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Bentiu - Tonga

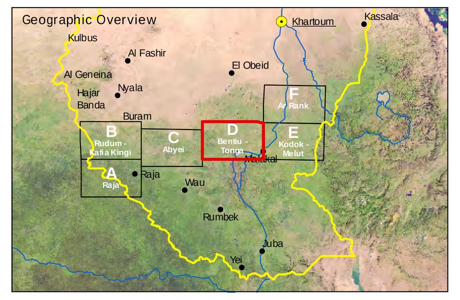
SUDAN

Topographic Field Map

North/South Border Map Series

Map sheet: Bentiu - Tonga

West Kordofan, Western- / Upper Nile, South Kordofan



1:250'000

0 5 10 15 20 km

Raster Resolution: 90 meters
UTM Grid: 25 kilometer interval
Geographic Grid: 30 minutes interval
Projection: Universal Transverse Mercator (UTM)
UTM Zone: UTMZ 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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Settlements
- State capital
- Principal town
- Secondary town
- Administrative town
- Settlement (verified)
- Settlement (not verified)
- Built-up area
- Vulnerable area (camp, idp)
- Schools

Infrastructural features
- Airstrip (CDE)
- Main road (CDE)
- Gravel / Dirt road (CDE)
- Track (CDE)
- Street (CDE)
- Railway (CDE) (non-operational)
- Main road (EIS)
- Gravel road (EIS)
- Street (EIS)
- Dirt road or track (EIS)
- Bridge
- River crossing

Topography
- Spot height
- Main contour (100 m interval)
- Intermediate contour (50 m interval)
- Supplementary contour (25 m interval)

Elevation classes
- below 400 m
- 401 - 450 m
- 451 - 500 m
- 501 - 550 m
- 551 - 700 m
- 701 - 900 m
- 901 - 1,300 m
- 1,301 - 1,800 m
- 1,801 - 2,500 m
- above 2,500 m

Political boundaries
- National boundary

Geographical features
- Hill or mountain

Tribal area
- Dinka Nomadic or tribal area

Hydrological features
- Main river
- Seasonal river
- Occasional river
- Episodic river
- Dry river
- Canal (wet or dry)
- Canal (unfinished)
- Pipeline
- Borehole (machine / hand drilled)
- Culvert
- Pond / Pool
- Reservoir
- Spring
- Waterhole
- Well
- Wetland

Land cover classes
- Sparse vegetation (single shrubs, grassland)
- Shrubby vegetation (scrubland)
- Dense vegetation (groves, mature crops)
- Agriculture (irrigated, rainfed)
- Settlement area (built-up area)
- Outcrop (basement, vulcanic)
- Wetlands (marshes, swamps)
- Surface Water (perennial waterbodies)

Disclaimer:

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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 1:500k, 1:250k, and 1:100k 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.

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Technical data sources

Imagery 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 sensors used: Terra /ASTER-vnir data for 2002-2006, Landsat ETM+ 7/4/2 and EarthSat Natural Vue RGB 3/2/1 data for 2000 and Digital Globe Quickbird 2 imagery for 2003-2005.

Internet sources: GeoNetwork of UNOCHA, www.unsudanig.org, UNICEF, UNJLC, UNMIS, UNMAS, WFP, OLS-data on DEPHA server, FAO AfriCover project, Global Name and Gazetteer data, Global Wetland Data (GLWD), Google Earth Pro, NCCR North-South and individual communications within the international aid community.

Map sources: Eastview Information Services (EIS), Minneapolis, USA www.cartographic.com (mainly Russian Military Topographic Map, 1:200,000 and 1:100,000 Series).

Other sources consulted: In particular the Topographic Map Series 1:250,000 published by the Sudan Survey Department 1934-1937 (partly revised 1976).

Data compilation

Georeferencing of spatial data was obtained through image-to-image and vector-to-image rectification. Except for the non-sloping area, NASA's Shuttle Radar Topography 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 (50m interval), altitudinal belts (200m intervals), slopes, aspects, 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 not applied for image rectification. Average geometric distortion is estimated to be below +/- 100 m. Wetlands, forest, bush and shrub cover were derived from Landsat ETM+, Terra MODIS (VCF and EVI), and FAO AfriCover data (agriculture). Information was classified and cross-validated. In situ verification of data was not applied. Raster modelling, geodata compi-lation, and digital cartography were done with ESRI ArcGIS 9.2 and Leica ERDAS IMAGINE 9.1. Minor settlement, track and path features were extracted based on satellite data provided by Google Earth Pro 4.17.

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- & jpg-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. SUDAN Topographic Field Map [map] 1:250,000, Draft-Release 1.0/December 2007. North/South Border Map Series. Bern: CDE, 2007.