

# RECORD OF ENVIRONMENTAL CONSIDERATION

**PROJECT NAME:** NASA African Monsoon Multidisciplinary Analysis (NAMMA)

**FR#:** 68205

1. Description and location of proposed action: The AMMA (African Monsoon Multidisciplinary Analysis) Campaign will employ extensive surface observation networks and aircraft to characterize the evolution and structure of African easterly waves and mesoscale convective systems over western Africa. The NASA portion (NAMMA) will study downstream (oceanic) evolution of waves and precipitating convective systems, particularly into tropical cyclones. The NASA/UND DC-8 will be based out of Sal, Cape Verde and is scheduled to be on site August 15 to September 15, 2006.

2. It has been determined that the above action (choose one)

\_\_\_\_\_ a. Is adequately covered in an existing EA or EIS.

Title: \_\_\_\_\_  
Date: \_\_\_\_\_

XX b. Qualifies for Categorical Exclusion and has no special circumstances which would suggest a need for an Environmental Assessment.

Categorical Exclusion: 4.2.1 a (2)  
(NASA, NPR 8580.1, Chapter 4)

\_\_\_\_\_ c. Is exempt from NEPA requirements under the provisions of:

\_\_\_\_\_

\_\_\_\_\_ d. Has no significant environmental impacts as indicated by the results of an environmental checklist and/or detailed environmental analysis. (Attach checklist or analysis as applicable)

\_\_\_\_\_ e. Will require the preparation of an Environmental Assessment.

\_\_\_\_\_ f. Will require the preparation of an Environmental Impact Statement.

\_\_\_\_\_  
Environmental Group Lead, Code 250

\_\_\_\_\_  
Date

\_\_\_\_\_  
Project Manager, Code 840

\_\_\_\_\_  
Date

## NEPA Environmental Checklist (R&D Projects)

Project Name: NASA African Monsoon Multidisciplinary Analysis (NAMMA) Date: May 18, 2006

Project Contact: Dave Easmunt

Project Start Date: August 1, 2006

Building Number and Location: D-1, room 219

Phone Number: 757-824-2454

Description of Project: See attached sheet

### Environmental Impacts:

"Yes" responses may require the project to prepare an Environmental Assessment or conduct additional studies.

#### A. Geologic:

- a. Greater than 10% change in topography or ground surface relief features? Yes [ ] Maybe [ ] No [ X ]
- b. Any increase in wind or water erosion of soils, either on or off site? Yes [ ] Maybe [ ] No [ X ]
- c. Changes in deposition, situation, or erosion that may modify the wetlands or bay? Yes [ ] Maybe [ ] No [ X ]

Explain all "yes" and "maybe" answers: \_\_\_\_\_

#### B. Air:

- a. Substantial air emissions or deterioration of ambient air quality? Yes [ ] Maybe [ ] No [ X ]
- b. The creation of objectionable odors? Yes [ ] Maybe [ ] No [ X ]
- c. Alteration of air movement, moisture, temperature, or any changes in climate, either locally or regionally? Yes [ ] Maybe [ ] No [ X ]

Explain all "yes" and "maybe" answers: \_\_\_\_\_

#### C. Water:

- a. Disturbance of groundwater? Yes [ ] Maybe [ ] No [ X ]
- b. Greater than 10% changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? Yes [ ] Maybe [ ] No [ X ]
- c. Alter the course or flow of floodwaters? Yes [ ] Maybe [ ] No [ X ]
- d. Alteration of the direction or rate of ground water? Yes [ ] Maybe [ ] No [ X ]
- e. Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations? Yes [ ] Maybe [ ] No [ X ]
- f. Activities resulting in changes of greater than 10% of Center total potable water use (maximum 820,000 gallons/month)? Yes [ ] Maybe [ ] No [ X ]
- g. Any construction or other activity in a floodplain or wetland? Yes [ ] Maybe [ ] No [ X ]

Explain all "yes" and "maybe" answers: \_\_\_\_\_

#### D. Cultural Resources:

- a. Is the project located in an historic district or affects an existing landmark? Yes [ ] Maybe [ ] No [ X ]
- b. Will the project alter a building that is 50 years or older? Yes [ ] Maybe [ ] No [ X ]
- c. Is the project located in an area of suspected archaeological resources? Yes [ ] Maybe [ ] No [ X ]

Explain all "yes" and "maybe" answers: \_\_\_\_\_

#### E. Biological Resources:

- a. Construction/grading/filling within or adjacent to designated wetlands? Yes [ ] Maybe [ ] No [ X ]
- b. Reduction of the numbers of any rare, or endangered species? Yes [ ] Maybe [ ] No [ X ]
- c. Construction/grading/filling within open space or grasslands areas? Yes [ ] Maybe [ ] No [ X ]
- d. Introduction of new species or plants into an area, or impacts the normal replenishment of existing species? Yes [ ] Maybe [ ] No [ X ]
- e. Proposed construction activities in piping plover habitat? Yes [ ] Maybe [ ] No [ X ]
- f. Proposed construction activities within 600 feet of an eagle's nest? Yes [ ] Maybe [ ] No [ X ]
- g. Propose new landscaping or modify existing landscaping? Yes [ ] Maybe [ ] No [ X ]

Explain all "yes" and "maybe" answers: \_\_\_\_\_

**F. Noise:**

- a. A noise increase greater than 10% from an existing operation? Yes [ ] Maybe [ ] No [ X ]
  - b. Exposure of people to severe noise levels (above 80 dBA)? Yes [ X ] Maybe [ ] No [ ]
  - c. Increase existing CNEL noise contours surrounding the airfield Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" and "maybe" answers: Only at take-off and landing. Hearing protection required on airfield.

**G. Land Use:**

- a. Substantial alteration of the present or planned land use? Yes [ ] Maybe [ ] No [ X ]
  - b. Increase in the rate of use of any natural resource? Yes [ ] Maybe [ ] No [ X ]
  - c. Activities resulting in changes of greater than 10% of Center energy consumption (1,800,000 KWH of Main Base energy, 2,175,000 KWH of launch area energy, or 4,250,000 KWH of total energy)? Yes [ ] Maybe [ ] No [ X ]
  - d. Activities resulting in a change in total employment levels greater than 10% (more than 95 people)? Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" and "maybe" answers: \_\_\_\_\_

**H. Health and Safety:**

- a. Generation of ionizing or non-ionizing radiation? Yes [X] Maybe [ ] No [ ]
  - b. Generate any air emissions? Yes [ ] Maybe [ ] No [ X ]
  - c. Use of pesticides, including insecticides, herbicides, fungicides or rodenticides? Yes [ ] Maybe [ ] No [ X ]
  - d. Confined space entry? Yes [ ] Maybe [ ] No [ X ]
  - e. Risk of exposure to asbestos or lead containing materials? Yes [ ] Maybe [ ] No [ X ]
  - f. Result in the exposure or disturbance of contaminated soil or ground water? Yes [ ] Maybe [ ] No [ X ]
  - g. Generate industrial wastewater or storm water discharge? Yes [ ] Maybe [ ] No [ X ]
  - h. Use of Class I ozone-depleting substances (CFC's, TCA, halons)? Yes [ ] Maybe [ ] No [ X ]
  - i. Acquisition, use, or storage of any toxic or hazardous substance? Yes [ ] Maybe [ ] No [ X ]
  - j. Generation of medical (biohazard), hazardous, toxic, or radiological wastes? Yes [ ] Maybe [ ] No [ X ]
  - k. Use, disturbance, or disposal of PCBs? Yes [ ] Maybe [ ] No [ X ]
  - l. Use of toxic gas? Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" or "maybe" answers: Lase laser and KR-85 (see overview)

**I. Transportation/Circulation:**

- a. Generation of substantial vehicle trips (over 620 per day)? Yes [ ] Maybe [ ] No [ X ]
  - b. Affect existing parking facilities or demand for new parking? Yes [ ] Maybe [ ] No [ X ]
  - c. Substantial impact upon existing transportation systems? Yes [ ] Maybe [ ] No [ X ]
  - d. Increase in traffic hazards to motor vehicles, bicyclists, or pedestrians? Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" and "maybe" answers: \_\_\_\_\_

**J. Services:**

- a. Affect or result in need for new or altered government-provided fire protection services? Yes [ ] Maybe [ ] No [ X ]
  - b. Affect or result in need for new or altered government-provided security services? Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" and "maybe" answers: \_\_\_\_\_

**K. Environmental Justice:**

- a. Does the project have the potential to disproportionately affect low-income populations or minority populations? Yes [ ] Maybe [ ] No [ X ]
- Explain all "yes" and "maybe" answers: \_\_\_\_\_

# OVERVIEW OF THE NASA AFRICAN MONSOON MULTIDISCIPLINARY ANALYSIS (NAMMA) CAMPAIGN

## 1.1 INTRODUCTION

Tropical cyclonic storms pose a serious, imminent, and ongoing hazard to citizens of the United States. The NASA/UND DC-8 will be employed to study the downstream or oceanic evolution of precipitating convective systems, largely as this evolution pertains to tropical cyclogenesis in the eastern half of the Atlantic. The DC-8 will provide the following measurements:

- Observations of cloud and hydrometeor microphysics
- Precision observations of the *in situ* and vertical structure of water vapor and aerosols
- Passive microwave observations of cloud ice
- Vertical radar structure of precipitation
- *In situ* meteorological state variable (temperature, humidity, pressure, winds)
- Remotely sensed profiles of temperature
- Cloud electrical fields
- Drosopnde measurements

## 1.2 OBJECTIVES

- To characterize precipitation processes in the West African region and the adjacent eastern Atlantic, with specific focus on the transition of convective systems from continental to maritime
- Study tropical cyclogenesis in the eastern and central Atlantic, particularly the manner in which African Eastern Waves evolve into strong (category 3, 4, and 5) hurricanes that impact the United States east coast.
- Measure composition and vertical structure of the Saharan Air Layer with focus on how aerosols impact the efficiency of cloud precipitation processes, as well as its hypothesized influences (e.g. shear, dry air and thermodynamic stability) on cyclone development.

## 1.3 SCHEDULE

The Principal Investigator (PI) for the NAMMA is Dr. Ed Zipser from the University of Utah. University of North Dakota (UND) will supply the DC-8 maintenance and aircrew supporting a 120 flight hour campaign. NASA's Wallops Flight Facility (WFF) will supply safety and project management.

The scheduled mission dates are as follows:

- Instrument integration (UND) – July 7 to August 1, 2006
- Engineering Check Flight (UND) – August 7, 2006
- Project Check Flight #1 (UND) – August 9, 2006
- Project Check Flight #2 (UND) – August 11, 2006
- Transit to Cape Verde – August 15, 2006
- ~10 Science flights from Cape Verde
- Transit to UND – September 15
- De-integration (UND) – September 19

#### **1.4 ENVIRONMENTAL CHECKLIST SUMMARY, SECTION H, ITEM A**

The NAMMA mission has two items that fall under the environmental checklist.

##### **1.4.1 LASE**

The Lidar Atmospheric Sensing Equipment (LASE) is a tunable laser system that contains three Lasers: (1) a neodymium-doped yttrium aluminum garnet (Nd:YAG) (Class IV) pump laser operating at 1064-nanometers and 532-nanometers, (2) a titanium-sapphire (Ti:sapphire) (Class IV) power oscillator operating at selected wavelengths in the 813-818 nanometers region, and (3) a Gallium-Aluminum-Arsenide (GaAlAs) (Class III) laser diode operating at selected wavelengths in the 813-818 nanometer region. The maximum nominal ocular hazard distance (NOHD) for the Nadir beam is 22,400 feet with the maximum NOHD for the Zenith beam is 14,700 feet. The aircraft's normal operating altitude of 25,000 feet ensures the laser beam is eye safe at ground level. When the aircraft is operated at lower altitudes, the Nadir beam will be adjusted to ensure the beam is below the Maximum Permissible Exposure (MPE) at ground level. The LASE Lidar will be operated under NASA Langley's Safety Permit # NIR-367.

Dr. Victor Feigels, is a well known expert in the field of laser propagation through the atmosphere and water. He is well known in the lidar research community and he is also a consultant to Optec (Canada) the largest of the firms currently producing lidar systems). According to Dr. Feigel, the sensitivity ratio calculated for various species of marine mammals yields an effective threshold energy limit,  $MPE_s$ , which is at least 12 times as much as  $MPE_h$  (humans) for most sensitive species and 86 times as much as  $MPE_h$  for the majority of marine mammals. Eye tissue sensitivity in organisms is greater than skin sensitivity. Therefore, since this mission will be flown above the NOHD for humans, there is no anticipated ocular or dermal impacts to marine wildlife.

##### **1.4.2 LARGE Kr- 85**

In accordance with Title 10 of the Code of Federal Regulation Part 31.5 (10 CFR 31.5) there is no requirement to have a license for the use or possession of the Krypton-85 (Kr-85) Sources. The source itself is a Model 3077 2 mCi Kr-85 source manufactured by

TSI, Incorporated, serial number 2606. The source is maintained under our control and falls under the general license that comes with it.

Points of Contact:

Principal Investigator

Edward J. Zipser  
Professor  
Department of Meteorology  
University of Utah  
135 S 1460 E Room 809  
Salt Lake City, UT 84112-0110  
801.585.0467 (o)  
801.585.3681

Wallops Island,  
VA 23337  
757.824.2454 (o)  
757.894.3729 (c)  
Brenda.Mulac@gsfc.nasa.gov

NASA Mission Manager

David P. Easmunt  
Range and Mission Management Office  
NASA Wallops Flight Facility  
Building D-1 Room N-220  
Wallops Island, VA 23337  
757.824.1376  
David.P.Easmunt@nasa.gov

NAMMA Mission Manager

Brenda L. Mulac  
Project Manager  
LJT & Associates  
Range and Mission Management Office  
NASA Wallops Flight Facility  
Building D-1 Room N-220