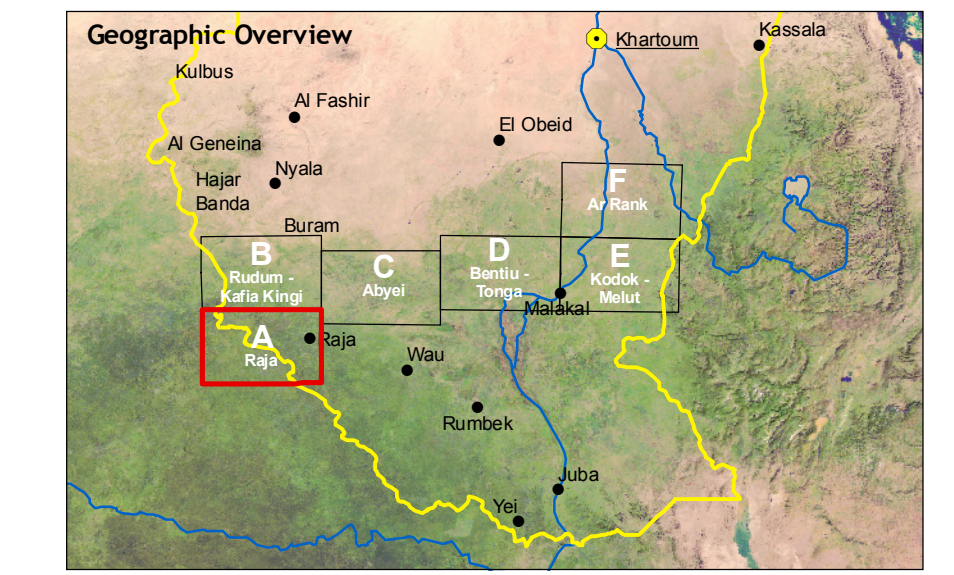


SUDAN

Topographic Field Map

North/South Border Map Series

Map sheet: Raja
Western Bahr el Ghazal, Central African Republic



1:250'000

Scale bar: 0 5 10 15 20 km
Raster Resolution: 90 meters
UTM Grid: 25 kilometer interval
Geographic Grid: 30 minute interval
Projection: Universal Transverse Mercator (UTM)
UTM Zone: UTM 35
Meridian of Origin: 27 degrees 00 minutes E of Greenwich
Latitude of Origin: Equator
Horizontal Datum: WGS84
Vertical Datum: Mean sea level
Spheroid: WGS84

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Version: Draft Release 1.1, March 2008
Internet: www.cde.unibe.ch

- Settlements**
 - State capital
 - Principal town
 - Secondary town
 - Administrative town
 - Settlement (verified)
 - Settlement (not verified)
 - Built-up area
 - Vulnerable area
 - Settlement (not verified)
- Infrastructure features**
 - Airstrip (CDE)
 - Main road (CDE)
 - Gravel/dirt road (CDE)
 - Track (CDE)
 - Street (CDE)
 - Railway (CDE)
 - Non-operational
 - Main road (ES)
 - Gravel road (ES)
 - Street (ES)
 - Dirt road or track (ES)
 - Bridge
 - River crossing
- Topography**
 - Spot height
 - Main contour (100 m interval)
 - Intermediate contour (50 m interval)
 - Supplementary contour (25 m interval)
 - Land cover classes
 - Sparsely vegetated (single shrubs, grassland)
 - Shrubby vegetation (scrubland)
 - Dense vegetation (savanna, mature crops)
 - (irrigated, rainfed) settlement area (built-up area)
 - Quarry
 - (basement, volcanic)
 - Wetlands (marshes, swamps)
 - Surface Water
 - perennial waterbodies
- Political boundaries**
 - National boundary
- Geographical features**
 - Hill or mountain
 - Tribal area
 - Dinka: Homadic or tribal area
- Hydrological features**
 - Main river
 - Seasonal river
 - Occasional river
 - Epilotic river
 - Canal (wet or dry)
 - Canal (unfished)
 - Pipeline
 - Borehole (hand drilled)
 - Culvert
 - Pond / Pool
 - Reservoir
 - Spring
 - Wadi
 - Well
 - Wetland

Disclaimer:
The boundaries, demonstration and any other information shown on this map do not imply any judgment about the legal status of any territory, or constitute any official endorsement or acceptance of the boundaries by the part of any Government. The publisher (CDE) assumes no liability for any direct, incidental, special, or consequential damages whatsoever. The publisher (CDE) is not responsible for claims by any third party.

Project Information
The present map was prepared for the *North-South Border Commission*, whose work is in progress as part of the implementation of the Comprehensive Peace Agreement signed on January 9, 2005. The map sheet is part of a series of maps 1:250,000 and 1:100,000 covering the tentative border area of the northern and southern part of Sudan. The map and the geospatial database were prepared by the Centre for Development and Environment (CDE) of the University of Bern, Switzerland.
Map authors: Heidi Christen, Vivian Jürg, Henning Christian, Gernert Ullrich, Erika-Maria Emmanuel, Geoprocessing Unit, Centre for Development and Environment, Institute of Geography, University of Bern.

Technical data sources
Image sources: Most of the line and point features (mainly roads, tracks, pipelines, air strips, as well as resettled villages, water surfaces and meanders) were added, based on satellite image interpretation by CDE.
Satellite images used: Terra / ASTER-nir data for 2002-2006, Landsat ETM+ 7-4-2 and Earthstar HyperView (AS2) data for 2002 and Digital Globe QuickBird 2 imagery for 2003-2005.
Internet sources: Geoinformation of UNCSIS, www.unhcr.org; UNEF; UNICEF; UNMOGIL; UNMIS; WFP; OLS-data on DERRIA server; FAO Affricover project; Global Name and Geospatial Data; Global Wetland Data (GWDH); Google Earth Pro; NCRC North-South and Individual communications within the international aid community.
Map sources: Eastview Information Services (ES), Minneapolis, USA
www.eastview.com
Other sources consulted: In particular the Topographic Map Series 1:250,000 published by the Sudan Survey Department 1934-1937 (party release 1974).

Data compilation
Georeferencing of spatial data was obtained through image-to-image and vector-to-image rectification. Except for the non-digitized areas, the Sudan's Topographic Mission (SRTM) data were used as the principal reference for topographic features and the development of the digital terrain and the highly detailed drainage model. The DTM has a 90-meter resolution and shows contours (10m intervals), vertical datum (1984 International), slope, aspect, spot heights and a shaded relief. In flat areas the DTM was calculated based on spot heights and contours from map sources. Ground control points were applied for image rectification. Average geometric distortion is estimated to be below +/- 100 m. Wetlands, boreholes and ponds were derived from satellite ETM+, Terra, MODIS (KVP and EVI), and FAO Affricover data (agriculture). Information was classified and vectorized using the verification of field work and applied. River modeling, geodata compilation, and digital cartography were done with ESRI ArcGIS 9.2 and ArcSWAT (MAGE) 1.1. River settlements, tracks and paths from the map were extracted based on satellite data provided by Google Earth Pro 4.1.7.
The CDE (University of Bern) would welcome any information that could improve this map. For comments and suggestions, please contact the CDE at info@cde.unibe.ch.
Digital maps, pdf, 8 page files, and further project information are accessible on CDE's Sudan Map Download Server at <http://www.cde.unibe.ch>.

Please note that when information is used in other mapping products, the source of the map must be credited or cited: CDE, University of Bern, SDAM Topographic Field Map Series 1:250,000, Draft Release 1.1 (December 2007), North/South Border Map Series, Bern: CDE, 2007.

