SAFARI 2000 FEWS 10-day Rainfall Estimate, 8-Km, 1999-2001

Abstract

The U.S. Agency for International Development (USAID) Famine Early Warning System (FEWS) have been supporting the production of 10-day Rainfall Estimate (RFE) data for Africa since 1995. The FEWSNET project was established with the goal of reducing the incidence of drought- or flood-induced famine by providing decision makers with timely and accurate information on conditions that may require intervention. RFE data for continental Africa for 1999, 2000, and 2001 were downloaded the from the African Data Dissemination Service (ADDS) site at http://edcsnw4.cr.usgs.gov/adds/index.php [Internet Link], and have been subset for southern Africa by the SAFARI 2000 data group.

The RFE 1.0 algorithm, implemented from 1995 to 2000, uses an interpolation method to combine Meteosat and Global Telecommunication System (GTS) data, and warm cloud information for the 10-day estimations. The 30-minute geostationary Meteosat-7 satellite infrared data are used to estimate convective rainfall from areas where cloud top temperatures are less than 235K. The RFE 2.0 algorithm, implemented as of January 1, 2001, uses additional techniques to better estimate precipitation while continuing the use of cold cloud duration and station rainfall data. The 2.0 algorithm also incorporates two additional satellites, the Special Sensor Microwave/Imager (SSM/I) and the Advanced Microwave Sounding Unit (AMSU) to further aid the estimation. Rain gauge data from ~1000 World Meteorological Organization (WMO) GTS stations that pass quality control procedures are weighted more heavily toward the final rainfall estimate as the distance to the station decreases. Thus, at a distance far from the rain gauge, satellite estimates data dominate the final output result. For additional information on the FEWS RFE algorithm, please refer to the links in the **Additional Sources of Information** section below.

Background Information

Investigators:
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Project: FEWSNET
Data Set Title: FEWS 10-day Rainfall Estimate (RFE)

Site: Southern Africa
Westernmost Longitude: 20° 38' 29.80" W
Easternmost Longitude: 50° 31' 12.55" E
Northernmost Latitude: 10° 05' 58.52" N
Southernmost Latitude: 42° 16' 57.42" S

Data Set Citation:

Xie, P. 2004. SAFARI 2000 FEWS 10-day Rainfall Estimate, 8-Km, 1999-2001. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

Data File Information

The RFE subsets are flat binary images, with no headers. The data are limited to the range 0-250 and the rainfall units are total millimeters for the 10-day period. The data are in an Albers projection, and the pixels are 8 km square. Each single-byte image is 928 samples by 711 lines. There are 3 images per month, thus 36 per year, for a total of 108 10-day rainfall images for the period 1999-2001.

FEWS RFE files of continental Africa were downloaded from the ADDS server. These files were georeferenced within the PCI image processing package using the georeferencing information provided. Subsets of southern Africa were then extracted. The original images of continental Africa were 1152 samples (columns) by 1152 lines (rows). From this, a subset was extracted from starting sample 47, starting line 442, that was 711 samples by 928 lines in size.

Data Parameters

Number of samples	928
Number of lines	711
Bytes per pixel	1
Data Range	0-250
Fill Value	0

Data Units	millimeters
Pixel size	8000 x 8000 meters
Projection	Albers

Georeferencing

Projection : Albers Conical Equal-Area Datum-Ellipsoid : NAD 27 - Clarke 1866 True origin : 20°00'00.0000"E 1°00'00.0000"N 1st std parallel : 19°00'00.0000"S 2nd std parallel : 21°00'00.0000"N

Projection Coordinates

Upper Left Corner	-4240000.000 E	1080000.000 N
Upper Right Corner	3184000.000 E	1080000.000 N
Image Centre	-528000.000 E	-1764000.000 N
Lower Left Corner	-4240000.000 E	-4608000.000 N
Lower Right Corner	3184000.000 E	-4608000.000 N

Geograhphic Coordinates

Upper Left Corner	20°38'27.57" W Lon	10°00'27.23" N Lat
Upper Right Corner	50°31'10.87" E Lon	10°06'00.73" N Lat
Image Centre	14°58'40.98" E Lon	14°10'31.86" S Lat
Lower Left Corner	20°00'57.22" W Lon	42°17'06.29" S Lat
Lower Right Corner	50°03'00.88" E Lon	42°09'45.38" S Lat

The FEWSNET Estimation of Precipitation over Africa

Due to the sparse distribution of rain gauges over the African continent, and in response to devastating drought and famine that have plagued the region in the past, the USAID supported the development of a technique to estimate precipitation over continental Africa. Available METEOSAT data and GTS rain gauge reports, in conjunction with model analyses of wind and humidity, were used along with orographic information to

estimate the accumulated rainfall over the continent. By combining model analyses with real-time observations, the biases inherent in each approach can be eliminated. For further details on the development of the FEWS precipitation estimates, please see the RFE Technical Paper links within the References section below.

The precipitation estimates provided here were developed for climatological purposes over 10-day periods that were established by FEWS for drought monitoring. There are 3 periods per month, the first are days 1-10, the second, days 11-20, and the third period contains the remaining days of the month, which varies from 8-11 days depending upon the month and year.

Additional Sources of Information

Xie, P. and P. A. Arkin, 1997. A 17-year monthly analysis based on gauge observations, satellite estimates, and numerical model outputs. *Bulletin of the American Meteorological Society* 78(11): 2539-58.

RFE 1.0 technical paper:
http://edcintl.cr.usgs.gov/adds/RFEPaper.php [Internet Link]

RFE 2.0 technical paper:
http ://www.cpc.ncep.noaa.gov/products/fews/RFE2.0_tech.pdf [Internet Link]

Changes to procedures:
http://www.cpc.ncep.noaa.gov/products/fews/ctp.html [Internet Link]

CPC FEWSNET:
http://www.cpc.ncep.noaa.gov/products/fews/index.html [Internet Link]

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