambia alone. This is the northern end of the IGBP Kalahari Transect.

SAVE has installed a 30-m above-canopy tower at the site for semi-automatic and near-continuous measurement of canopy level radiation properties. These will be augmented with ground transects and aircraft imagery. Additional atmospheric research is currently being proposed to study nutrient deposition. Additional research leveraging off current infrastructure and data is welcome. This site has been associated with AERONET aerosol monitoring program for many years.

6.4 Maun Tower (Maun, Botswana)

Contacts:

Elmar Veenendaal
Susan Ringrose
Harry Oppenheimer Okavango Research Centre
University of Botswana
Bag 285, Maun
BOTSWANA
Phone Wk 267-661833
E-mail: Eveenendaal@orc.info.bw
E-mail: sringrose@orc.info.bw

Latitude:

19.83 S

Longitude:

23.50 E

This tower is located in a mopane woodland east of the Okavango Delta. It is operated by the Max Planck Institute of Germany, in cooperation with researchers at Univ. of Botswana.

6.5 Etosha

Contact:

Johan Le Roux
Ministry of Environment and Tourism
P.O.Box 46
Okaukuejo Via Outjo Namibia
Tel: 264 67229854
Fax: 264 67 229853
E-mail: jlr@tsu.namib.com

Latitude: 18.00 S (17.0 - -19.5 S)

Longitude: 17.00 E (16.0 - 18.0 E)

Elevation: 1129 m

6.6 Sua Pan, Botswana -

Uni. Botswana and MISR Ground-based Measurements

Contacts:

Frank Eckardt
University of Botswana
Private Bag 0022
Gaborone, Botswana
Tel: 267 355 2540
E-mail: ECKARDT@mopipi.ub.bw

Mark Helmlinger
Jet Propulsion Laboratory
Mail Stop 169-237
4800 Oak Grove Drive
Pasadena CA 91109
Tel: (818) 354-0547
Fax: (818) 393-4619
E-mail: mch@jrd.jpl.nasa.gov

Latitude: 20° 32' S

Longitude: 26° 4' W

Elevation: 1100 m

MISR Calibration & Validation goals at Sua Pan:

1. Make ground truth measurements necessary for top-of-atmosphere radiance predictions in the Vis-NIR spectrum at nadir and at the MISR bandpasses and viewangles.
 - 1a. Provide in-flight intercalibration/intercomparison opportunity. (Possible comparisons between AirMISR and CAR?)
2. Make measurements necessary for MISR aerosol algorithm validation over bright homogeneous scene.
3. Make measurements necessary for MISR biophysical algorithm validation using large, flat consistent grasslands on peninsula penetrating the pan.
4. Enable aerosol closure experiment (requires appropriate in-situ sampling overflights) for both ground and space-based radiometric techniques.
5. Make ancillary measurements necessary to enhance data available for pan aerosol transport studies (in coordination with Dr. Eckardt of the University of Botswana).

Instruments:

PARABOLA, CIMEL, MFRSR, and Reagan sunphotometers. Aircraft overflights at various altitudes are desired concurrent with the satellite overpasses.

Schedule:

- 8/02 Mark Helmlinger arrives at Pietersburg within this window to act on arrangements made in previous weeks.
8/06
- 8/10 C-141 unloads at Pietersburg Int'l Airport.
8/12 Open House at Pietersburg Int'l Airport.
- 8/13 Pietersburg to Sua, allowing 5 days to for transport and setup before first
8/17 Terra overflight of Sua Pan.
- 8/18 1st overpass Sua Pan, X-track offset ~100km, view angle ~8deg.
8/27 2nd overpass Sua Pan, X-track offset ~60km, view angle ~5deg.
9/03 3rd overpass Sua Pan, X-track offset ~100km, view angle ~8deg.
- 9/04
to Strike Sua, transport to Skukuza & setup (3 days)
9/06

6.7 Prescribed Burns

**** TBD from Darold Ward ****

6.7.A Controlled Experimental Burns

Biomass-burning emissions will also be investigated during SAFARI 2000 based on a coupled analysis of biofuel composition, emissions from experimental burns, and mass-balance calculations. Biofuels will be sampled by collaborating SAFARI-2000 investigators during the dry season of 2000 in 3 regions characteristic of major ecosystem types of southern Africa: The Etosha National Park in northern Namibia, the Kruger National Park in northeastern South Africa, and woodland sites in Zambia, Malawi, Tanzania, Zimbabwe, and Mozambique (the Miombo Network).

Experimental fires will be conducted in late 2000 or early 2001 utilizing an existing facility at the Max Planck Institute for Chemistry, Mainz, Germany. This facility provides a partially controlled burning environment and will be used to measure major exhaust species (CO_2 ; CO ; CH_3Cl ; CH_3Br ; CH_3I ; NO_x ; N_2O ; CH_4 ; NH_3 ; HCl ; HNO_3 ; SO_2 ; HCOOH ; CH_3COOH ; alkaline-reactive, volatile Cl, Br, and I; the ionic composition of particles including Cl^- , Br^- , NO_3^- , NH_4^+ , SO_4^{2-} , HCOOH , and CH_3COOH ; and the elemental composition of particles including C, N, Cl, Br, I, and S) as well as the elemental composition of both biofuels and residues. Sampling and analytical techniques include canisters, mist chambers, filter packs, continuous on-line analyses via non-dispersive infrared and chemiluminescence techniques, gas chromatography/mass spectrometry, ion chromatography, and other methods. The mass balances of C, N, S, Cl, Br, and I emitted during burning will be assessed. Results will be interpreted in conjunction with those from other SAFARI-2000 investigators to model regional biomass-burning emissions of halogen-, nitrogen-, sulfur-, and carbon-containing compounds and to assess their regional and global-scale implications.

6.8 AERONET

The objectives of the AERONET (Aerosol Robotic Network) sites are:

- To provide diurnal regional characterization of aerosol optical properties
- EOS validation - through the characterisation of spatial and temporal variations in aerosol optical properties
- Aerosol flux characterization
- AERONET validation (on Peter Hobbs' plane)
- Measurement of direct aerosol forcing at the surface

AERONET Sites for S2K**Zambia:****Mongu: EOS core validation site, SAVE Tower**

AERONET Permanent: Lat.= 15° 15' S, Long.= 23°9'E, Elev.= 1040m

Advanced ground based sun sky radiometer Aug. 25 to Sept 20

Shadowband Aug. 25 to Sept. 25

Flux Sensors: PAR permanent, K&Z Pyranometer Permanent

Microtops O3: Aug. 10 to Sept. 25

Ndola: Lat.= 12° 59.7' S, Long.= 28°39.5'E, Elev.= ??m

AERONET Aug. 5 to Oct. 1

Flux Sensors PAR permanent

K&Z Pyranometer Aug 10 to Sept. 25

Solwezi: Lat.= 12° 9.8' S, Long.= 26°24.3'E, Elev.= ??m

AERONET Aug. 7 to Oct. 1

Zambezi: Lat.= 13° 31' S, Long.= 23°06'E, Elev.= 1107m

AERONET Aug. 9 to Oct. 1

Flux Sensors PAR permanent

K&Z Pyranometer Aug 10 to Sept. 25

Kaoma: Lat.= 14° 51' S, Long.= 24°49'E, Elev.= 1230m

AERONET Aug. 10 to Oct. 1

AERONET floater (based in Senanga)

Lat.= 16° 06' S, Long.= 23°17'E, Elev.= 1025m

Aug. 11 to Oct. 1

Handheld (50 sites) Western Zambian Box network

June - October

Mozambique:

Inhaca Is.-Permanent site: Lat.= 26° 02' S, Long.= 32°54'E, Elev.= 73m

Napula- Lat.= ?° ?' S, Long.= ?'E, Elev.= ?m

Aug 8? to Sept. 30

Republic of South Africa:**Skukuza-EOS core validation site, SAVE Tower:**

AERONET Permanent: Lat.= 24° 59'S, Long.= 31°35'E, Elev.= 150m

MPL Aug. 10 to Sept. 18

TSAY base Radiation station; Aug 12 to Sept.24

JPL BRDF Characterization Sept. 7 to Sept. 24

Bethlehem: Lat.= 28° 14' S, Long.= 28°19'E, Elev.= 1709m

AERONET Permanent Site

Springbok: Lat.= 29° 30' S, Long.= 17°48'E, Elev.= ??m

AERONET(Wits) Permanent Site (begin ~Aug. 20)

High Veld network (Handheld ~ 30 instruments)

Botswana:

Maun Tower: Lat.= 19° 54' S, Long.= 23°33'E, Elev.= 940m
 AERONET -Permanent site
 Shadowband- Permanent
 Various radiation sensors- Permanent

Sua Pan: Lat.= 20° 32' S, Long.= 26°4'E, Elev.= 1100m
 AERONET (JPL) Aug. 18 to 24
 JPL BRDF Characterization Aug 18 to Sept.4

Namibia:

Etosha Pan (Okaukuejo): Lat.= 18° 00' S, Long.= 17°00'E, Elev.= 1129m
 AERONET Permanent Site:

Walvis Bay: Lat.= 23° 00.5' S, Long.= 14°30'E, Elev.= 10m
 AERONET: Sept. 6 to Sept. 25
 AERONET (MPI): Aug. 20 to Sept. 25

6.9 Rawinsonde Network

The stations performing upper air ascents during the intensive S2K campaign in August /September 2000 are:

1) Lusaka	Zambia	- Assistance from NASA (140 sondes) Twice daily
2) Windhoek	Namibia	- Twice daily
3) Maun	Botswana	- Once a day
4) Gaborone	Botswana	- Twice daily
5) Harare	Zimbabwe	- Once a day
6) Bulawayo	Zimbabwe	- Once a day
7) Pretoria	South Africa	- Twice daily
8) De Aar	South Africa	- Assistance from NASA (70 sondes) Twice daily
9) Durban	South Africa	- Assistance from NASA (70 sondes) Twice daily
10) Cape Town	South Africa	- Twice daily
11) TBD	TBD	- Assistance from NASA (130 sondes) Twice daily
12) Pietersburg	South Africa	- Calibration testing of instruments (10 sondes) TBD
13) Skukukza	South Africa	- Twice daily Thermodynamic profile only in support of ground based observations

The stations assistance are rendered to are those that are situated on the outer rim of the semi-permanent anti-cyclone system that are present over the central part of the southern African sub-continent

Data from all the upper air radiosonde ascents will automatically be placed by SAWB on the GTS where it is distributed directly to Washington - who in turn distributes it further to ECMWF and NCEP and other users worldwide. The SAWB is a WMO Regional Telecommunications Hub (RTH). The data will be made available in the standard WMO-format accepted worldwide as a standard format. Options for the availability of the data and its archive in the central data-archive of S2K include sending the data on a realtime basis to the central database, daily or monthly using an ftp address.

These upper air data will be used as input to the SAWB regional numerical forecasting model (ETA - Model) to supplement the input data resulting ultimately in more accurate forecasts to the SAFARI science community. Additional rawinsonde data will automatically be ingested by the pre-processing procedure of the numerical forecasting models used. (ETA 48 or 29 km) model. The pre-processing procedure involves scanning through a WMO-list of stations in southern Africa. Output from the numerical forecasting models are in turn used as input to the regional trajectory model which determines the transport, dispersion and recirculation of pollutants and aerosols over the sub-continent.

Apart from being utilized by Numerical forecasting models - the data will also provide extremely valuable information to the "Absolute Stable Layer Analysis" procedure the WITS group performs. This entails using all rawinsonde data available to determine the characteristics of the absolute stable layers in the atmosphere over the sub-continent which acts as "atmospheric boundaries" beneath which pollution and aerosol material are trapped. Together with the transport analysis the above form a more complete picture of the trajectory analysis of particles over the region.

SAWB's upper air programme as of 1 April 2000

Station	Number	Lat & Long	00:00 Obs	12:00 Obs
Irene	68263	29.5S 28.2E	GPS	PTU/Pilot
Bloemfontein	68442	29.1S 26.3E		Pilot
Durban	68588	29.9S 30.9E	PTU(W) GPS(S)	Pilot
Cape Town	68816	33.9S 18.6E	GPS	PTU/Pilot
Port Elizabeth	68842	33.9S 25.6E	PTU	Pilot
Upington	68424	28.4S 21.3E		PTU(S)/Pilot
Pietersburg	68174	23.7S 28.9E	PTU(S)	Pilot
Springbok	68512	29.5S 17.8E	PTU(W)	Pilot
Bethlehem	68461	28.2S 28.3E	GPS(W)	Pilot
De Aar	68538	30.7S 24.0E		PTU/Pilot
Gough Island	68906	40.3S 09.9E	GPS	GPS
Marion Island	68994	46.9S 37.8E	GPS	GPS

Notes:

GPS: Radiosondes recording PTU and winds

PTU: Radiosondes recording PTU only - no winds

(W): Winter - 1 April to 30 September

(S): Summer - 1 October to 31 March

Minimum height is 200 hPa and only one second attempt may be made.

12:00 PTU soundings: winds to be determined by optical theodolite.

De Aar will also have a shadow band sun photometer

6.10 Other Sites of Interest

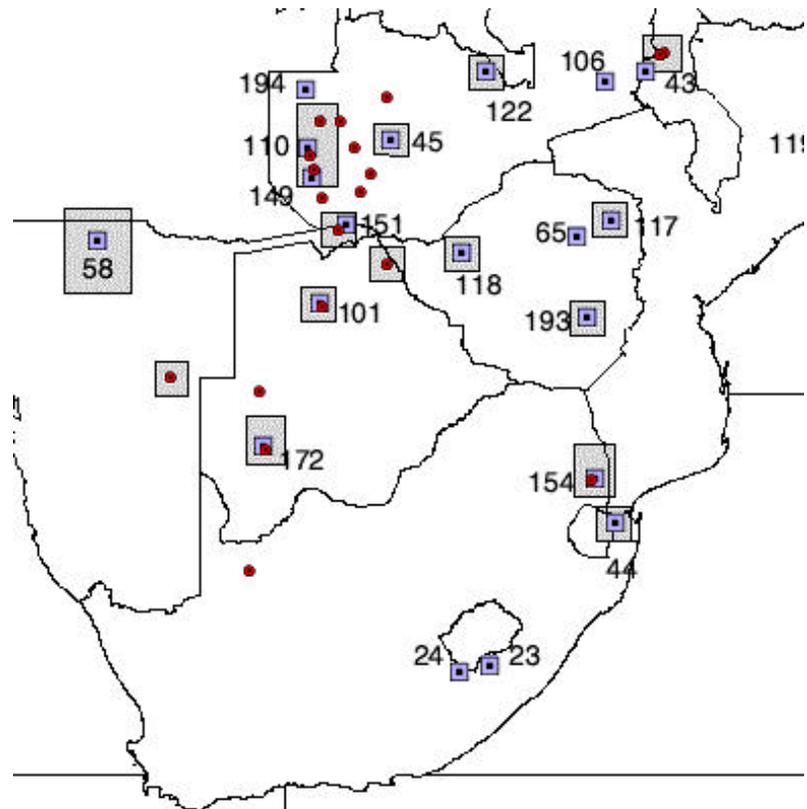
Thohoyandou/Messina, South Africa (or nearby location)

Cimel sunphotometer (Wits, Vista)

Aerosol samplers (Antwerpen, Venda, Vista)

7.3 Satellite Acquisitions for Core Ground Sites

IKONOS, ASTER and MISR "Local Mode" requests



Ikonos requests shown as red circles
MISR Local mode sites shown as blue boxes
Aster requests shown as grey rectangles

Numbers refer to ASTER requests given at:
http://modarch.gsfc.nasa.gov/MODIS/LAND/VAL/xar_s2k.htm

7.4 AVHRR Near-Realtime Fire Products

AVHRR 1-km data products to be provided by Jackie Kendall and Jim Tucker, NASA GSFC, Code 923

1. Near-realtime (within 6 hours of acquisition) "quick look" data products for flight planning for three periods:

August/September 1999
January/February 2000
August/September 2000

At least one day time and one night time 1-km AVHRR acquisition will be acquired and distributed with six hours of the overpass.

A. Simple procedures for deriving flight planning materials for fire occurrence in the Safari-2000 mission region from NOAA AVHRR 1-km data;

B. Assist local group (Satellite Applications Center of CSIR/Mikomtek) in implementing "quick look" fire product capability including distribution to Safari-2000 designated mission control center.

2. Provide post-Safari-2000 analysis products, consisting of day and night single day full-resolution AVHRR 1-km products below, from 5° to 35° S and as far west as the 1-km AVHRR data allow, for three periods:

July 15 - October 15, 1999
December 15, 1999 - March 15, 2000
July 15 - October 15, 2000

Products: channel 1 and 2 reflectances (day only); channels 3, 4, and 5 brightness temperatures; latitude, longitude, solar and viewing geometry; and NDVI, cloud, and fire.

All data will be calibrated, geometrically corrected, and mapped to common equal area projection (TDB).

3. Maintain a digital archive of all NOAA AVHRR 1-km data collected during the time periods in #2 above. These data will be made available to any interested requester for the marginal cost of reproduction.

7.5 Meteosat

Meteosat data will be archived by the SAWB and supplied via CD or any other suitable method to the SAFARI 2000 Central Data Archive. Data volume is roughly 80MB per day. Real-time meteosat quicklook data is available every 6 hrs at:

<http://rsd.gsfc.nasa.gov/goesg/earth/Weather/weather.html>

8.0 COMMUNICATIONS

8.1 Overview

SAFARI 2000 Operations will use a communications network to exchange information between the Operations Center and the other locations and elements of the campaign. This network should consist of radio, telephone, facsimile, e-mail, and, at some sites, Iridium satellite phone. In addition a server based local area network will be established.

Radio Links:

- a. Aircraft-to-aircraft (VHF): NASA ER-2, UW CV-580, Aero 690As, UK C-130
- b. Pietersburg Operations Center (VHF and/or HF) to: NASA ER-2, UW CV-580, and Aerocommanders

Phone (Voice, Fax):

- a. Voice/Fax between Pietersburg Operations Center, Skukuza, Mongu, Etosha, Maun, Sua Pan, Lusaka, Walvis Bay, Windhoek
- b. Cellular Phones (voice only)
- c. Iridium Satellite Phone (voice only)

Server/Internet/E-mail:

- a. Wits will provide a computer server set up for Pietersburg, and a satellite download capability through one of the local satellite companies. A hub will be installed to allow connection to other computers, laptops, etc.
- b. Telephone dial up with 56K modem capability will be provided by the NASA ER-2 logistics group.

8.2 Telephones and Fax

The principal mode of communications will be via telephone and fax. The office and laboratories will be equipped with telephones. There will be at least one fax machine located in the Pietersburg Operations Center. Each ground site and aircraft operating base away from Pietersburg should arrange a phone and fax machine at those locations and inform the Operations Center of the appropriate numbers. Faxes will be the preferred mode of contacting the field sites. Telephone and fax facilities should also be available at local hotels. Calls to the ground sites should be at pre-arranged times to insure the desired person is readily available.

8.3 Cellular Telephones

Arrangements for cellular phones will be made for persons serving in key campaign functions. These phones should be used for communications regarding mission plans and operations, and for emergency situations. These phones should be activated and available at all times.

8.4 Telephone Policy

Due to the expected high cost of long distance telephone calls, the following policy will be implemented for the use of telephones and fax machines:

a. Fax machines will be used as much as possible. A fax center will be set up at the Campaign Operations Center for sending/receiving information, reports, and data between the operations center and the ground/airborne field sites. Mail slots will be setup for each organizational element.

b. Telephones will be configured for local calls only. Long distance calls will require the use of a calling card, or credit card, or you may reverse the charges.

c. Incoming calls maybe either local or long distance.

8.5 Internet

Wits will provide a computer server set up for Pietersburg, and a satellite download capability through one of the local satellite companies. A hub will be installed to allow connection to other computers, laptops, etc. ***add details when available***

(We need info here from Betty. Who is the ISP in Pietersburg and how to get the required software? Is a modem all that is required?)

8.6 Satellite Phones (Iridium)

Iridium Satellite Phones will be in place at 3 ground stations (Pietersburg, Mongu, & TBD) and onboard the CV-580 and ER-2 aircraft. The primary use of these phones will be for emergencies; however, it will be the principal means of coordinating CV-580 aircraft flights with the prescribed burns near Mongu in western Zambia.

8.7 Web Pages

SAFARI 2000 will maintain a web page on the local server during the campaign. The web page will include an overview of the campaign, daily operations plans, Daily Mission Summaries to date, participants, announcements, etc. Hot links to other SAFARI web pages and other key sites will be included.

The campaign web page will allow participants in the field and remote sites as well as interested observers back home, to poll the page to see the latest status, plus accomplishments to date.

<http://www.safari2000.org>

A general email facility will be in place to receive emails for all participants safari@safari2000.org Messages should have the recipients names In the subject line. All messages will be printed and be made available to participants.

Emails to Leon Herbert can be sent to leon@safari2000.org

9.0 DATA MANAGEMENT

9.1 Overview

To make SAFARI 2000 field and remote sensing data readily available to the project team both the United States and southern Africa, the SAFARI 2000 Science Steering Committee has established a Data Policy and a data and information system.

The S2K Data Policy is designed to ensure that participants have access to data in a timely manner, that intellectual property rights are protected, and that co-authorship, acknowledgement, or credit is given to data originators and principal investigators. The data policy may be found in Appendix XX and on-line at: http://mercury.ornl.gov/safari2k/Data_Policy.htm

The data and information system will be based on the following:
sharing data over the internet using the Mercury metadata search and data retrieval system;
exchanging large volume data on CD-ROM; and
preparation of science-team selected golden day data sets.

9.2 Mercury

The SAFARI 2000 Project has chosen Mercury to be the project's data and information system. Mercury is a Web-based system that allows the searching of distributed metadata files to identify data sets of interest and direct the user to them.

The Mercury system provides both the team collecting the data and the data users significant advantages relative to the traditional data management systems. Data sets remain with those responsible for the data collection, thus allowing them to maintain full control of the quality, version, and availability of their data sets. The ORNL DAAC provides these collectors with a metadata editor tool that can be used to help organize field data. SAFARI 2000 Investigators are to register their data in Mercury using the Metadata Editor. Once the URL of the data's location is registered through the metadata tool, the Mercury system harvests the metadata and creates a pointer to the data, which then appears in the Mercury search and query page. The scientist maintains full control of his/her site. The scientist has the option of temporarily removing the data or restricting access by requiring a password from users. This allows the metadata to be created and registered as soon as possible yet provides some time for initial quality checks on the data before making it available to the public.

Mercury and its Metadata Editor are available for your use. Please register any data you collected for SAFARI 2000 by using the Metadata Editor, which may be found at the following URL:

<http://mercury.ornl.gov/safari2k/>

and click on "Metadata Editor." A tutorial, glossary, and FAQs section are available for background on how to use the Metadata Editor.

To search for S2K data that has already been registered in Mercury, please visit the following URL:

<http://mercury.ornl.gov/safari2k/search.htm>

Currently, Mercury contains site characteristic data for Mongu and Skukuza, including Landsat 7 data, NPP data for several sites in southern Africa, and regional data for southern Africa (land cover, vegetation, biomass, soil properties, and hydrology).

9.3 CD-ROMs

Many of the data sets generated in SAFARI 2000 will be large volume image data that will be difficult to share over the internet. To facilitate sharing of these data, the S2K DIS will collect image products from instrument data centers, package the products on CD-ROM, and distribute to SAFARI 2000 investigators. Collection will be done by staff from NASA's Goddard Space Flight Center; they will also distribute in North America. Distribution in southern Africa will be done by staff from the University of Witswatersrand.

9.4 Data Responsibilities

Acquisition and Submittal of Data: PIs are responsible for acquiring data, performing QA/QC, and registering metadata in Mercury.

Quick/Timely Data Distribution: ORNL DAAC and University of Witswatersrand are responsible for establishing the metadata editor and Mercury search system

US -Regional Data Liaison - including quick and long-term data distribution; transporting data sets to the region; regional training: ORNL DAAC and University of Witswatersrand

Defining Data for Focused Studies and Synthesis: At Data Workshops, the S2K Science Team will define data sets needed for synthesis

Data QA and Packaging of Synthesis Data Sets: Staff at GSFC will package image data and synthesis data and distribute by CD-ROM

Long-term Data Archival and Distribution: ORNL DAAC and University of Witswatersrand will be responsible for data archival and distribution.

9.5 Best Practices for Preparing Ground-based Data Sets

At the request of several field researchers, guidance is given on data management practices investigators should perform during the course of data collection to improve the usability of their data sets. This guidance is tailored to those who perform ecological and other ground-based measurements. These are felt to be the most important practices that a researcher could implement to make their data sets ready to share with global change

researchers. In addition, these practices will save data center staff time, enabling the quick release of data sets to users around the world.

The seven best practices are:

- Assign Descriptive Data Set Titles
- Assign Descriptive File Names
- Use Consistent and Stable File Formats
- Define the Parameters
- Use Consistent Data Organization
- Perform Basic Quality Assurance
- Provide Documentation

A more complete version of this guidance is available as a separate document entitled " Best Practices for Preparing Ecological and Ground-Based Data Sets To Share and Archive."

10.0 KEY CONTACTS AT PIETERSBURG OPS CENTER

(Complete list of contacts with itineraries is available in a separate document entitled "S2K Contacts and Itineraries")

NOTES:

(1) Telephone and FAX numbers at the Ops Center in Pietersburg are TBD at this time. Use listed cell phone numbers for voice contact.

(2) A general e-mail facility will be in place to receive e-mails for all participants:

safari@safari2000.org

Messages should have the recipients names in the subject line. All messages will be printed and be made available to participants.

Harold J Annegarn
Atmosphere & Energy Research Group
University of Witwatersrand
Private Bag X 3
WITS 2050
REPUBLIC OF SOUTH AFRICA
NEW Tel: +27 11 717 6551
Fax +27 11 403 7555
Cell Ph: 083 325 7349
email annegarn@src.wits.ac.za

Also at Wits:

via Lisanne, Melodie, or Melanie (Harold's Office) +27-11-717-6548
Lisanne Frewin (PA to Harold) Cell Ph: 083 267 3446

Margie Barenbrug Cell Ph: 082 956 8320
Kristy Ross Cell Ph: 083 704 2543

Peter Maseloa (S2K transport officer & trouble shooter)
Cell: 083 440 5273

Martha Moleti (Wits Press liaison Officer)
086martha@atlas.wits.ac.za
Tel: 011 717 1019
Cell: 083 327 0103

Leon Herbert
University of the Witwatersrand
School of Civil and Environmental Engineering
Private Bag 3, WITS 2050
SOUTH AFRICA
Tel: +27-11-4038722, Msg: +27-11-7177111 (message facility)
Fax: +27-11-3391762
Cell: +27 82 219 7966
email: leon@safari2000.org

Stuart Piketh
Climatology Research Group
University of the Witwatersrand
Gauteng,
SOUTH AFRICA
Tel (office): 27 (0)11 716 2986 or + 27 11 716 3142
Fax: 27 (0)11 716 3161 or + 27 11 339 2144
Cell: 27 (0)82 806 3026
e-mail: stuart@crg.bpb.wits.ac.za or piketh@schonlan.src.wits.ac.za

Bob Scholes
CSIR – Environmentek
P. O. Box 395
Pretoria, Gauteng 0001
REPUBLIC OF SOUTH AFRICA
Tel: 27-12-841-2708
Fax: 27-12-841-3659
Cell Ph: 082 292 6769
EMAIL: Bscholes@csir.co.za

Luanne Otter
CSIR Environmentek
PO Box 395
Pretoria
E-mail: <lotter@csir.co.za>
telephone (work) - (012) 841-2708
phone (home) (011) 678-1482
fax (012) 841-3659
Cell Ph: 083 709 4040

Michael D. King
EOS Senior Project Scientist
Code 900
NASA Goddard Space Flight Center
Greenbelt, MD 20771
Tel: (301) 614-5636
FAX: (301) 614-5620
Cell Ph: 082 956 7908
E-mail: king@climate.gsfc.nasa.gov

Peter V. Hobbs
Department of Atmospheric Sciences
Box 351640
University of Washington
Seattle, WA 98195-1640
Tel: (206) 543-6027
Fax: (206) 685-7160
Cell Ph: TBD
E-mail: phobbs@atmos.washington.edu

Judith Opacki, Administrator
Cloud & Aerosol Research
Department of Atmospheric Sciences
University of Washington
Box 351640
Seattle, WA 98195-1640 USA
Tel: (206) 543-6026
Fax: (206) 685-7160 or 543-0308
Cell Ph: TBD
E-mail: jopacki@atmos.washington.edu

Robert J. Swap (Bob)
University of Virginia
Department of Environmental Sciences
291 McCormick Rd.
P.O. Box 400123
Charlottesville, VA 22904-4123
Tel: 1-804 - 924 - 7714
Fax: 1-804 - 924 - 3323
Cell Ph: 082 956 7978
Iridium Sat Phone: 8816-310-52229
Email: rjs8g@virginia.edu or Swapper@virginia.edu

John T. Suttles (Tim)
NASA EOS Project Science Office /Raytheon ITSS Corp.
7701 Greenbelt Road, Suite 300
Greenbelt, MD 20770
Tel: 1- 301-441-4028
Fax: 1-301-441-2432
Cell Ph: 082 956 7821
Iridium Sat Phone: 8816-310-52239
E-mail: tim.suttles@gsfc.nasa.gov

Gary Shelton
Director, Airborne Science Directorate
Code Y M/S 1623 - H
NASA Dryden Flight Research Center
Edwards, CA 93523-0273
Tel: 1-661-258-2919
FAX: 1-661-258-3719
Cell Ph: **TBD**

Walter Klein, ER-2 Mission Manager
NASA Dryden Flight Research Center
<http://www.dfrc.nasa.gov/dryden.html>
Tel: 1-661-276-3243
Fax: 1-661-277-7746
Cell Ph: **TBD**

Betty Symonds
SAIC / NASA Ames Research Center
Moffett Field, CA 94035-1000
Tel: 1-650-604-3495
E-mail: bsymonds@mail.arc.nasa.gov

Steven Platnick
NASA Goddard Space Flight Center
Code 913
Greenbelt, MD 20771
Tel: (301) 614-6243
Fax: (301) 614-6307
Cell Ph: 082 956 7885
e-mail: platnick@climate.gsfc.nasa.gov

Stephen Cole
EOS Project Science Office / Raytheon ITSS
NASA Goddard Space Flight Center
Code 900
Greenbelt, MD 20771
Tel. 301-441-4146
Fax: 301-441-2432
Cell Ph: (Aug) 082 956 7844
Email: scole@pop900.gsfc.nasa.gov

APPENDIX A -- DAILY MISSION SUMMARY -- LOG FORM
(prepared by Daily Mission Scientist)

Date:

Daily Mission Scientist:

Deputy Daily Mission Scientist:

Mission Objective:

Mission Description:

Weather Synopsis:

Synoptic Situation:

Aircraft:

Aircraft	Depart Time	Land Time	Comments
NASA ER-2			
UW C-580			
Aerocommander JRA			
Aerocommander JRB			
UKMO C-130			

Surface Sites:

Site	Weather & Visibility	Instrument Status	Activities/Comments
Skukuza Tower			
Skukuza Airport			
Mongu Tower			
Mongu Box			
Maun Tower			
Etosha			
Sua Pan			
Other			

Satellite:

Satellite	Overpass Time (P'burg)	Azimuth	Elevation	Comments
Terra				
NOAA AM				
NOAA PM				
Landsat				
Other				

Highlights of Mission:**Significant Hardware/Other Problems:****Actions Prior to Next Mission:****Signature:**

APPENDIX B -- WEATHER FORECAST -- LOG FORM
(prepared by Lead Forecaster)

Date:

Weather Synopsis:

Synoptic Situation:

Note: Attach Satellite Image with appropriate mb overlay

Signature:

APPENDIX C. -- SURFACE SITE -- LOG FORM

Date:

Local Weather & Visibility Conditions:

Surface Activities (e.g., prescribed burns, transects, etc.):

What data were collected (parameters and/or instruments used)?

Where were the data collected (site names or areas)?

When (time period) of data collection?

Who collected the data (individuals or team/PI)?

Problems encountered.