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SAFARI 2000 DAILY RAINFALL ESTIMATES, 0.1-DEG, SOUTHERN AFRICA, 1993-2001

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Summary:

The Microwave InfraRed Algorithm (MIRA) is used to produce an imagery data set of daily mean rain rates at 0.1-degree spatial resolution over southern Africa for the period 1993-2001. MIRA combines passive microwave (PMW) from the Special Sensor Microwave/Imager (SSM/I) on board the DMSP F10 and F14 satellites at a resolution of 0.5 degrees and infrared (IR) data from the Meteosat 4, 5, 6, and 7 satellites in 2-hour slots at a resolution of 5 km. This approach accounts for the limitations of both data types in estimating precipitation. Rainfall estimates are produced at the high spatial and temporal frequency of the IR data using rainfall information from the PMW data. An IR/rain rate relationship, variable in space and time, is derived from coincident observations of IR and PMW rain rate (accumulated over a calibration domain) using the probability matching method. The IR/rain rate relationship is then applied to IR imagery at full temporal resolution. The results presented here are the daily means of those derived rain rates at 0.1-degree spatial resolution.

The rainfall data sets are flat binary images with no headers. They are compressed band sequential (bsq) files that contain all of the daily images for the given year. Each image is an array of 341 lines, each with 401 binary floating-point numbers, containing rainfall at 0.1 degree resolution for the area 10 to 50 degrees longitude and 0 to -34 degrees latitude. The number of band sequential images in each annual file and the associated dates can be found in the file MIRA_data_dates.csv.

Data Citation:

Cite this data set as follows:

Layberry, R., D. R. Kniveton, and M. C. Todd. 2005. SAFARI 2000 Daily Rainfall Estimates, 0.1-Deg, Southern Africa, 1993-2001. Data set. Available on-line [http://daac.ornl.gov/] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/793.

References:

- Atlas, D. T. and L. Bell. 1990. Climatologically tuned reflectivity-rainrate relations and links to area-time integrals. J. Appl. Met., 29: 1120-1135.
- Todd, M. C., C. Kidd, T. J. Bellerby, and D. R. Kniveton. 2001. A combined satellite infrared and passive microwave technique for estimation of small-scale rainfall. Journal of Atmospheric and Oceanic Technology, 18(5): 742-755.

Data Format:

The rainfall data sets are flat binary images with no headers. The compressed data files are named following the format **mira_rainfall_YYYY.zip**. These files are:

Precipitation Image Files
mira_rainfall_1993.zip
mira_rainfall_1994.zip
mira_rainfall_1995.zip
mira_rainfall_1996.zip
mira_rainfall_1997.zip
mira_rainfall_1998.zip
mira_rainfall_1999.zip
mira_rainfall_2000.zip
mira_rainfall_2001.zip

The data files are band sequential files that contain all the daily images for the given year. The number of band sequential images in each annual file and the associated dates can be found in the file **mira_data_dates.csv**.

Band Sequential Information File

Below are the first few records of the **mira_data_dates.csv** file. The MIRA rainfall images are a concatenation of daily rainfall images listed in this information file. The information file is an ASCII file that has a two header records, the first of which is year, the second is the total number of days (bands) in each band sequential yearly file. Below this, the dates (bands) contained within each yearly file, are listed.

1993	1994	1995	1996	1997	1998	1999	2000	2001
------	------	------	------	------	------	------	------	------

band	362	354	283	332	351	353	341	364	353
1	1-Jan-1993	1-Jan-1994	1-Jan-1995	1-Jan-1996	1-Jan-1997	1-Jan-1998	1-Jan-1999	1-Jan-2000	11-Jan-2001
2	2-Jan-1993	2-Jan-1994	2-Jan-1995	2-Jan-1996	2-Jan-1997	2-Jan-1998	2-Jan-1999	2-Jan-2000	12-Jan-2001
3	3-Jan-1993	3-Jan-1994	3-Jan-1995	3-Jan-1996	4-Jan-1997	3-Jan-1998	3-Jan-1999	3-Jan-2000	13-Jan-2001
4	4-Jan-1993	4-Jan-1994	4-Jan-1995	4-Jan-1996	5-Jan-1997	4-Jan-1998	4-Jan-1999	4-Jan-2000	14-Jan-2001

Image Parameters

Each image is an array of 401 lines, each with 341 binary floating-point numbers, containing rainfall at 0.1 degree resolution for the area 10 to 50 degrees longitude and 0 to -34 degrees latitude. The array reads in the order: first point is centered on 10 degrees longitude and -34 degrees latitude, 2nd point is centered on 10.1 degrees longitude, -34 degrees latitude, etc.

Additional information about the data format and data processing is found in the companion file:

http://daac.ornl.gov/daacdata/safari2k/climate_meteorology/daily_precip_est/comp/daily_precip_est_readme.pdf.

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