



Horizon 2020
Programme

LEAP-RE

Research and Innovation Action (RIA)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 963530

Start date : 2020-10-01 Duration : 72 Months
<http://www.leap-re.eu/>



LEAP-RE

Long-Term Joint EU-AU Research
and Innovation Partnership on Renewable Energy

Final version of the Geothermal Atlas for Africa

Authors : Jan-Diederik van Wees (TNO), Jetze Hofstra (TNO), Hans Veldkamp (TNO), Marianne van Unen (TNO), Job Mos (TNO), Joop Hasselman (TNO)

LEAP-RE - Contract Number: 963530

Project officer: Maria-Laura TRIFILETTI"

Document title	Final version of the Geothermal Atlas for Africa
Author(s)	Jan-Diederik van Wees (TNO), Jetze Hofstra (TNO), Hans Veldkamp (TNO), Marianne van Unen (TNO), Job Mos (TNO), Joop Hasselman (TNO)
Number of pages	258
Document type	Deliverable
Work Package	WP9
Document number	D9.5
Issued by	TNO
Date of completion	2025-09-30 16:12:58
Dissemination level	Public

Summary

This report documents the activities and products of Task9.4 in LEAP-RE, focused on the creation of the web-based and printed version of the Geothermal Atlas of Africa. The printed maps are included as Annex in this deliverable. The web version is available on <https://geothermalatlasforafrica.org> The Geothermal Atlas includes results from completed tasks in Work package 9 of LEAP-RE: - D.2 Final report of task 9.1 on geoscience data collected to be used in the Geothermal Atlas - D9.3 Final report of task 9.2 on all surface data collected to be used in the Geothermal Atlas - D9.4 Final report on the social analysis and the related data developed in task 9.3 and to be used in the Geothermal This document describes the overarching goals of the geothermal atlas of Africa in section 2. Subsequently technical details of the atlas are given. The architecture of the atlas is based on open source components and has been set up such that it can be maintained and updated by LEAP-RE partners

Approval

Date	By
2025-09-30 18:05:28	Fiaschi DANIELE (UNIFI)
2025-10-02 13:43:00	Léonard LÉVÊQUE (LGI)



LEAP-RE

Long-Term Joint EU-AU Research
and Innovation Partnership on Renewable Energy

Research & Innovation Action

September 2024

WP 9 Geothermal Atlas for Africa

D9.5 report of task 9.4 on Final version of Geothermal Atlas of Africa

Version N°1

Authors:

Jan-Diederik van Wees, Jetze Hofstra, Hans Veldkamp, Marianne van Unen, Job Mos, Joop Hasselman (TNO) Bekele Abebe, Balemwal Atnafu (AAU), Chris Rochelle, Darren Jones (BGS), Chrystel Dezayes, Bernard Sanjuan (BRGM), Abdelkader Ait Ouali (CDER), Eugenio Trumpy, Domenico Montanari (CNR), Nicholas Mariita (DeKUT), Jacques Varet (Géo2D), Egbert Jolie, Anna Jentsch, Simona Regensburg (GFZ), Islam Abou El-Magd (NARSS), Samatar Mohamed, Nasteho Djama Houssein, Hassan Mohamed Magareh, Nasteho Djama Houssein, Hassan Mohamed Magareh (ODDEG), Fabio Iannone (SSSA), Elisante Mshiu, Nyora Donald Kobare and Nelson Boniface (UDSM), Boaventura Chongo Cuamba, Francisco Vieira, Luis Magaia (UEM), Meseret Teklemariam (UNEP), Daniele Fiaschi, Claudio Zuffi (UNIFI), Joseph Onjala (UoN, AU), Fred Beekman (UU)

Disclaimer



This project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

The content of this report reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

Document information

Grant Agreement	963530
Project Title	Long-Term Joint EU-AU Research and Innovation Partnership on Renewable Energy
Project Acronym	LEAP-RE
Project Coordinator	Vincent Chauvet – LGI
Project Duration	1 st October 2020 – 30 September 2026 (72 Months)
Related Work Package	9
Related Task(s)	9.4
Lead Organisation	TNO
Contributing Partner(s)	AAU,BGS, BRGM,CDER,CNR, Géo2D, GFZ, NARSS, ODDEG, SSSA,UDSM,UEM, UNEP, UNIFI, UoN, UU
Due Date	31-3-2024
Submission Date	29-3-2024 Resubmission on 02/20/2025
Dissemination level	Public

History

Date	Version	Submitted by	Reviewed by	Comments
23/10/2024	1	Joop Hasselman	Daniel Fiaschi	
26/10/2025	2	Joop Hasselman	Daniele Fiashi	updated after PO rejection

Table of contents

1. Introduction.....	6
2. Goal of the Geothermal Atlas for Africa	7
3. Geoscientific data	8
4. Engineering	12
5. Socio-economic.....	14
6. Geothermal Potentials	15

List of figures

Figure 1 Use cases for Geothermal energy sources in Africa	6
Figure 2 Geoscientific: Well data and active faults	11
Figure 3 Geoscientific: sedimentary thickness of basins and extent of hydrocarbon provinces in Africa	12
Figure 4 Engineering: planned geothermal wells, power plants and electricity grid compiled for engineering	13
Figure 5 Socio-economic: world population density and gross national income	14
Figure 6 Geothermal Potentials: Heating Capacity for direct Uuse (UNIFI model).....	17
Figure 7 Combined map for Cooling/Chill and masked for population density and vicinity of roads.....	18

Please note that the list of figure does not include figures in the annex

List of Tables

Table 1 Energy conversion scenarios considered in the Geothermal Atlas for Africa ...	15
Table 2 Geothermal resource parameters at grid locations	16
Table 3 Compound criteria for generation of resource quality classes.....	17
Table 4 Masking criteria for maps.....	18

Abbreviations and Acronyms

Acronym	Description
WP	Work Package
ES-MDA	Ensemble smoother – multiple data assimilation
O&G	Oil and Gas
LAB	Lithosphere-Asthenosphere Boundary

Summary

This report documents the activities and products of Task9.4 in LEAP-RE, focused on the creation of the web-based and printed version of the Geothermal Atlas of Africa. The printed maps are included as Annex in this deliverable.

The web version is available on <https://geothermalatlasforafrica.org> .

The Geothermal Atlas includes results from completed tasks in Work package 9 of LEAP-RE:

- D9.2 Final report of task 9.1 on geoscience data collected to be used in the Geothermal Atlas
- D9.3 Final report of task 9.2 on all surface data collected to be used in the Geothermal Atlas
- D9.4 Final report on the social analysis and the related data developed in task 9.3 and to be used in the Geothermal

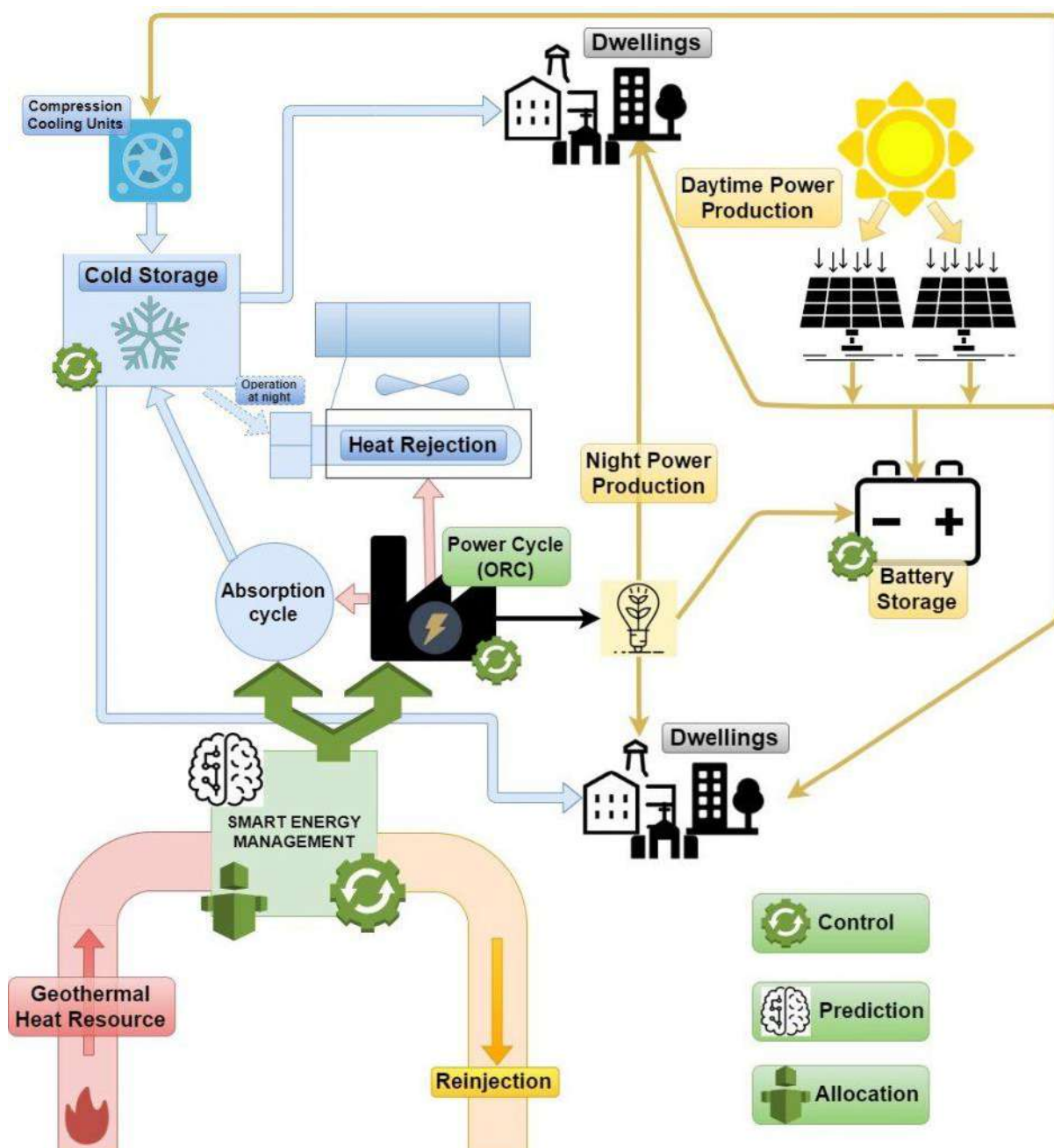
This document describes the overarching goals of the geothermal atlas of Africa in section 2. Subsequently technical details of the atlas are given. The architecture of the atlas is based on open source components and has been set up such that it can be maintained and updated by LEAP-RE partners.

Keywords

Geothermal Atlas, Geoscience, Sedimentary basins, tectonics, thermal data, wells, volcanism, hot springs, engineering, socio-economic.

1. Introduction

Low to high enthalpy geothermal resources exist across the African continent, however, the utilisation is still minimal. The Geothermal atlas for Africa presents a comprehensive compilation of information on relevant geoscientific data, engineering and resource exploitation, novel results for geothermal energy potentials, as well information for societal embedding.



Renewables GEO Friendly Integration

Figure 1 Use cases for Geothermal energy sources in Africa

This report documents the activities and products of Task9.4 in LEAP-RE, focused on the creation of the web-based and printed version of the Geothermal Atlas of Africa. The printed maps are included as Annex in this deliverable.

The web version is available on <https://geothermalatlasforafrica.org> .

The Geothermal Atlas includes results from completed tasks in Work package 9 of LEAP-RE:

- D9.2 Final report of task 9.1 on geoscience data collected to be used in the Geothermal Atlas
- D9.3 Final report of task 9.2 on all surface data collected to be used in the Geothermal Atlas
- D9.4 Final report on the social analysis and the related data developed in task 9.3 and to be used in the Geothermal

This document is structured as follows. First we describe the overarching goals of the geothermal atlas of Africa in section 2. Subsequently we give technical details of the atlas which is based on open source components and has been set up such that it can be maintained and updated by LEAP-RE partners in the future. Finally the annex gives a graphical representation of maps included in the Geothermal Atlas of Africa, updated from D9.2, including 21 additional maps.

2. Goal of the Geothermal Atlas for Africa

East Africa has well-known high enthalpy geothermal resources due to its geological setting (East African Rift System). The potential for power generation related to this favourable geological condition is extensive, but geothermal development has (to date) been limited. Kenya is leading the development with an installed capacity of 690 MWe, largely at one site (Olkaria), demonstrating that large-scale development of renewable energy resources can be done in this part of Africa.

The current focus is mainly on high-temperature resources (i.e., East African Rift), while low-medium systems are still neglected, even though they could provide sustainable heat/energy sources for industrial purposes, tourism, and others.

To this end, the Geothermal Atlas for Africa presents the origin and location of low to high enthalpy geothermal resources for the development of African electricity production, plus a range of direct heat/cold use applications and water use.

This has been achieved by identifying, organising, assessing, classifying, and interpreting: (1) geoscientific information (e.g., geology, geochemistry, geophysics), (2) technological information (e.g., existing power plants, installed capacity), and (3) social aspects with a multi-scale approach (local, regional, continental) to define the origin and location of low to high enthalpy geothermal resources for the development of African electricity production, plus a range of direct heat/cold use applications and water use.

Results are available online (and as pdf), which will allow easy access to relevant information on geothermal resources for scientists, project developers, policy & decision-makers, and investors.

Anticipated Impacts (in conjunction with other work pillars of LEAP-RE) are:

1. Successful identification and development of geothermal systems
2. Factors that help enable the construction of existing installations in place (both for high and low enthalpy)
3. Awareness of infrastructural constraints and social aspects of geothermal development
4. Reliable identification of the most suitable areas for combining geothermal projects with other renewables
5. Cost assessment of geothermal projects and pro/cons of their stand-alone or combined installation with other renewable energy systems
6. Awareness of sustainability of geothermal projects in Africa in the different areas, relevant for stakeholders, politicians, and decision-makers
7. Transfer of knowledge and experience from Europe to Africa and from one African country to another
8. Capacity building for African partners (research, community members, other stakeholders)
9. Regional networking and sharing results of research and scientific findings; links between researchers and institutions in Africa and Europe
10. Increase the investment opportunities for foreign companies in Africa

3. Geoscientific data

The following activities in particular in the first two years contributed to compilation of relevant datasets presented in the Geothermal Atlas:

- Communication with external partners for networking and data acquisition (e.g., IRENA, Royal Museum for Central Africa, GRÓ-GTP, KenGen, GDC).
- Development of a questionnaire for external partners for further data collection.
- Development of concepts for the storage and provision of the GAA datasets after the LEAP-RE project has ended.
- Development of comprehensive GIS project as a working document for data collection (Shape files, reports, pdf's) including all metadata in the development of a structure for the GAA.
- Abstract for World Geothermal Congress 2023 and ARGeo-C9.
- Initiate contacts and project discussions with Dr. Damien Delvaux (Royal Museum of Africa, Belgium) and Dr. Magdala Tesaure (University of Trieste) for a collaboration in data acquisition of the central part of Africa (Congo Basin and Craton, and surrounding areas).
- The BGS "EARTH" dataset / GIS model / report (covering the East African Rift region) was made available to the Task Lead to help populate the GAA with pre-existing data. They also released the report covering the above and the DOI. Opening of continental-scale "hidden" data within the "EARTH" model, and incorporation of additional continental-scale data. After a major literature search and review, a list of references was produced in which about 80 references related to geothermal activities (mainly technical reports in French and some documents) in Africa were identified. The main African countries concerned are the Republic of Djibouti (about 53 references), Rwanda (6 references), Madagascar (6 references), Tunisia (5 references), Morocco (4 references), Cameroon (3 references), Burundi and Mozambique (2 references). The heat flow database for continental Africa was also retrieved from the Africa GIS project (Guillou-Frottier

et al., 2002 - BRGM/RP-51902-FR report, 56 p.). Most of the activities described in these documents derive from surface geothermal exploration work carried out between 1970 and 1995 in the fields of structural geology, geological mapping, volcanology, mineralogy, geochemistry of hot spring fluids, geophysics and hydrogeology. Unfortunately, most of these documents are in restricted access and cannot be consulted in open access. Furthermore, it was decided to develop a questionnaire, which provides a good overview of the data needed/required for the Geothermal Atlas for Africa in order to obtain relevant data from all African geological surveys (English/French version). Compilation of data from existing reports and databases was also carried out. Libraries in KenGen, the Ministry of Energy in Nairobi and elsewhere were visited. Relevant paper reports were identified, some of which have data on geothermal sites in the country, and a summary was made for some of the information they have (covering geology, thermal, geochemistry and hydrogeology and geophysics). Additionally, work was carried out to develop the concept of geothermal play-types. Based on the geodynamic characteristics of the African continent, 10 geothermal play-types were proposed and mapped. These types of plays condition the type of geothermal development to be considered, in terms of exploration, drilling strategy, possible applications and overall economics.

- For the data collection and digitisation of already published data, all previous works related to geothermal energy were listed. In particular, the geological map of Djibouti was digitised to provide a shape-file for the project's metadata file. Then the geothermal manifestations (hot springs and fumaroles) of Djibouti were well collected.
- A focus on the structural geological data of the Main Ethiopian Rift (MER) was carried out. The following datasets were organised and collected: (i) faults; (ii) caldera edges; (iii) volcanic vents; (iv) fault-slip data; (v) rock dating; and (vi) geolocation of the maps from which the datasets were collected. The following continental-scale datasets were prepared: i) geothermal power plants; ii) distances to different plate margins; iii) density, magnitude and depth of earthquakes; iv) groundwater resources; v) rainfall; vi) surface air temperature; vii) sediment thickness; viii) global surface heat flux; ix) altitude; x) carbon dioxide emissions; xi) suitability map of geothermal power plants.
- Structural geological datasets at the MER scale contribute to volcano-tectonic characterisation and implications for geothermal exploration in Ethiopia.
- Data collection on geothermal information in Mozambique was also carried out. The information was collected from the Ministry of Mineral Resources and Energy and from published books and documents. The main findings of the study are: (i) Prospective geothermal areas occur in areas affected by tectonic events related to the Karoo and the southern extension of the EARS; (ii) Manifestations of geothermal activity are hot springs of temperature between 37 and 95°C; (iii) The depth of potential geothermal reservoirs was estimated from a limited number of geophysical data to be located at 1.5-2.5 km depth; (iv) Small geothermal power plants are predicted to be the most suitable for development. However, more relevant studies are still needed to confirm this potential across the country.
- An inventory of past research work involving Africa was also made. Collected and uploaded relevant research papers containing data of direct or indirect interest for some states such as Libya, Morocco and DDRC.
- Continental-scale work has also been carried out, taking up some papers prepared by the CNR on geothermal geographic suitability assessment, which has considered several datasets worldwide. With these continental scale datasets, it is possible to assess the main prospective areas in Africa for the exploitation of

geothermal resources of the collection of the mentioned datasets, as well as their digitization. In addition, metadata description and GIS webservices were prepared.

- NARSS work includes making available relevant data
- Open sources volcano data, From the Smithsonian Institution, Global Volcanism Program, American Geological Institute, Geological Survey (U.S.) and Environmental Systems Research Institute (Redlands, Calif.)
- Meta data (publications and other data) uploaded to the Nextcloud by different partners
- BGS groundwater Atlas (Open Access)
- TNO and UU data compilation and QC of open-source data of geothermal/geological information (Internship and MSc Thesis Hofstra (2022-2023): Basin shapefiles (Evenick, GETECH, Robertson), Hydrocarbon provinces (USGS). Porosity, permeability measurements (for reservoirs in sedimentary basins), Geological/seismic cross-section data (from literature), Well data (from literature), Limberger et al. (2018) grids indicating global geothermal potential indicators. Compilation of Continental scale data, jointly with GFZ and CNR, including Moho/Crustal/lithosphere depth (Finger et al. (2022), Globig et al. (2016), Swillus et al. (2019), Gravity data: BGI_WGM2012, EGM2008, Magnetics data: WDMAM (2015), EMAG2, Global Fault data: GAF-database, NASA surface temperature data (2022), Global seismic hazard assessment program (GSHAP) , Sedimentary thickness models: Laske & Masters (2013) (Already in other models), Straume et al. (2019), Creation of reservoir characteristics database (Excel) with the emphasis on porosity-depth, Sedimentary basin name nomenclature & synonym database, Digitalization of well & cross-section data from literature. Geothermal energy indicator analysis, resulting in indicator maps.
- Definition of geothermal provinces in Africa and display of relevant publications and reports in the atlas as point data (including metadata)
- Continuously more detailed datasets for the east African Rift, including data provided by CNR for Ethiopia, and at national scale.
- Drafting requests for letters to the organisations hosting the data for permission to access the data in their custody. With that permission, we will arrange for the data to be collected or photocopied and then entered into the LEAP-RE database.
- The surface temperature of Djibouti is conducted using satellite image processing.
- Digitized selected geological, geochemical and geophysical data from BRGM technical reports and printed documents relating to the Republic of Djibouti, Madagascar, Tunisia, Morocco and Cameroon, which will be integrated into the Geothermal Atlas for Africa.
- Sorted and converted the datasets into GIS format and a central GIS project in public domain QGIS to be shared among partners
- Created the conditions in terms of equipment and money for field trips to collect in situ data and acquire relevant information in the central and northern provinces of the country within the relevant national and provincial directorates of the Ministry of Mineral Resources and Energy (MIREME). The work consisted of the inventory and characterization of hot springs in order to define their best and most rational public use. Linkage with other geoscience subject areas such as plate tectonics and seismic activities for a better understanding of shear zones and potential geothermal zones was done. Compilation of sedimentary basin information of relevance for geothermal potential in Africa. Analysis of geothermal energy potential for sedimentary basins.

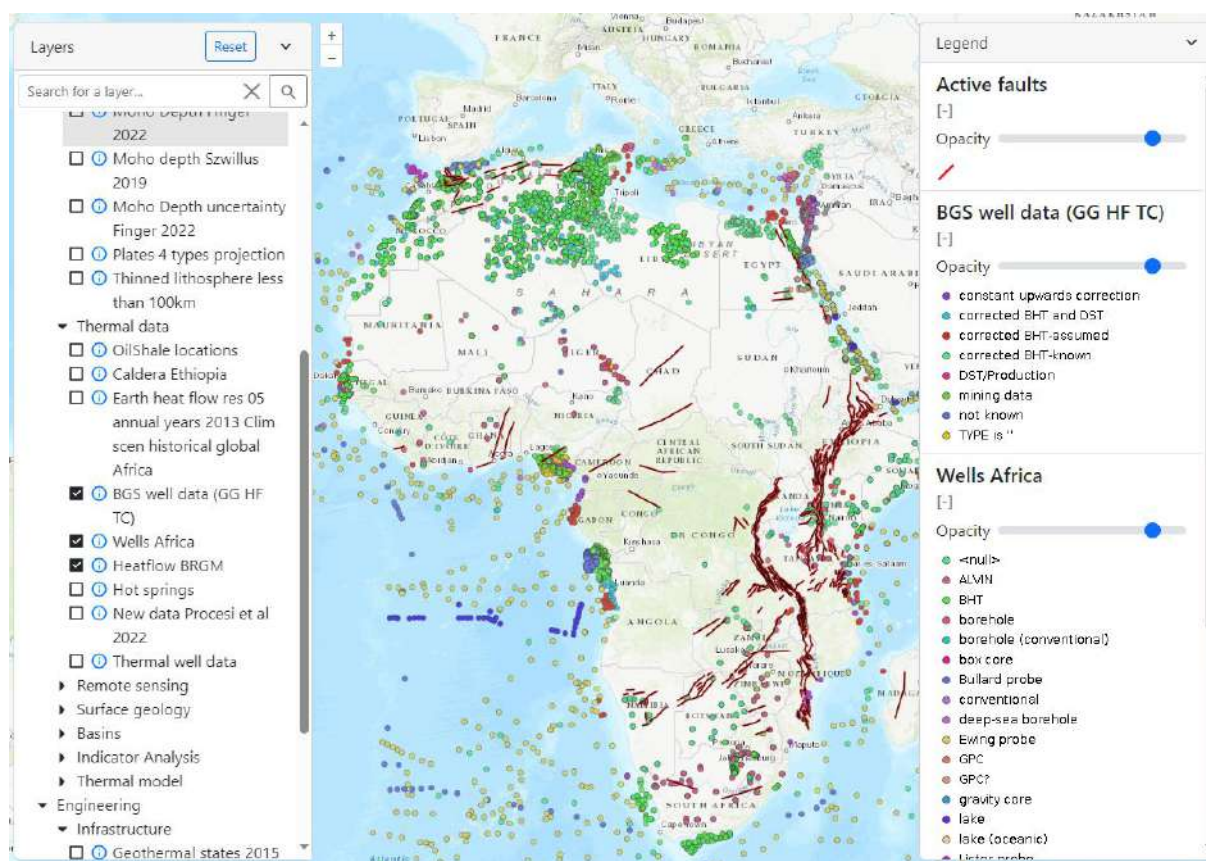


Figure 2 Geoscientific: Well data and active faults

In the last year the information has been funneled towards datasets which can be presented in the Geothermal Atlas, after ensuring that original owners of data agreed.

This resulted in various geoscientific maps, which have been subdivided in thematic Groups:

Tectonics: This group includes maps of (major) faults location and activity in Africa, crustal and lithospheric thicknesses, seismic hazard areas, location and type of major plate boundaries and Moho depths from various sources.

Thermal data: Here maps show locations and type of (thermal) wells in Africa, caldera volcanoes in Ethiopia, heat flow for Africa, name and type of hot springs in the East-African rift system derived from various sources, and potential locations for geothermal energy exploitation in Mozambique based on thermal springs geochemical characterization.

Remote sensing: Remote sensing techniques resulted in maps of surface temperature, magnetic anomalies, bedrock relief, and precipitation for Africa.

Surface geology: For each African country hydrogeological maps are made. Additionally, the location of volcanoes in Africa and gravity data in Djibouti are shown.

- Basins: Various sedimentary basin maps from different sources are being presented. This includes thickness maps, hydrocarbon provinces and cross sections located in Africa, and resistivity data for Djibouti. It also includes novel information and subsurface models which are required for presenting resource potential on a pan-African scale. These include porosity-depth interpretation for sedimentary basins and associated maximum potentially "permeable" sediment depths. sedimentary basins

- Input Potential: Includes complementary information for resource potential calculations including interpretation of permeable fault zones, and a temperature model interpreted permeable fault zones (volcanic). These data have been presented in

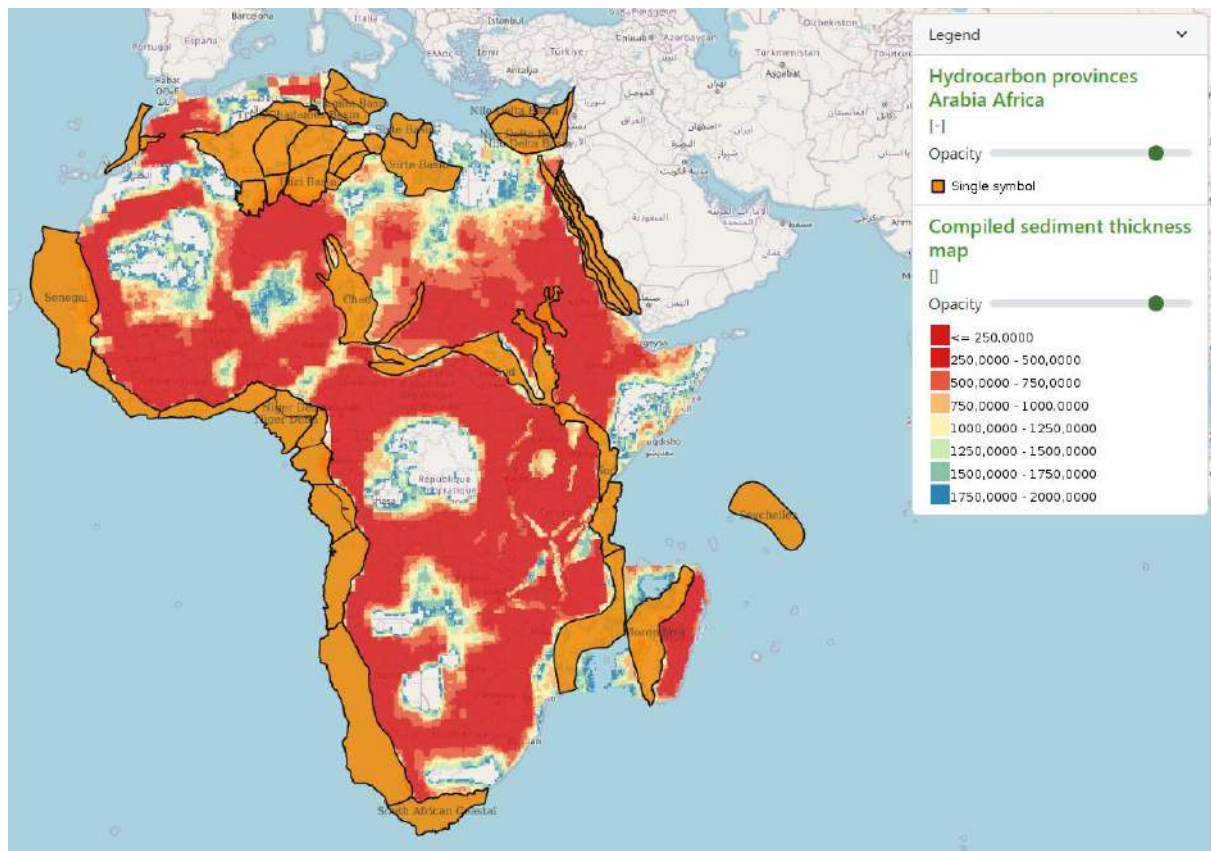


Figure 3 Geoscientific: sedimentary thickness of basins and extent of hydrocarbon provinces in Africa

4. Engineering

Engineering contains the current state of exploitation of geothermal resources of Africa, including an overview of (grid and road) infrastructures, and environmental restrictive areas of relevance for the future engineering of the resource base:

- Geothermal states: countries in Africa with geothermal energy production facilities
- Planned geothermal wells
- Power plants (including geothermal power plants)
- Protected areas
- Roads
- Electricity grid network

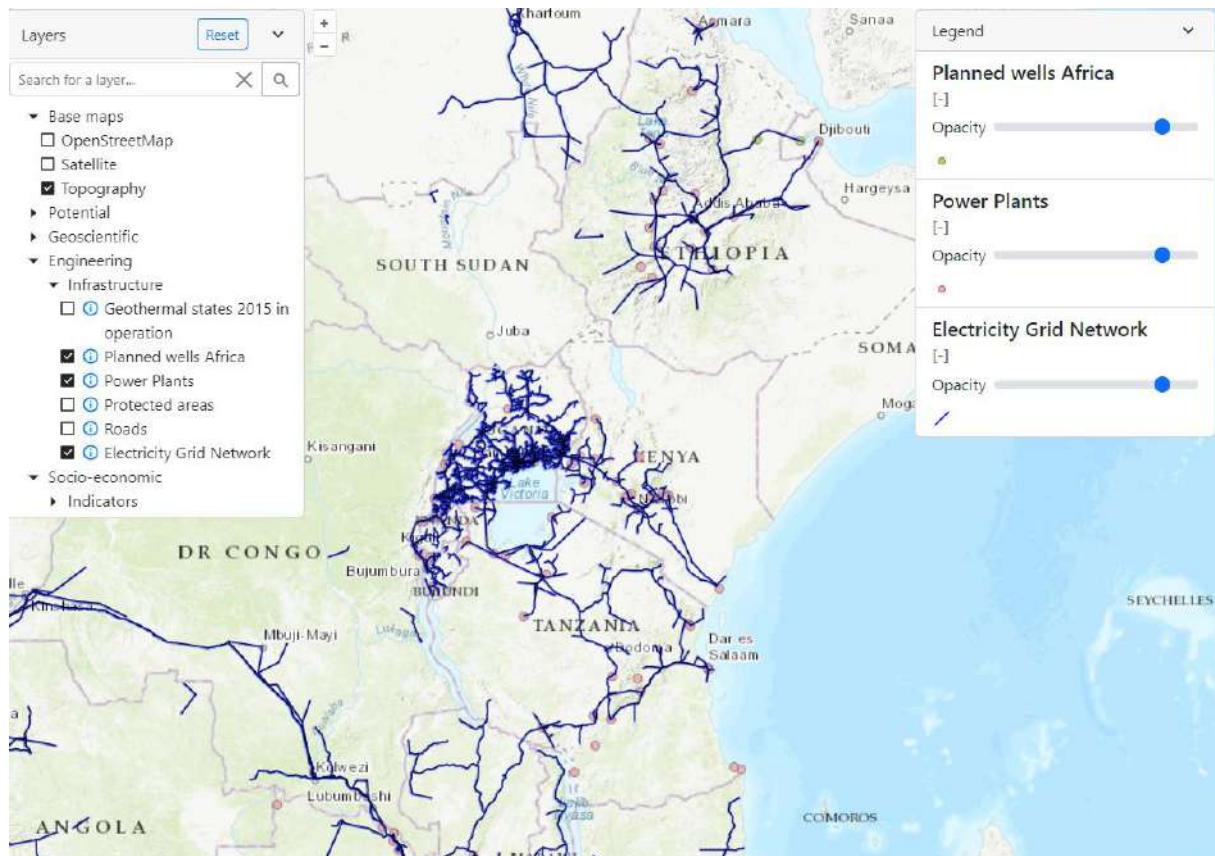


Figure 4 Engineering: planned geothermal wells, power plants and electricity grid compiled for engineering

5. Socio-economic

- Socio economic contains societal and demographic aspects which are of significant influence for the feasibility and potential use cases of geothermal energy development, including: adherence to rule of law as indication for maturity of legal frameworks for industrial investments, development and operation
- ease of doing business
- population density affecting strongly the practical potential for direct use of heat/adsorption cooling
- gross national income, affecting the potential demand for direct use of heat/adsorption cooling

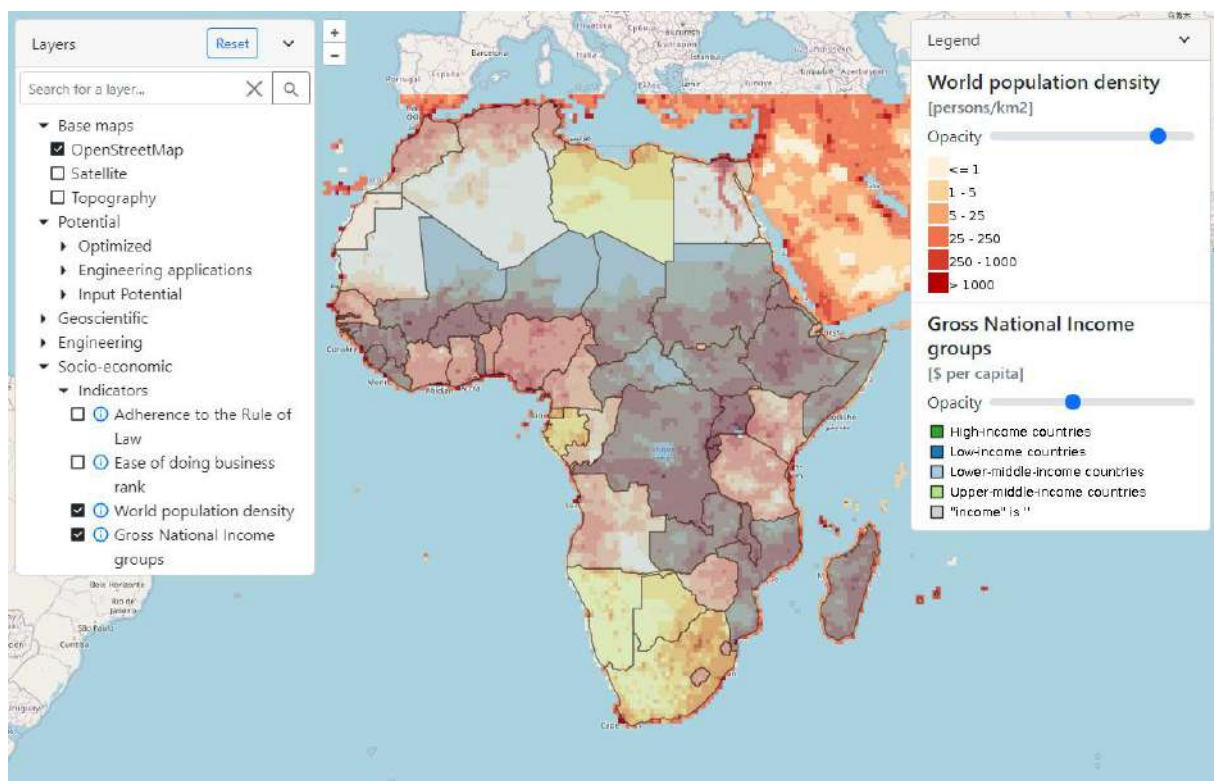


Figure 5 Socio-economic: world population density and gross national income groups

6. Geothermal Potentials

Geothermal potentials have been calculated for different energy conversion/engineering scenarios and with different methods for energy conversion calculations and subsurface (cost)engineering assumptions by partners TNO and UNIFI.

For all energy conversion calculations, the subsurface resource temperature, flow rate and based on geoscientific input on porosity of sedimentary basins and has been determined by locating at each x,y location the optimal depth for the potential resource to being produced for a particular energy conversion scenario, at a resolution of ca 25 km. It produces for each type of energy conversion scenario five resource performance indicator maps as listed in Table below. The optimized depth has been based on a doublet configuration, adopting total reinjection of produced brines, and finding optimal trade-off between improved resource quality in terms of temperature increasing with depth, and deterioration of resource flow properties and associated flow rate of wells with increasing depth as used in thermoGIS (cf www.thermogis.nl).

For input temperature and transmissivity the following geoscientific datasets have been used:

- Temperature model up to 4 km depth.
- Porosity-depth relationship of sedimentary basins converted to permeability based on poro-perm relationships for clastic aquifers (www.thermogis.nl) and to hydrologic transmissivity based on a potential aquifer thickness of 100 m.
- Active faults and volcanic areas have been interpreted as locations of potential fault and fracture permeability. For fault/fracture zone dominated aquifers it has assume that fault/fracture permeability can account for a hydraulic transmissivity of 20Dm up to a depth of 3 km. Corresponding “aquifer” permeability has been set to 10,000 mDarcy and a thickness of 20 m.

Table 1 Energy conversion scenarios considered in the Geothermal Atlas for Africa

Optimized	UNIFI cost engineering	TNO cost engineering model
ORC /FLASH	ORC and FLASH	ORC
DIRECT HEAT	Direct Heat	Direct Heat
HEAT PUMP	Heat Pump	Heat pump
CHILL/COOLING	Adsorption cooling	Chill

Table 2 Geothermal resource parameters at grid locations

parameter	Property name	Unit
Optimized depth of the aquifer	MIDDEPTH	Meter
Temperature at the optimized depth	TEMPRES	°C
transmissivity	KH	Darcy meter
Doublet well distance	L	M
Doublet Production flow rate	FLOWRATE	m3/h
Pressure needed to drive pumps	DP	Bar

The potential maps of the base case represent an expected value (P50) for potential. In order to illustrate the potential upside we also consider variation in subsurface parameter which results in a more positive business case outcome. So in total the based case complemented with two more positive scenarios have been considered:

- *Basecase:* default flow and thermal properties
- *Upside: Flow Upside:* P25 flow properties, based on a lognormal distribution for permeability, which standard deviation of 1 (for the natural logarithm)
- *Upside: Thermal upside + Flow upside:* As flow upside with 30% increase of the geothermal gradient in the temperature model

The performance models calculate Net power (MW), Levelized cost of Energy (LCOE, also denoted by Unit Technical cost UTC).

TNO subsurface (cost-)engineering methods and parameters are adapted from thermoGIS and are in particular representative for low enthalpy (<120C) in sedimentary basins. or Coefficient of Performance.

The UNIFI (cost-)engineering builds from the assumption of largely self flowing wells, which is representative for high enthalpy settings (> 150C). Consequently, the analysis is marked by low parasitic power consumption for subsurface flow of brines and better performance in terms of LCOE. Environmental performance In addition, environmental performance is expressed by gCO2 emissions/kWh.

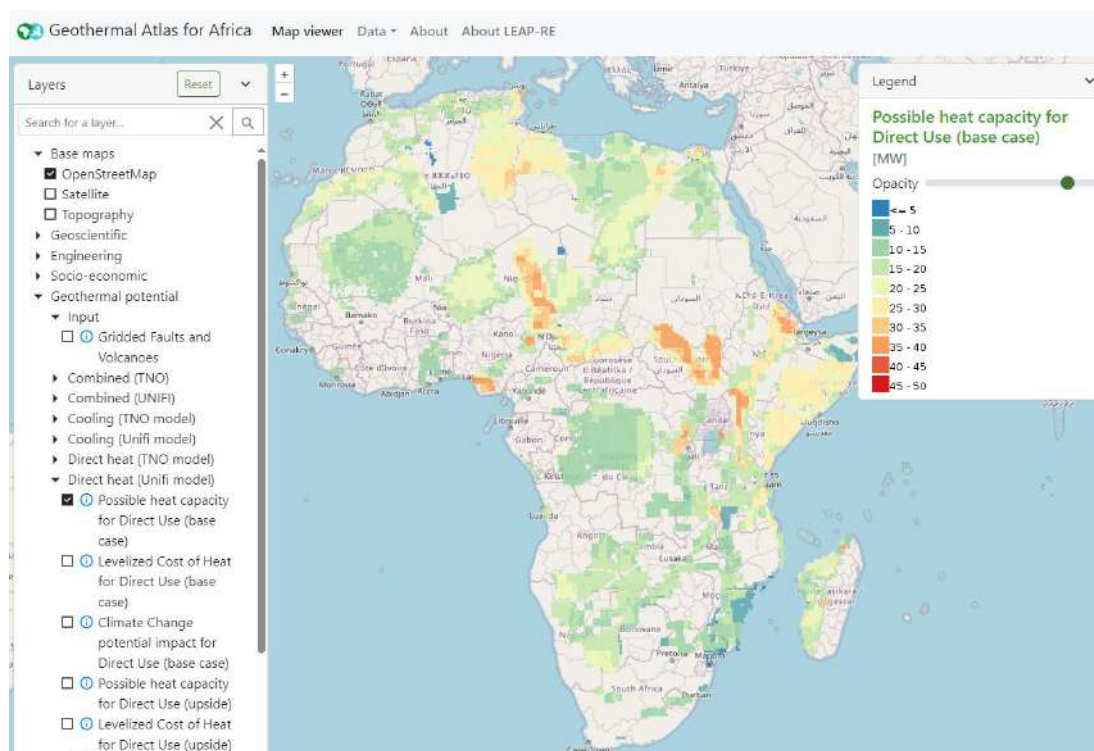


Figure 6 Geothermal Potentials: Heating Capacity for Direct Use (UNIFI model)

In addition for the TNO and UNIFI calculations for each scenario the resulting maps have been combined to compound index maps as indicated in Table 3. These maps are shown under combined under potential maps.

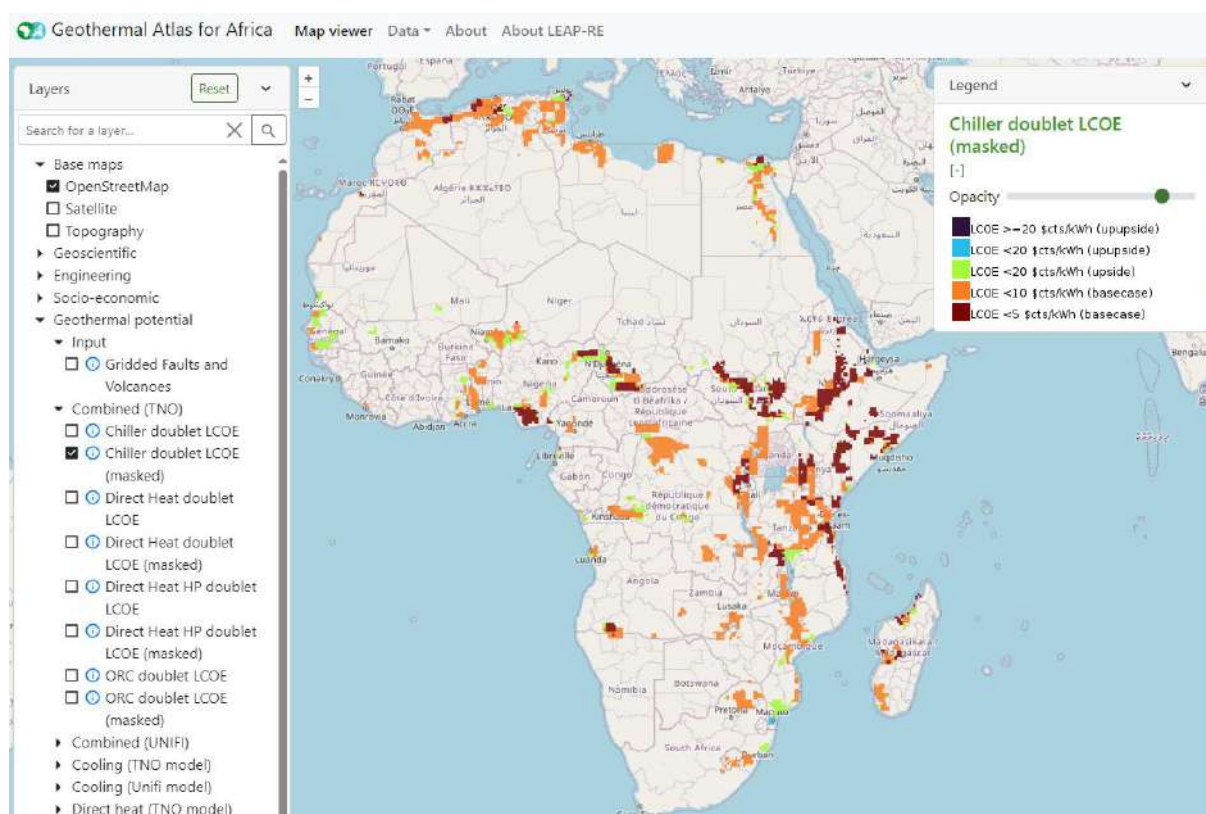
Table 3 Compound criteria for generation of resource quality classes

INDEX value	LCOE cutoff [US\$cts/kWh] directheat/other	Scenario considered
10	$\geq 10/20$	• upside
20	$< 10/20$	• upside
30	$< 10/20$	• Upside
40	$< 5/10$	• Basecase
50	$< 2.5/5$	• basecase

Furthermore, the resulting combined potential maps have been masked (i.e. for the vicinity of roads, population density and average daily temperature), depending on use scenario, according to Table 4.

Table 4 Masking criteria for maps

Geothermal energy conversion	Direct heat	Direct Heat HP	Chill/Cooling	ORC/Flash
roads	<50 km	<50 km	<50 km	<50 km
Population density	>20/km ²	>20/km ²	20/km ²	
temperature			>20	

**Figure 7 Combined map for Cooling/Chill and masked for population density and vicinity of roads**

ANNEX: Graphical representation of maps included in the Geothermal Atlas of Africa

- Basins (greater than 2km)

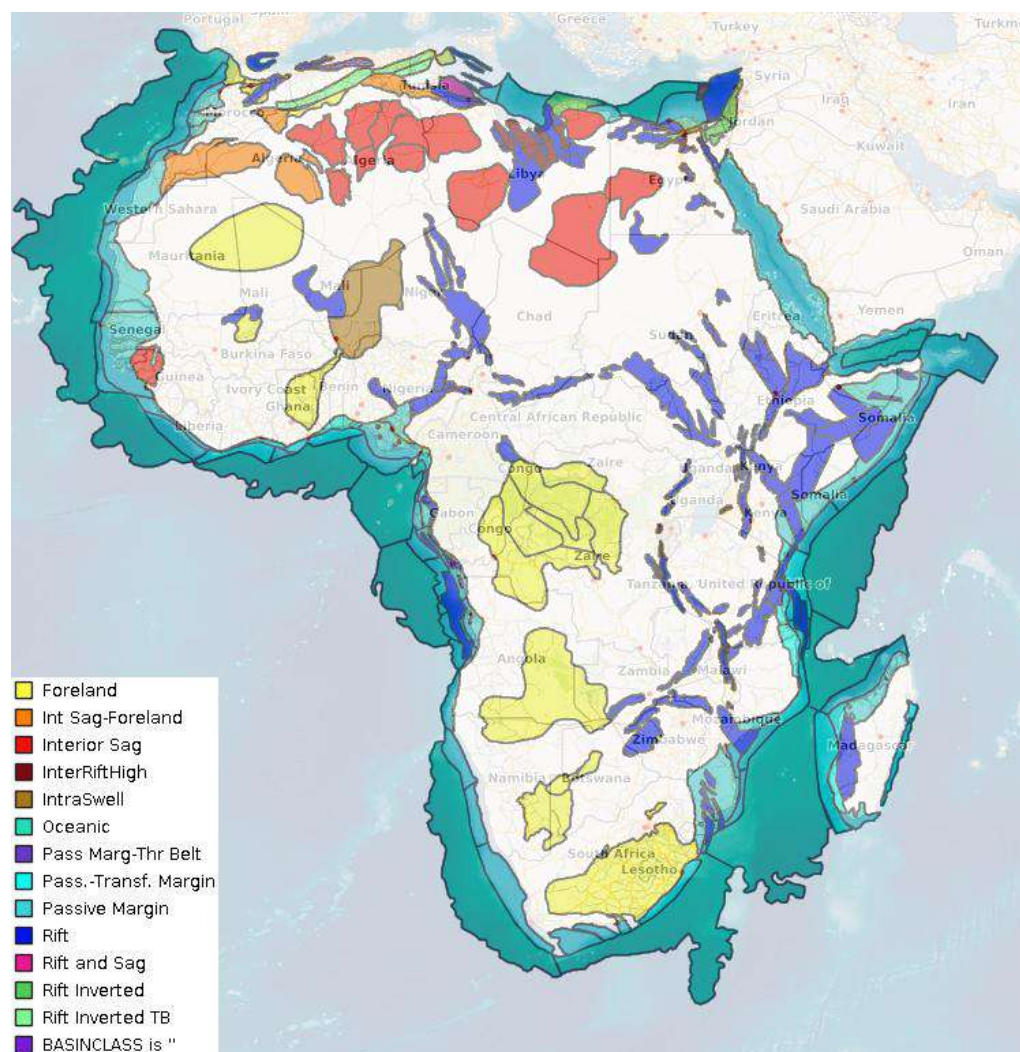
description: Basin shapefile of sedimentary basin in Africa with sedimentary thicknesses of at least 2km. Contains geological information about the sedimentary basins as basin name, class/type and age. Created by extracting data from open sources into a series of shapefiles and rasters containing information on culture, geology, geothermal and geophysical data.

keywords: Sedimentary basin, Africa, Sediment thickness

source: [link](#)

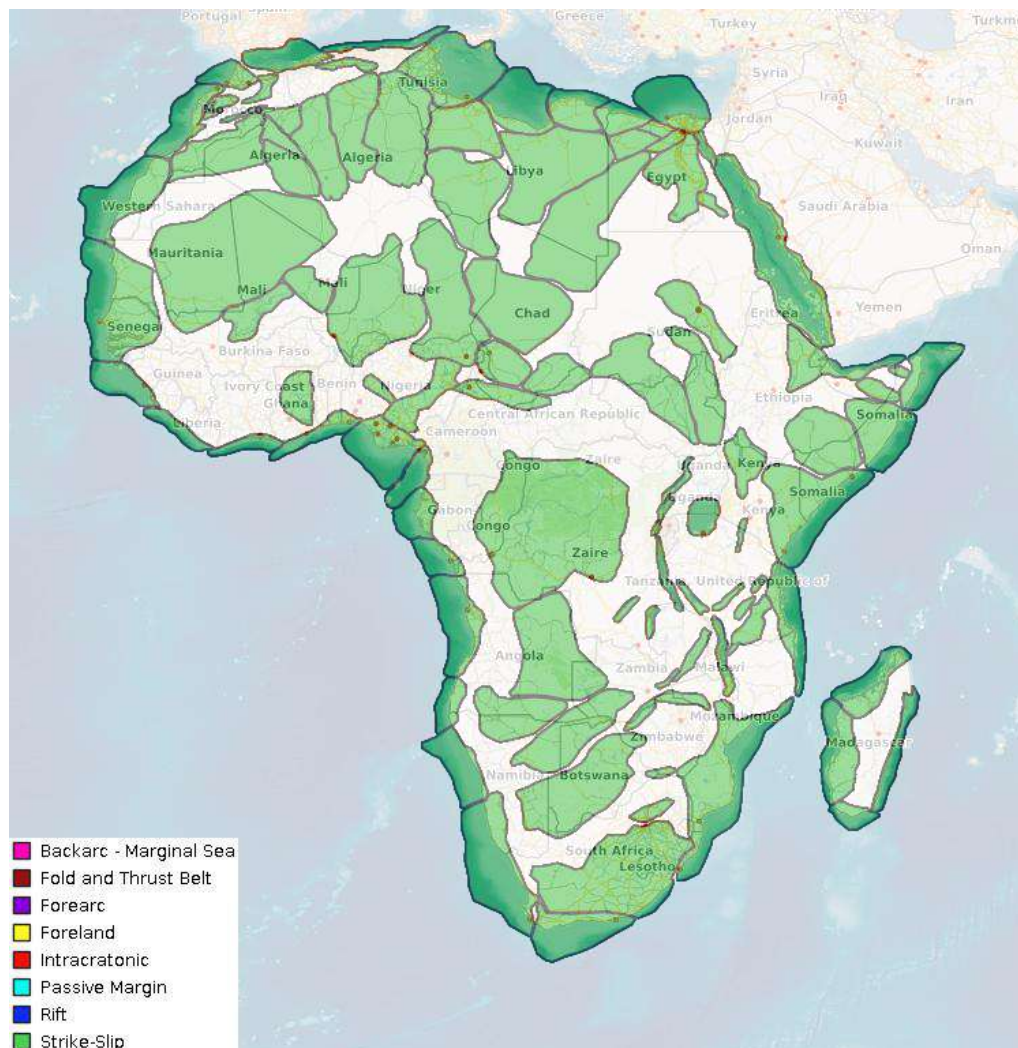
date: 2022

coverage: Africa



description: Shapefile showing the location of sedimentary basins in Africa compiled from previous work. The sedimentary basins have been revised to simplify the boundaries of sedimentary basins, as the definition of a basin (boundary) is often contested. Includes the name, geometry, type, age and evaporite content of a given basin.

coverage: Africa



• Basins (Robertson)

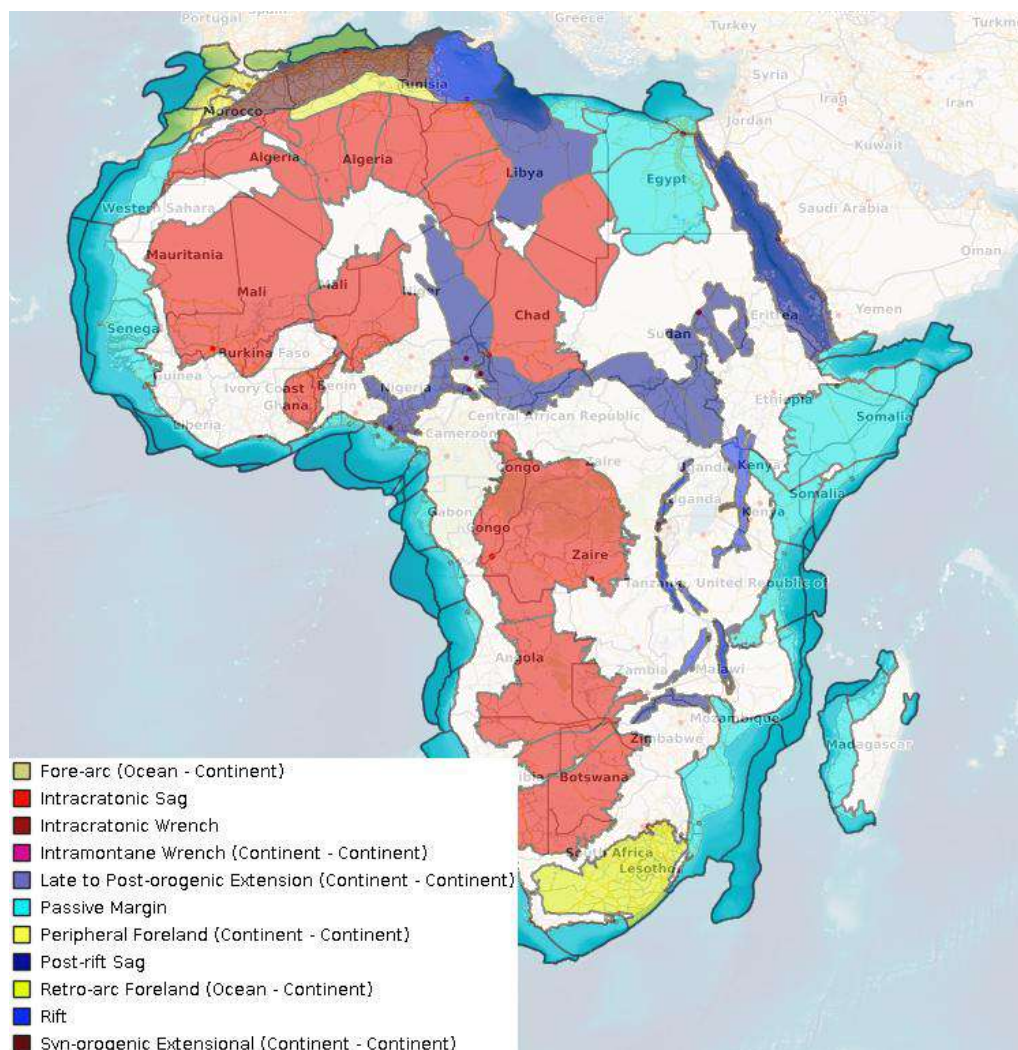
description: Shapefile showing the location of sedimentary basins in Africa. Part of the Robertson new ventures product suite. Includes information on the name, geometry, type and the hydrocarbon exploration status of a given basin.

keywords: Sedimentary basin, Petroleum, Africa

source: [link](#)

date: 2019

coverage: Africa



- **Combined sediment thickness (Laske & Masters, Straume et al.)**

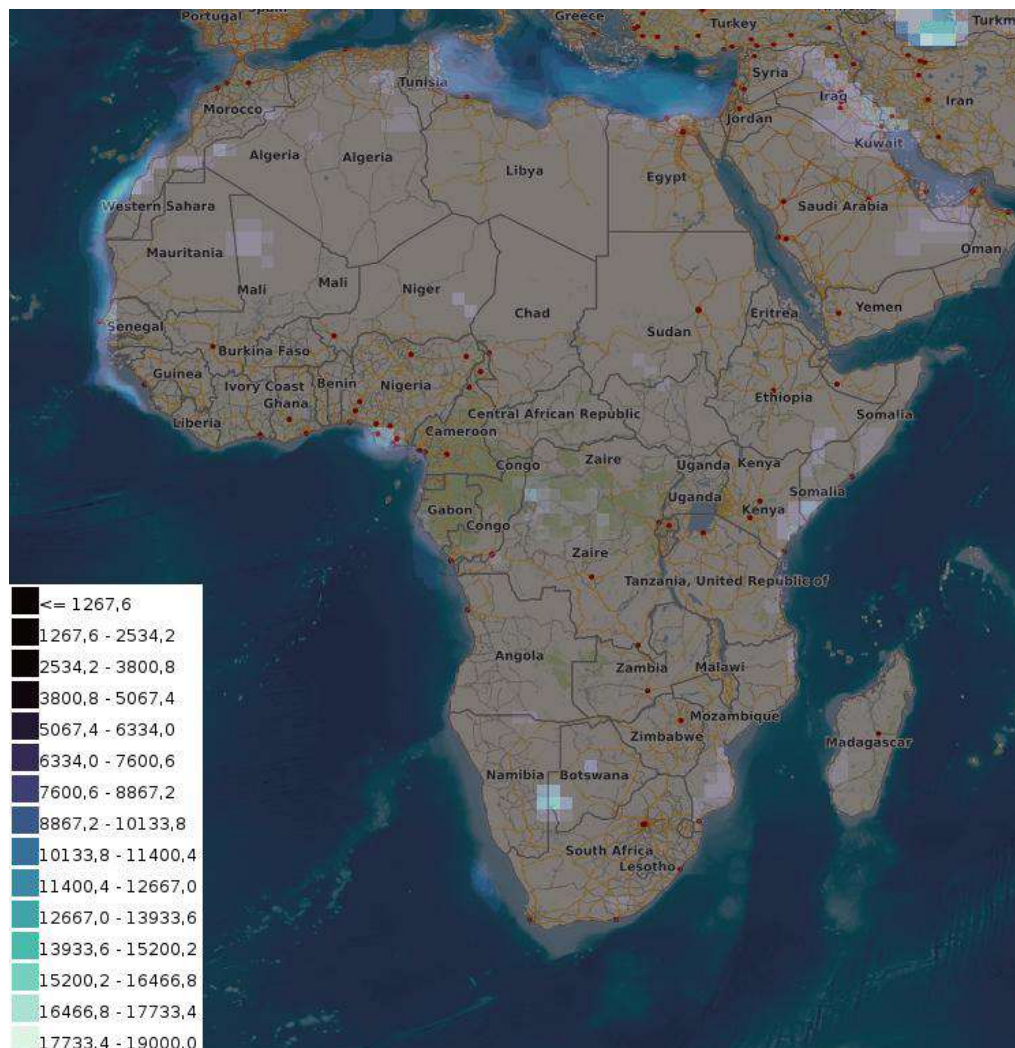
description: Combined sedimentary thickness map of Africa (and surrounding regions). This map is composed of the map from Laske & Masters (2013) and the map from Straume et al (2019). If there is data from both maps, the data from Straume et al (2019) is used as it has a better resolution.

keywords: Sediment thickness, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Global oceanic sediment thickness (Straume et al.)**

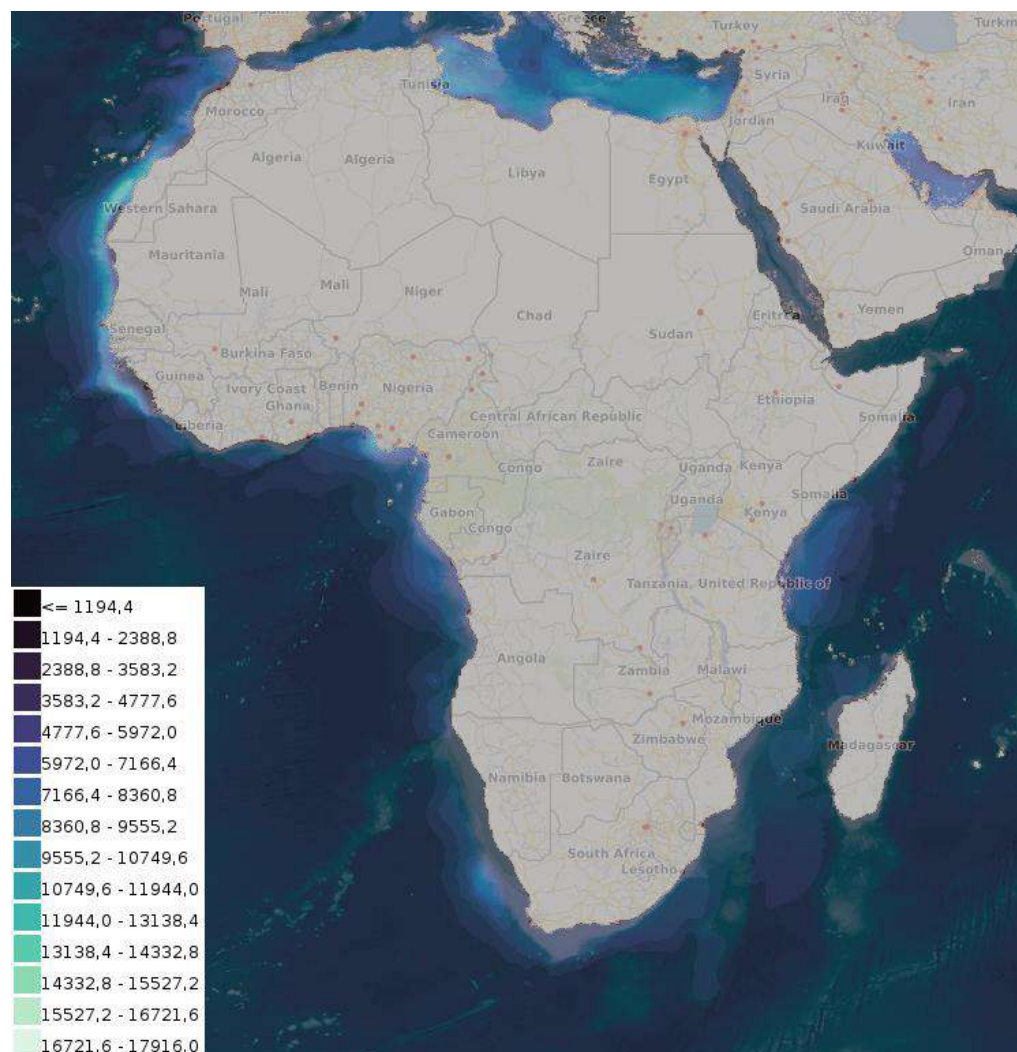
description: A global 5-arc-minute total sediment thickness grid for the world's oceans and marginal seas compiled from previous work and new data compilation efforts.

keywords: Sediment thickness, Oceanic, Global

source: [link](#)

date: 2019

coverage: Global



- **Global sediment thickness (Laske & Masters)**

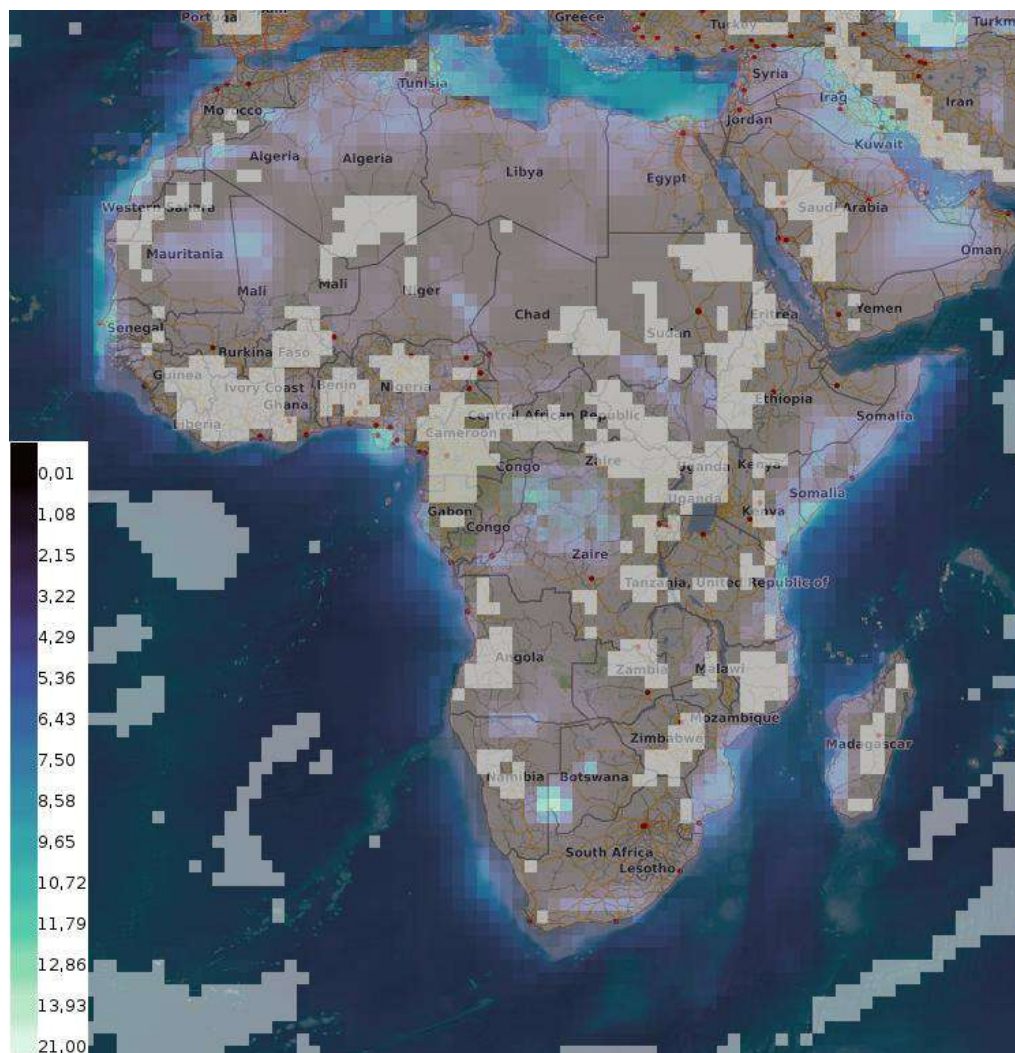
description: Global sediment thickness data as part of the CRUST1.0 model.

keywords: Sediment thickness, Global

source: [link](#)

date: 2013

coverage: Global



- **Hydrocarbon provinces Arabia Africa**

description: Shapefile showing the location of hydrocarbon provinces with proven petroleum reserves. This data is compiled as part of the USGS's world Energy Project (WEP).

keywords: Hydrocarbon, Petroleum, Africa

source: [link](#)

date: 2002

coverage: Africa



- **Sediment thickness (Laske & Masters)**

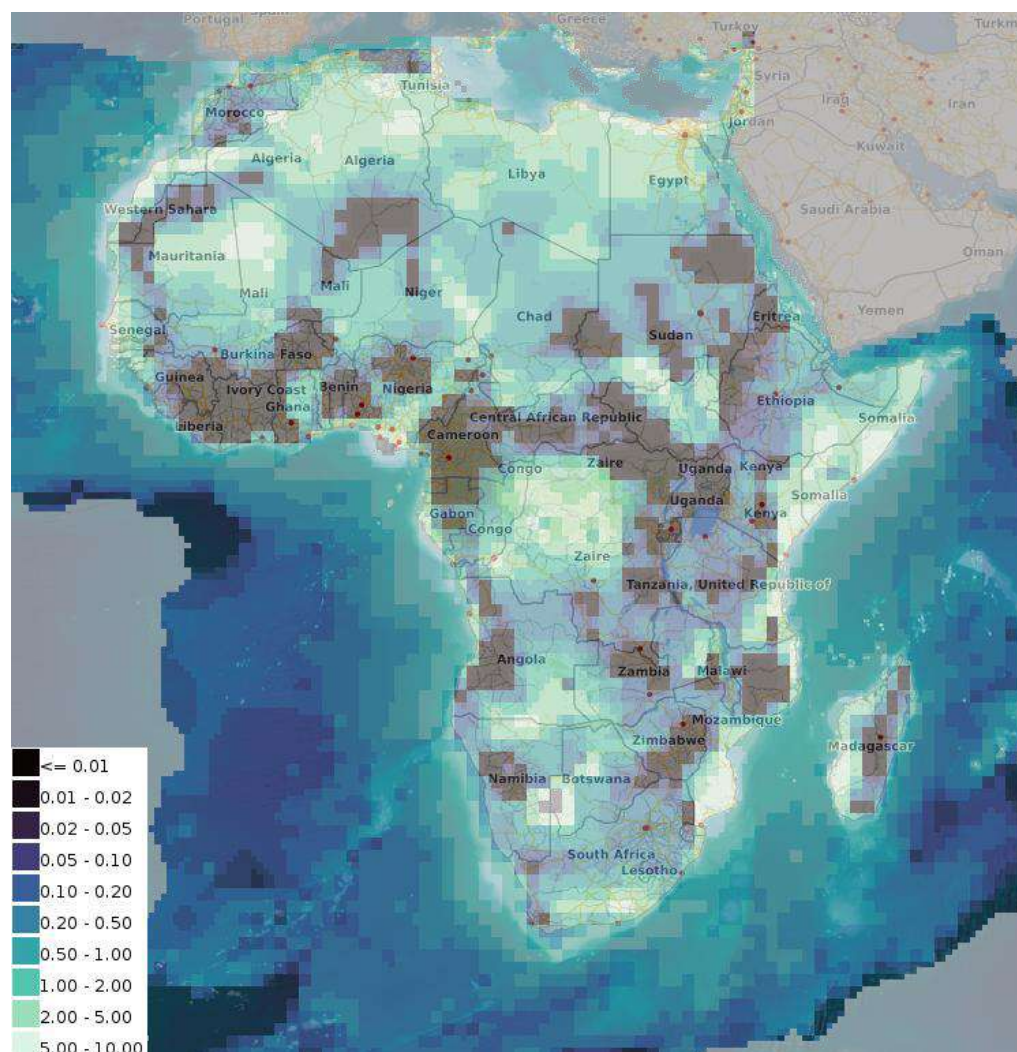
description: Sediment thickness map, data from Laske & Masters 2013, masked by the African plate shapefile.

keywords: Sediment thickness, Laske & Masters, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Sedimentary basins**

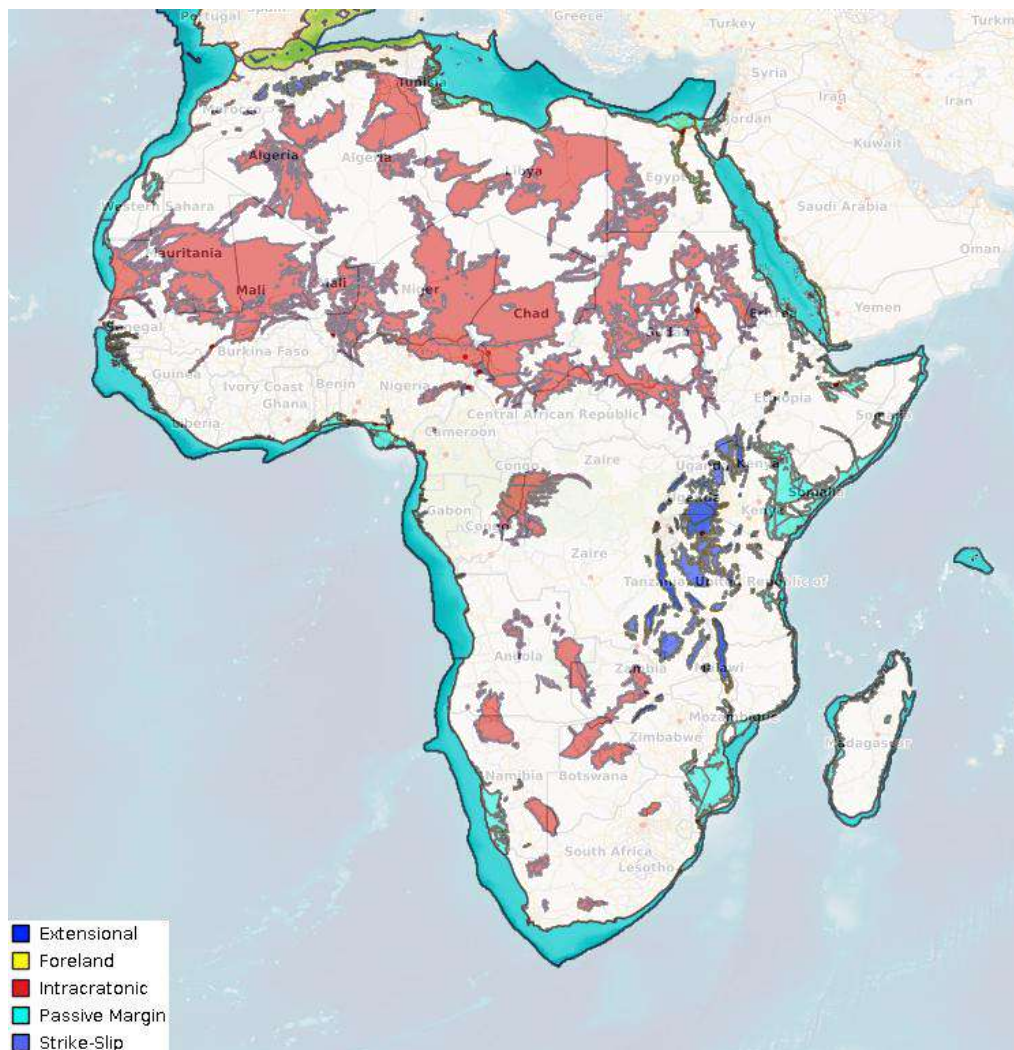
description: Shapefile showing the location of active sedimentary basin/depositional centers of Africa categorized by basin structure and climate-zone.

keywords: Sedimentary basin, Africa, Environnement, Depositional centres

source: [link](#)

date: 2015

coverage: Africa



- **Djibouti resistivity Assal wells**

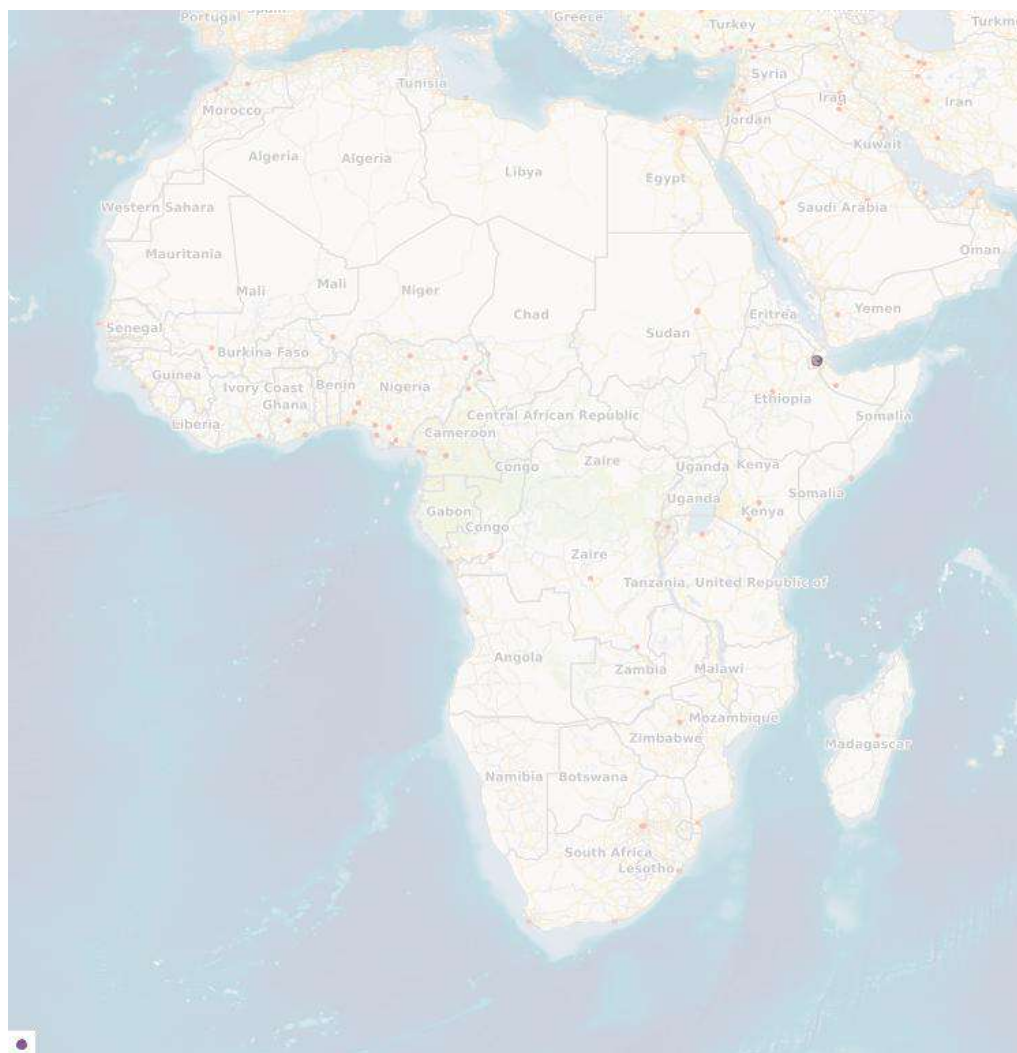
description: Resistivity measurements made around the Assal 1 and 2 wells

keywords: Electric sounding, Assal, rift, BRGM

source: no online source available

date: 1981

coverage: Djibouti



- **Djibouti resistivity Central Assal Rift**

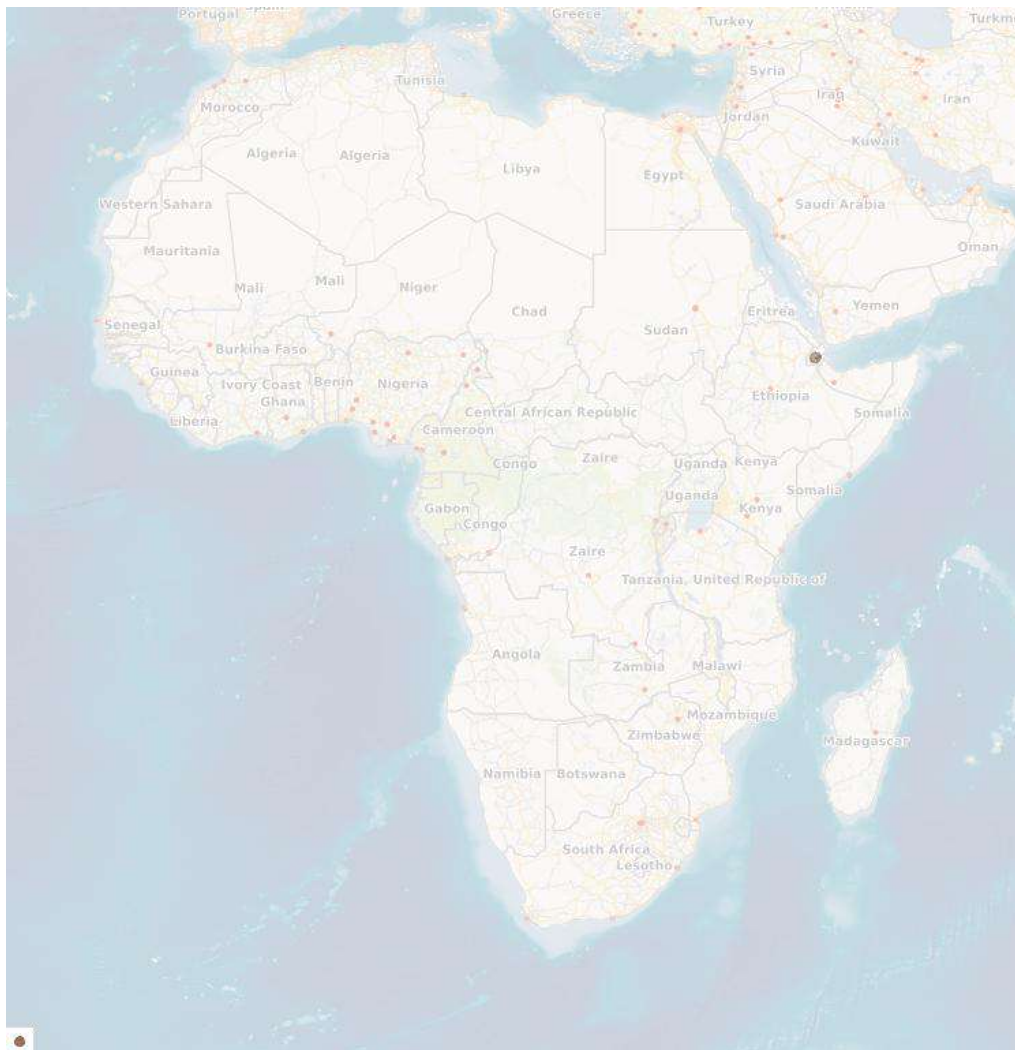
description: Measurements made in the central part of the Assal Rift

keywords: Electric sounding, Assal, rift, BRGM

source: no online source available

date: 1981

coverage: Djibouti



- **Compiled sediment thickness map**

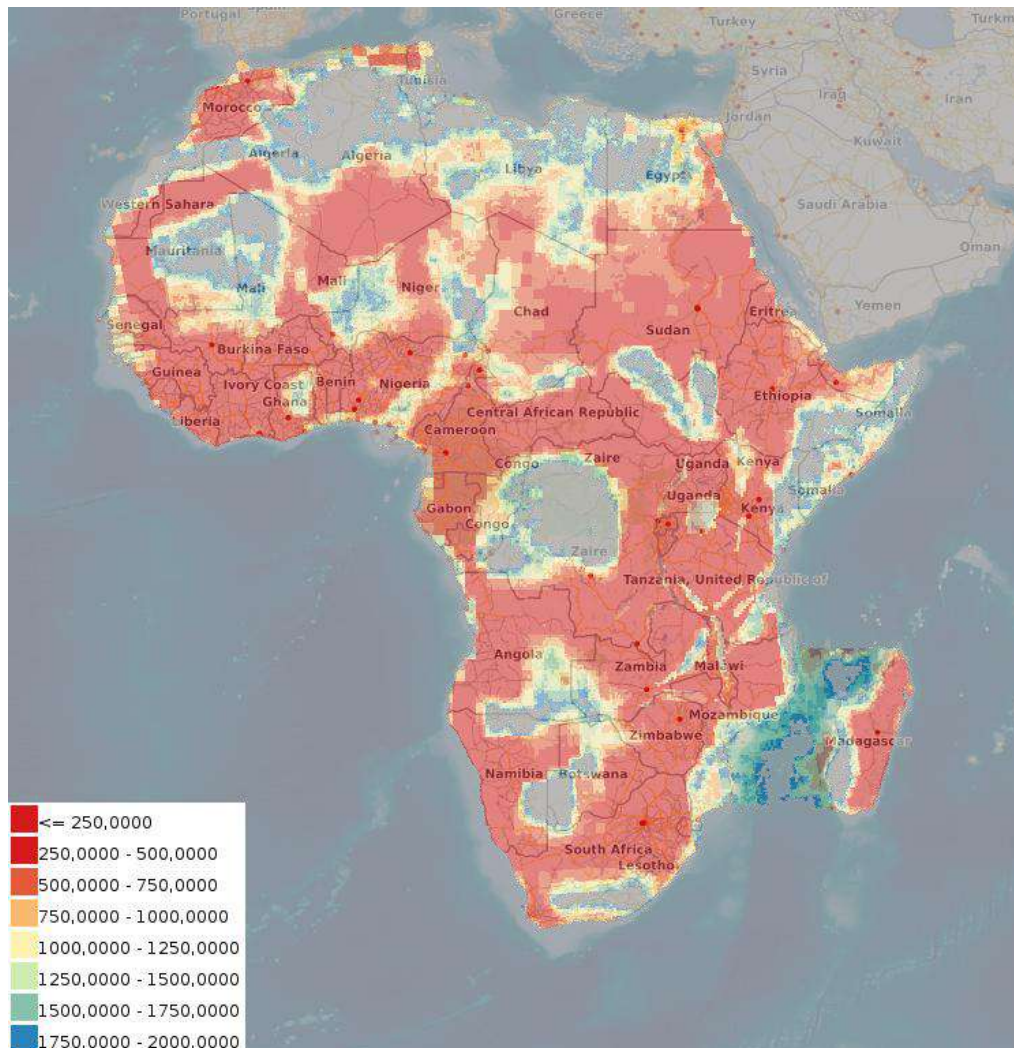
description: Sediment thickness map compiled from multiple sources. Used in geothermal potential calculations.

keywords: Sediment

source: [link](#)

date: 2024

coverage: Africa



- **Athy's Constant**

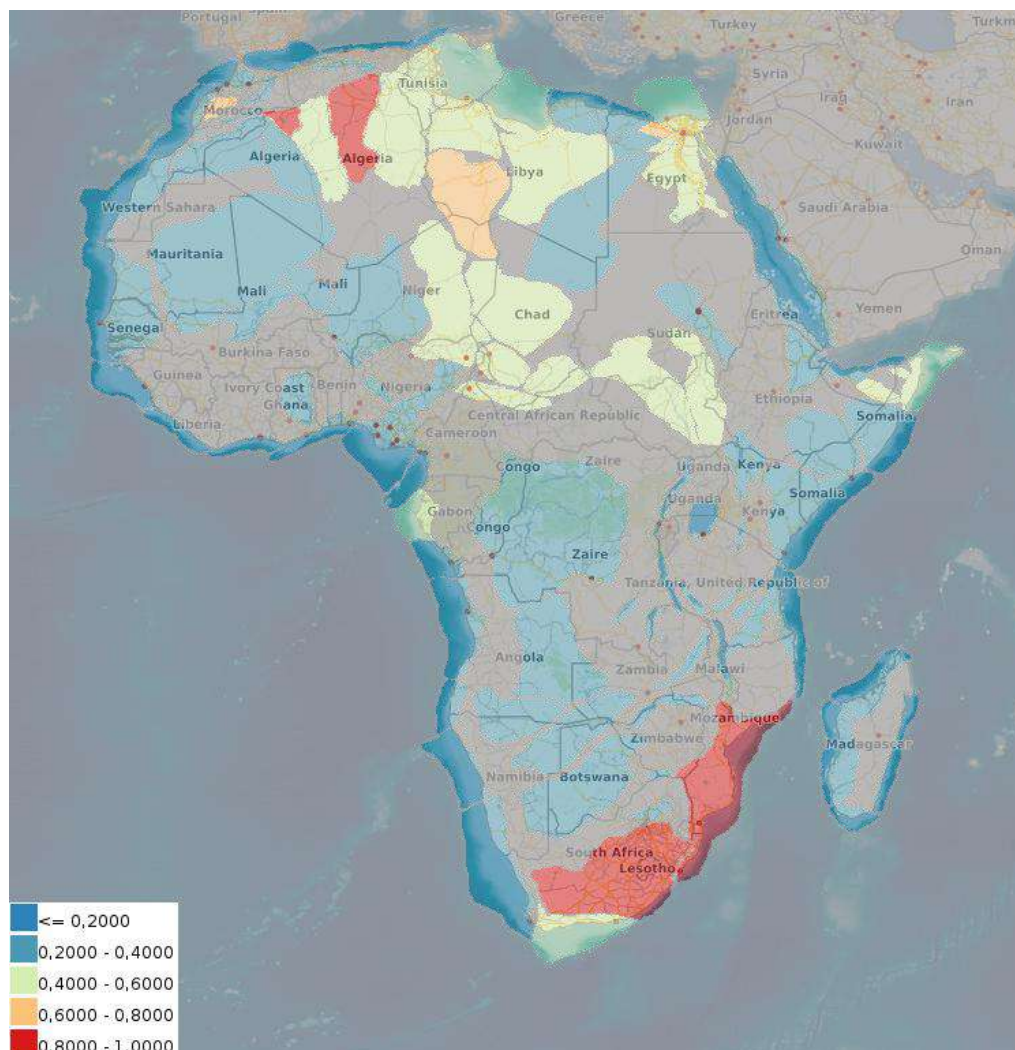
description: Athy's constant. Used in geothermal potential calculations.

keywords: Permeability, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Surface porosity**

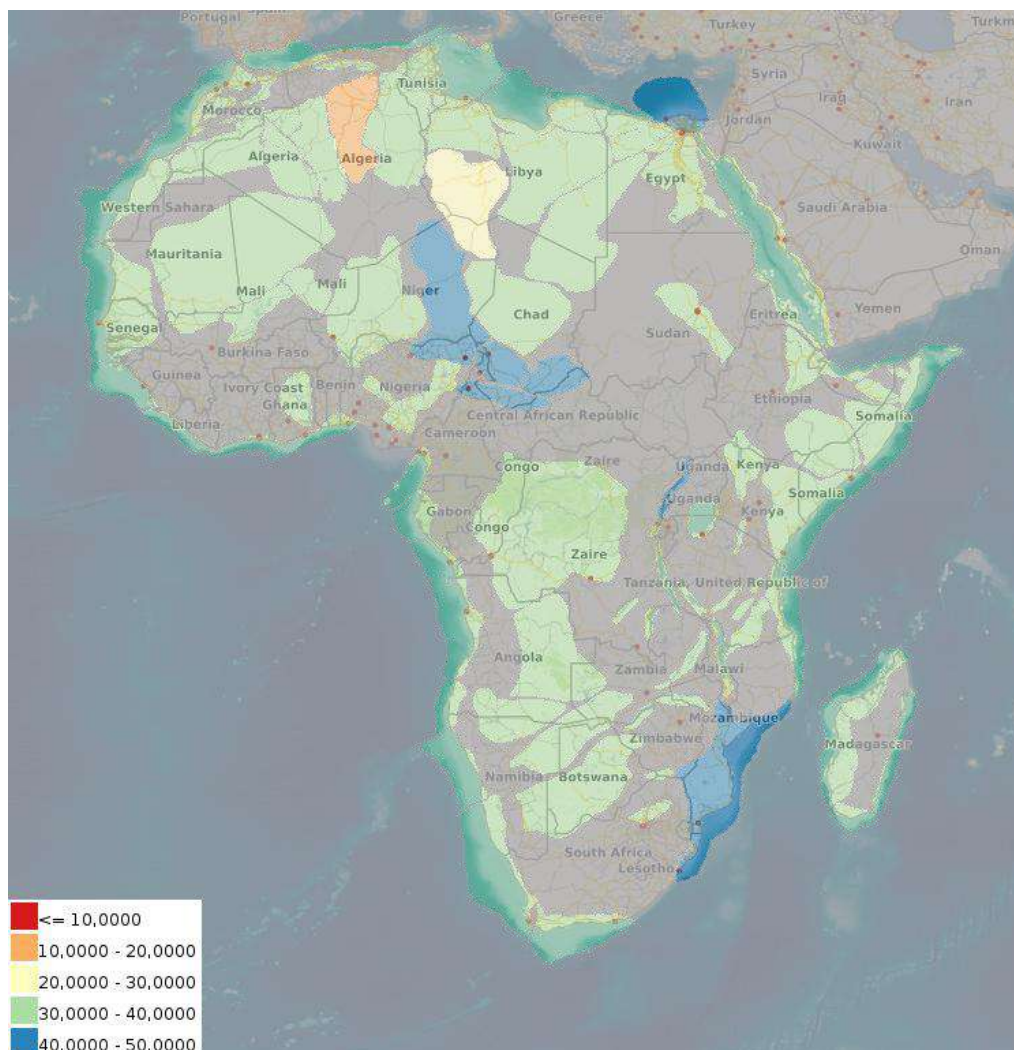
description: Surface porosity. Used in geothermal potential calculations.

keywords: Surface porosity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Base porosity**

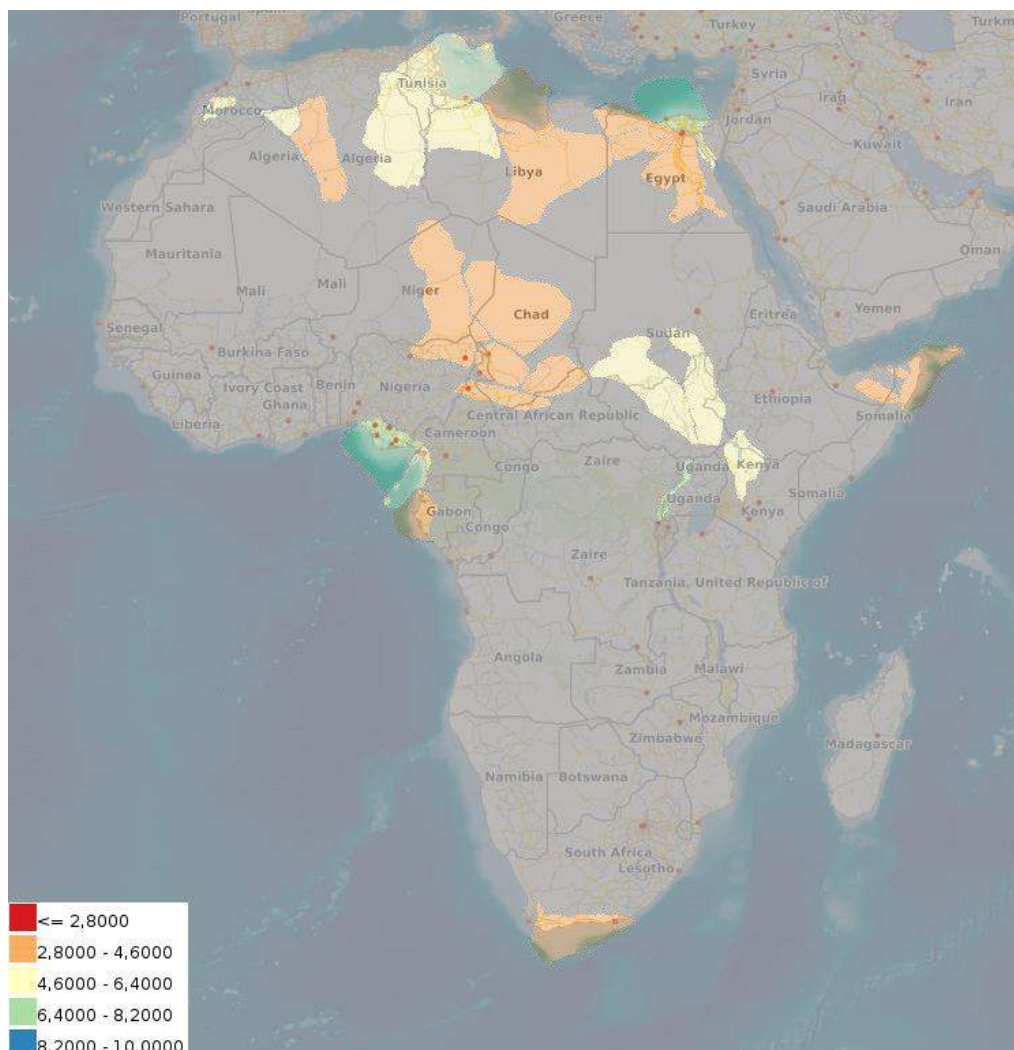
description: Base porosity. Used in geothermal potential calculations.

keywords: Base porosity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Air Surface Temperature**

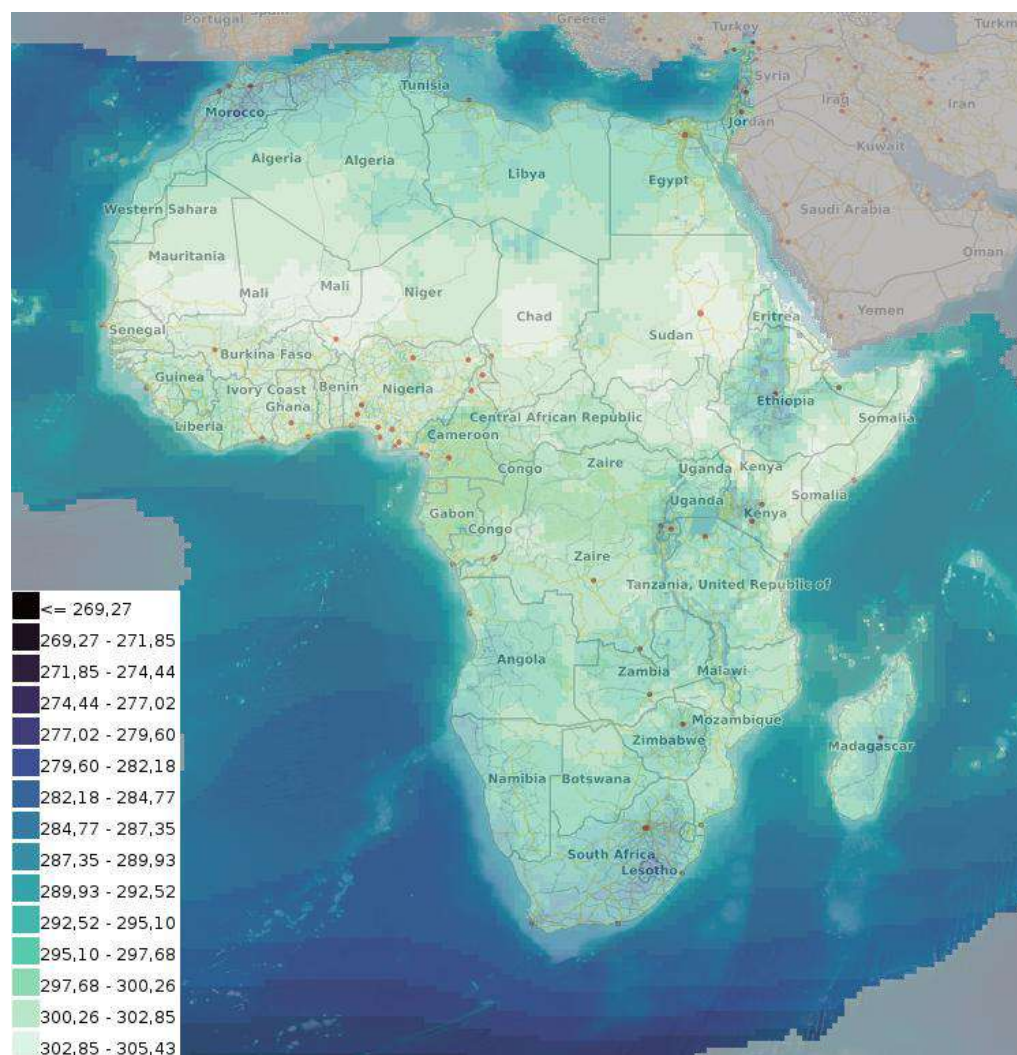
description: Air surface temperature of Africa derived from NASA, masked by the Africa plate shapefile.

keywords: Air surface temperature, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Average continental surface temperature**

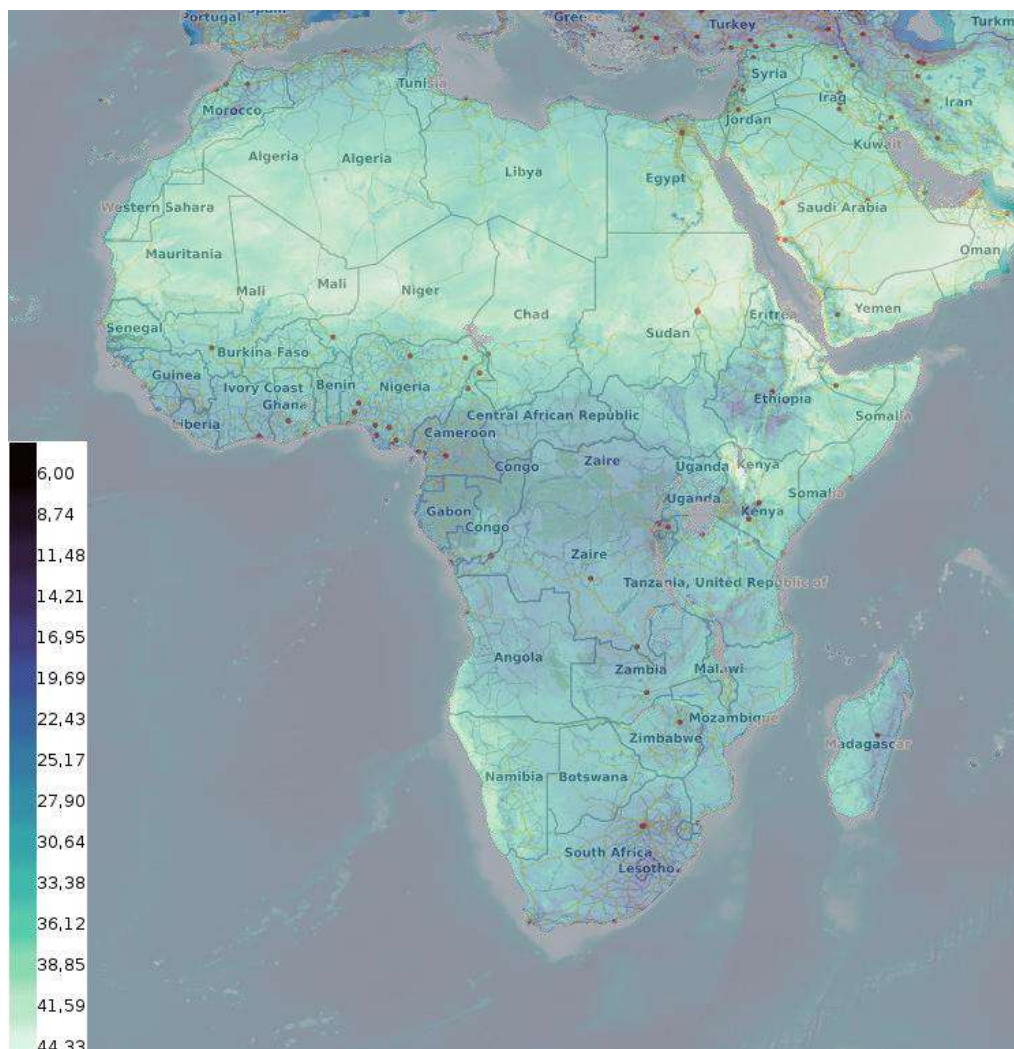
description: Map showing the average continental surface temperature of the year 2022. This map was created by interpolating raw monthly satellite data to fill holes in the grids and subsequently adding and averaging the monthly surface temperatures of the year 2022. The data is clipped to only show the African continental region. Data from other regions should be ignored. The raw data is collected during the daytime by the Moderate Resolution Imaging Spectroradiometer (MODIS), an instrument on NASA's Terra and Aqua satellites. Please note that the type of "surface" MODIS measures varies as a function of location. In some places, the measurement represents the skin temperature of the bare land surface. In other places, the temperature represents the skin temperature of whatever is on the land-including snow and ice, or the leafy canopy of forests and crop fields, or human-made structures such as pavement and building rooftops.

keywords: Average continental surface temperature, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Average water surface temperature**

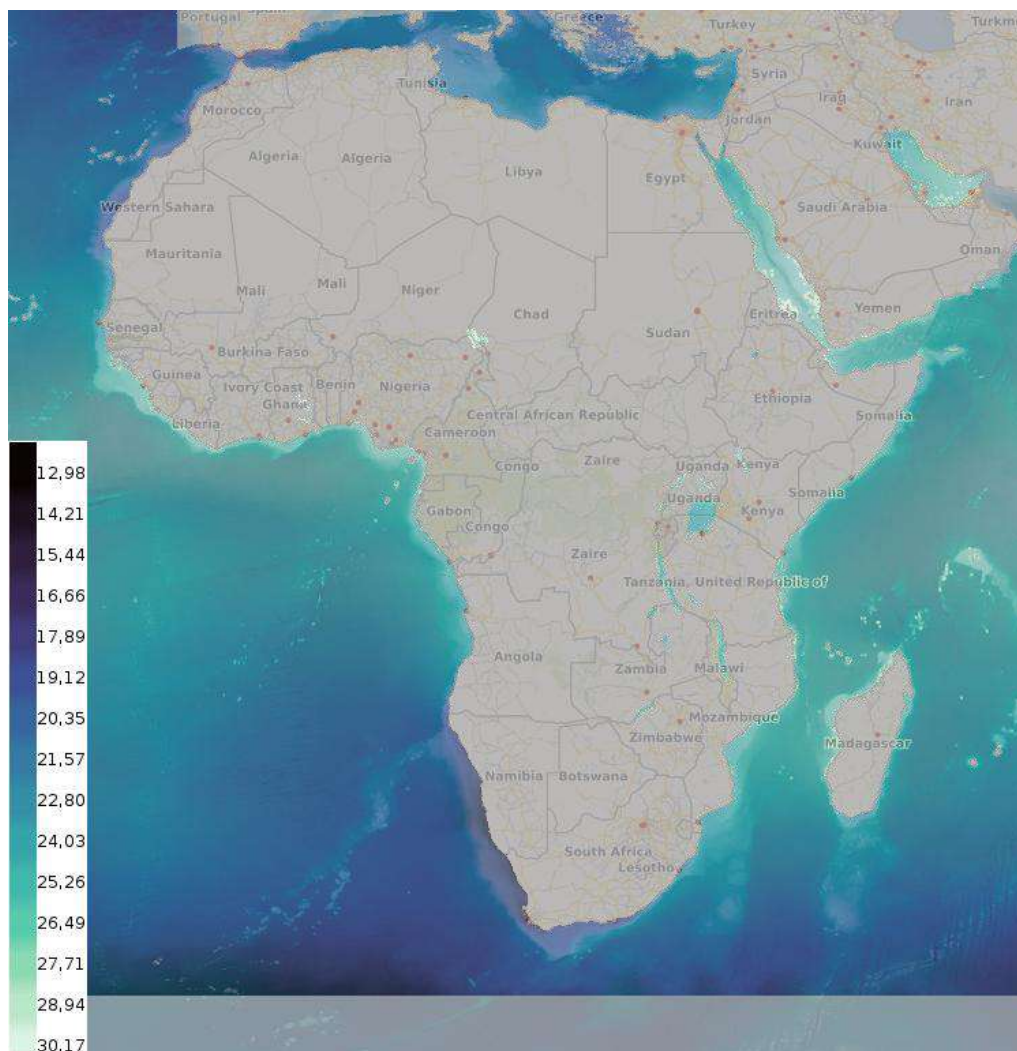
description: Map showing the average water surface temperature of the year 2022. This map was created by interpolating raw monthly satellite data to fill holes in the grids and subsequently adding and averaging the monthly surface temperatures of the year 2022. The data is clipped to only show the African continental region. Data from other regions should be ignored. The sea surface temperature map shows the temperature of the top millimeter of the ocean's surface. The Moderate Resolution Imaging Spectroradiometer (MODIS) instruments aboard NASA's Terra and Aqua satellites collect global measurements of sea surface temperature accurate to within half a degree Celsius.

keywords: Average sea surface temperature, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Electricity grid network**

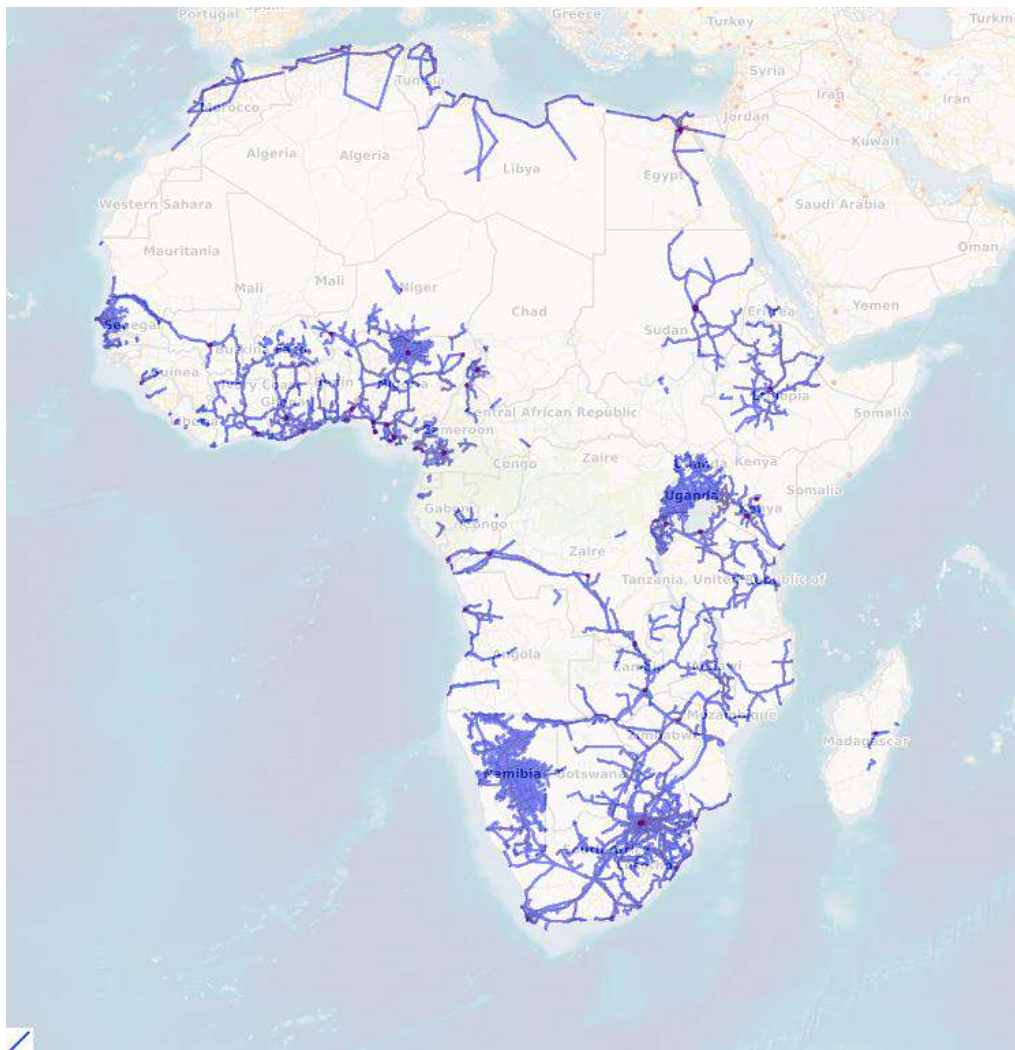
description: Shapefile showing the location and voltage of the electricity grid network of some parts of Africa.

keywords: Grid, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Earth Magnetic Anomaly**

description: Earth magnetic anomaly grid derived from ship, airborne and satellite data, part of the EMAG2 V3 model.

keywords: Magnetic anomaly, Africa

source: [link](#)

date: 2017

coverage: Africa



- **Bedrock relief model**

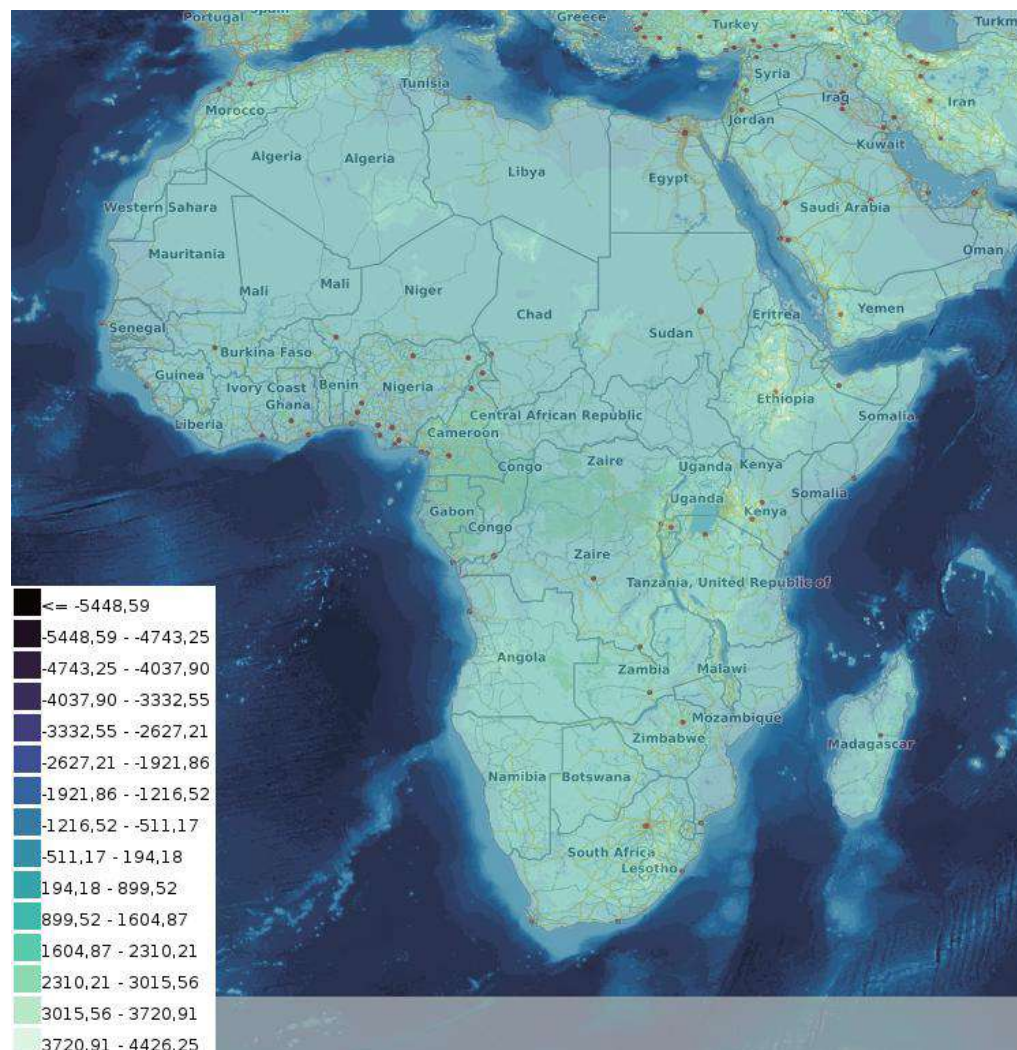
description: ETOPO 2022 global relief model, clipped from 30W to 60E and 40N to 40S.

keywords: DEM, Global

source: [link](#)

date: 2022

coverage: Africa



- **Precipitation2018 MOD**

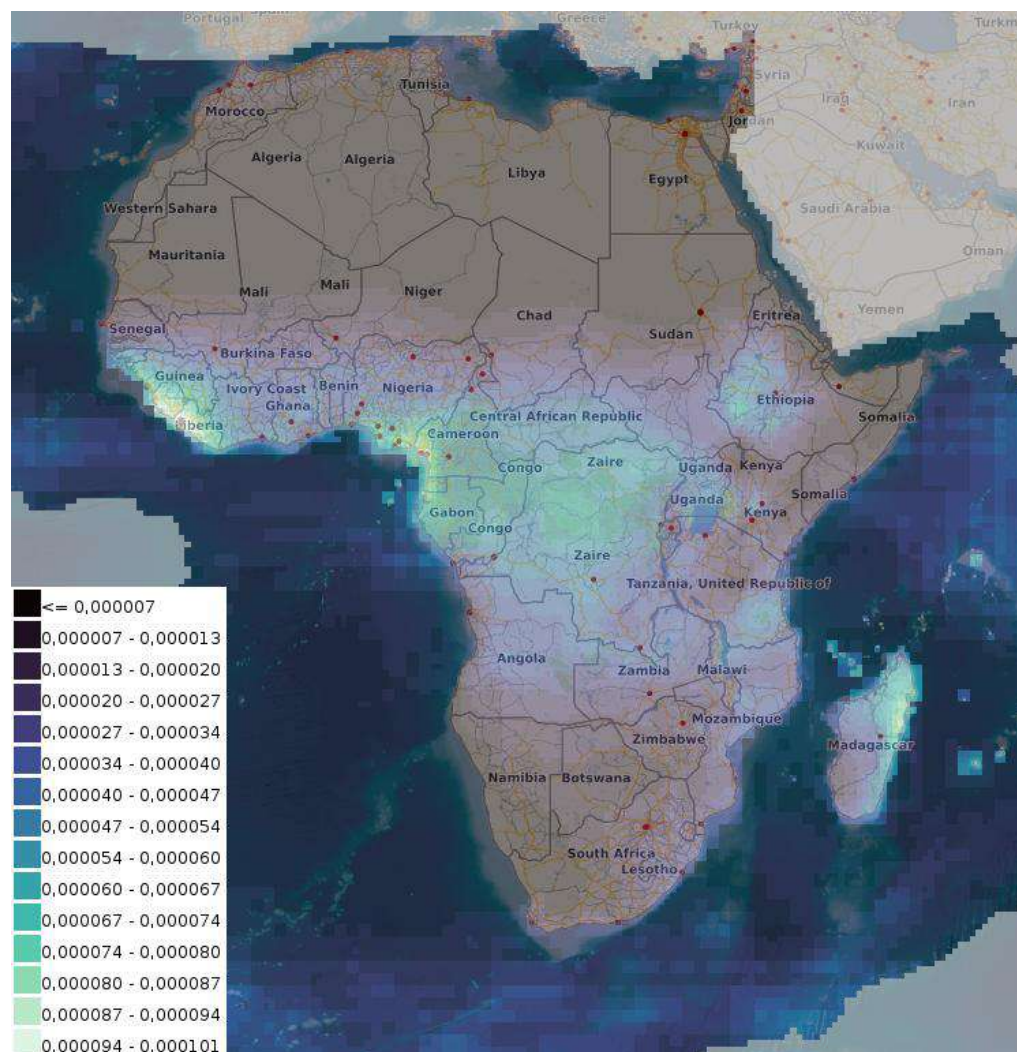
description: Precipitation map of Africa, masked by the African plate shapefile. (onshore and offshore have different resolutions --> different sources?)

keywords: Precipitation, Africa

source: no online source available

date: 2023

coverage: Africa



- **Magnetic anomaly**

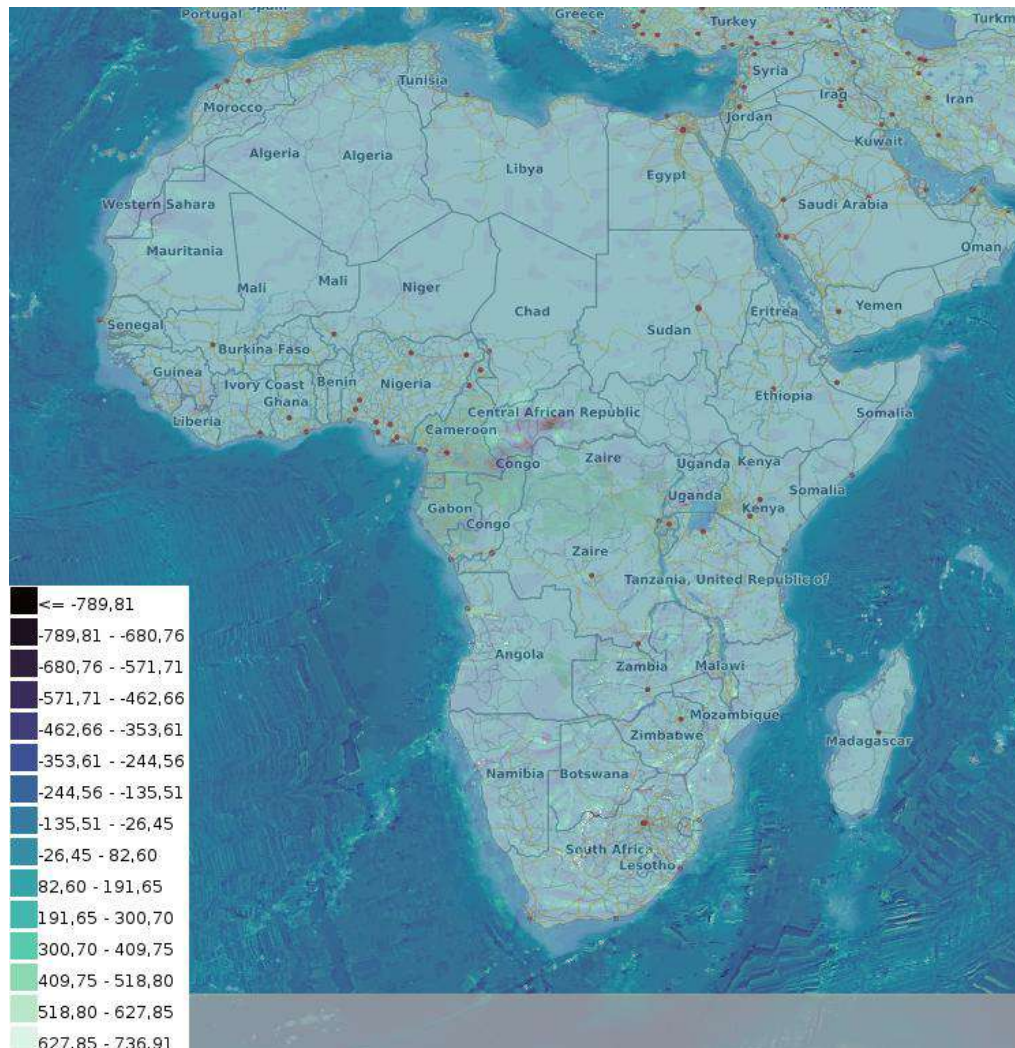
description: Magnetic anomaly map Africa, derived from the World Digital Magnetic Anomaly map (WDMAM).
Note that the blurry areas are interpolated due to not containing data points.

keywords: Magnetic anomaly, Africa

source: [link](#)

date: 2015

coverage: Africa



- **Geothermal plants in operation**

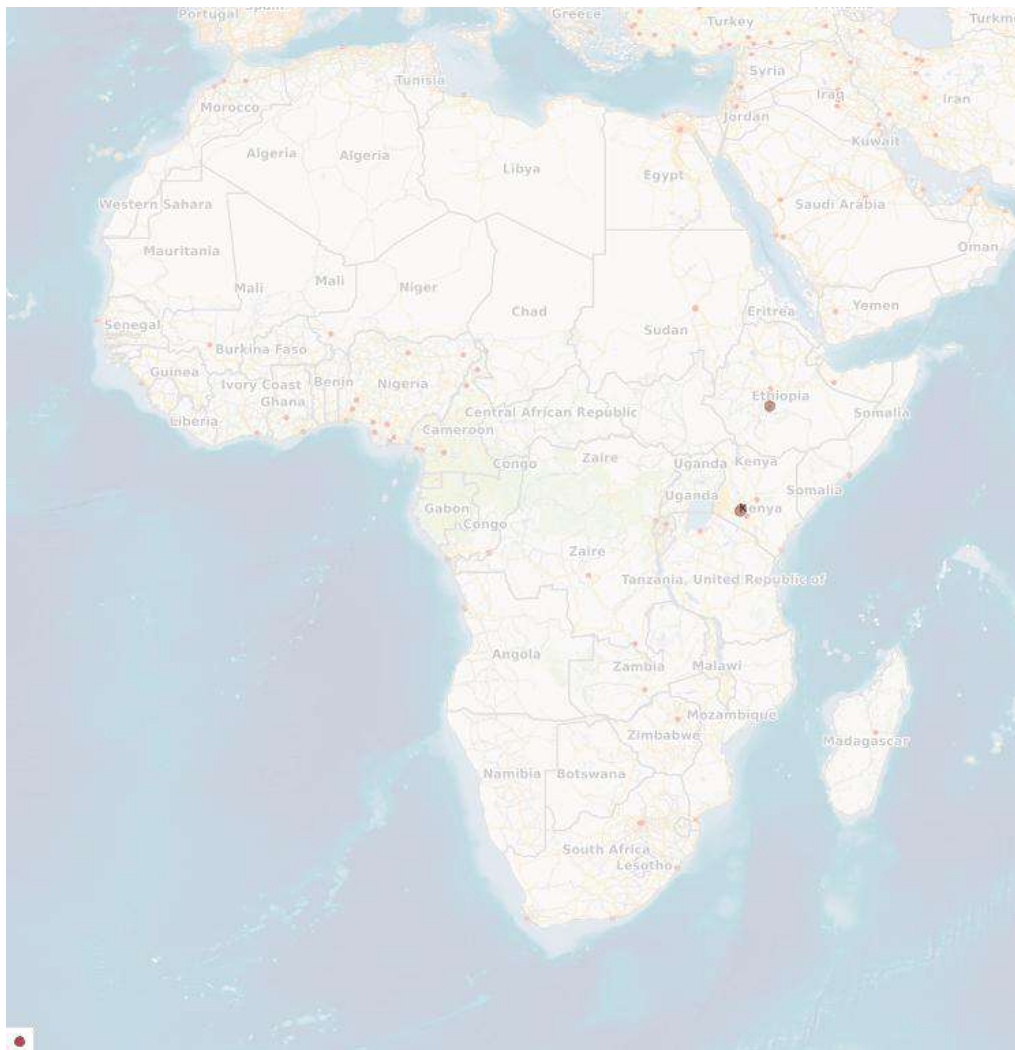
description: Shapefile showing the location of operational geothermal energy plants in Africa as of 2015.

keywords: Geothermal energy plants, 2015, Africa

source: no online source available

date: 2023

coverage: Africa



- **Cratons**

description: Shapefile showing the regions of cratonic lithosphere in Africa.

keywords: Cratons, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Granites**

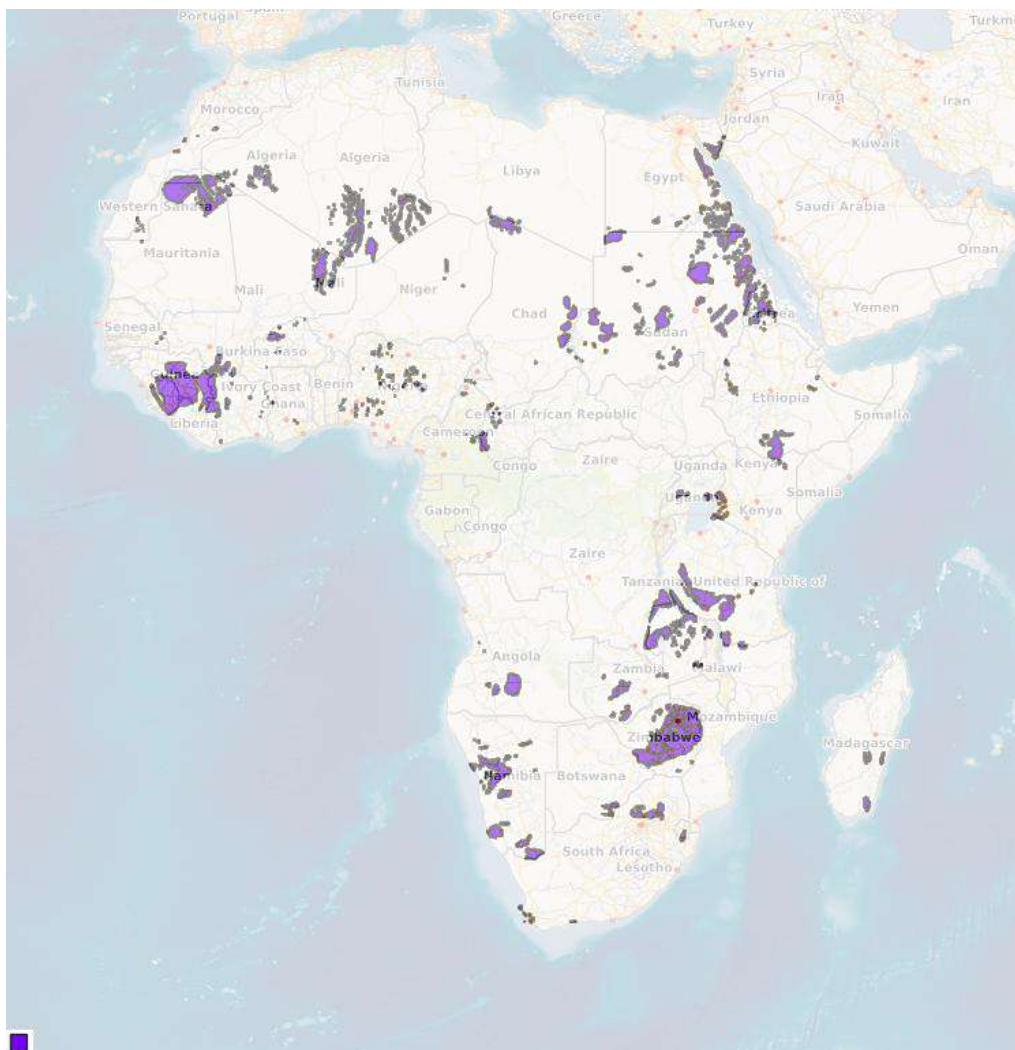
description: Shapefile showing the location of outcropping granites according to the USGS lithological map of Africa.

keywords: Granites, Lithology Africa

source: [link](#)

date: 2022

coverage: Africa



- **Groundwater Resources res 05 annual years 2011 Clim scen historical global Africa**

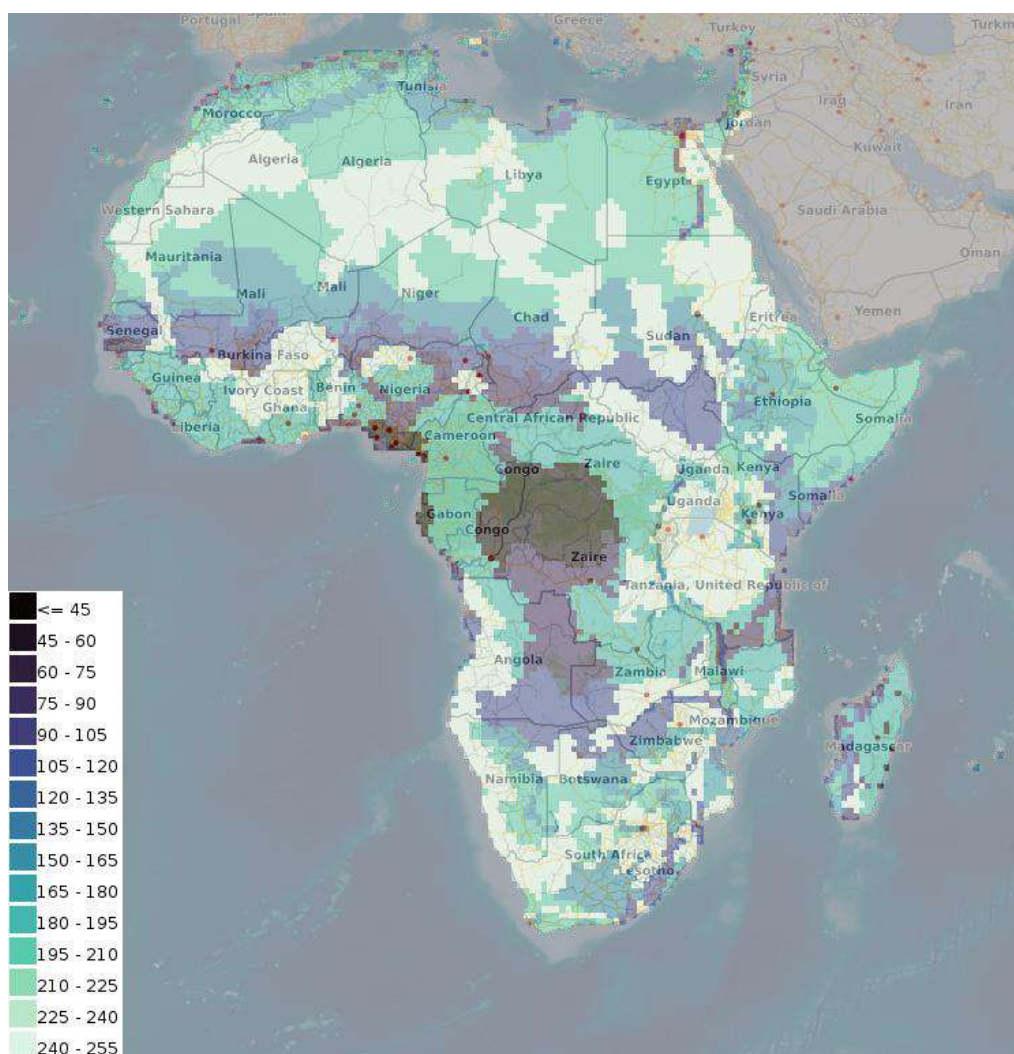
description: Groundwater resources map?

keywords: Groundwater, Africa

source: [link](#)

date: 2023

coverage: Africa



• Lithological map

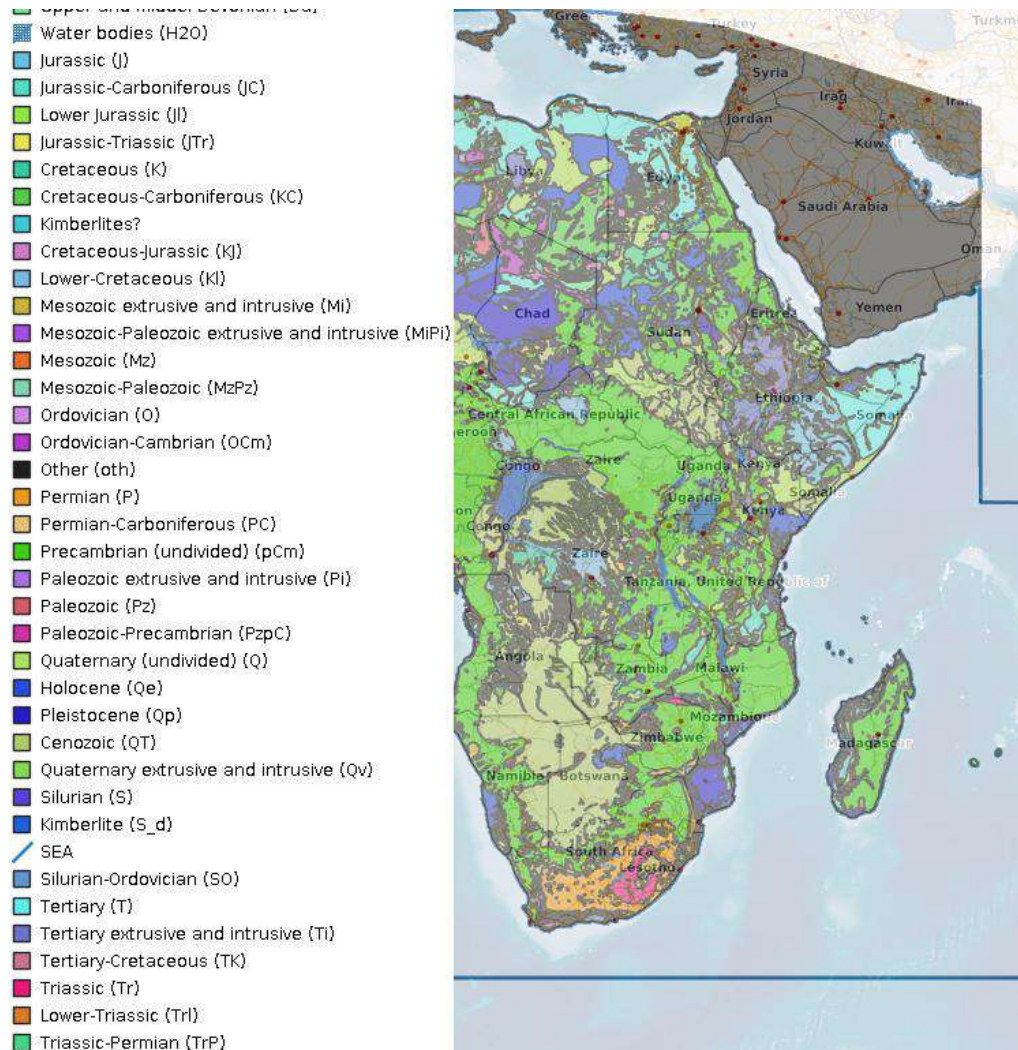
description: Shapefile showing a lithological map of Africa differentiated by geologic time (intervals) made by the USGS (2001).

keywords: Lithological map, Africa, Geologic time units

source: [link](#)

date: 2001

coverage: Africa



- **Planned wells**

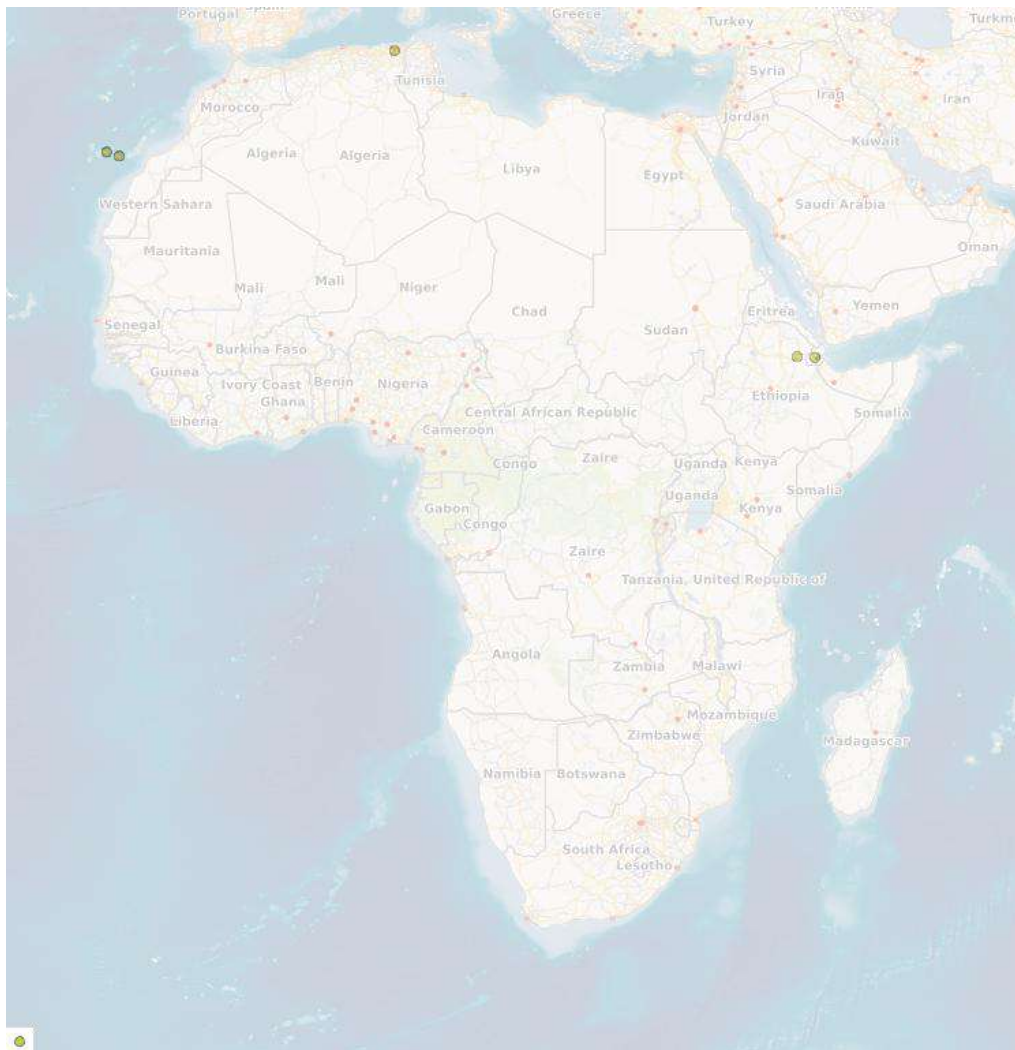
description: Shapefile showing the location of planned geothermal wells in Africa.

keywords: Geothermal well, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Volcanic rocks**

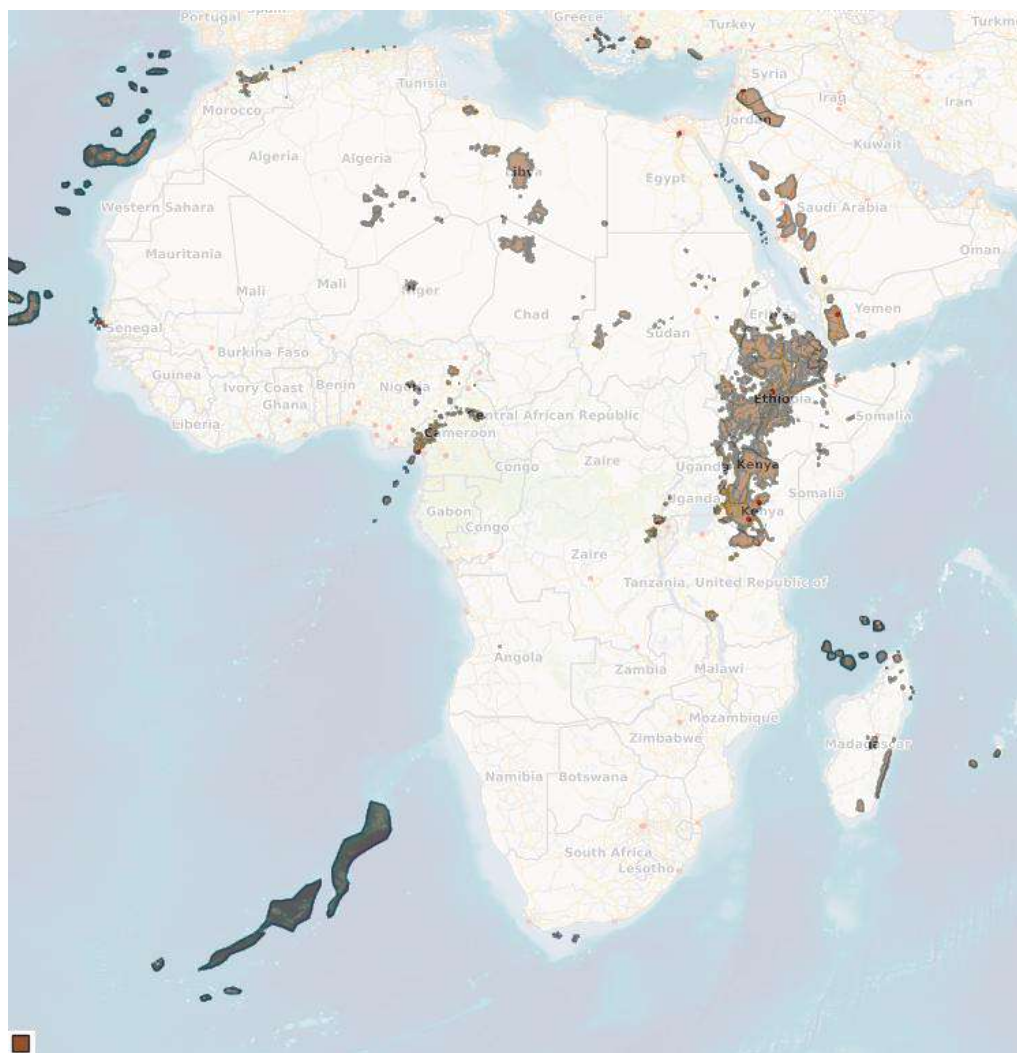
description: Shapefile showing the presence of volcanic rocks.

keywords: Volcanics, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Power plants**

description: Shapefile showing the location of powerplants along the East-African rift system, derived from the World Bank Transmission and distribution: Energy Atlas (ARDERNE, C. 2017)

keywords: Powerplants, E-Africa

source: [link](#)

date: 2020

coverage: E-Africa



- **Volcanoes**

description: Shapefile showing the location, status, height and type of volcanoes in Africa that are thought to have been active in the past 10000 years (Holocene). From the Smithsonian Institution, Global Volcanism Program, American Geological Institute, Geological Survey (U.S.) and Environmental Systems Research Institute (Redlands, Calif.)

keywords: Volcanoes, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Protected areas**

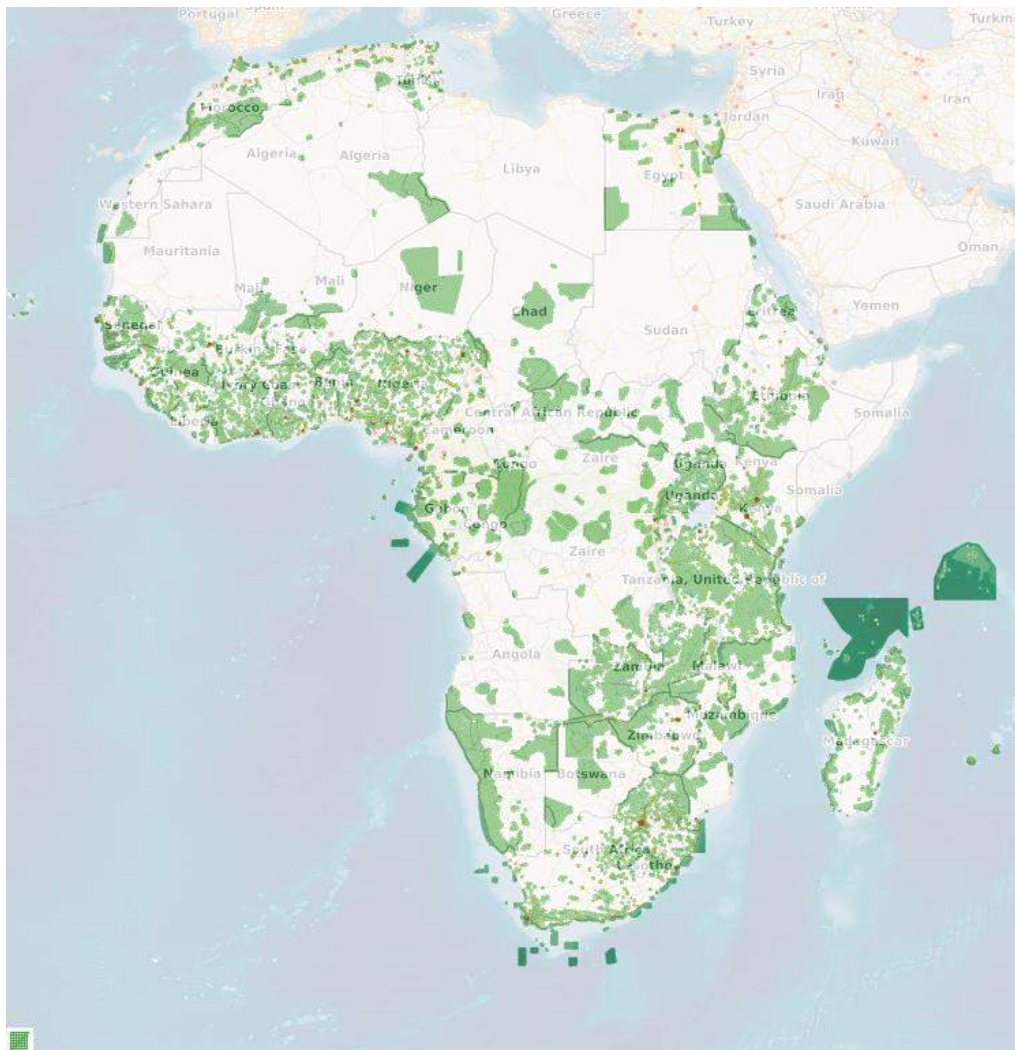
description: Shapefile showing the location of protected areas in Africa as national parks and natural reserves.

keywords: Areas, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Roads**

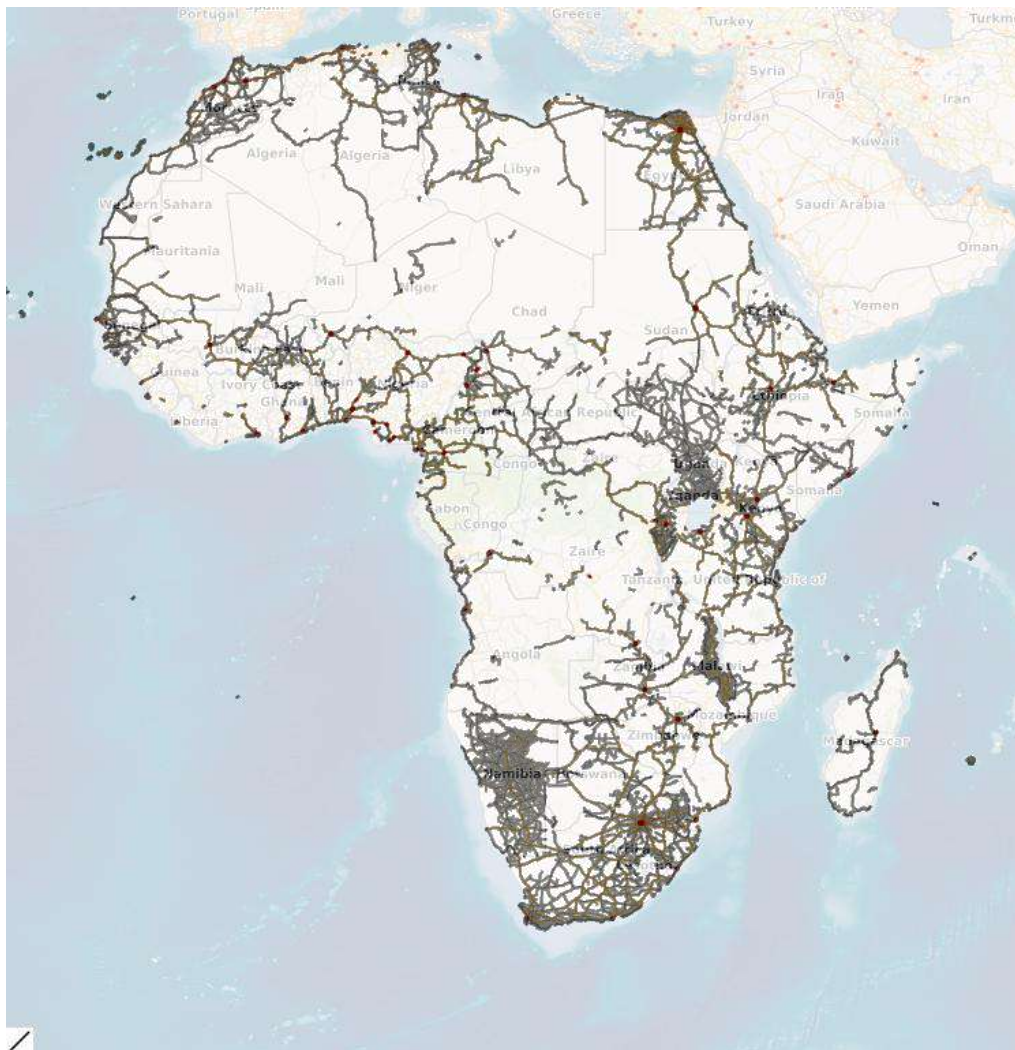
description: Shapefile showing the location of some major roads in Africa derived from open street map

keywords: Roads, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Djibouti gravity data**

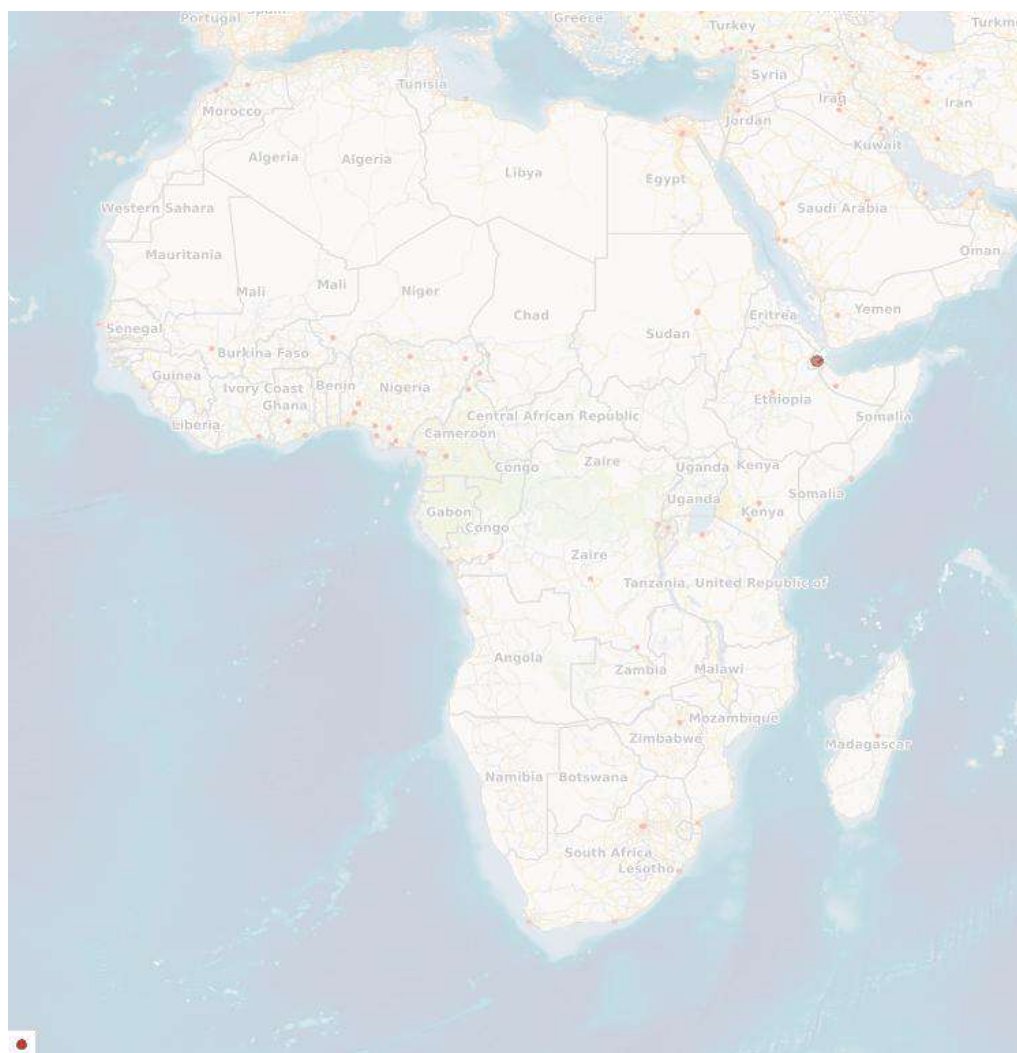
description: Gravimetric data recorded between 1979 and 1980 and described in report BRGM 80 SGN 525 GTH. The data contains the Bouguer anomaly ($d=2.67$), measured G (-978000), topographic correction ($d=2.39$), position and altitude. 919 points are included

keywords: Gravity, Assal, Bouger, BRGM

source: no online source available

date: 1980

coverage: Djibouti



- **Crustal thickness**

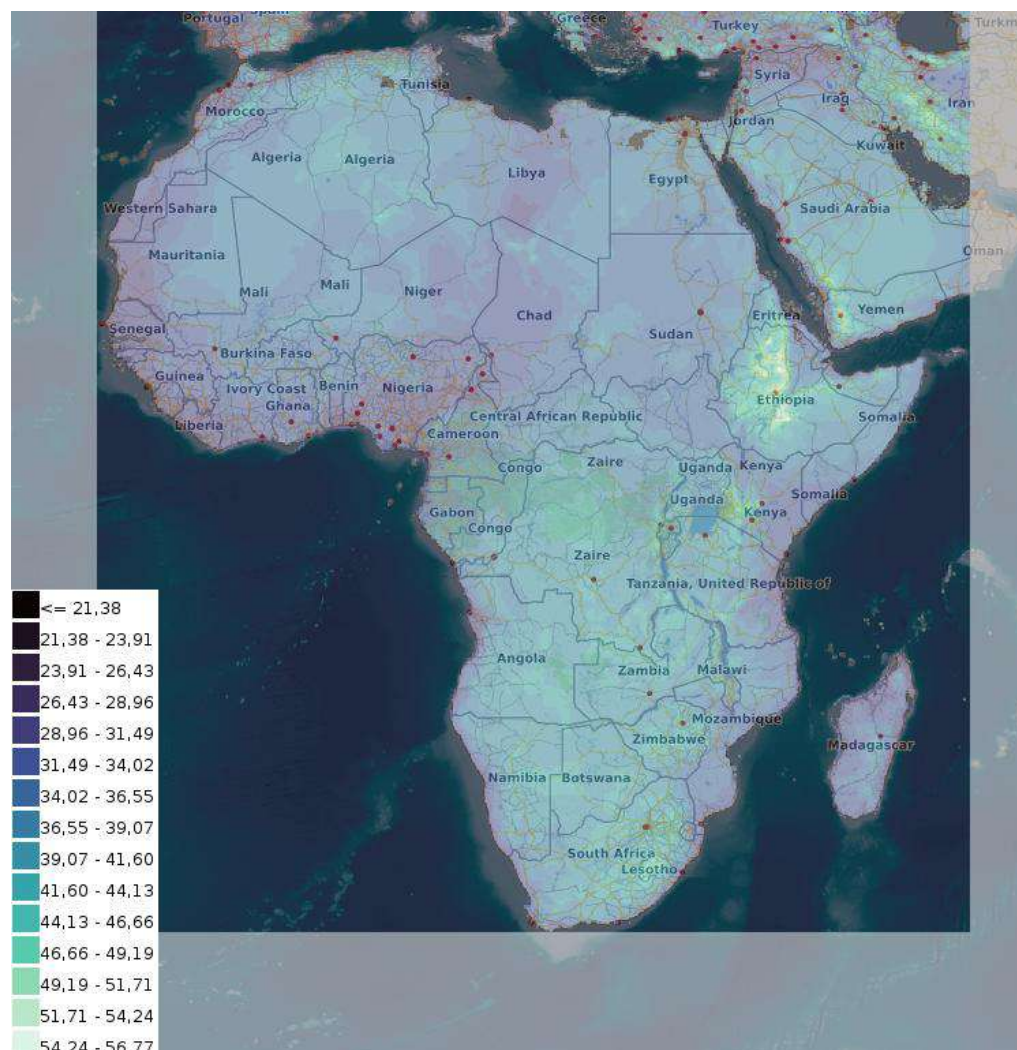
description: Crustal thickness map of Africa derived from integrated modeling of elevation and geoid data and thermal analysis, by Globig et al., 2016.

keywords: Crustal thickness, Moho, Africa

source: [link](#)

date: 2016

coverage: Africa



- **Global seismic hazard map**

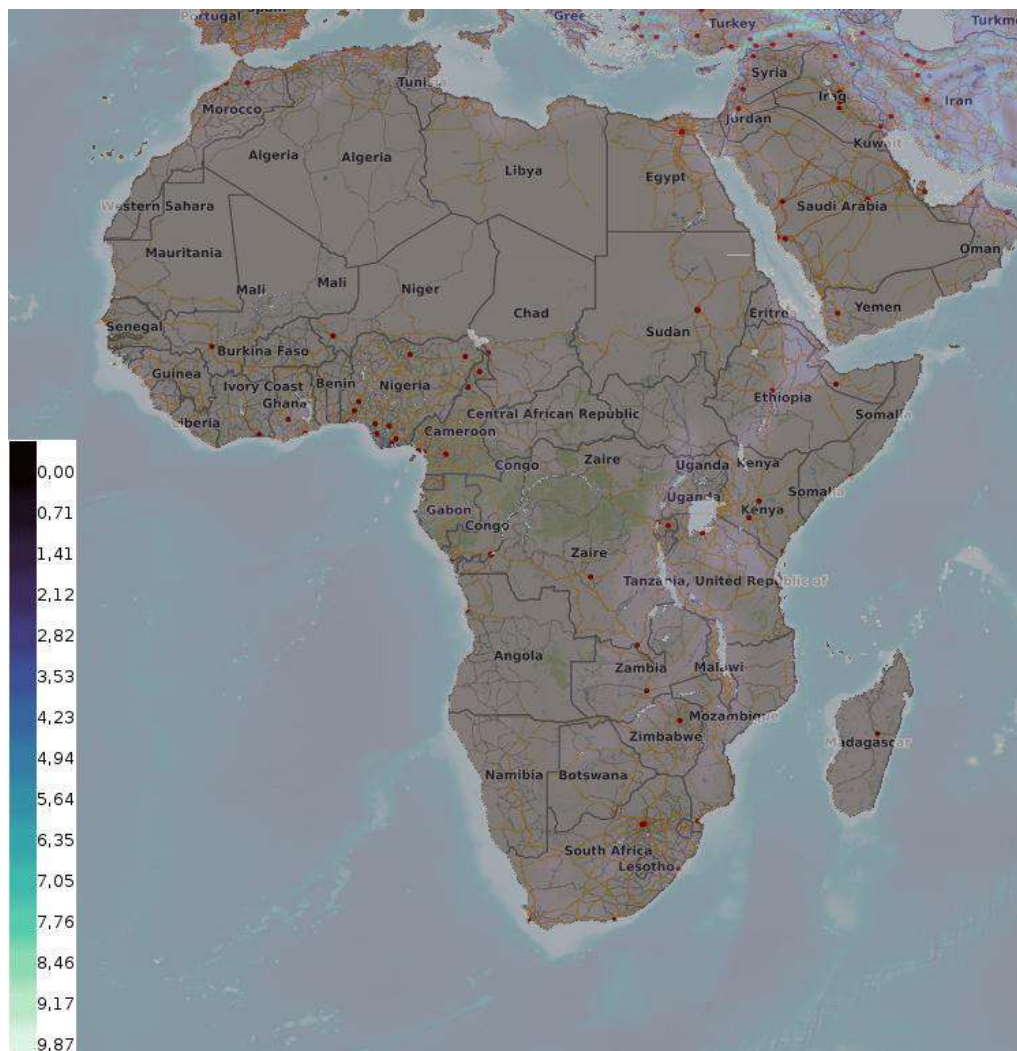
description: Map showing global seismic hazard areas. This Global Seismic Hazard Map depicts Peak Ground Acceleration (PGA) with a 10% chance of exceedance in 50 years. The data is collected as part of the Global Seismic Hazard Assessment Program (GSHAP). Here, an homogeneous approach of data collection is performed in different regions. The data was later combined in one map as an mosaic like structure. For more information please check out the source.

keywords: Seismic Hazard, global

source: [link](#)

date: 2003

coverage: Global



- **Lithosphere thickness**

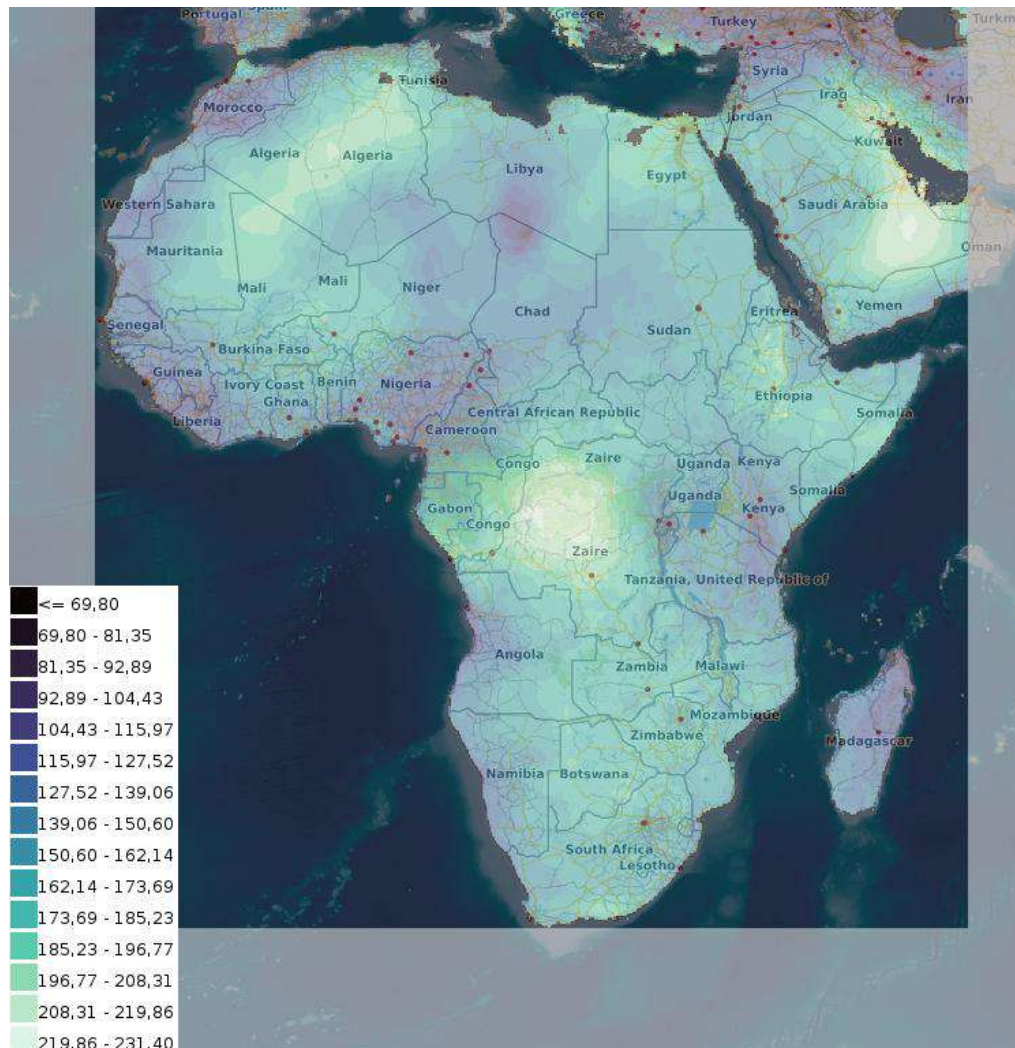
description: Lithosphere thickness map of Africa derived from integrated modeling of elevation and geoid data and thermal analysis, by Globig et al., 2016.

keywords: Lithosphere thickness, Moho, Africa

source: [link](#)

date: 2016

coverage: Africa



- **Faults**

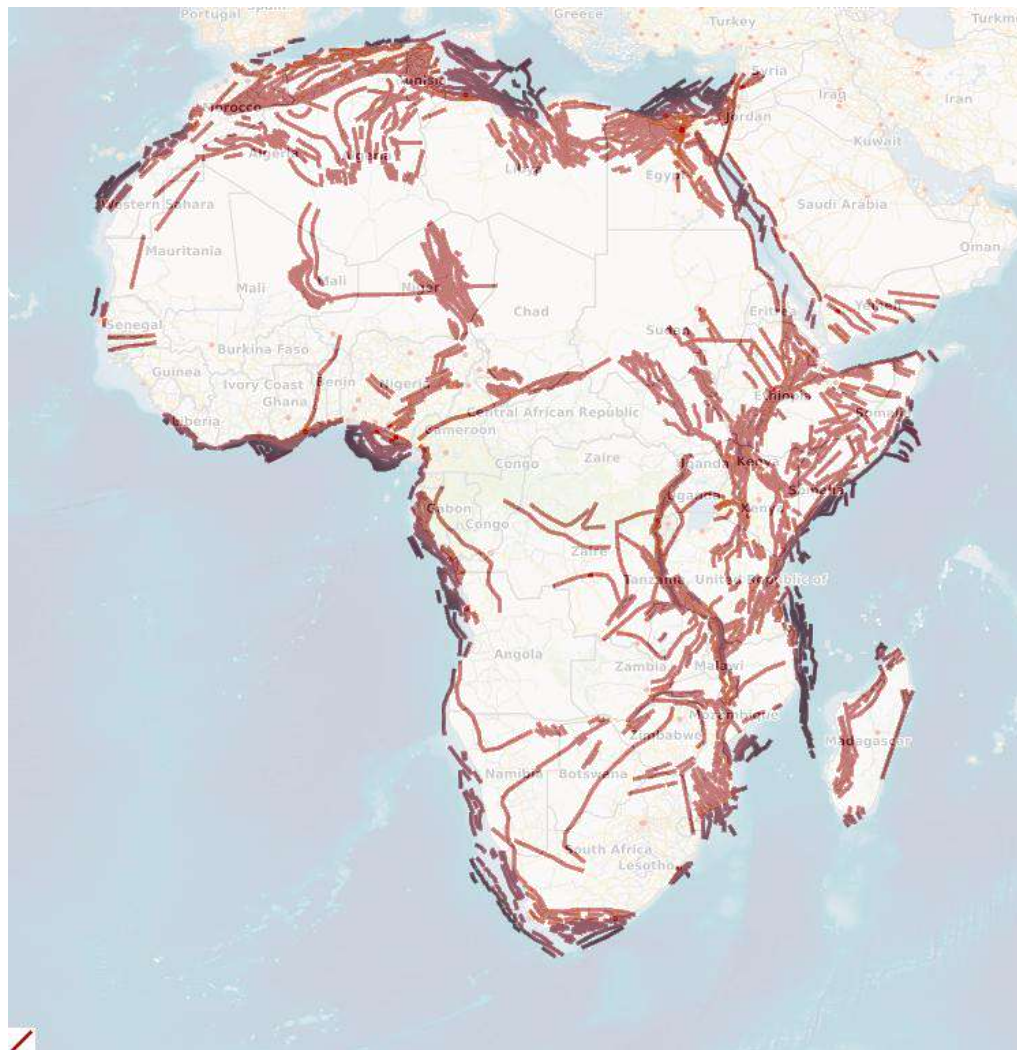
description: Shapefile showing the location and type of major faults in Africa.

keywords: Major faults, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Moho depth (Szwilius)**

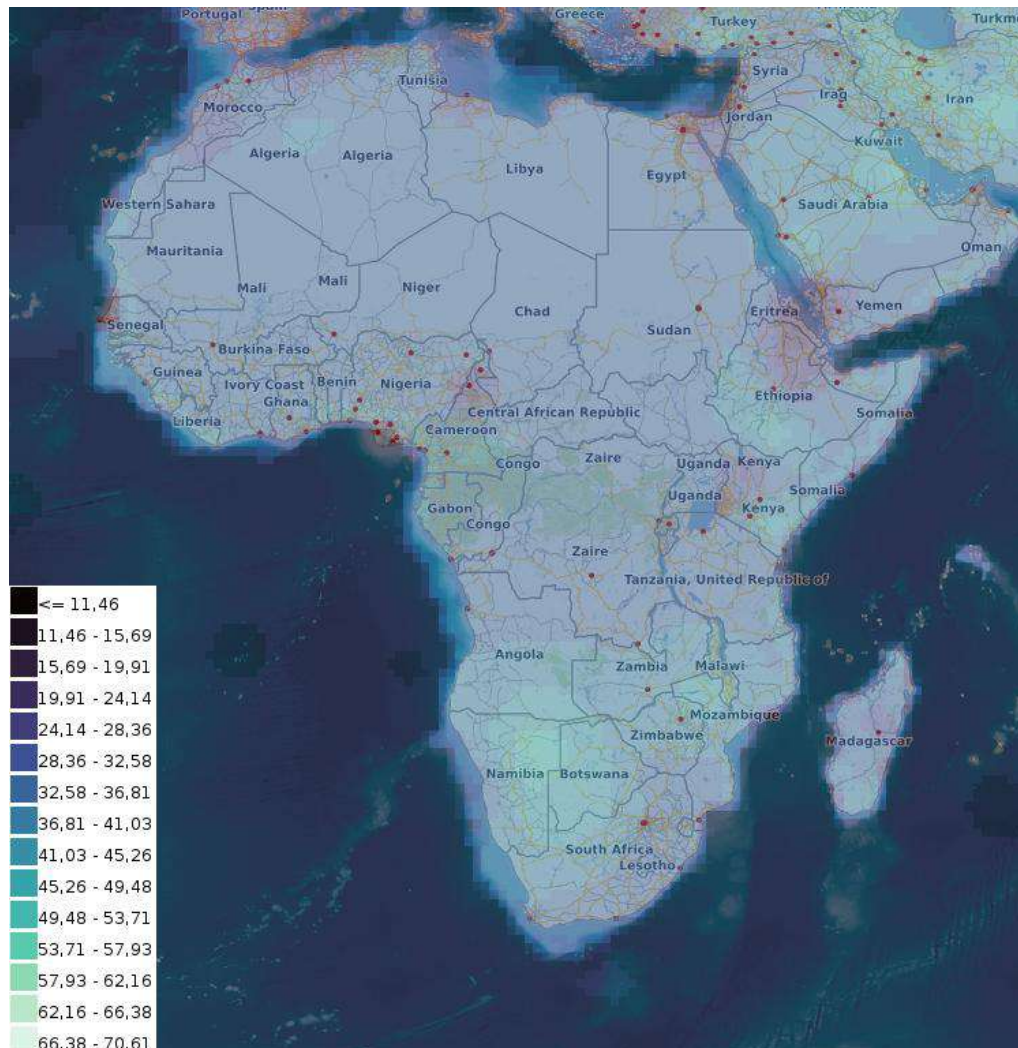
description: Global Moho depth map by Szwilius et al., 2019, derived from using a nonstationary kriging algorithm (Risser & Calder, 2017).

keywords: Moho depth, Global

source: [link](#)

date: 2019

coverage: Global



- **Moho Depth (Finger)**

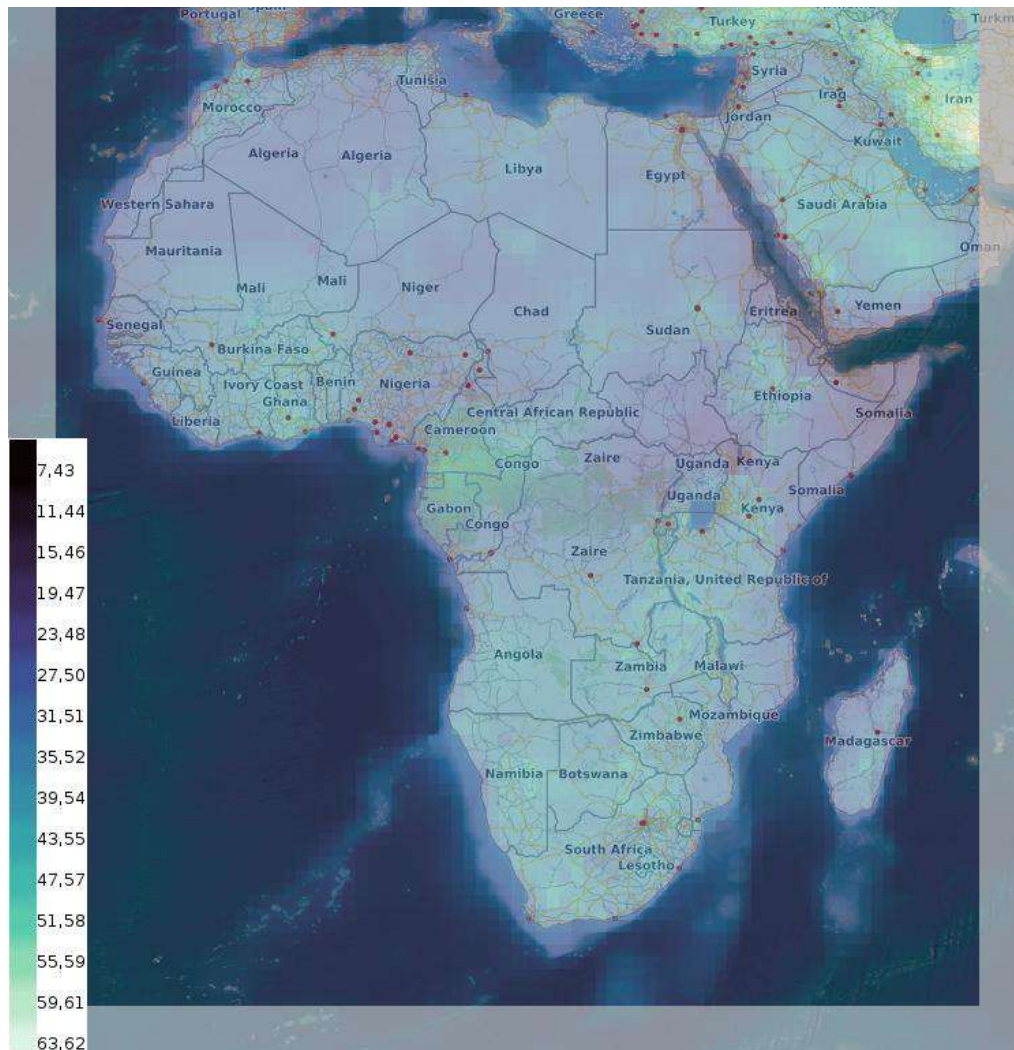
description: Map showing the Moho depth derived from S-wave seismic tomography data, by Finger et al., (2022). For more information please look at the source.

keywords: Moho depth, Crustal thickness, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Moho Depth uncertainty (Finger)**

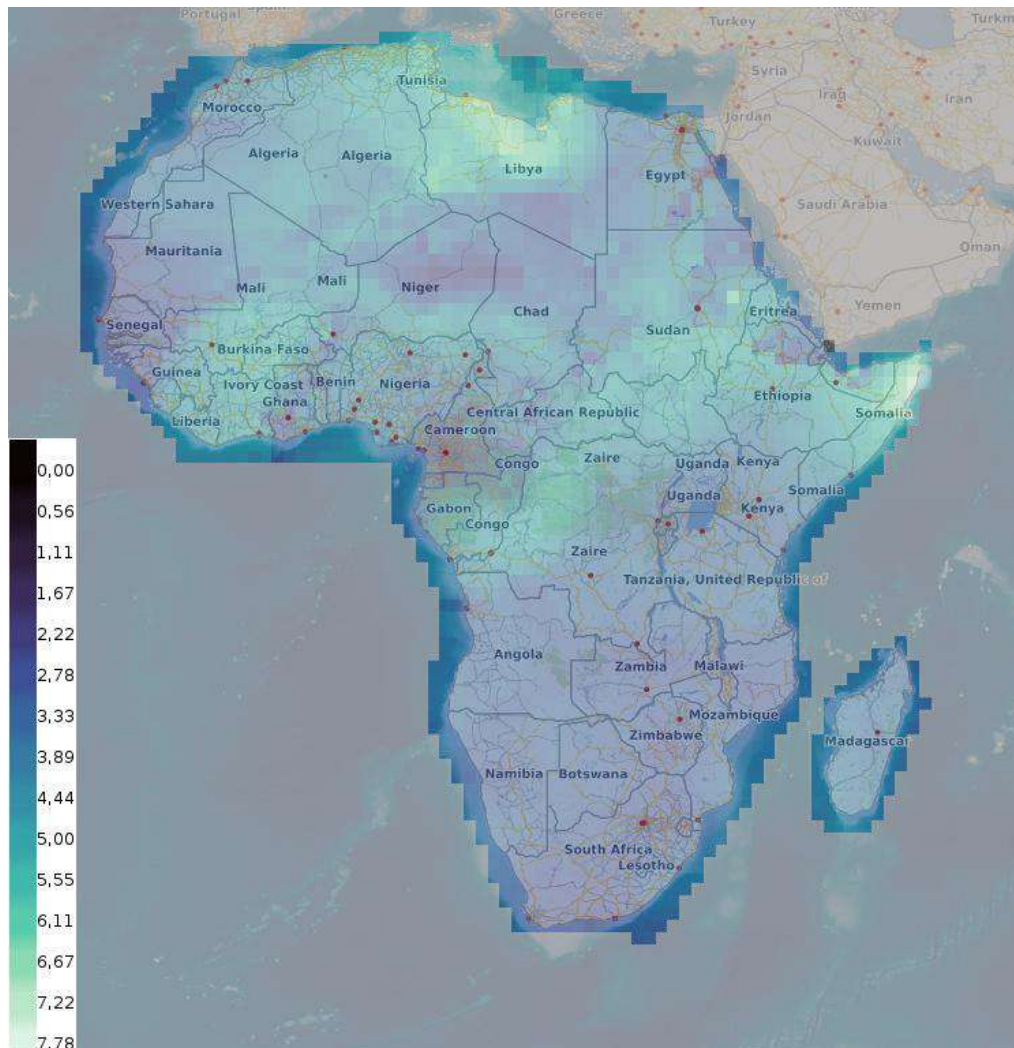
description: Map showing the Moho depth uncertainty, by Finger et al., (2022). For more information please look at the source.

keywords: Moho depth uncertainty, Crustal thickness uncertainty, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Thinned lithosphere**

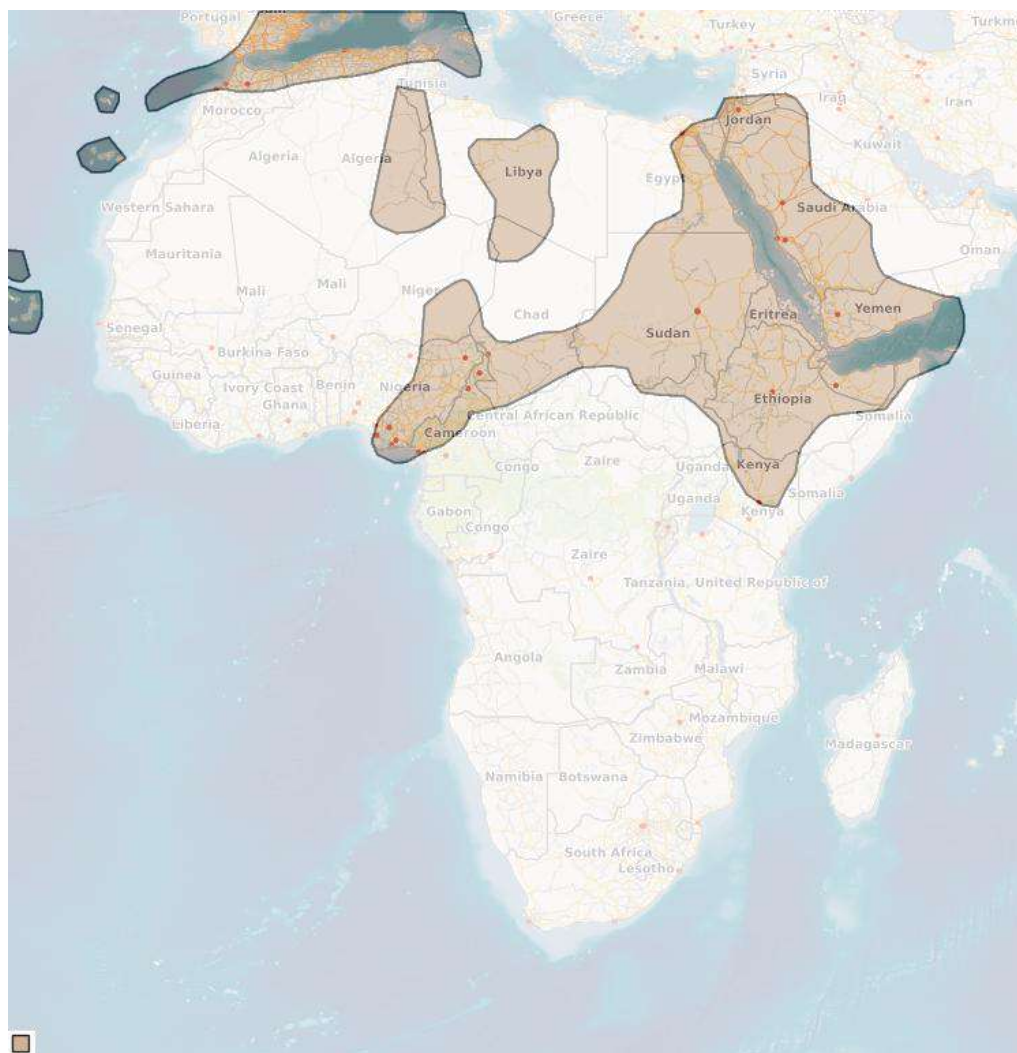
description: Shapefile showing the location of thinned lithosphere with thicknesses less than 100 km

keywords: Lithosphere, Africa

source: [link](#)

date: 2022

coverage: Africa



- **Calderas in Ethiopia**

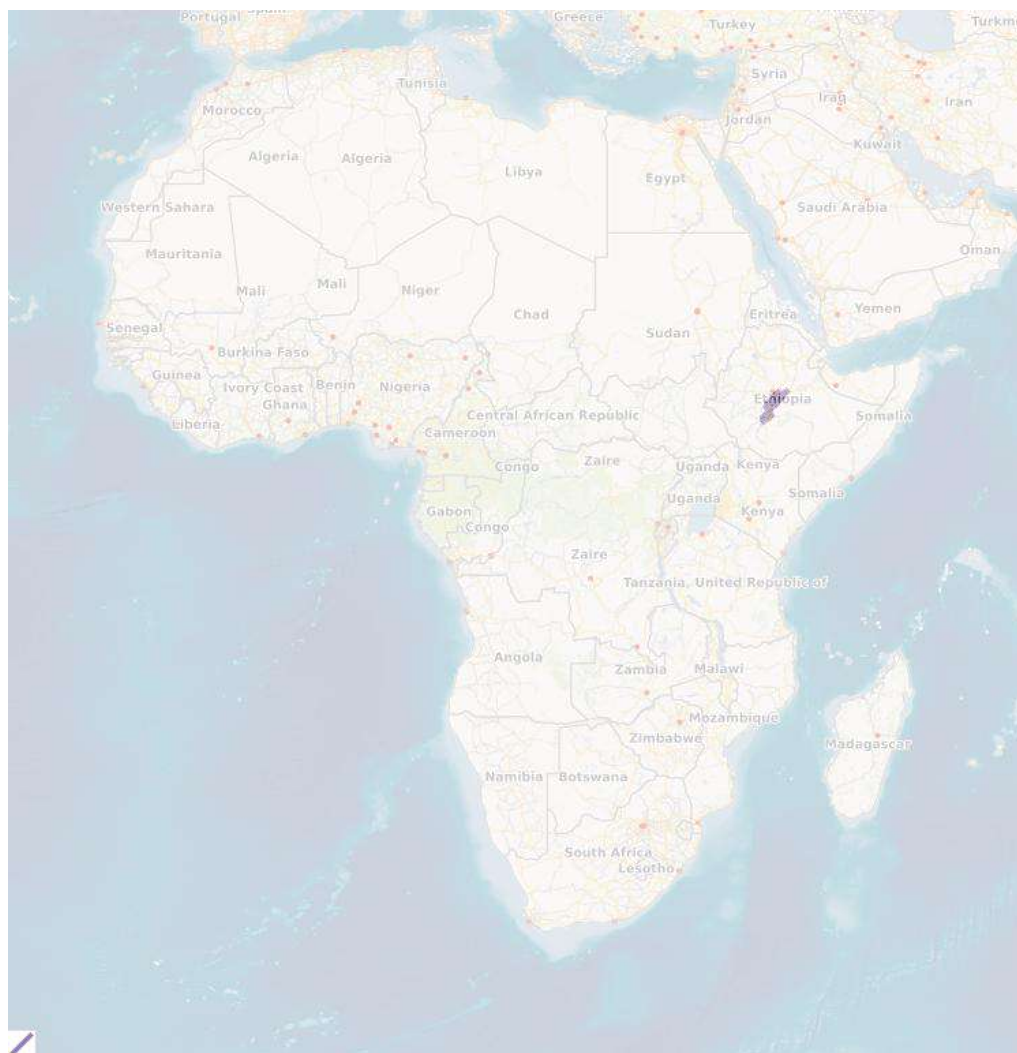
description: Shapefile showing the outline of caldera volcanoes in Ethiopia, from CNR.

keywords: Caldera, Volcanoes. Ethiopia

source: no online source available

date: 2023

coverage: Ethiopia



- **Earth heat flow**

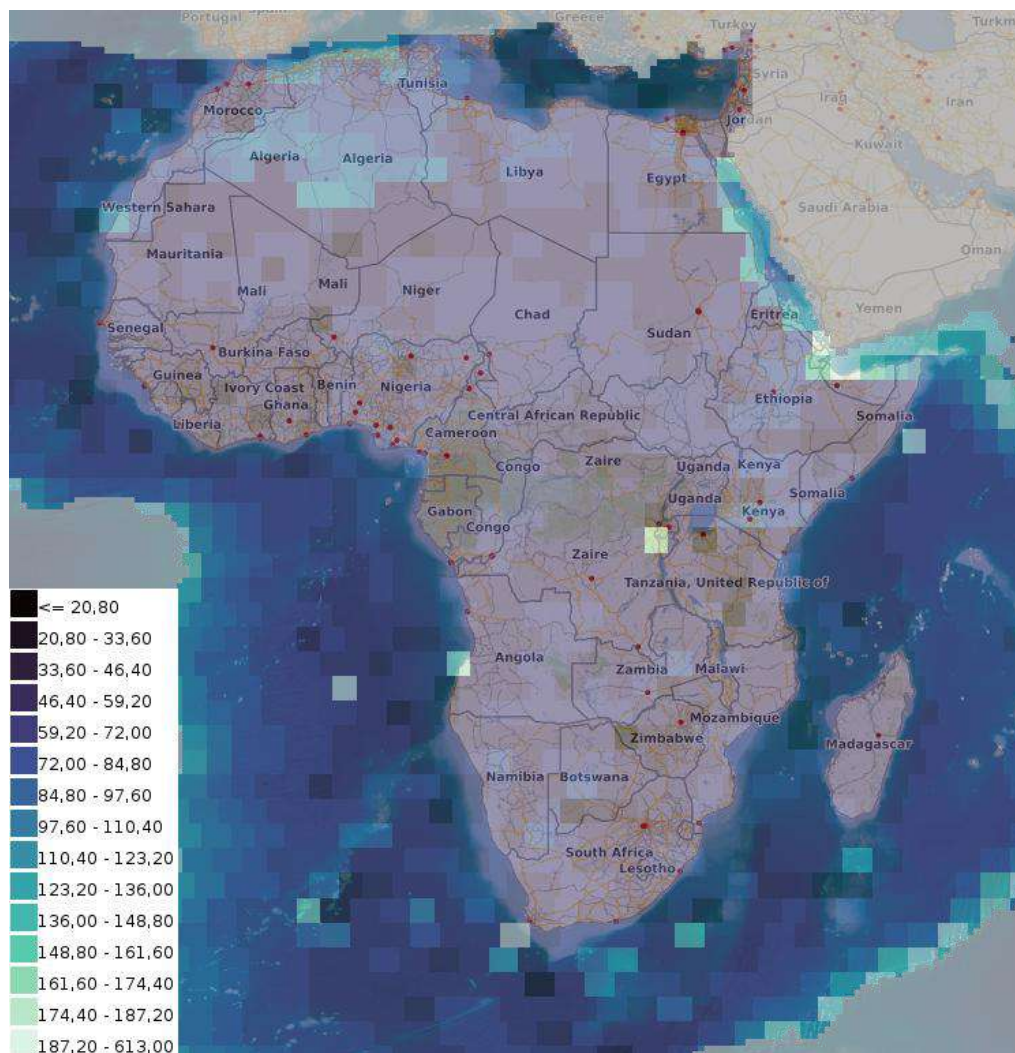
description: Heat flow map Africa, masked by the Africa plate shapefile.

keywords: Heat flow, Africa

source: no online source available

date: 2023

coverage: Africa



- **Well data (BGS Geology Geophysics Heatflow Thermal conductivity)**

description: Shapefile showing the location and type of wells in Africa as derived from literature.

keywords: Wells, Africa

source: [link](#)

date: 2022

coverage: Africa



- Wells

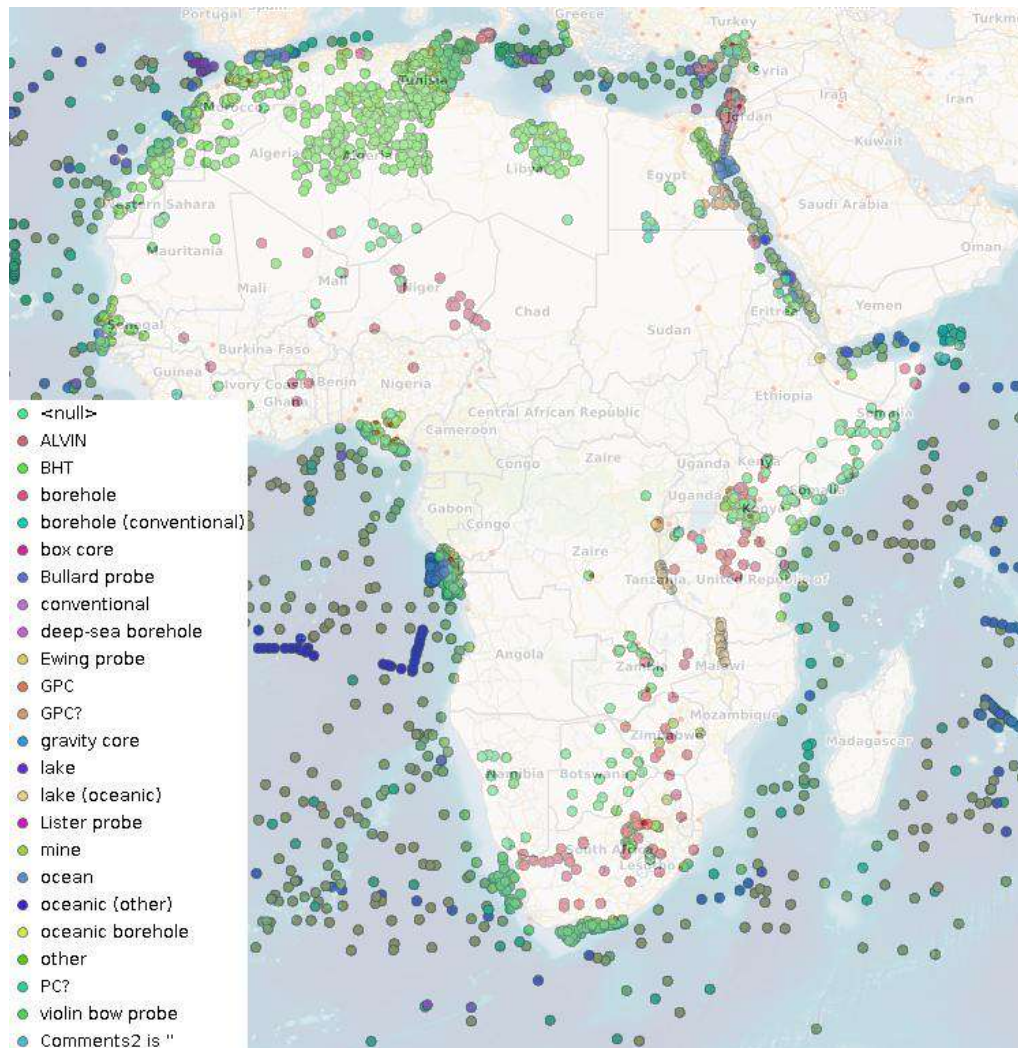
description: Shapefile showing the location of different types of wells in Africa. Includes information about well name, state of temperature correction, (temperature?) gradient, heat flow, and heat production of some wells.

keywords: Wells, Africa

source: no online source available

date: 2023

coverage: Africa



- **Heatflow (BRGM)**

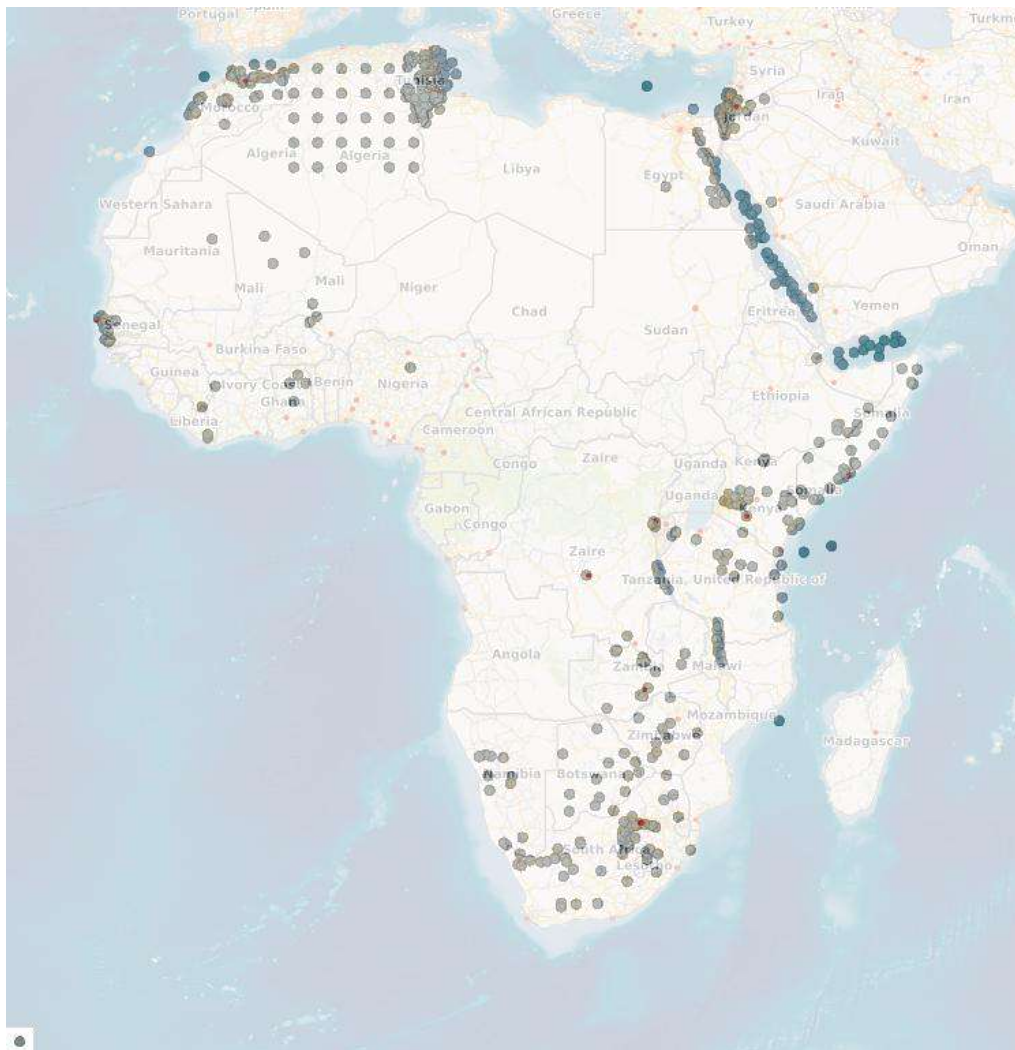
description: Shapefile showing heatflow and thermal related data of wells/sites in Africa, from BRGM.

keywords: Heatflow, Thermal properties, Africa

source: [link](#)

date: 2023

coverage: Africa



- **Hot springs**

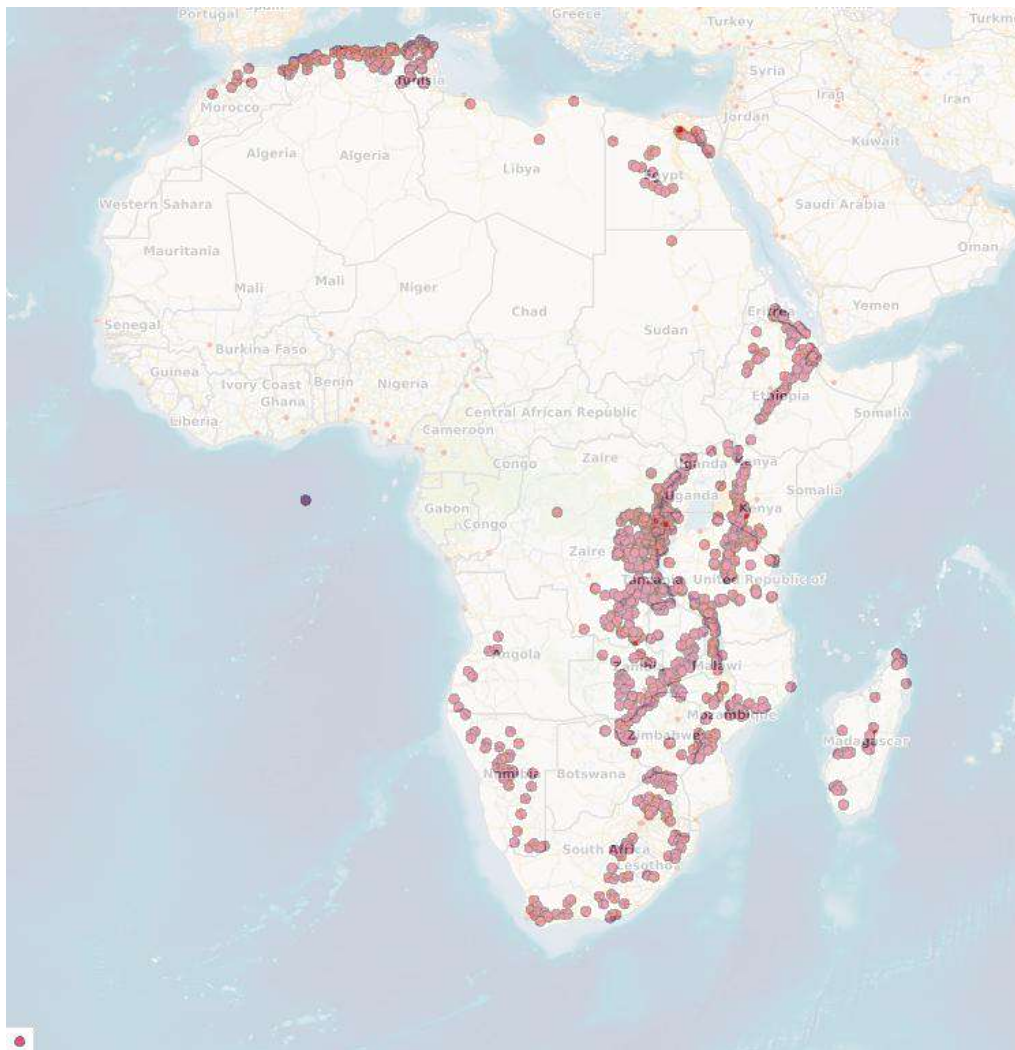
description: Shapefile showing the location of hot springs in Africa derived from multiple sources.

keywords: Hot springs, Africa,

source: no online source available

date: 2024

coverage: Africa



- **Adherence to the Rule of Law**

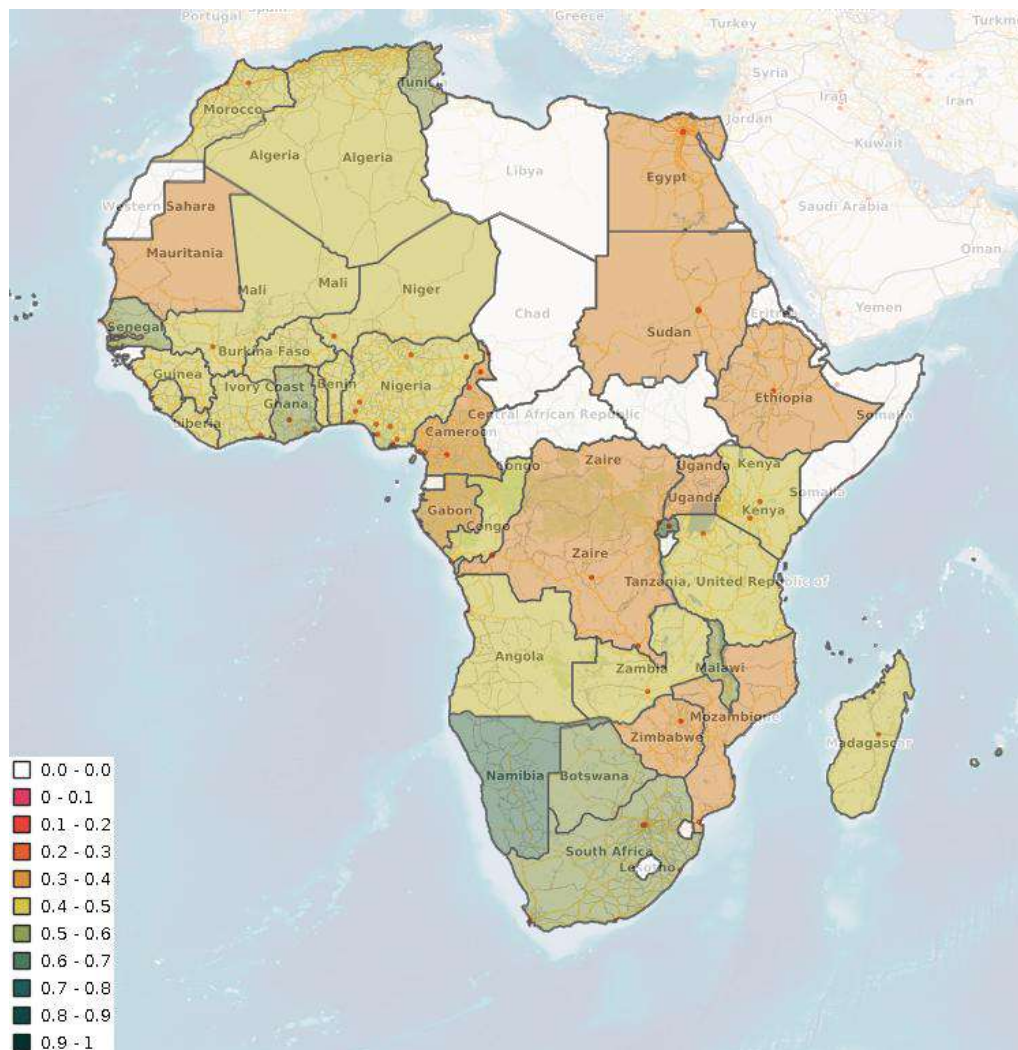
description: Shapefile showing the adherence to the Rule of Law, generated by the World Justice Project. Ease of doing business ranks economies from 1 to 190, with first place being the best. The ranking of economies is determined by sorting the aggregate ease of doing business scores. A high ranking (a low numerical rank) means that the regulatory environment is conducive to business operation. 0=weaker, 1=stronger.

keywords: Rule of Law, World

source: [link](#)

date: 2023

coverage: World



- **Ease of doing business**

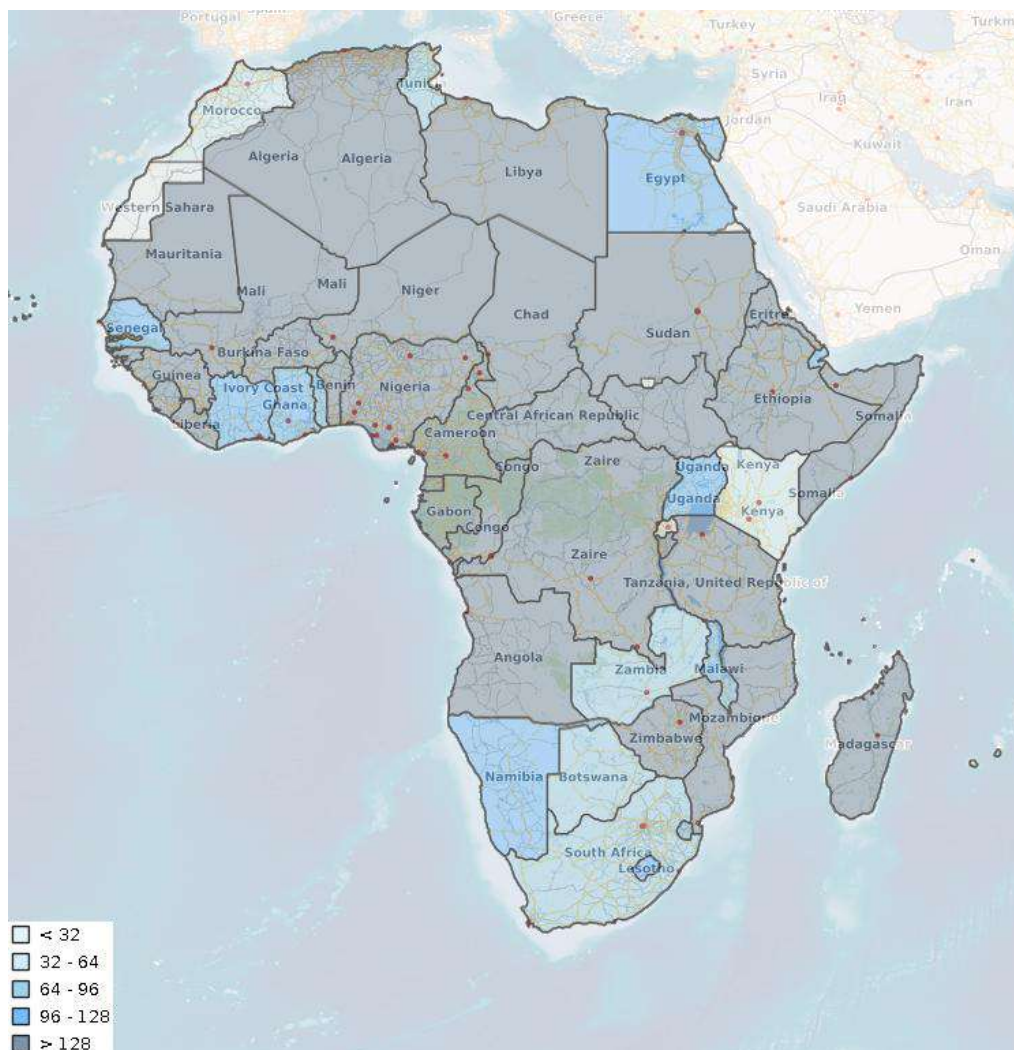
description: Shapefile showing the ease of doing business ranking, generated by the World Bank

keywords: Ease of doing Business, World

source: [link](#)

date: 2019

coverage: World



- **World population density**

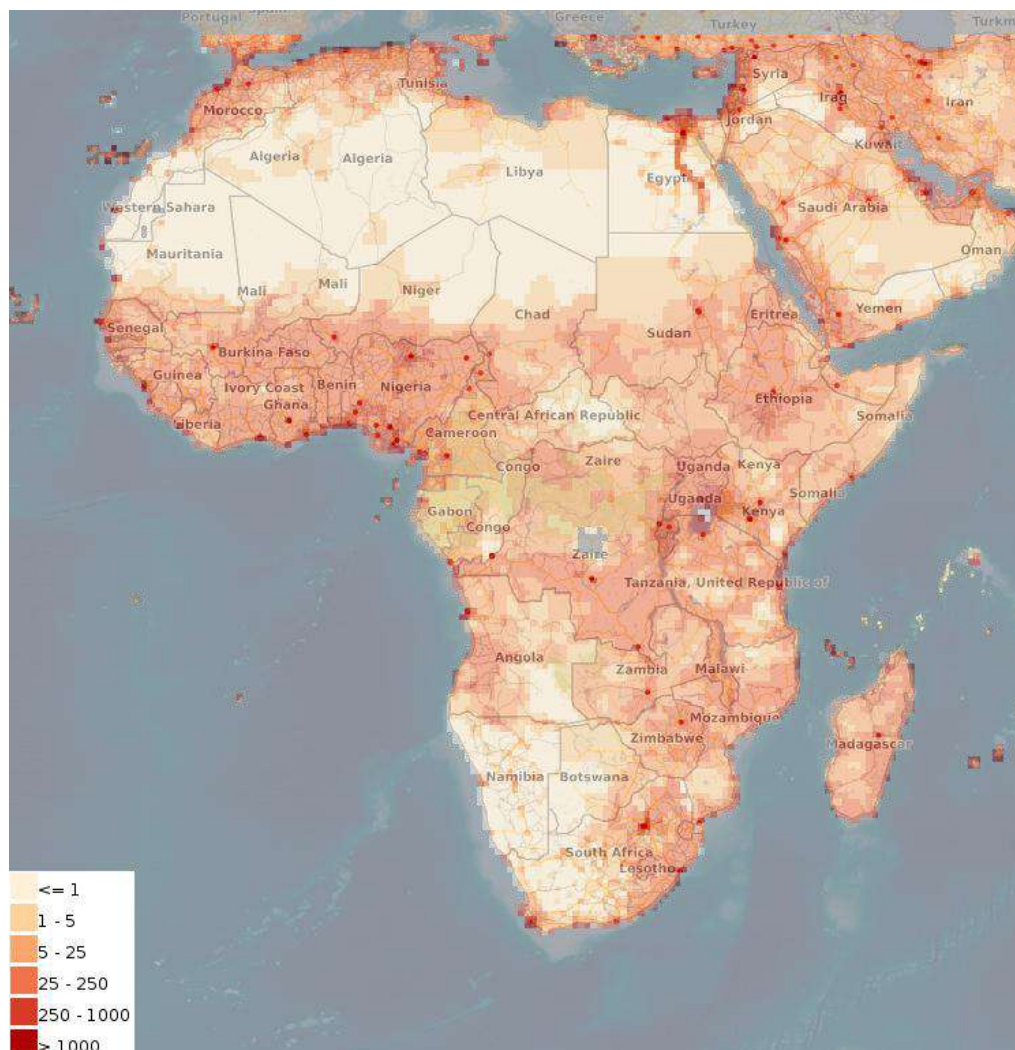
description: Gridded population density of the World (GPW), v5, generated by NASA

keywords: Population density, World

source: [link](#)

date: 2020

coverage: World



- **Gross national income groups**

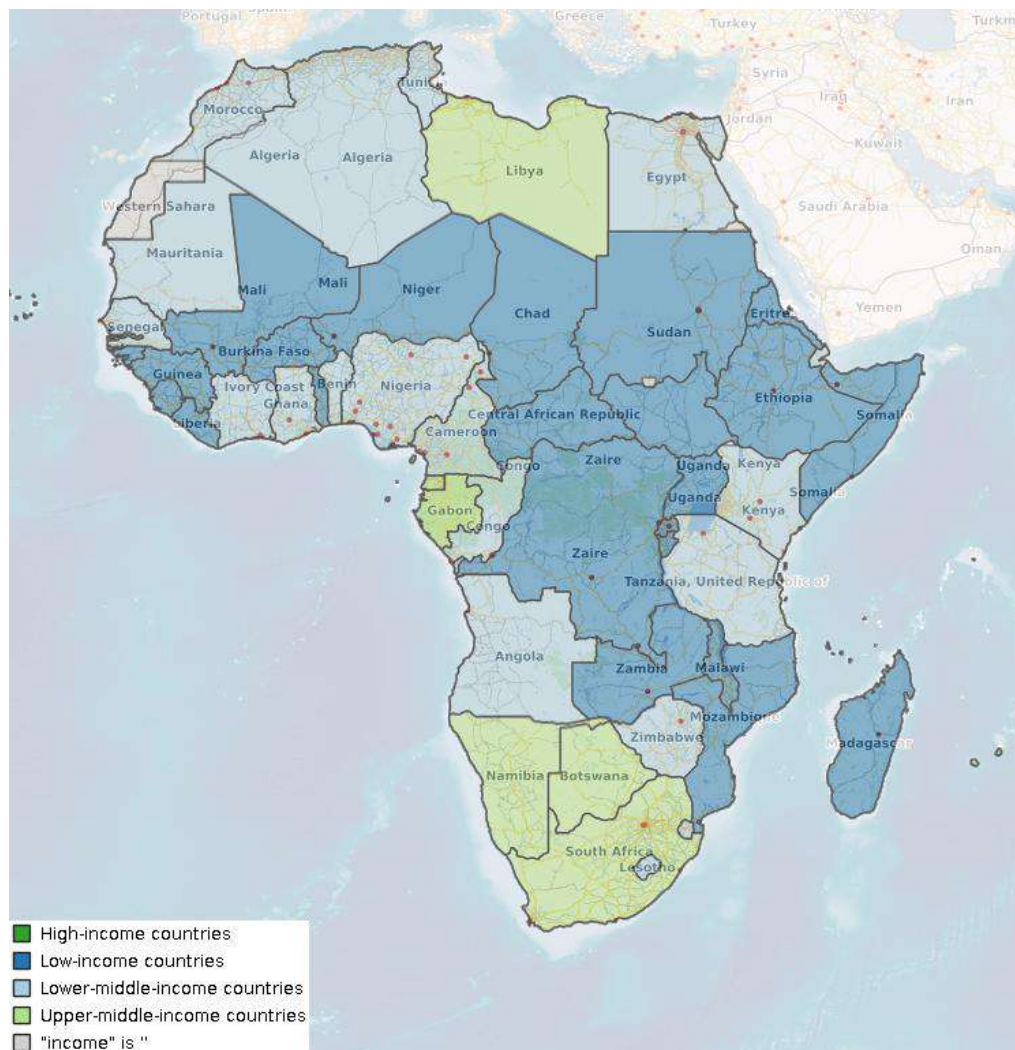
description: The World Bank's income classifications split countries into one of four categories determined by the country's gross national income (GNI) per capita. The GNI thresholds between income groups have changed through time based on World Bank definitions. Low-income countries are those with a gross national income (GNI)

keywords: Gross National Income, World

source: [link](#)

date: 2022

coverage: World



- **Oil shale locations**

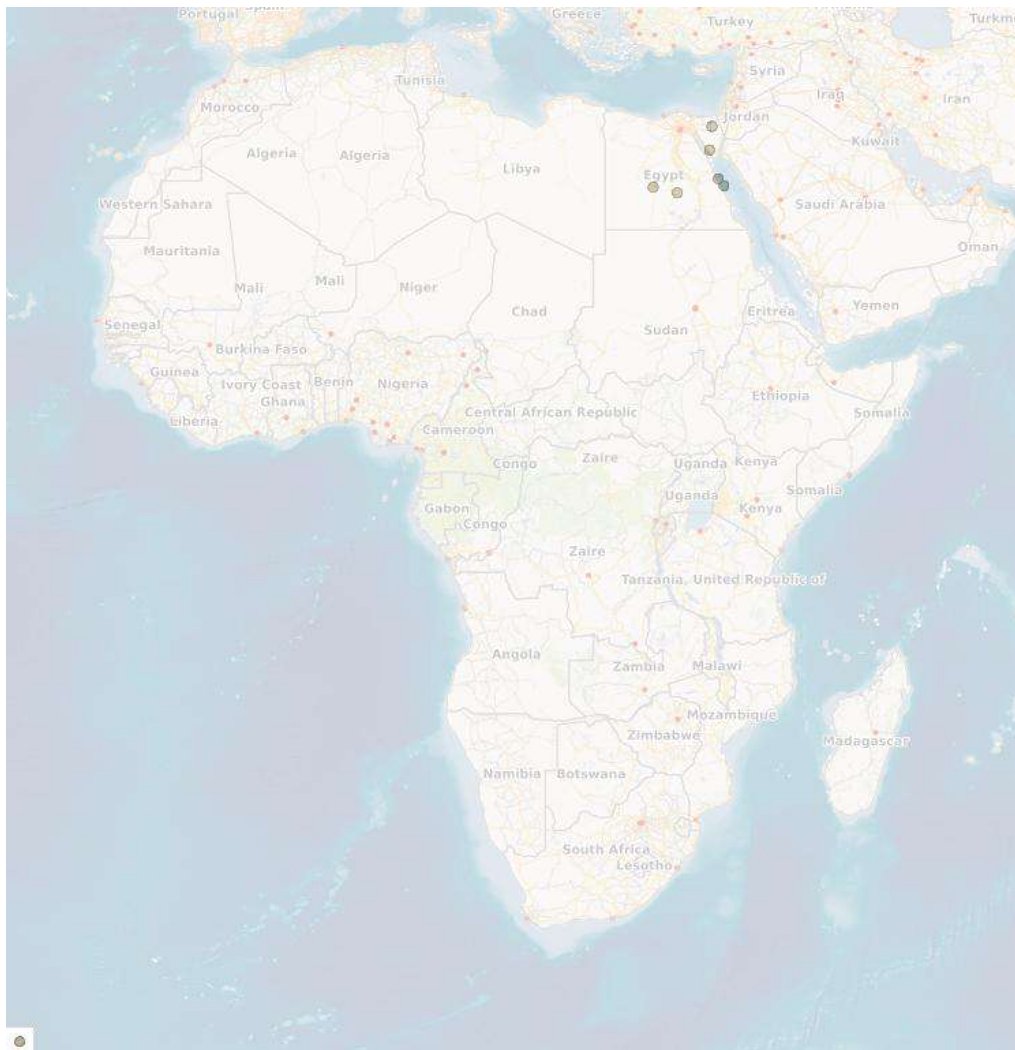
description: Shapefile showing the location of oil-rich shales in Egypt, from NARSS.

keywords: Shale oil, Egypt

source: no online source available

date: 2023

coverage: Egypt



- **Thermal well data**

description: Shapefile showing wells in which thermal properties have been measured, derived from multiple sources. These properties include thermal gradient, thermal conductivity and heatflow.

keywords: Thermal properties, Wells, E-Africa

source: [link](#)

date: 2020

coverage: Africa



- **Input heat flow**

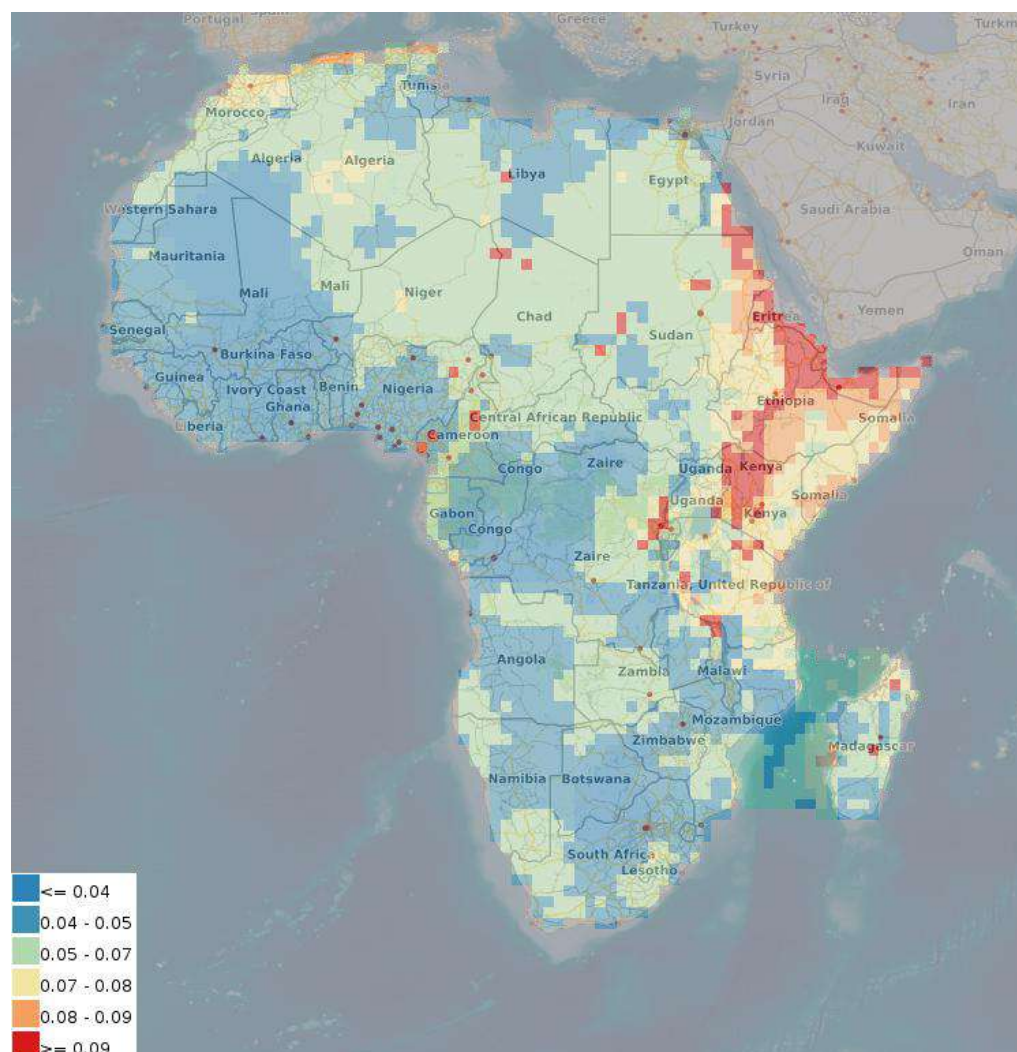
description: Heat flow

keywords: Heat flow, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Temperature at 1km depth**

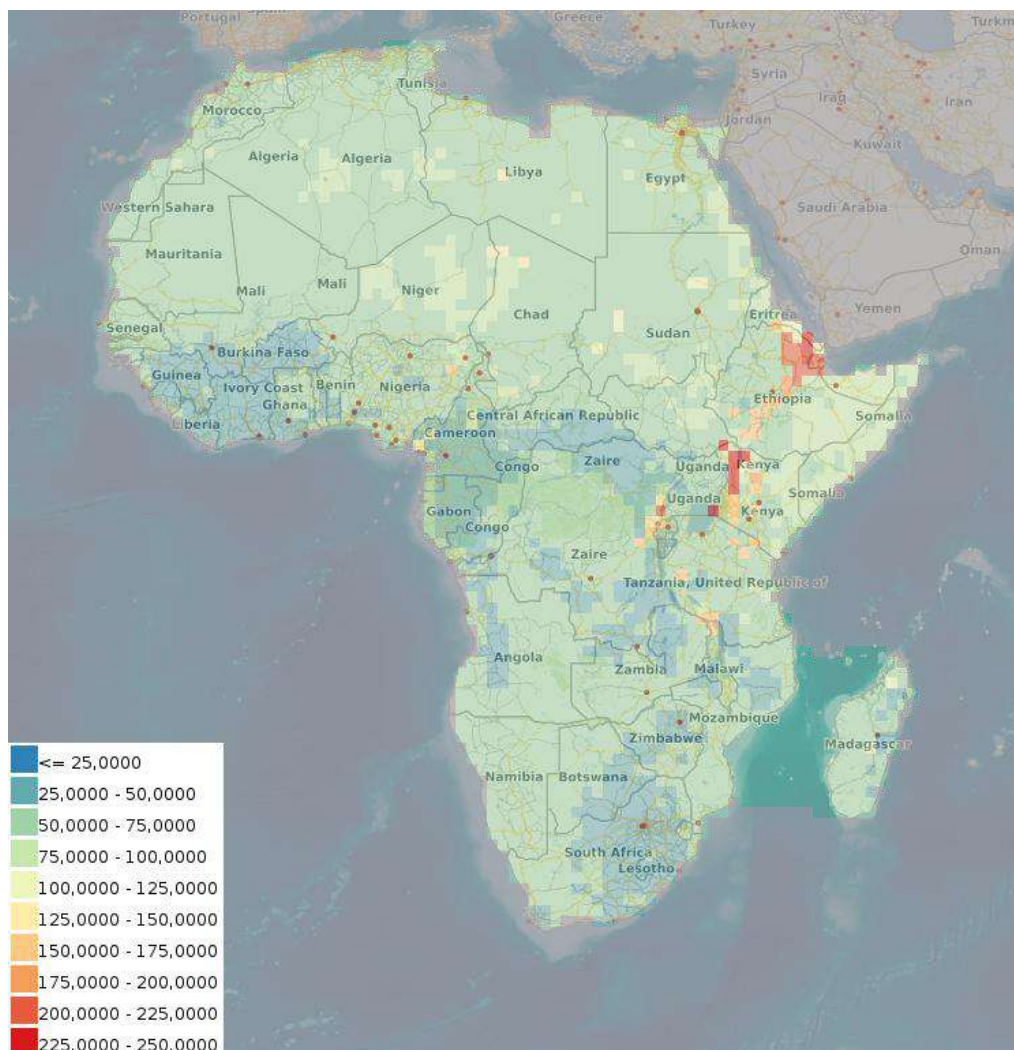
description: Temperature model at 1 km depth

keywords: temperature, depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Temperature at 2km depth**

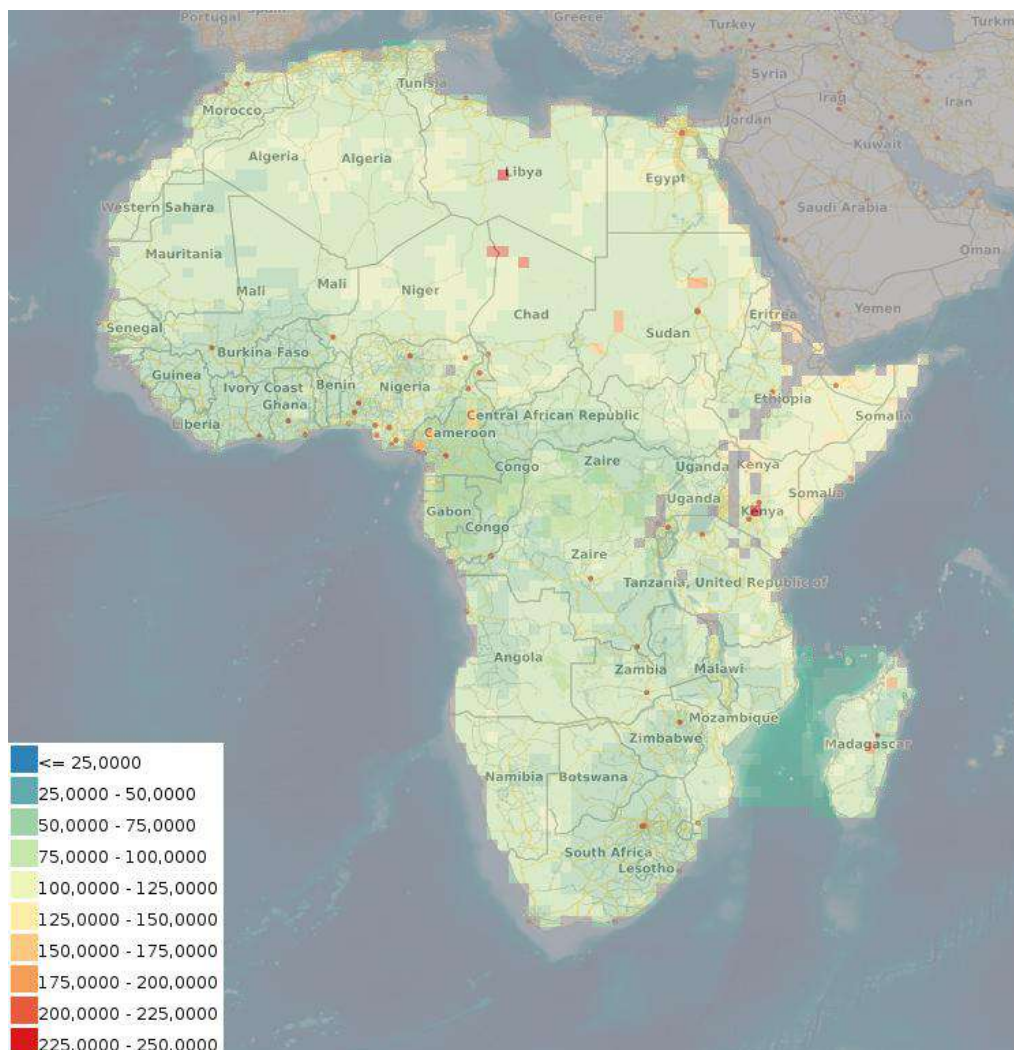
description: Temperature model at 2 km depth

keywords: temperature, depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Temperature at 3km depth**

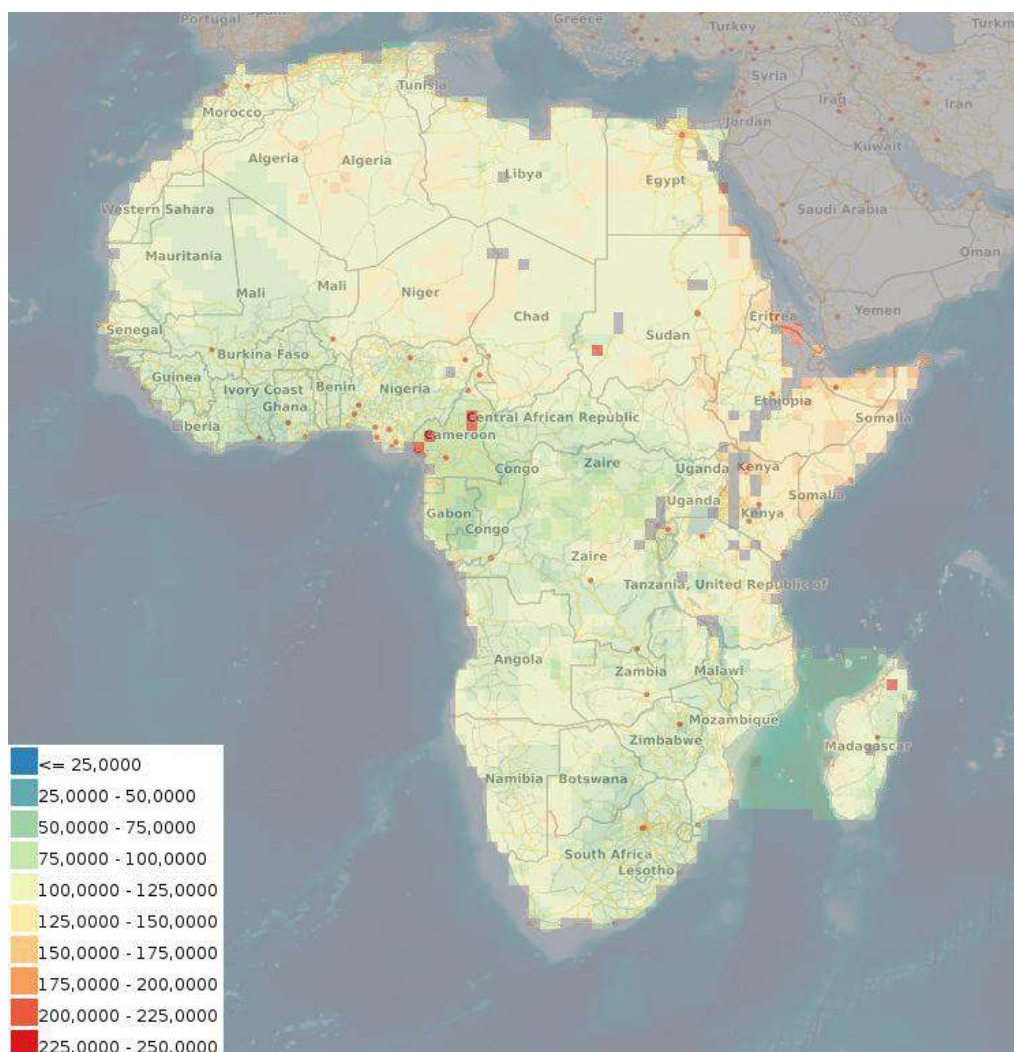
description: Temperature model at 3 km depth

keywords: temperature, depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Temperature at 4km depth**

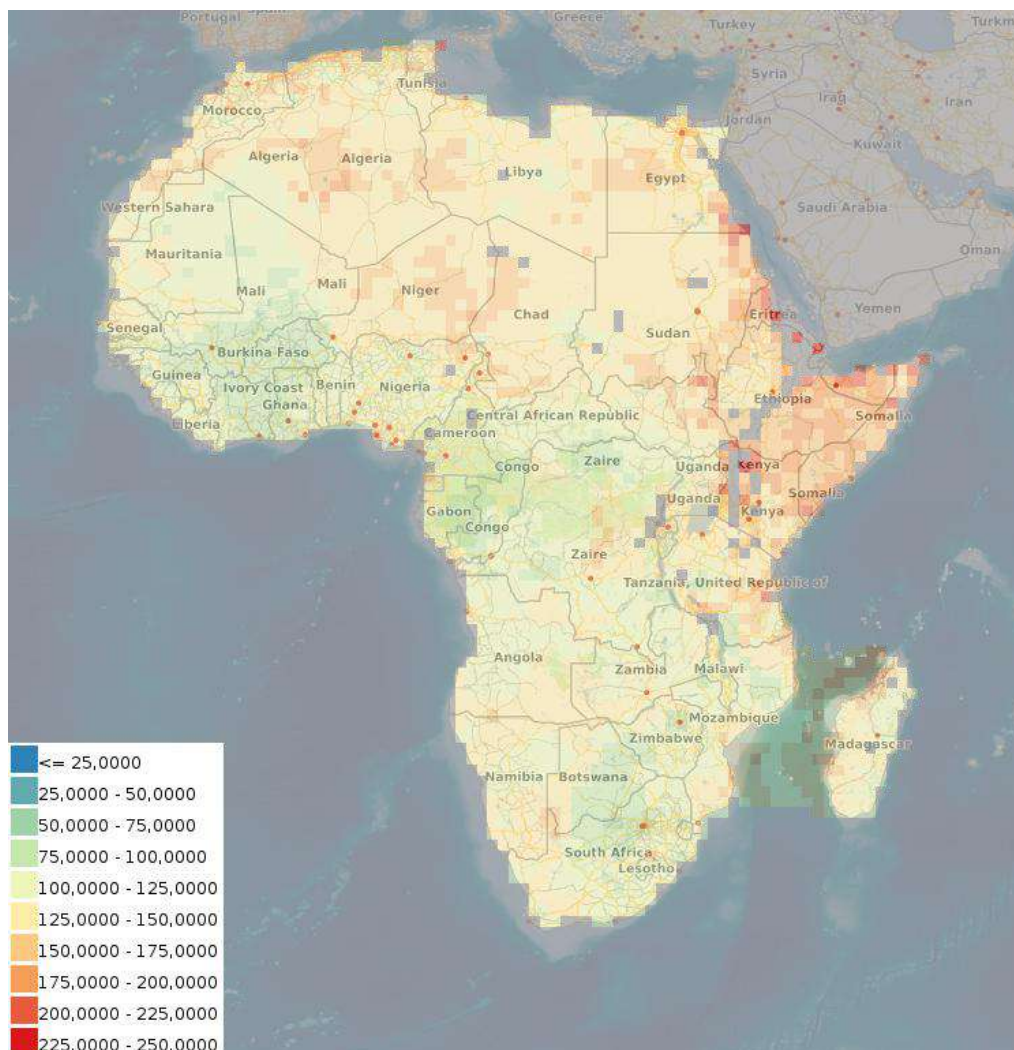
description: Temperature model at 4 km depth

keywords: temperature, depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Surface heat flow from temperature model**

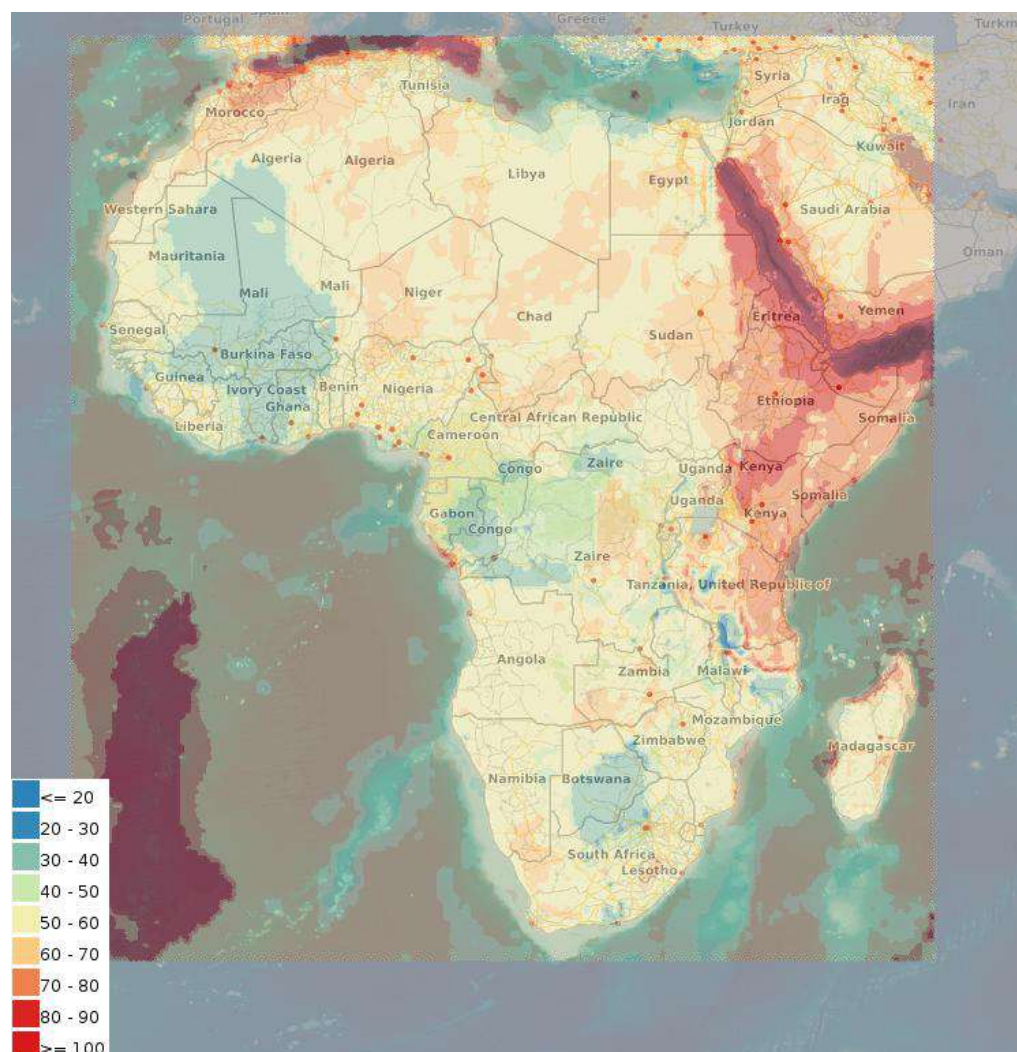
description: Surface heat flow from temperature model

keywords: Surface heat flow, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Gridded Faults and Volcanoes**

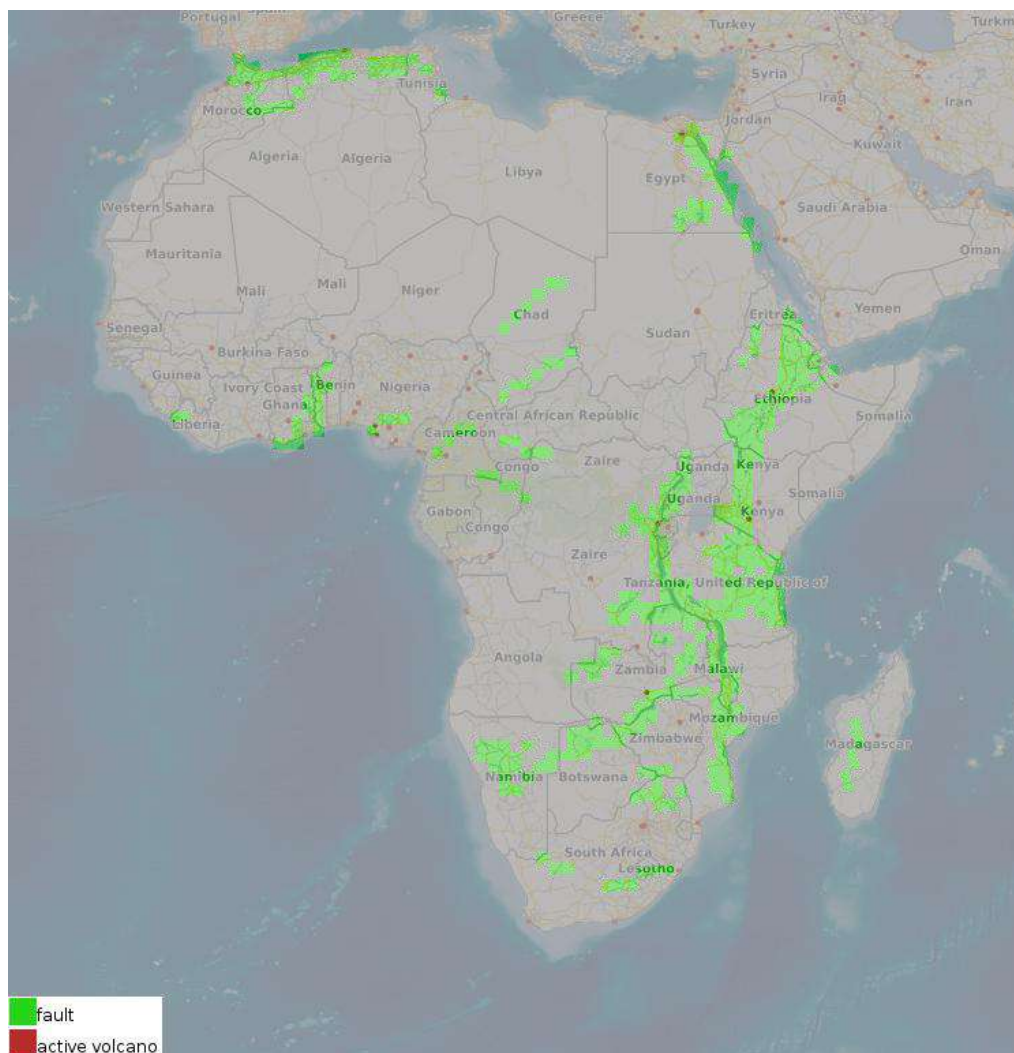
description: Gridded faults and volcanoes

keywords: Faults and volcanoes, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller doublet LCOE**

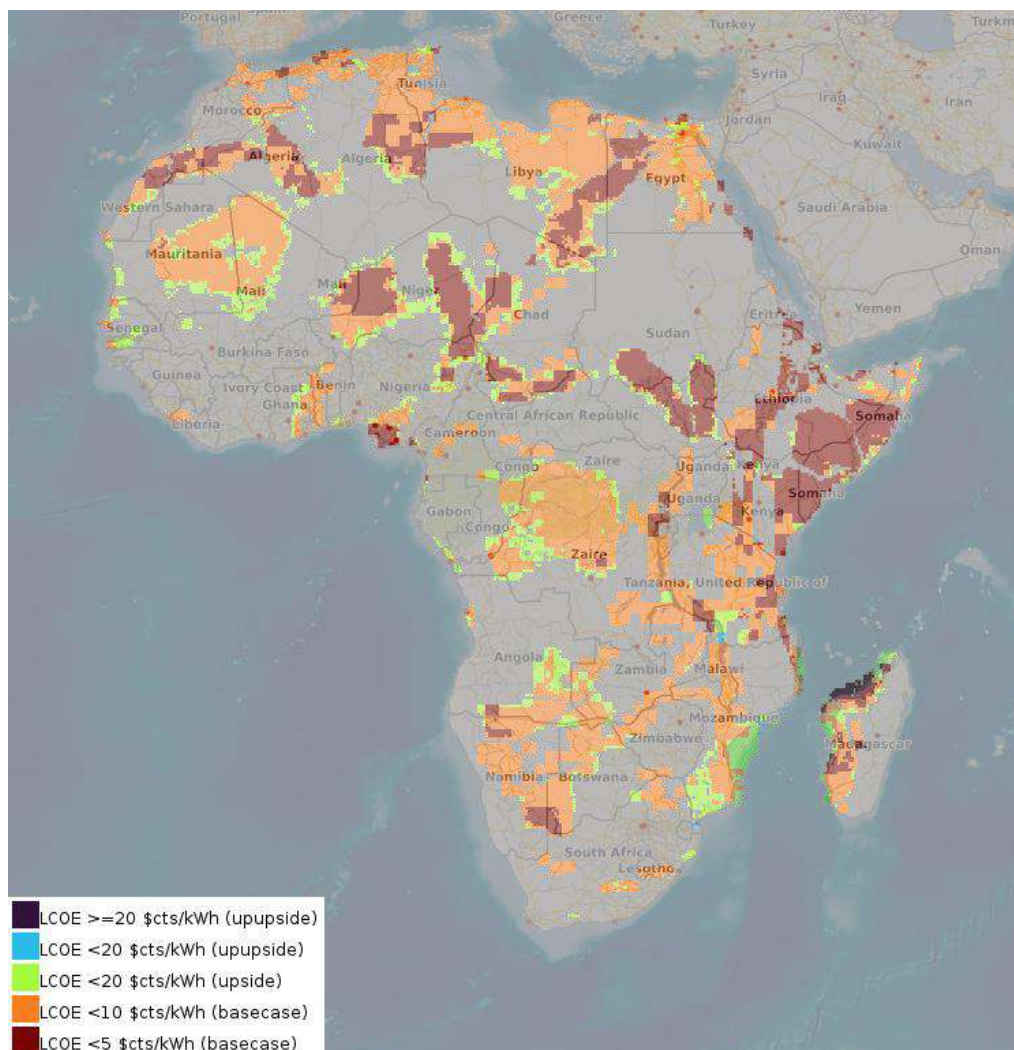
description: chiller LCOE composed from different scenarios

keywords: Chiller, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller doublet LCOE (masked)**

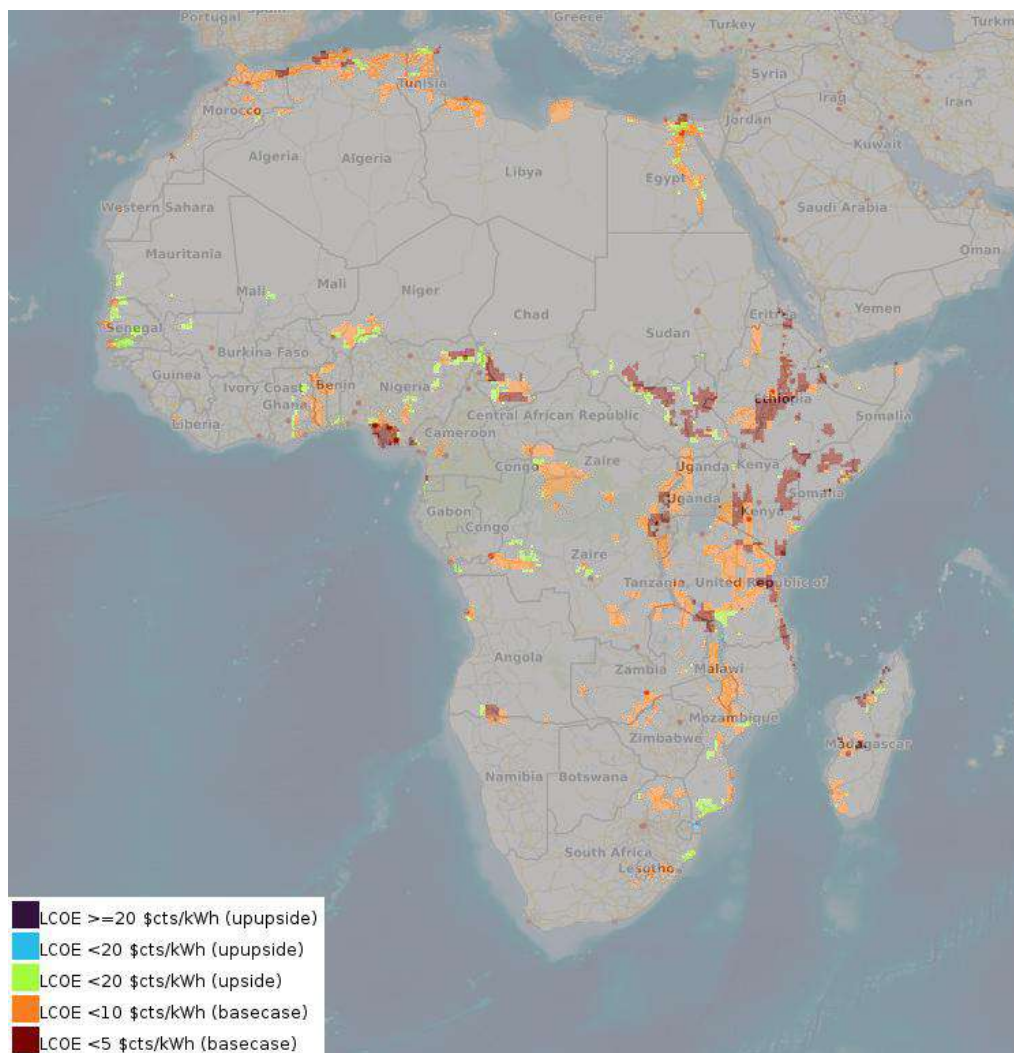
description: chiller LCOE composed from different scenarios (masked)

keywords: Chiller, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat doublet LCOE**

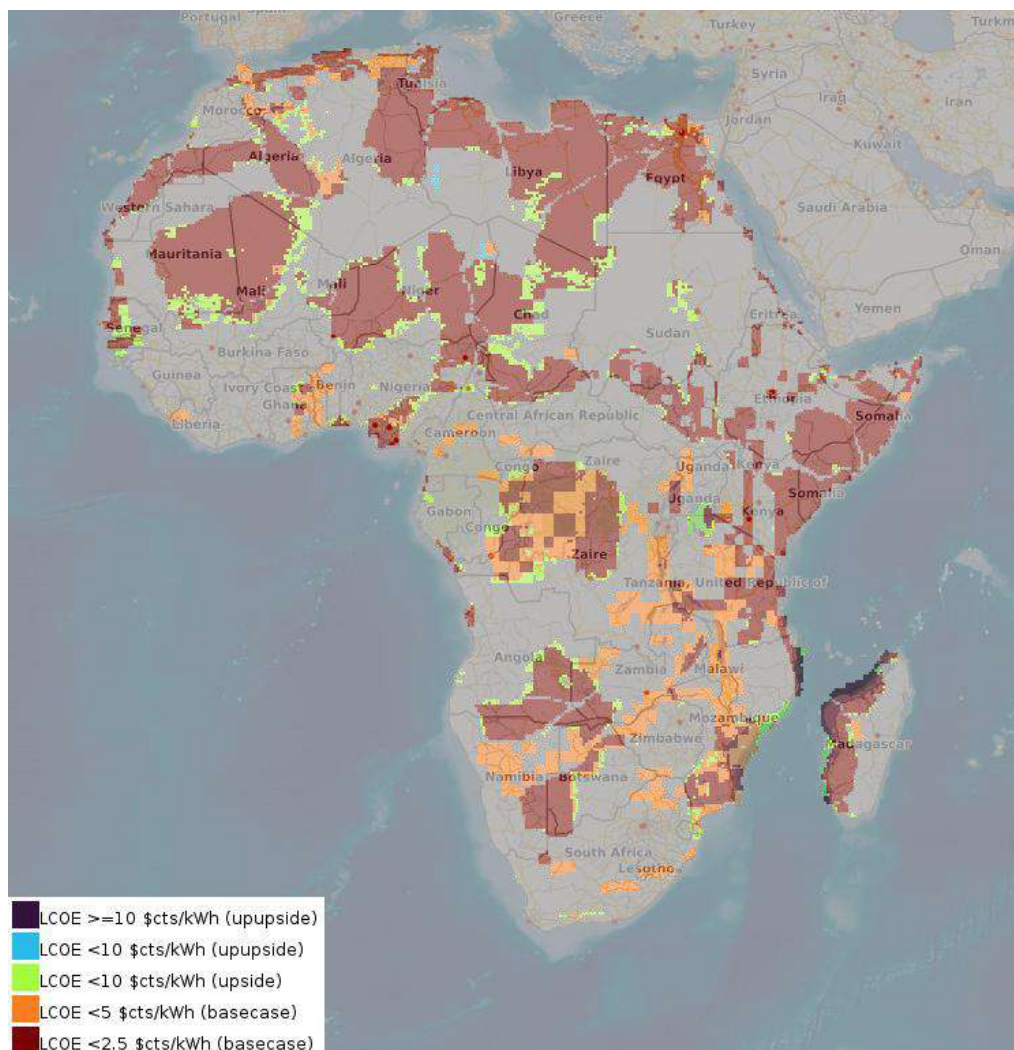
description: Direct Heat LCOE composed from different scenarios

keywords: direct heat, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat doublet LCOE (masked)**

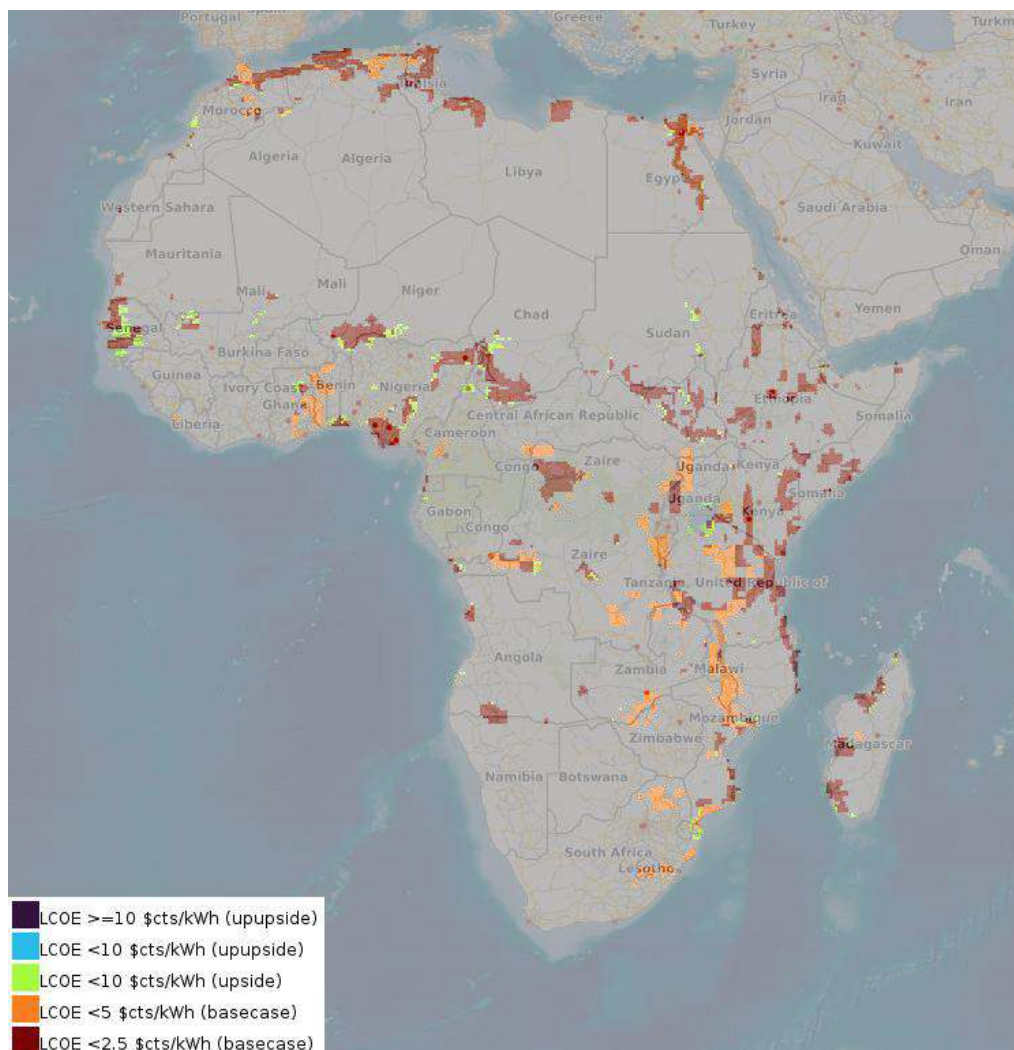
description: Direct Heat LCOE composed from different scenarios (masked)

keywords: direct heat, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat HP doublet LCOE**

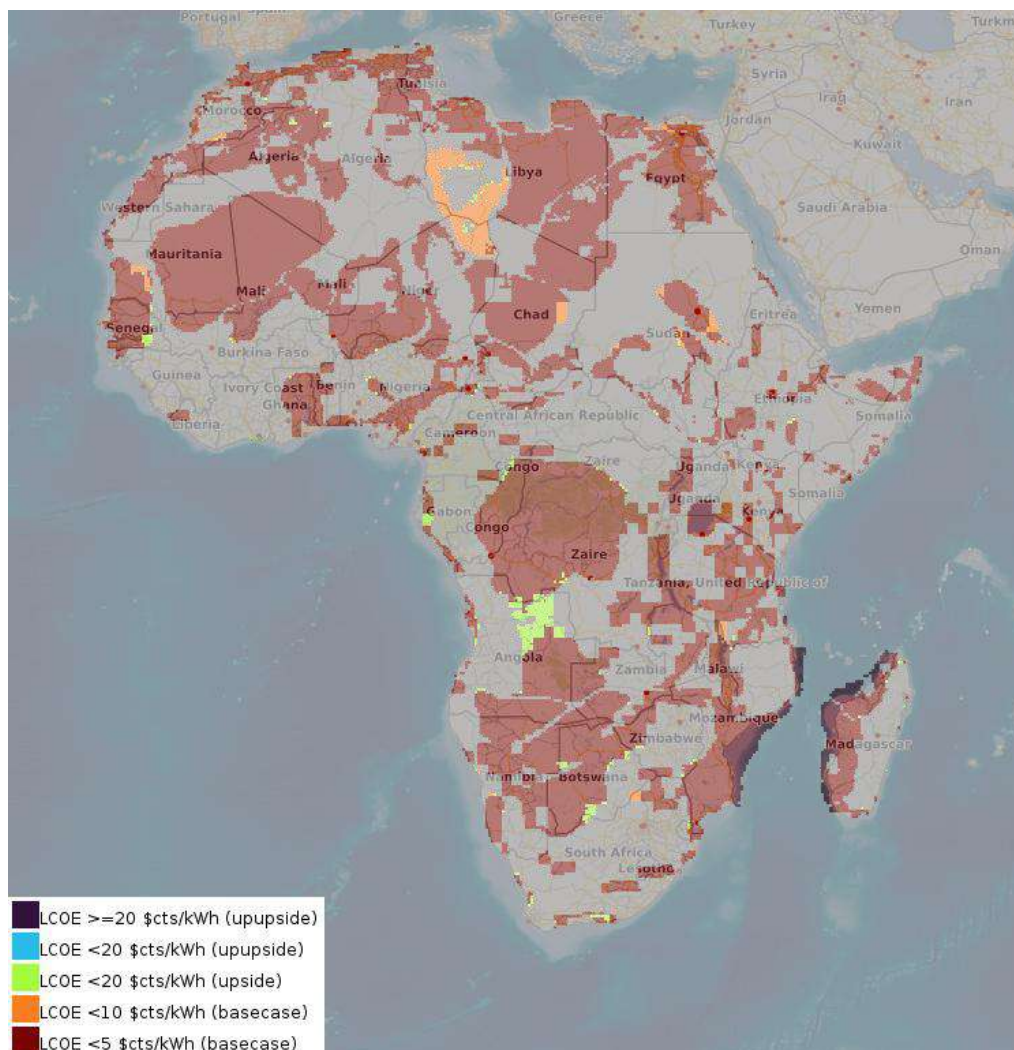
description: Direct Heat HP LCOE composed from different scenarios

keywords: direct heat HP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat HP doublet LCOE (masked)**

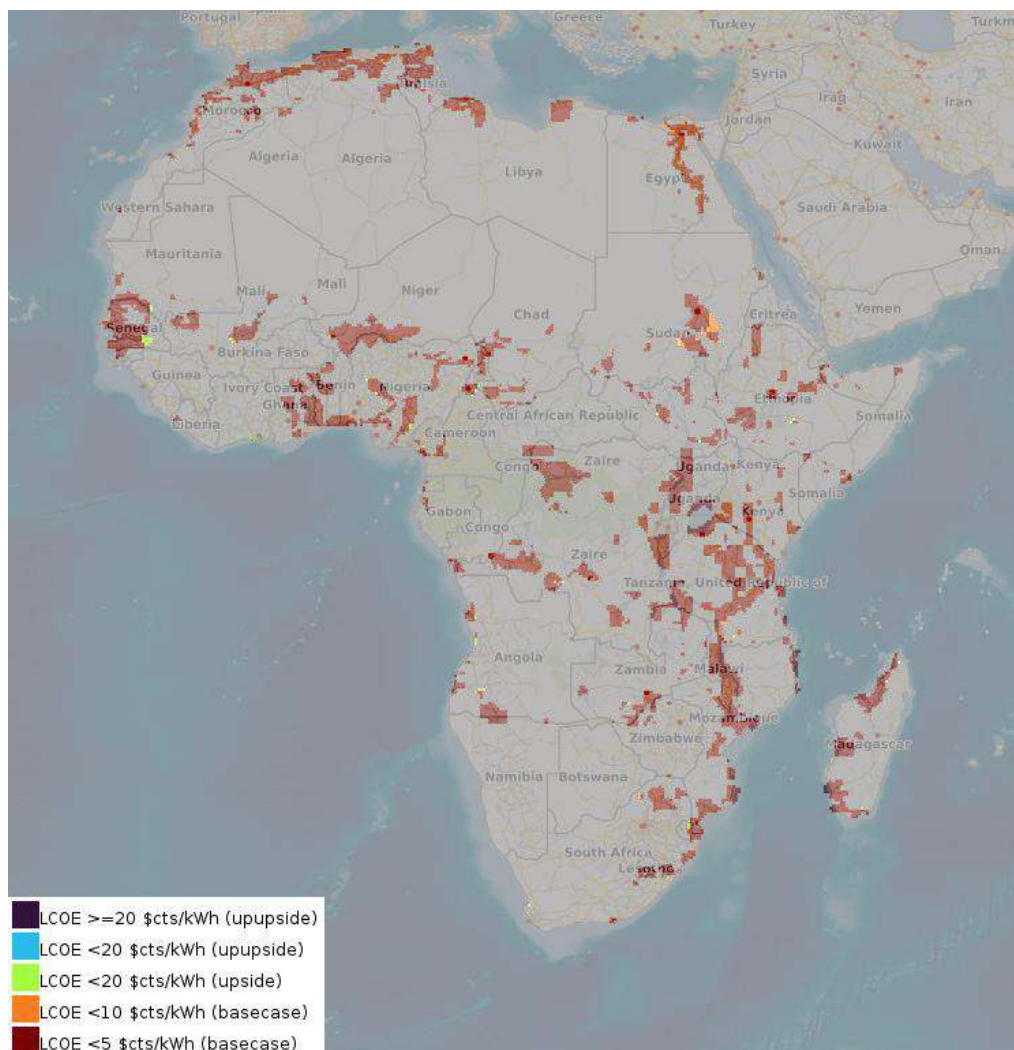
description: Direct Heat HP LCOE composed from different scenarios (masked)

keywords: direct heat HP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **ORC doublet LCOE**

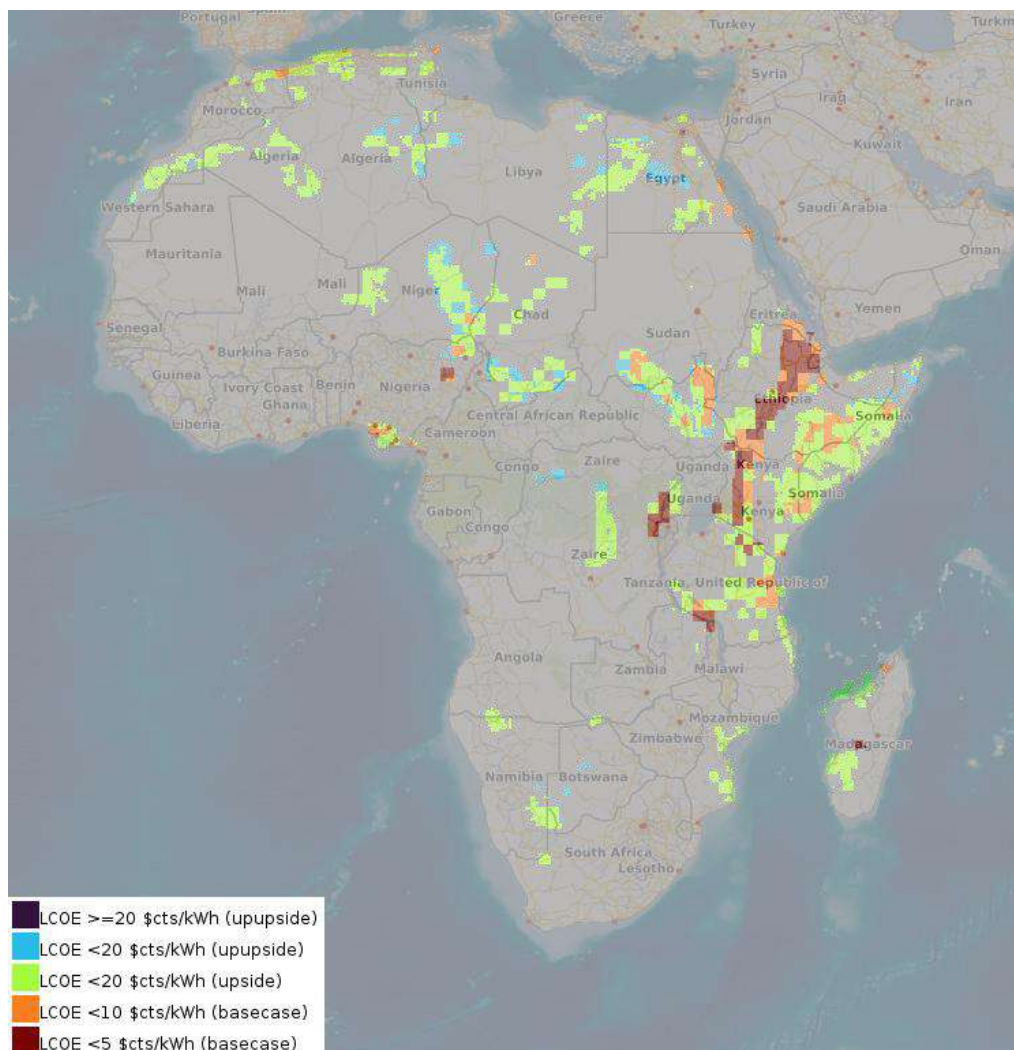
description: ORC LCOE composed from different scenarios

keywords: ORC, Africa

source: [link](#)

date: 2024

coverage: Africa



- **ORC doublet LCOE (masked)**

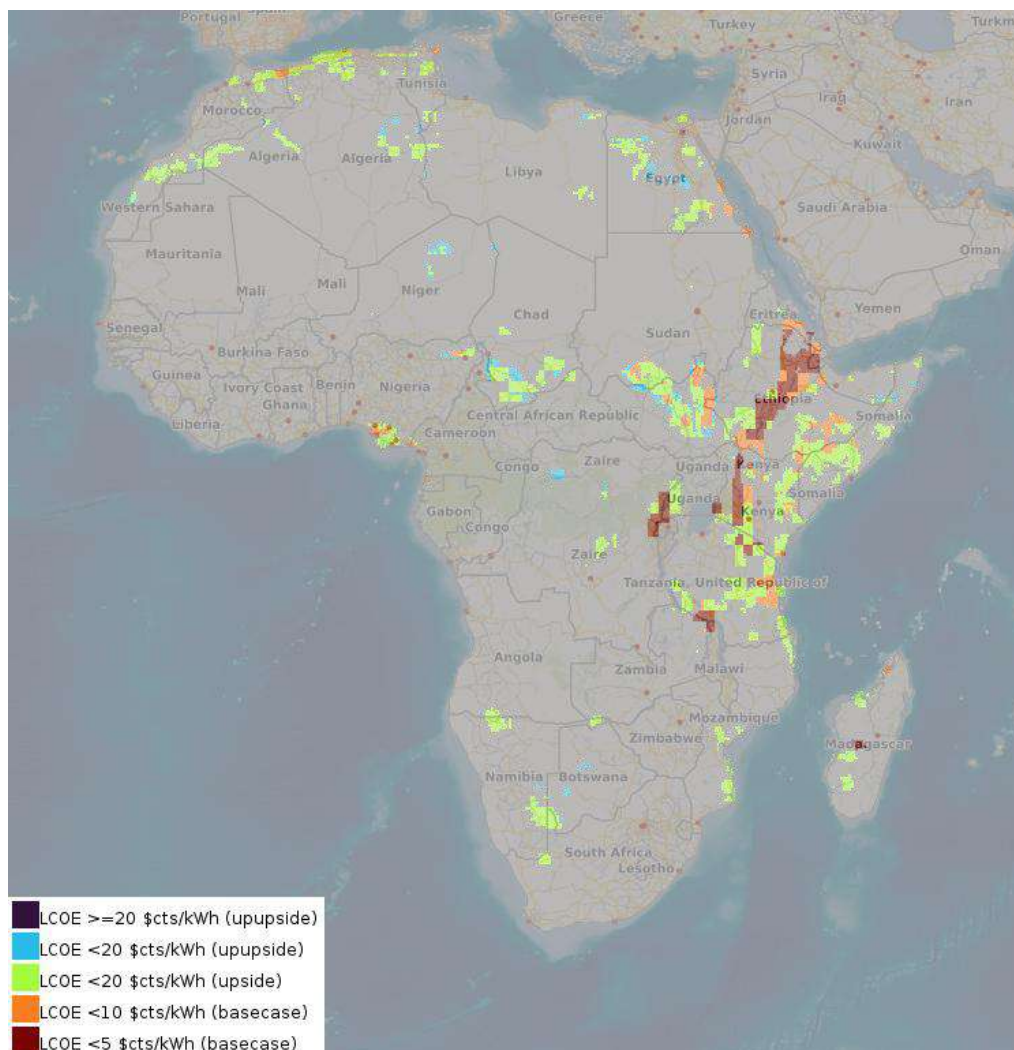
description: ORC LCOE composed from different scenarios (masked)

keywords: ORC, Africa

source: [link](#)

date: 2024

coverage: Africa



- **cooling refrigeration LCOE**

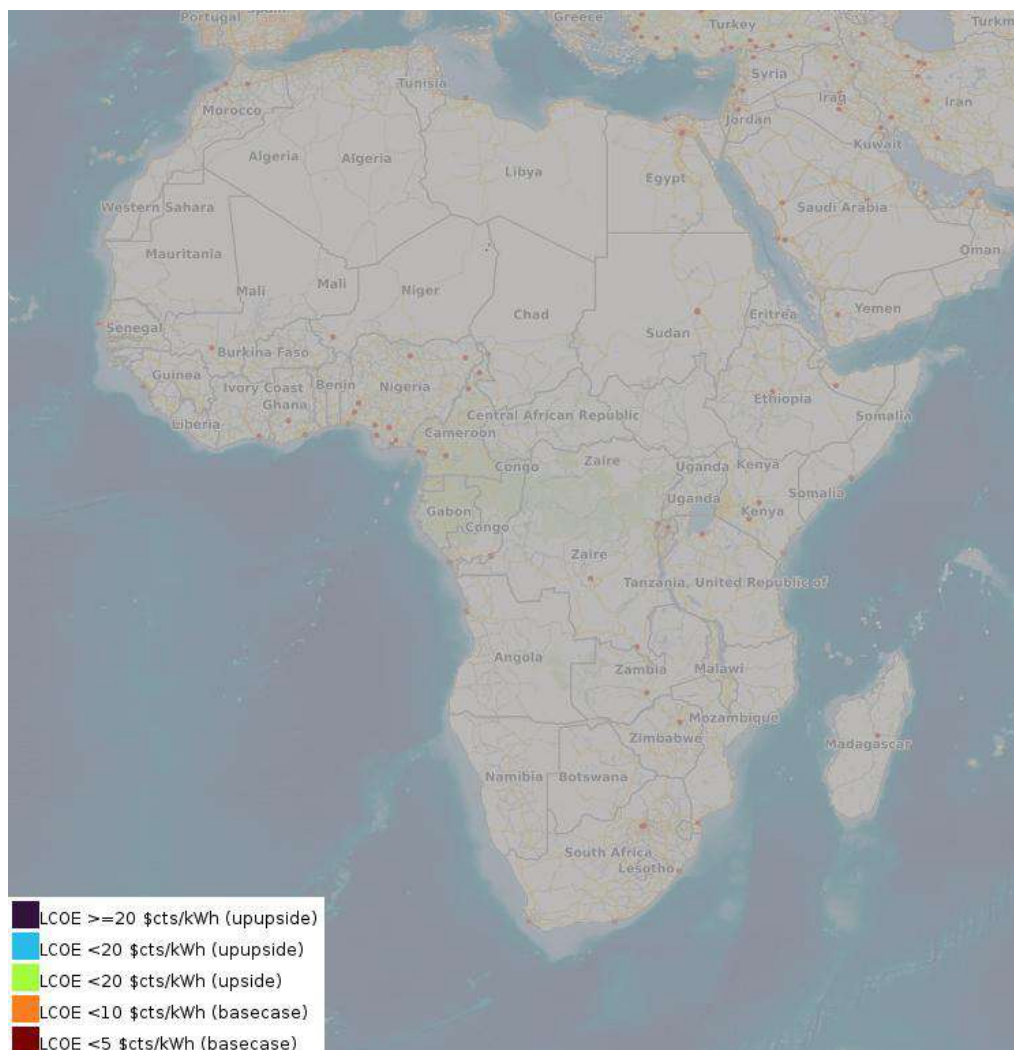
description: chiller LCOE composed from different scenarios

keywords: Chiller, Africa

source: [link](#)

date: 2024

coverage: Africa



- **cooling refrigeration LCOE (masked)**

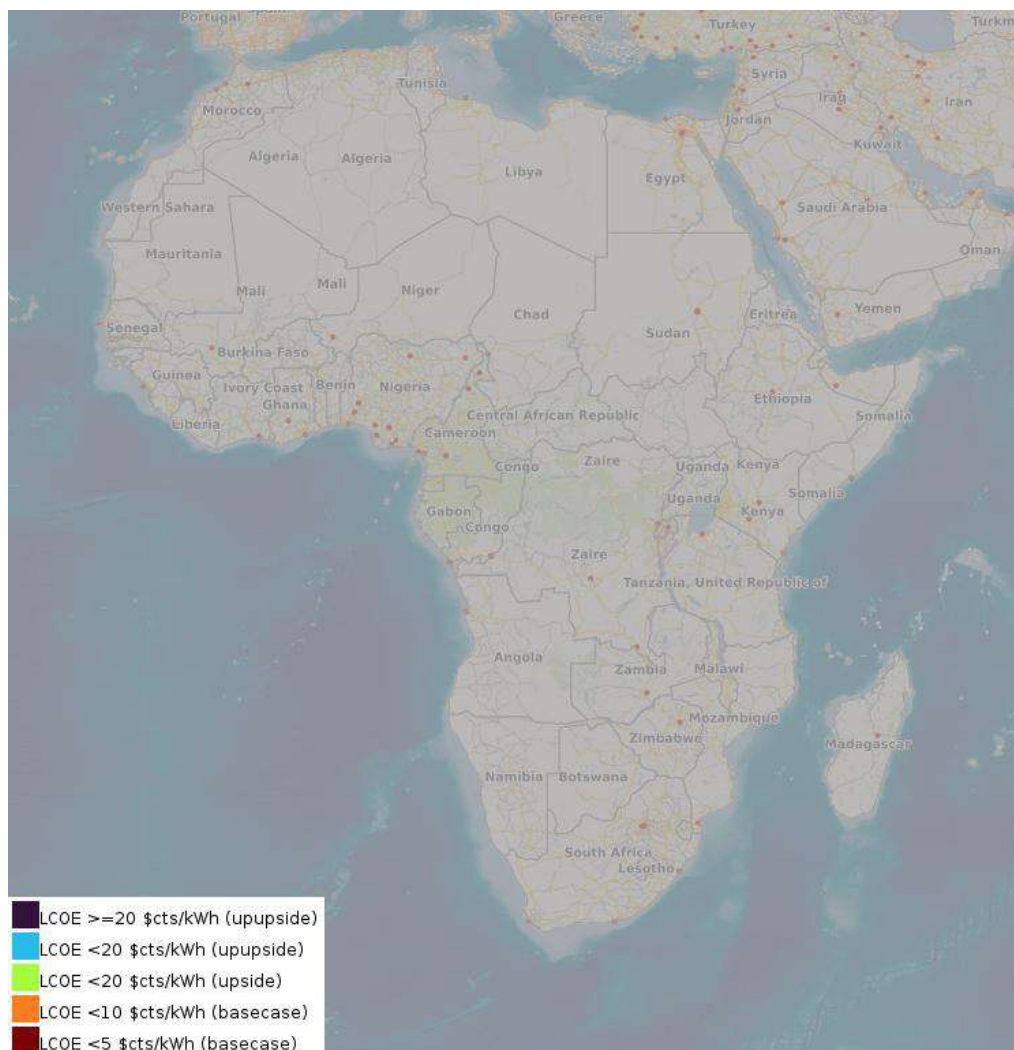
description: chiller LCOE composed from different scenarios (masked)

keywords: Chiller, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat doublet LCOE**

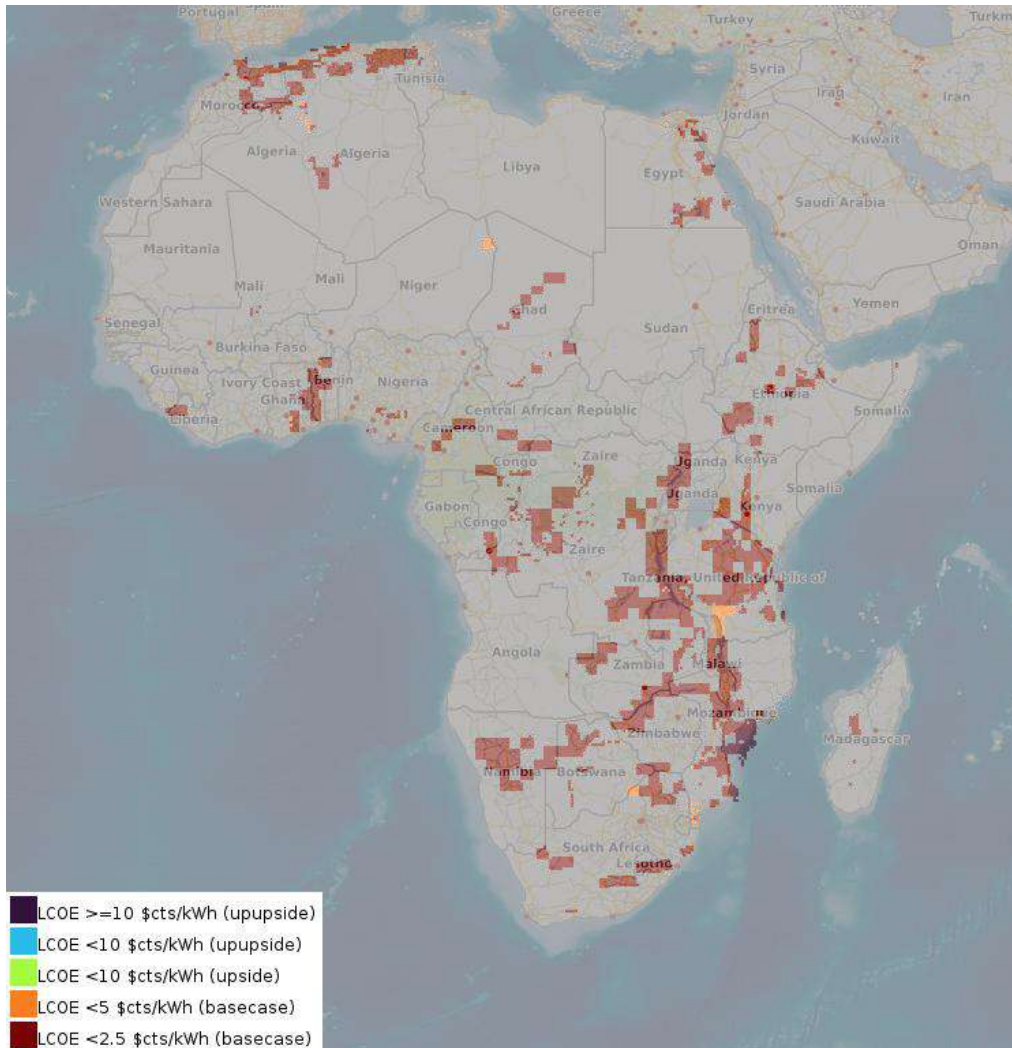
description: Direct Heat LCOE composed from different scenarios

keywords: direct heat, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat doublet LCOE (masked)**

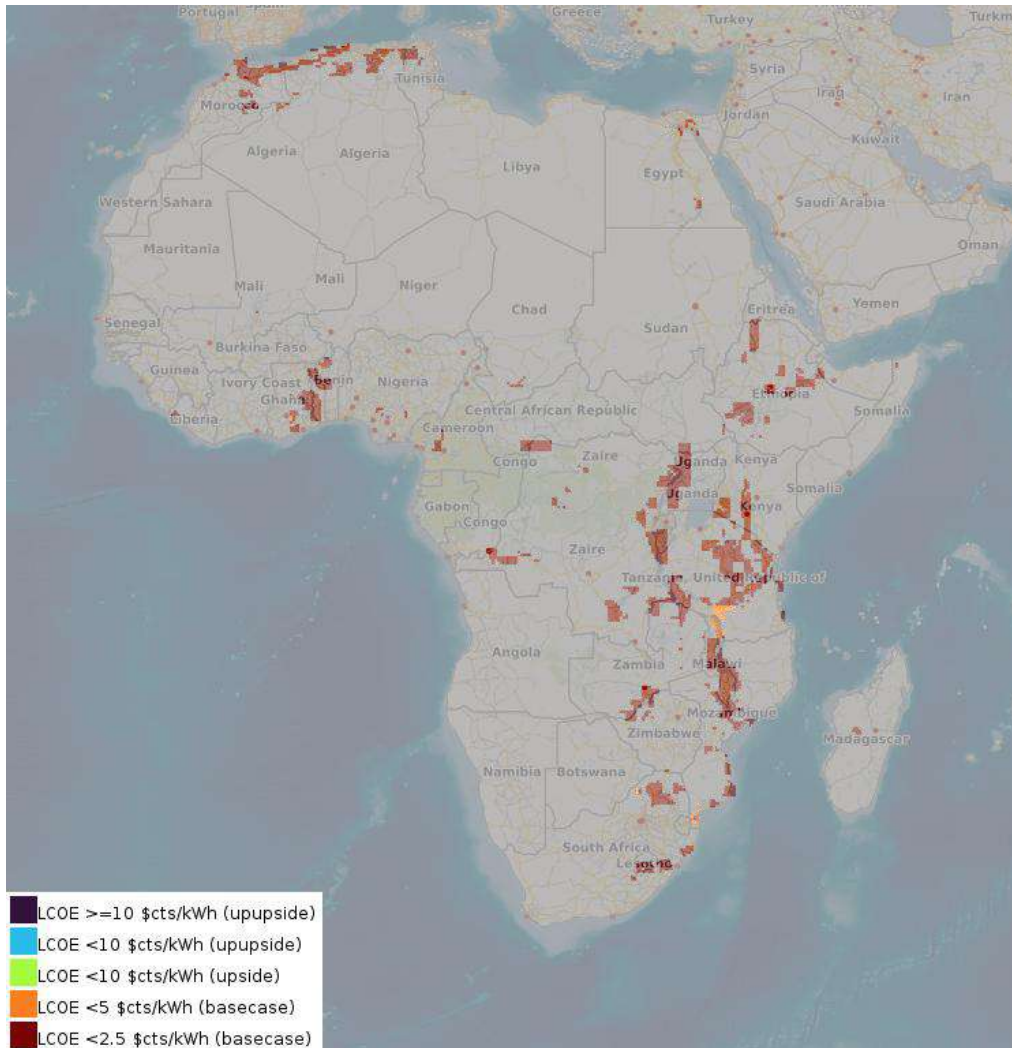
description: Direct Heat LCOE composed from different scenarios (masked)

keywords: direct heat, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat HP LCOE**

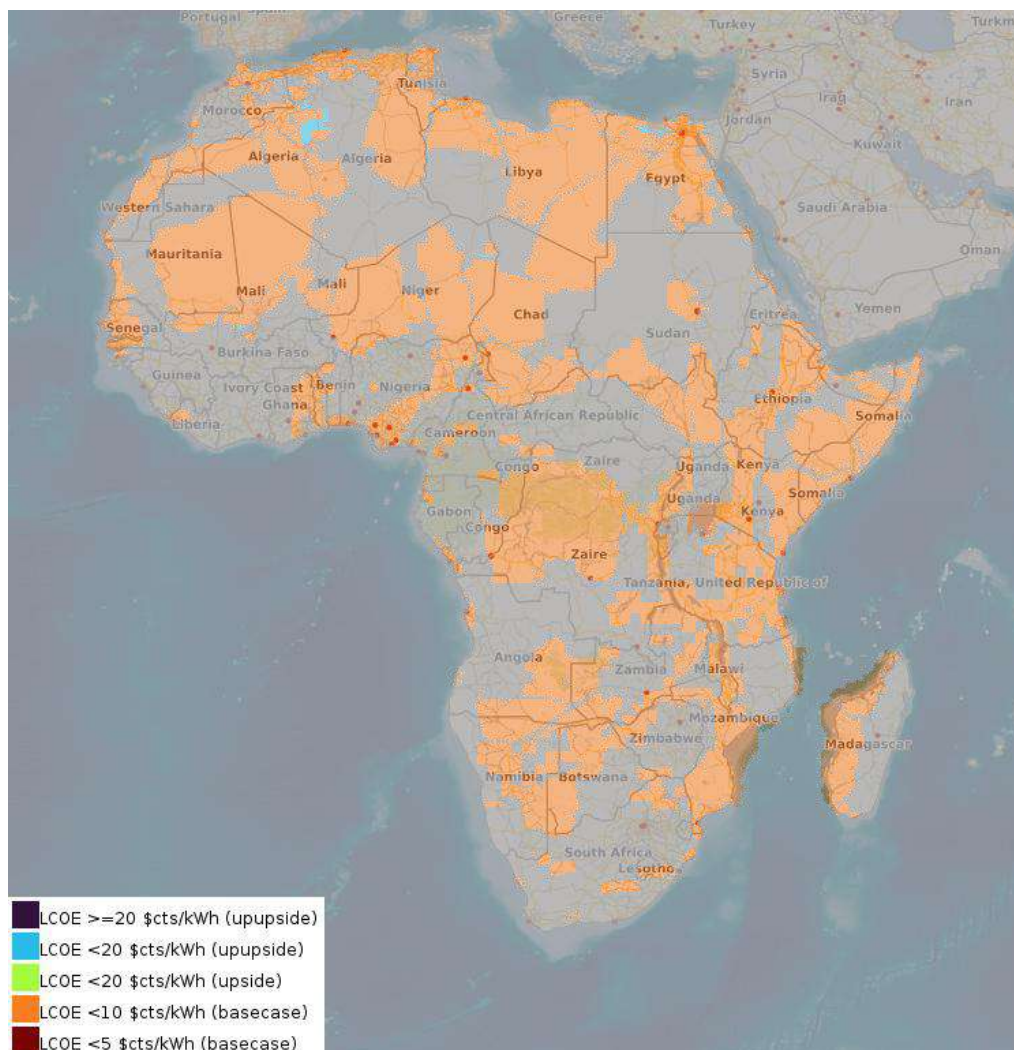
description: Direct Heat HP LCOE composed from different scenarios

keywords: direct heat HP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct Heat HP LCOE (masked)**

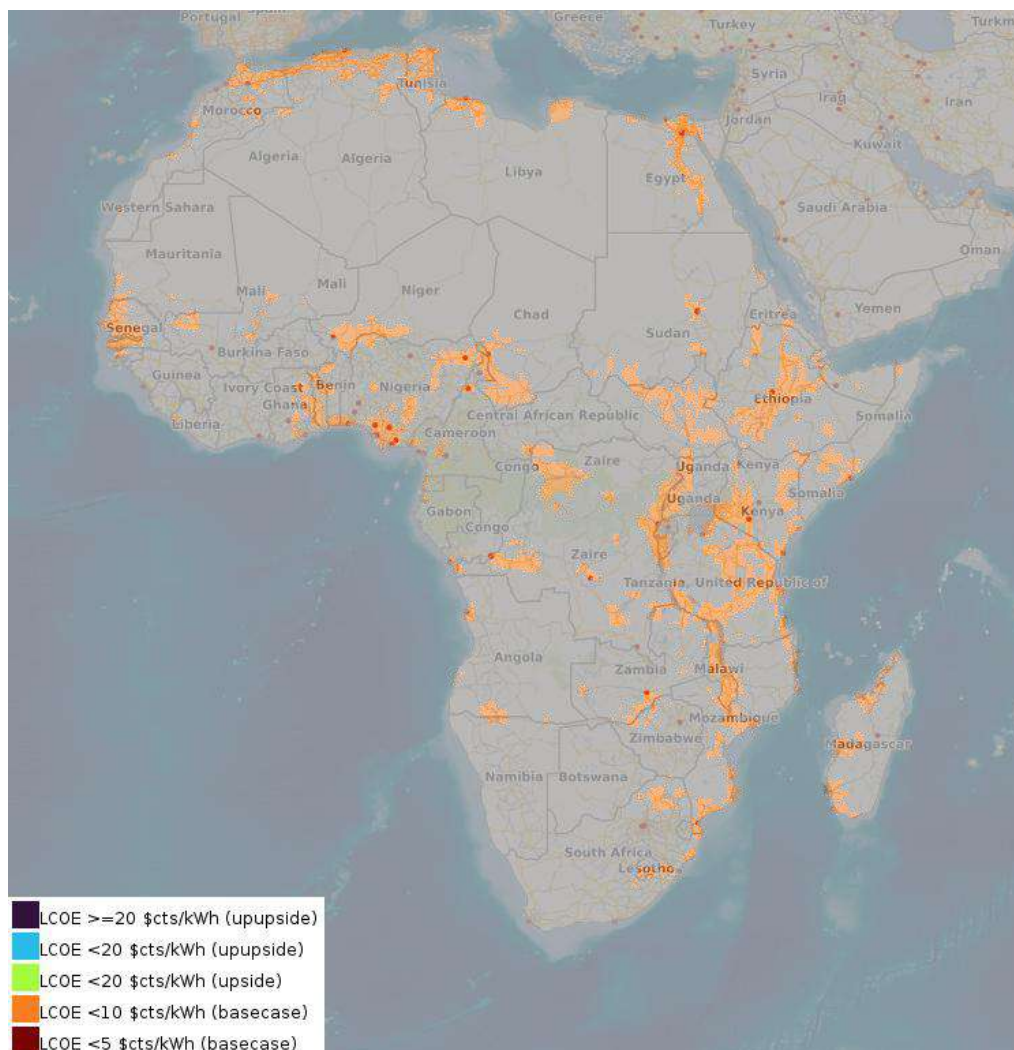
description: Direct Heat HP LCOE composed from different scenarios (masked)

keywords: direct heat HP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **ORC LCOE**

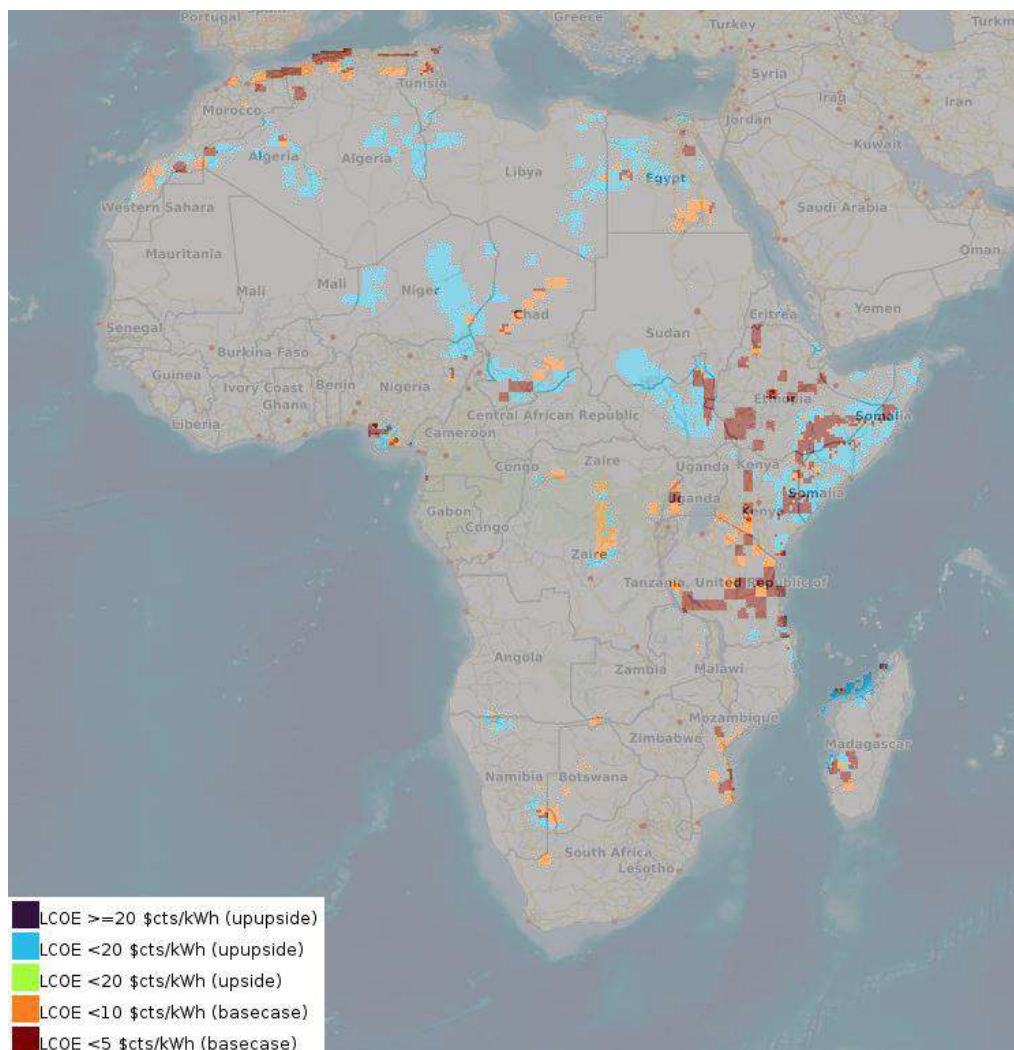
description: ORC LCOE composed from different scenarios

keywords: ORC, Africa

source: [link](#)

date: 2024

coverage: Africa



- **ORC LCOE (masked)**

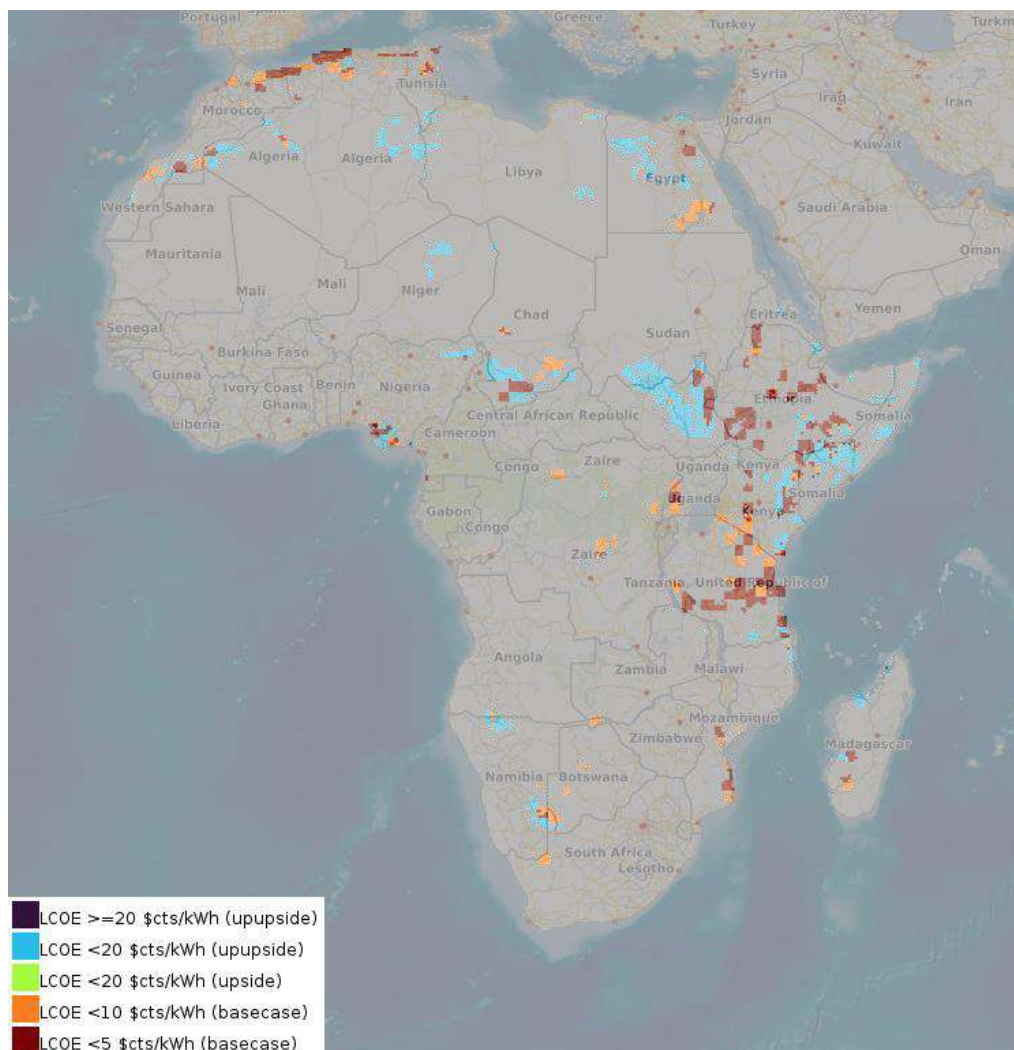
description: ORC LCOE composed from different scenarios (masked)

keywords: ORC, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller coefficient of performance (base case)**

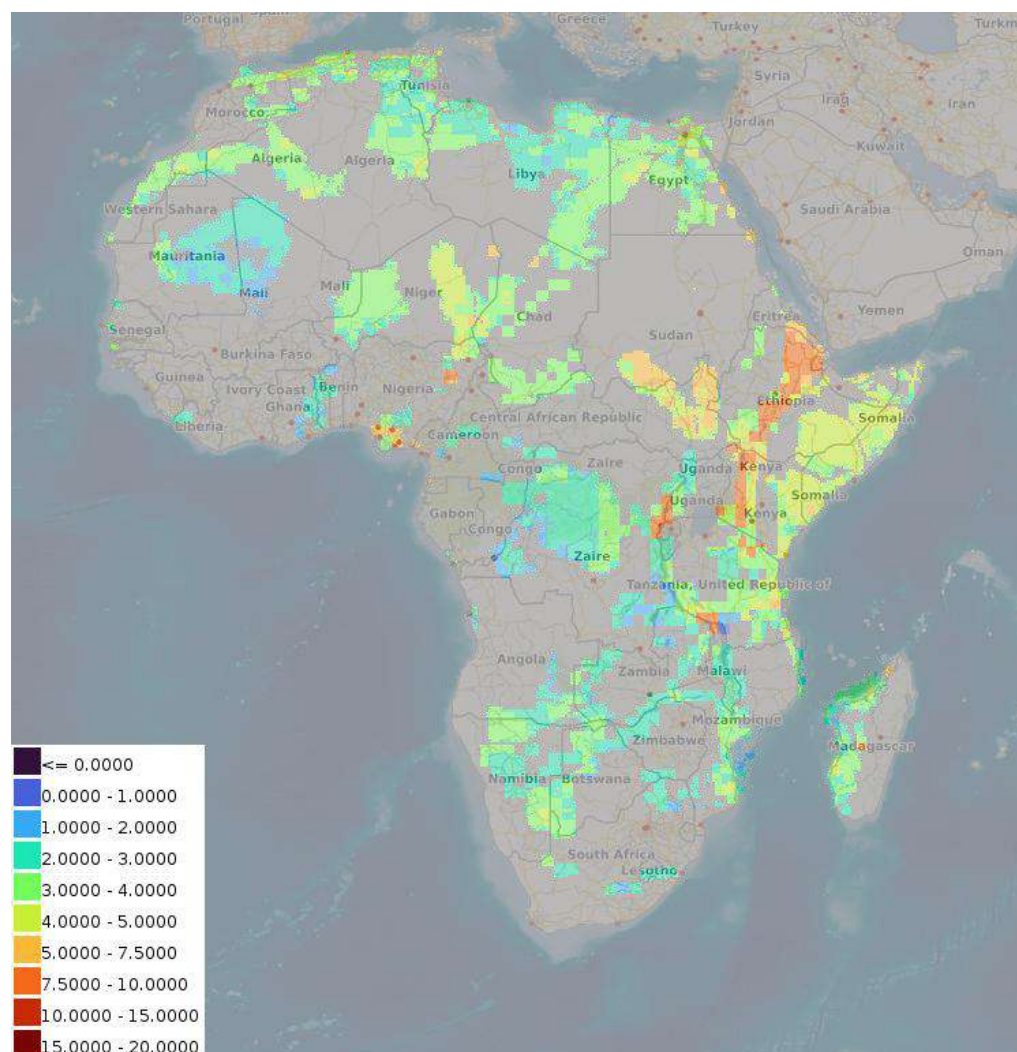
description: Chiller coefficient of performance (base case)

keywords: Chiller, COP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Pressure needed to drive pumps of the chiller (base case)**

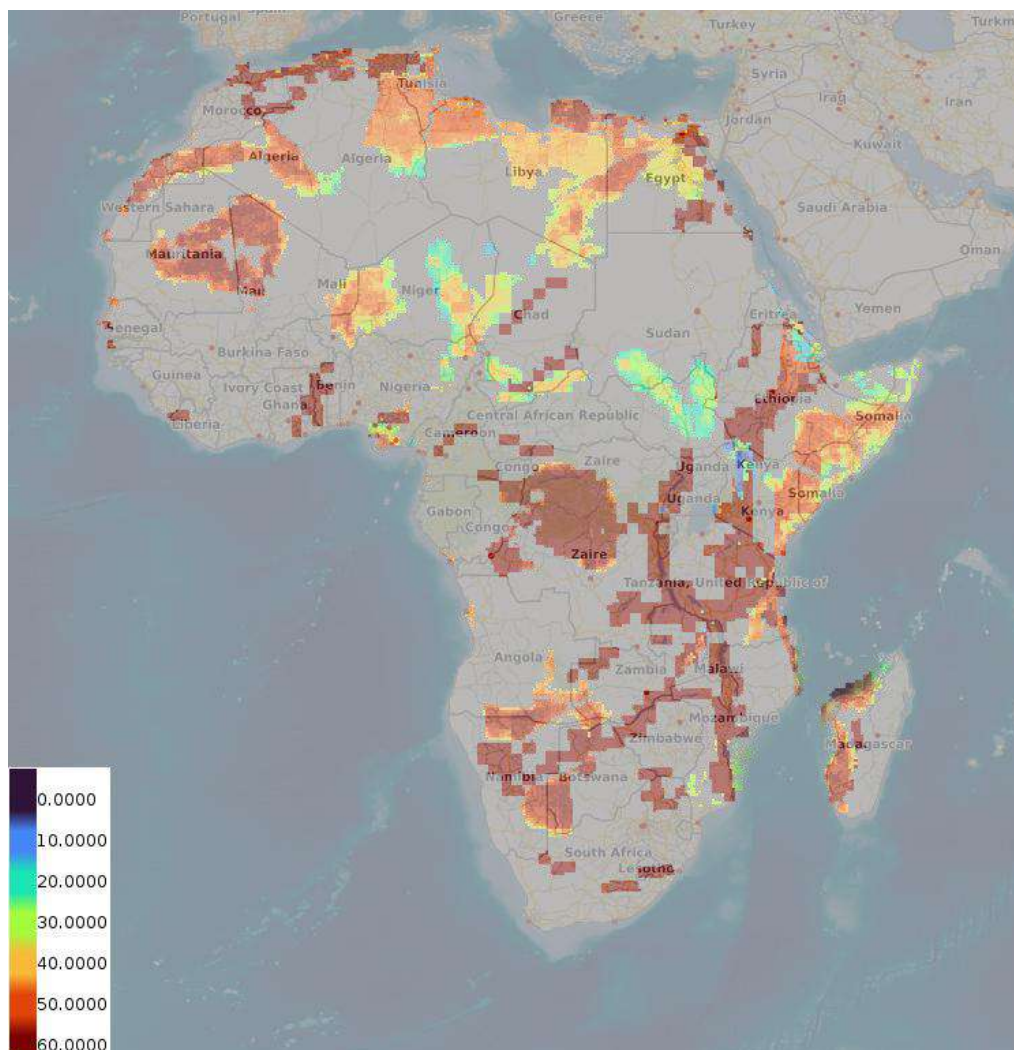
description: Pressure needed to drive pumps of the chiller (base case)

keywords: Chiller, Pressure, Heat pump, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller production flow rate (base case)**

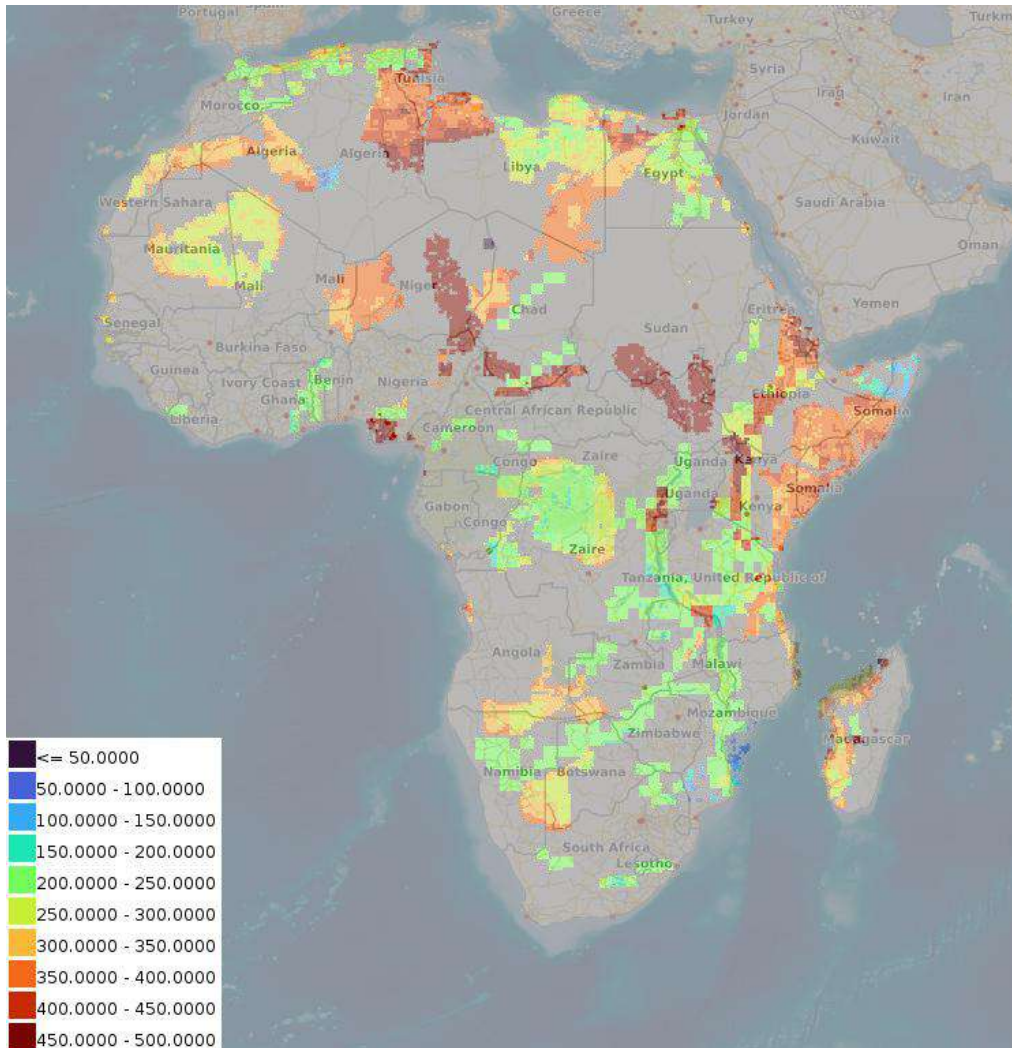
description: Chiller production flow rate (base case)

keywords: Chiller, FLOWRATE, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller doublet net production (base case)**

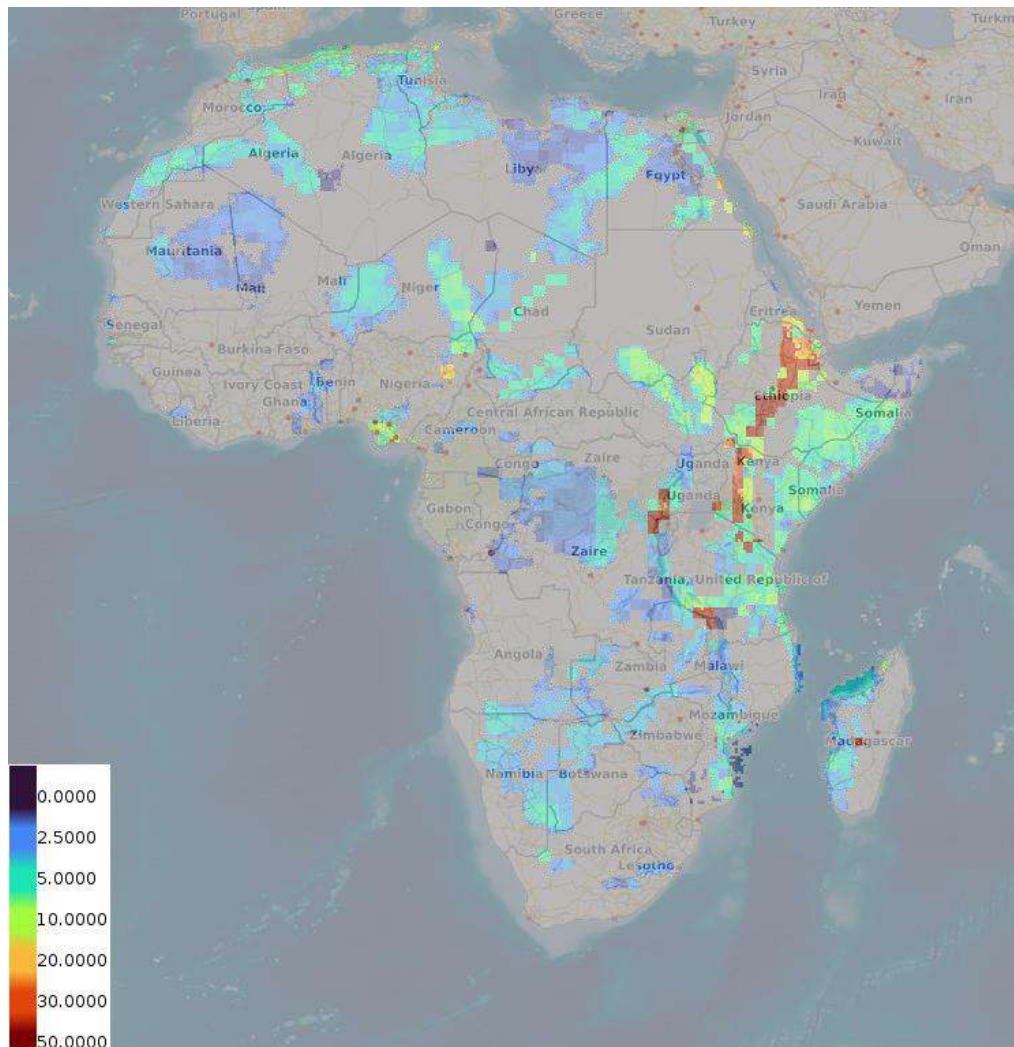
description: Chiller doublet net production (base case)

keywords: Chiller, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller transmissivity (base case)**

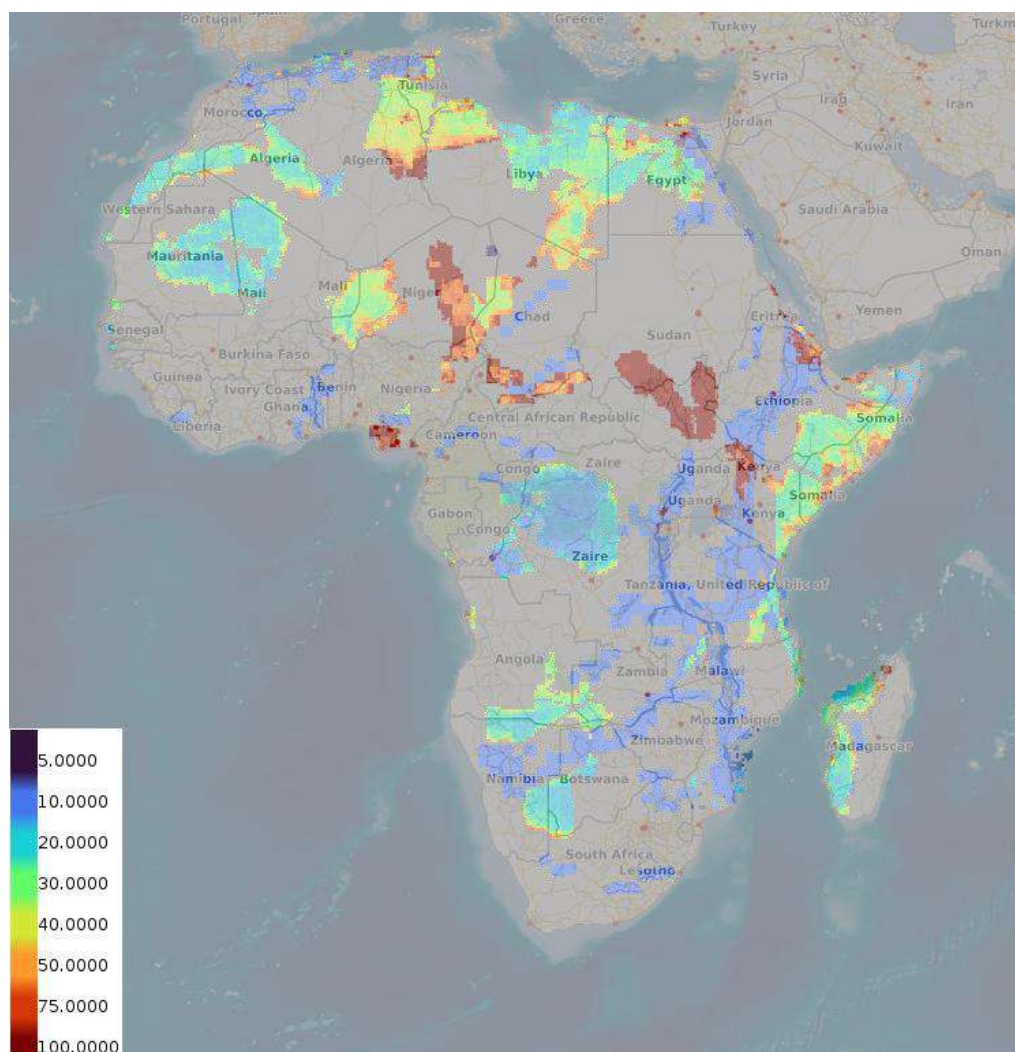
description: Chiller transmissivity (base case)

keywords: Chiller, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller well distance (base case)**

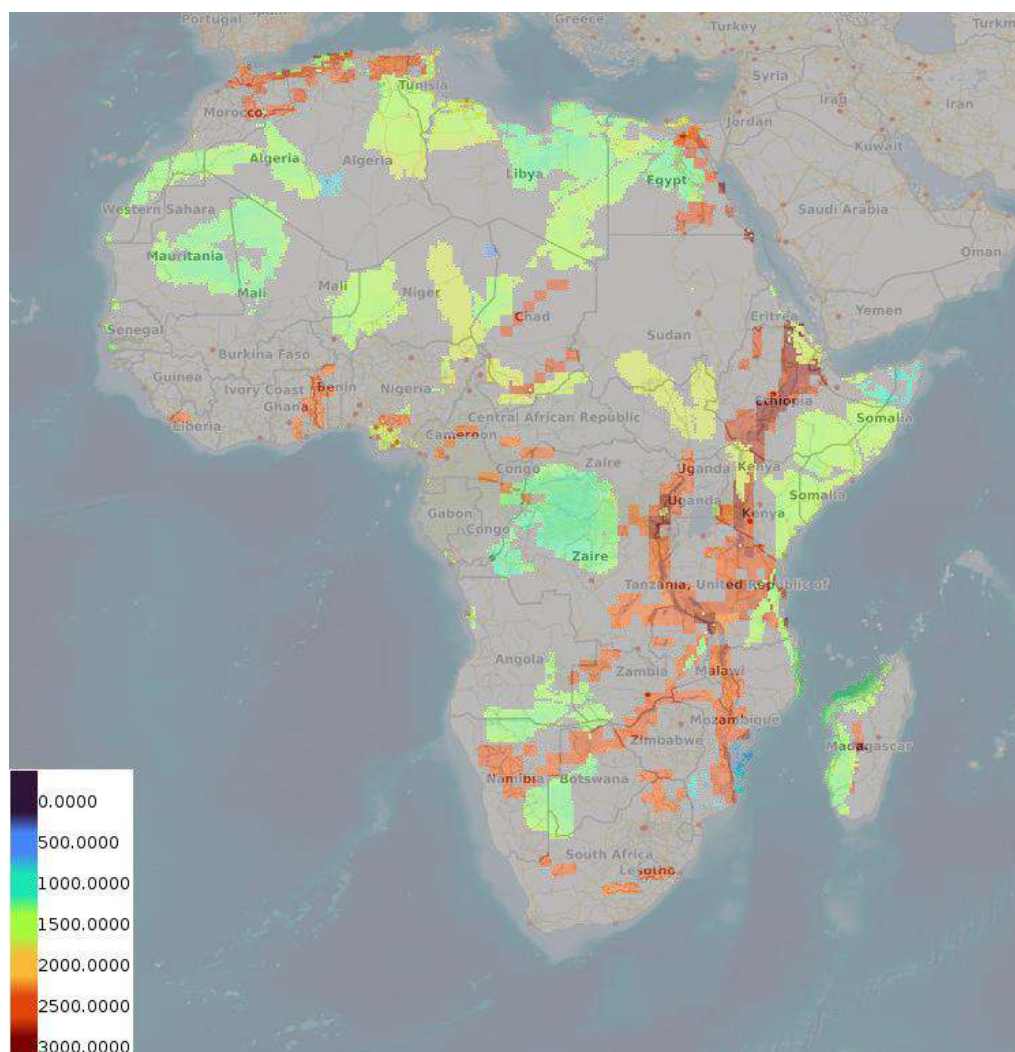
description: Chiller well distance (base case)

keywords: Chiller, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller optimized depth of the aquifer (base case)**

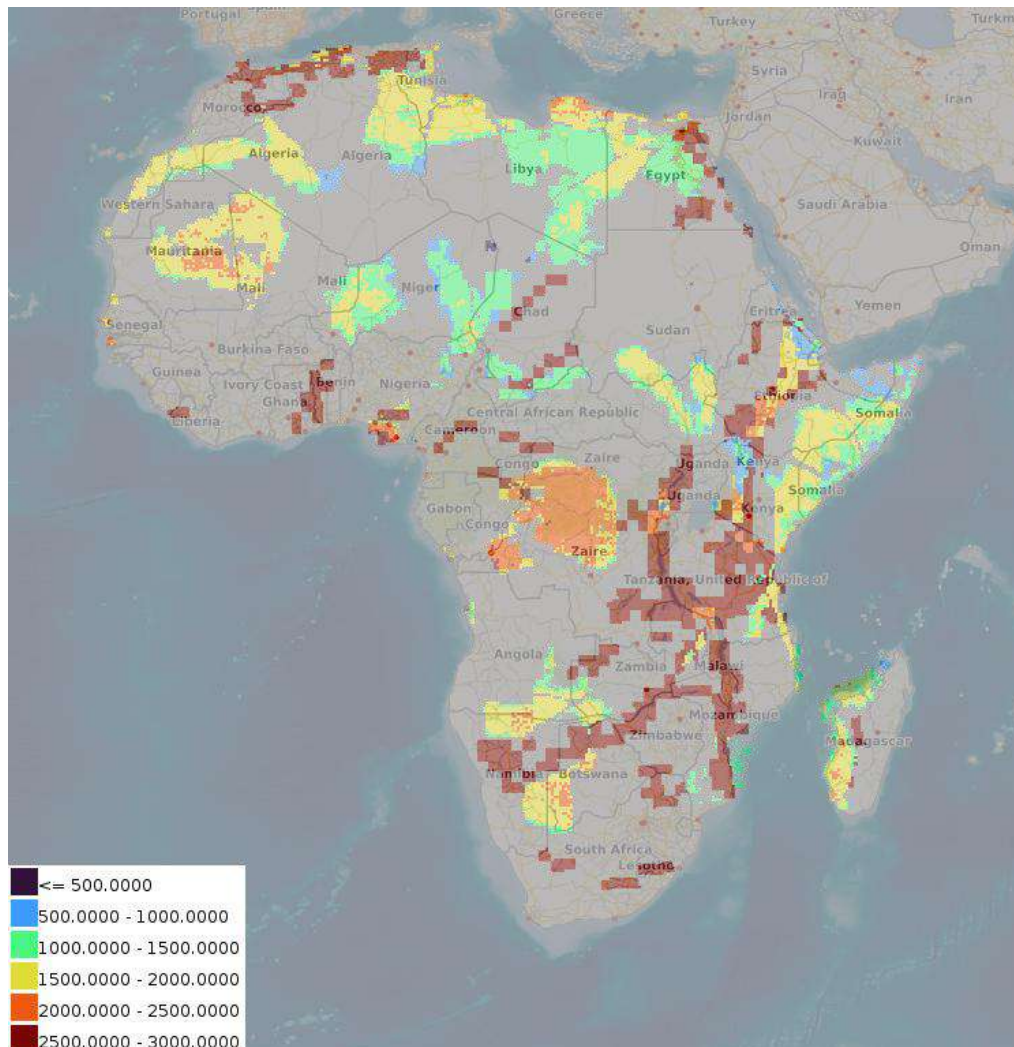
description: Chiller optimized depth of the aquifer (base case)

keywords: Chiller, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller temperature at reservoir (base case)**

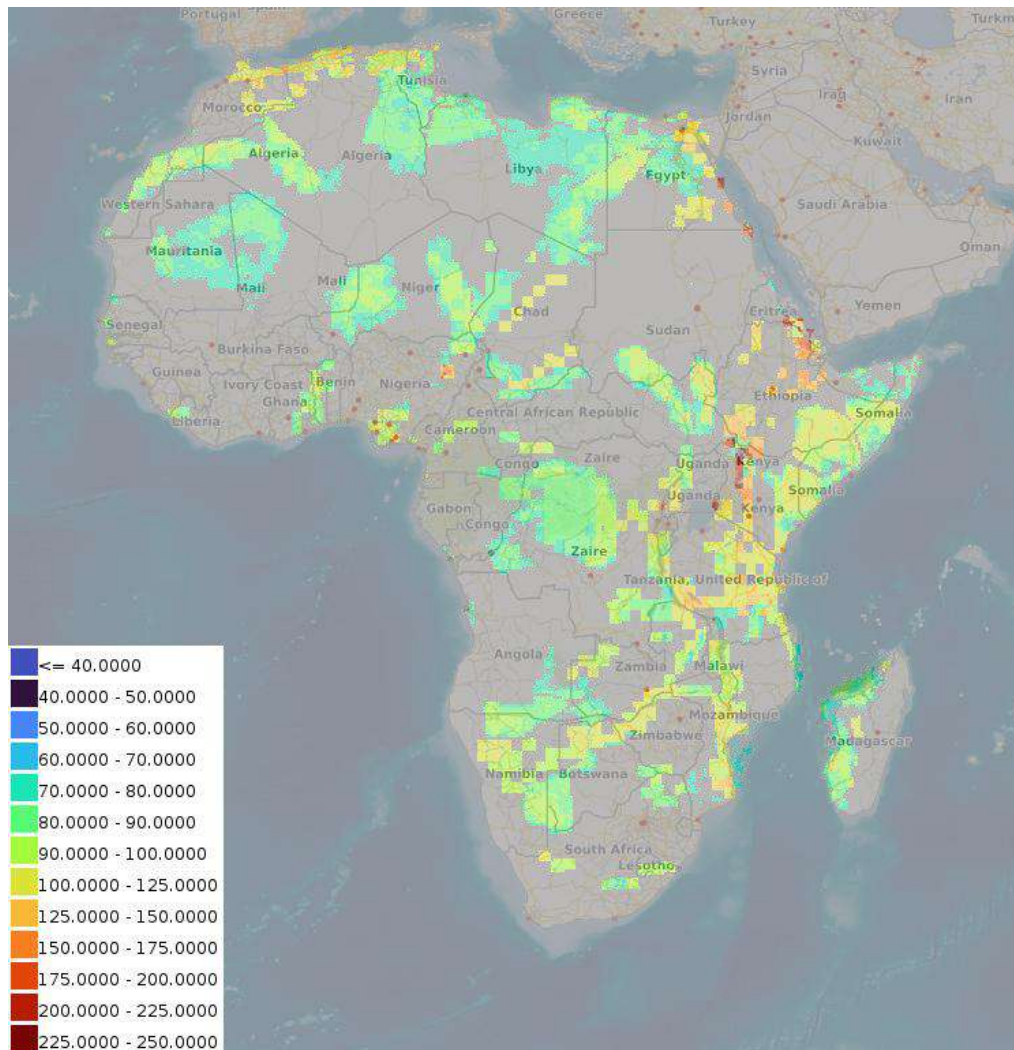
description: Chiller temperature at reservoir (base case)

keywords: Chiller, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller Levelized Costs of Energy (base case)**

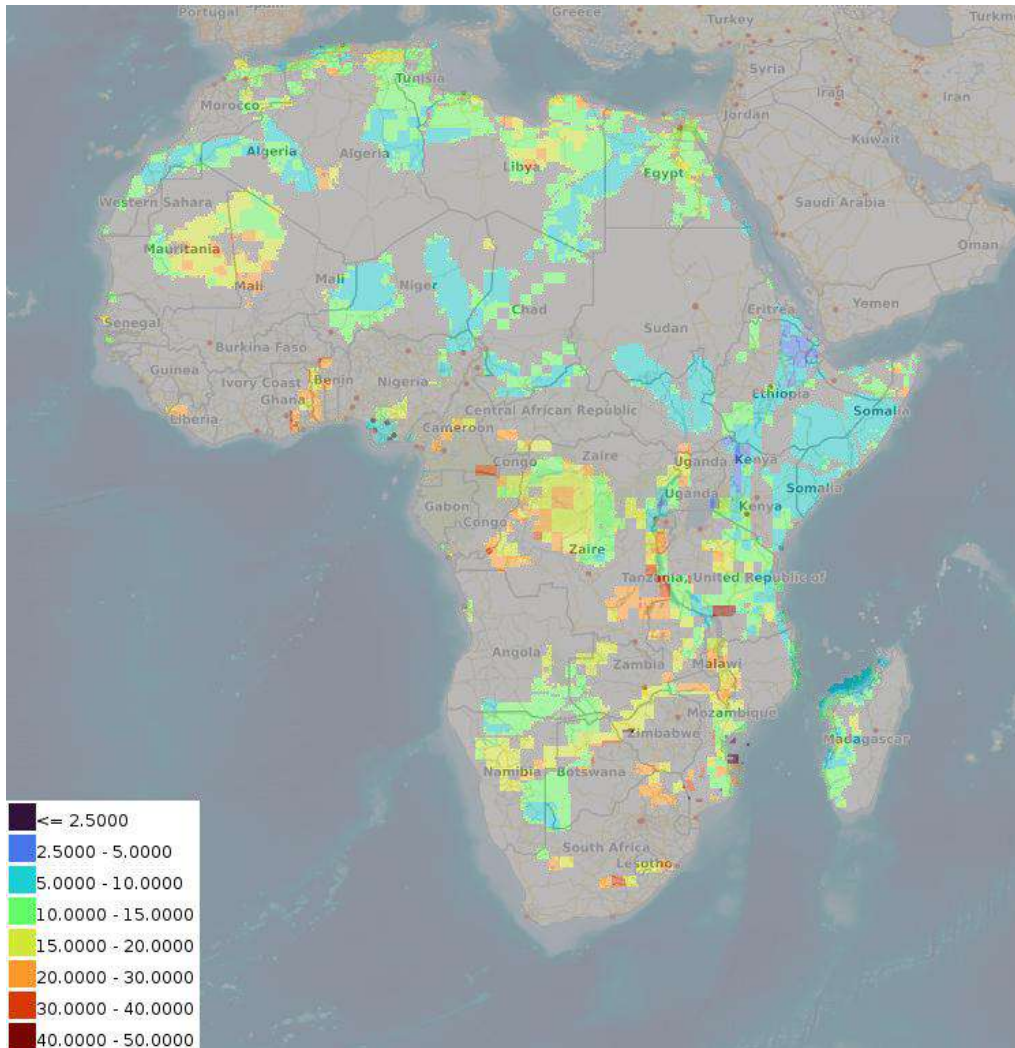
description: Chiller Levelized Costs of Energy (base case)

keywords: Chiller, Levelized Costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller coefficient of performance (upside)**

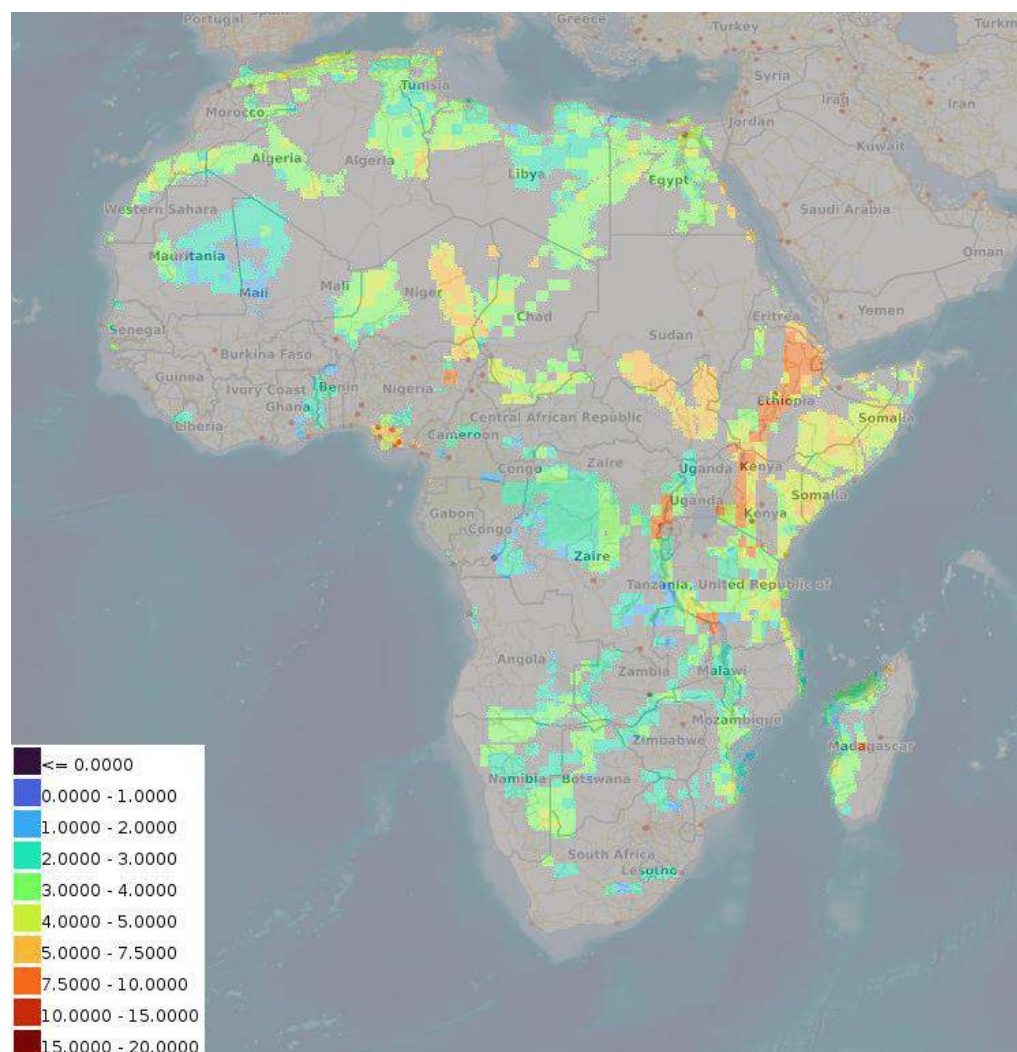
description: Chiller coefficient of performance (upside)

keywords: Chiller, COP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Pressure needed to drive pumps of the chiller (upside)**

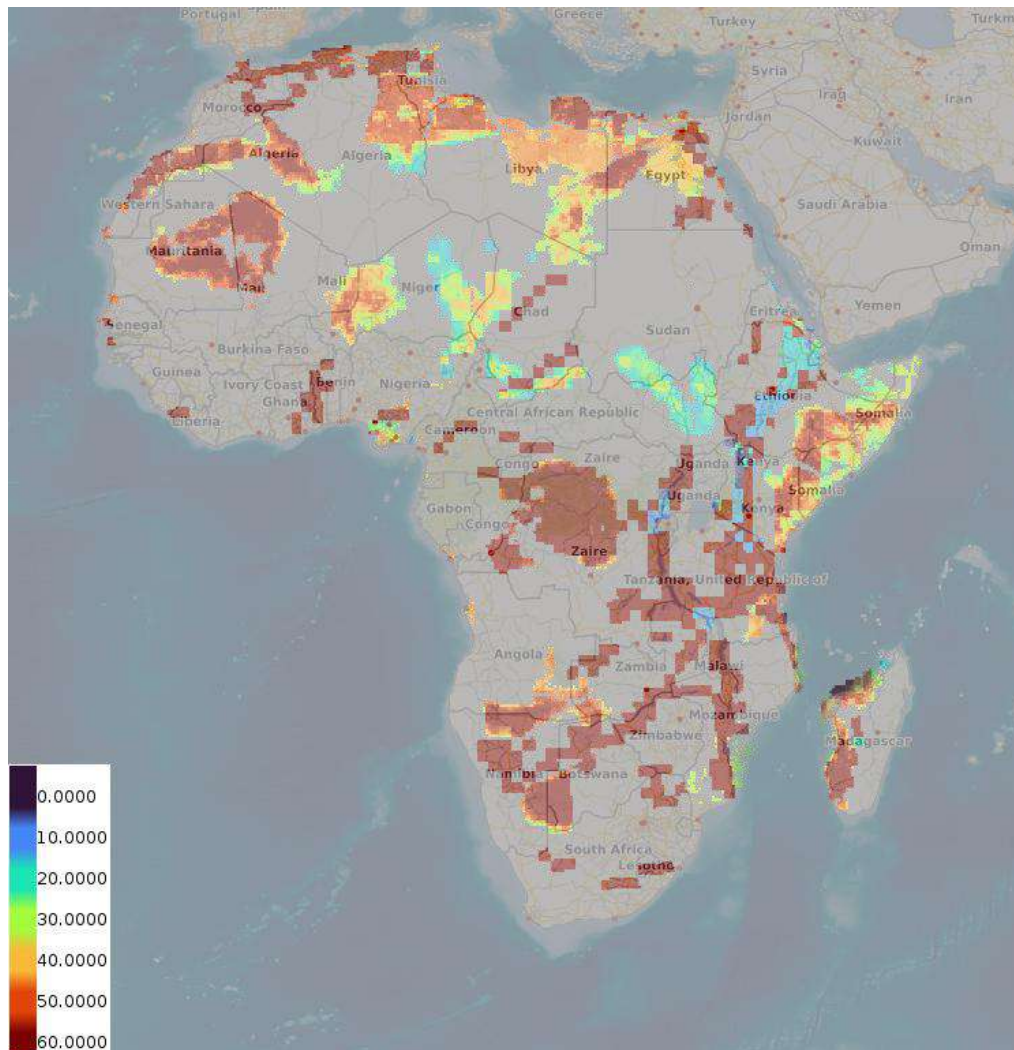
description: Pressure needed to drive pumps of the chiller (upside)

keywords: Chiller, Pressure, Heat pump, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller production flow rate (upside)**

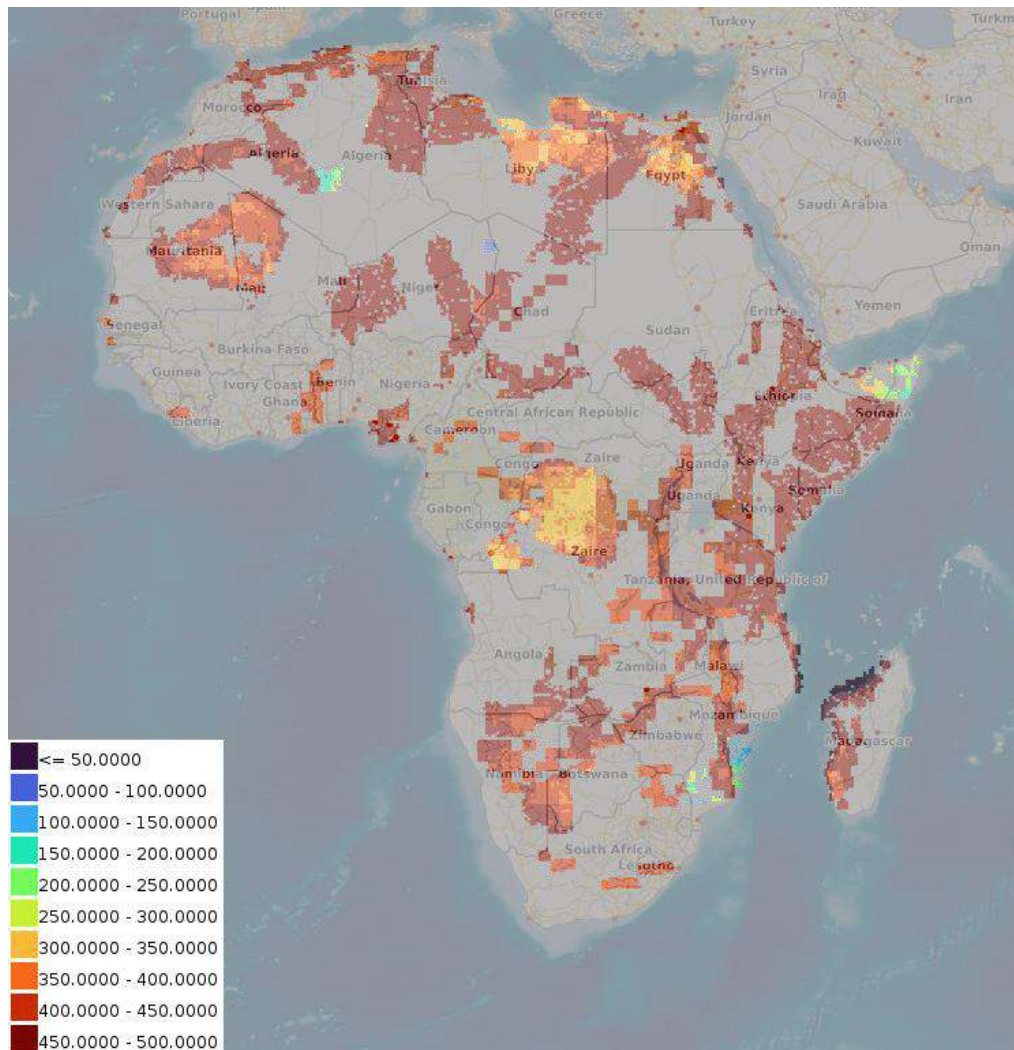
description: Chiller production flow rate (upside)

keywords: Chiller, FLOWRATE, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller doublet net production (upside)**

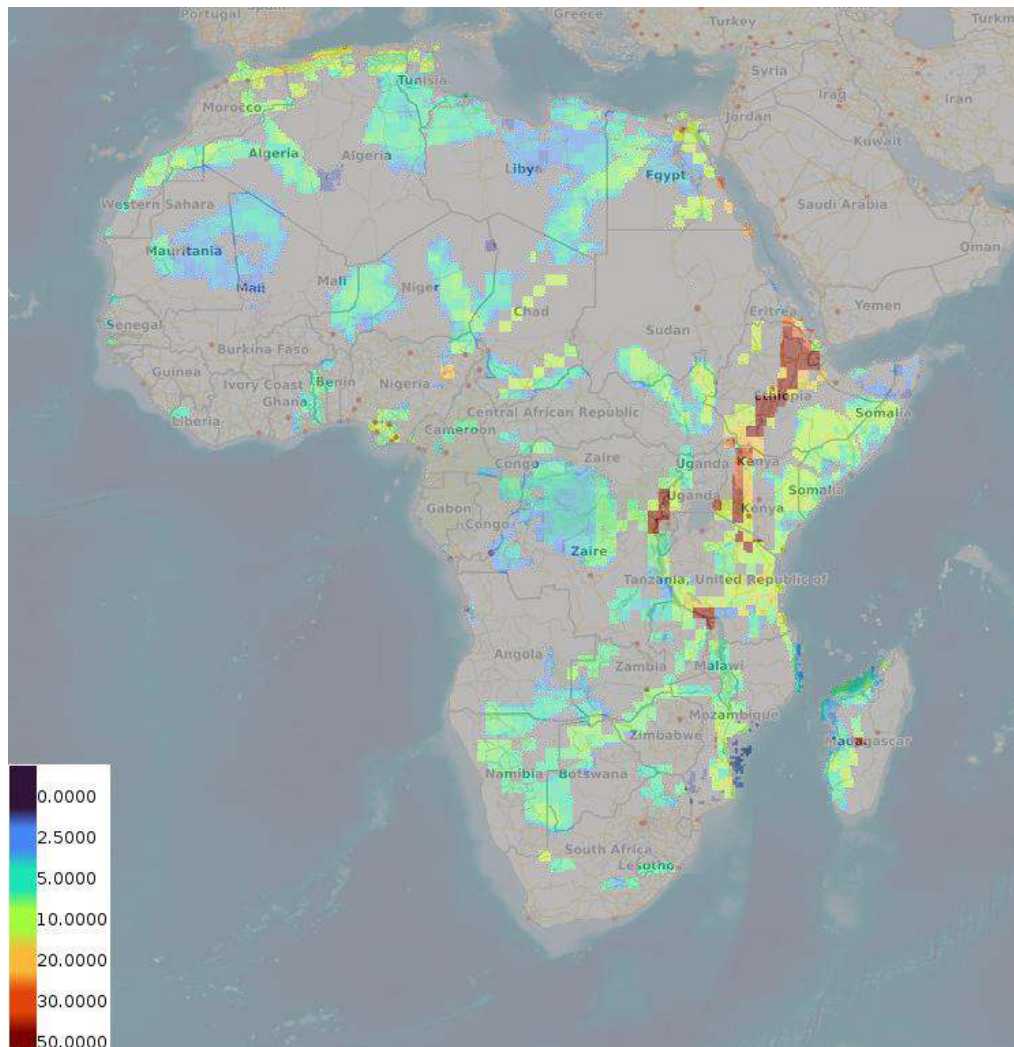
description: Chiller doublet net production (upside)

keywords: Chiller, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller transmissivity (upside)**

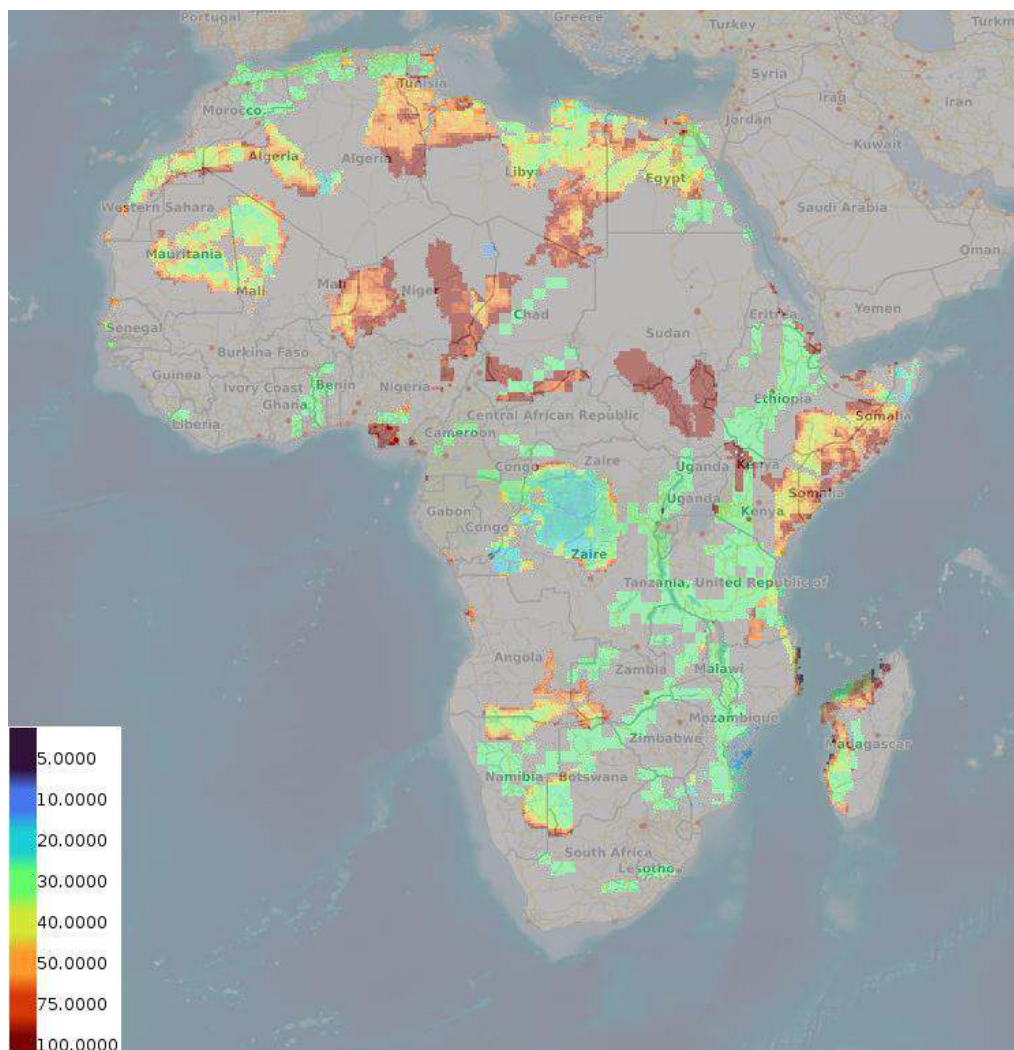
description: Chiller transmissivity (upside)

keywords: Chiller, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller well distance (upside)**

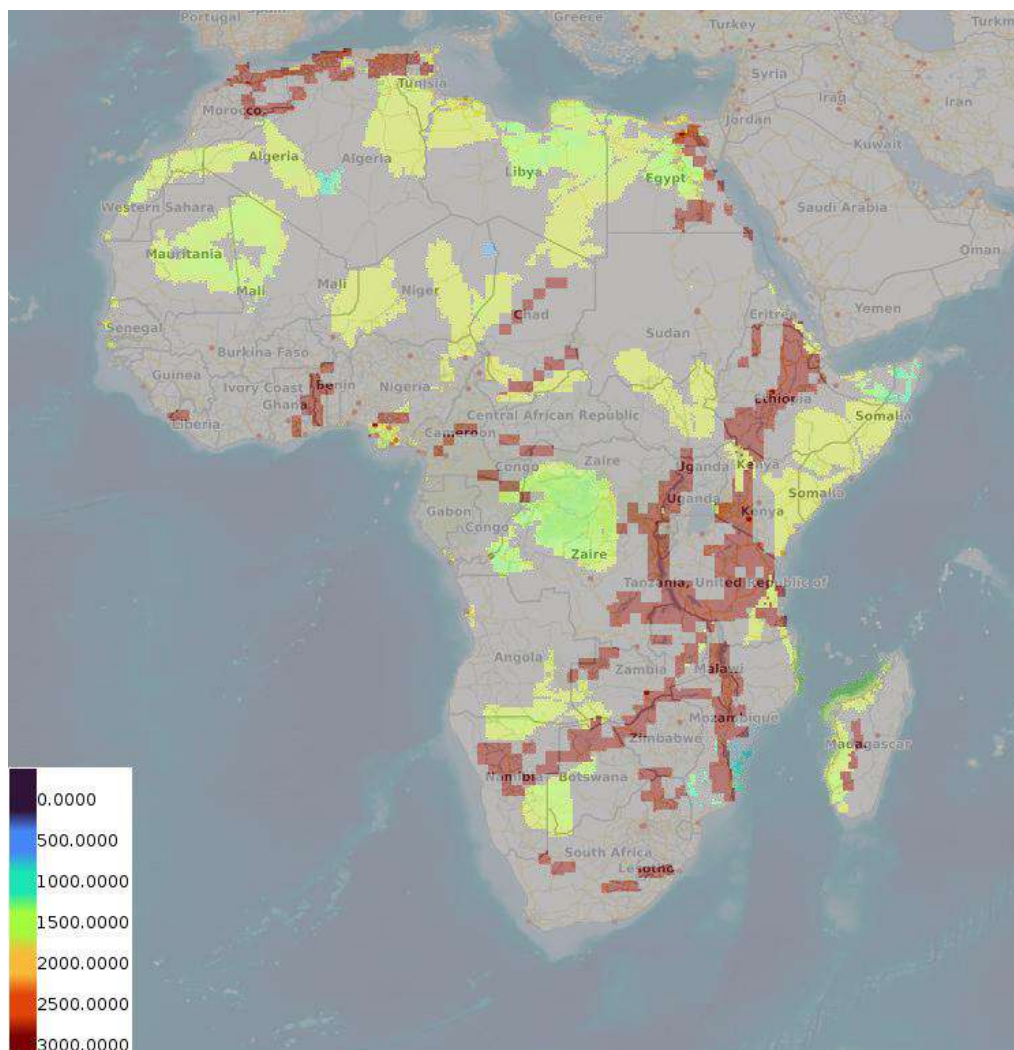
description: Chiller well distance (upside)

keywords: Chiller, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller optimized depth of the aquifer (upside)**

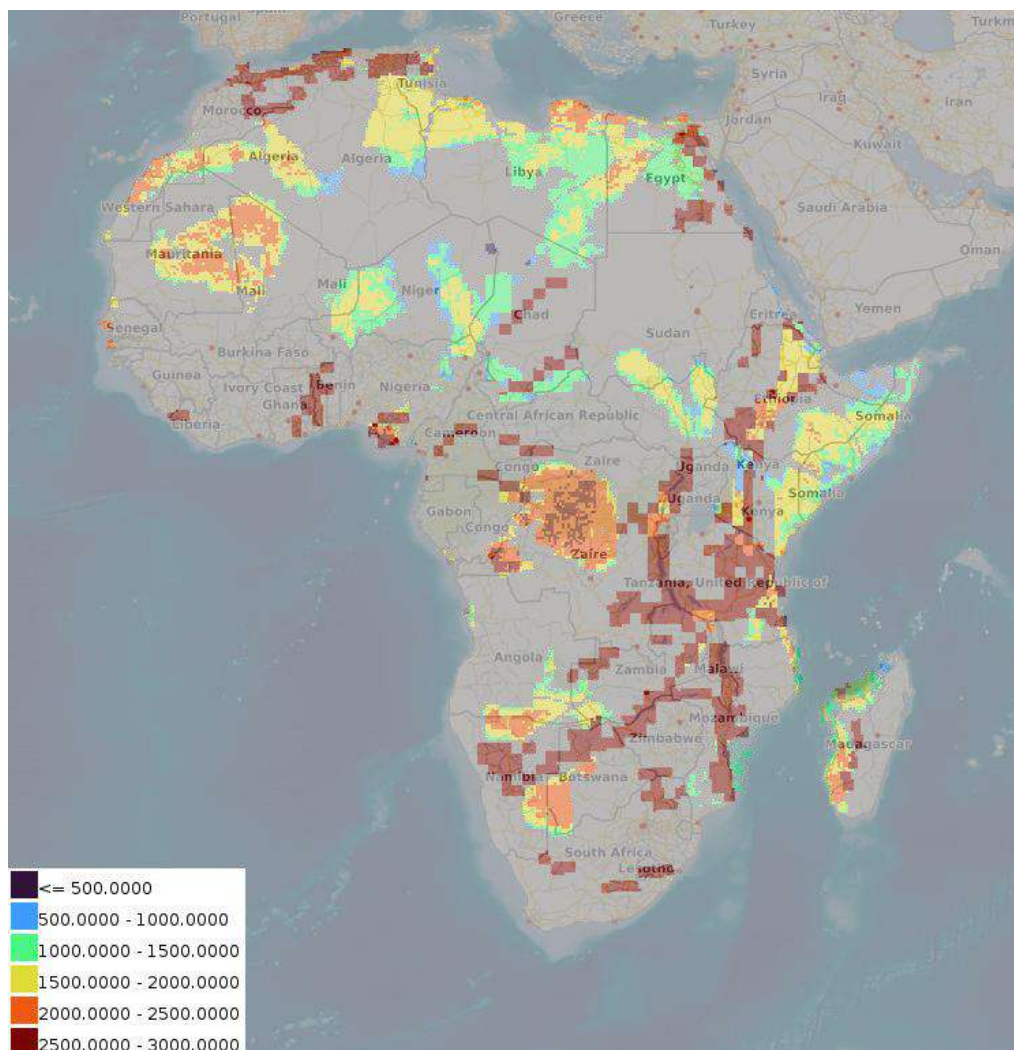
description: Chiller optimized depth of the aquifer (upside)

keywords: Chiller, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller temperature at reservoir (upside)**

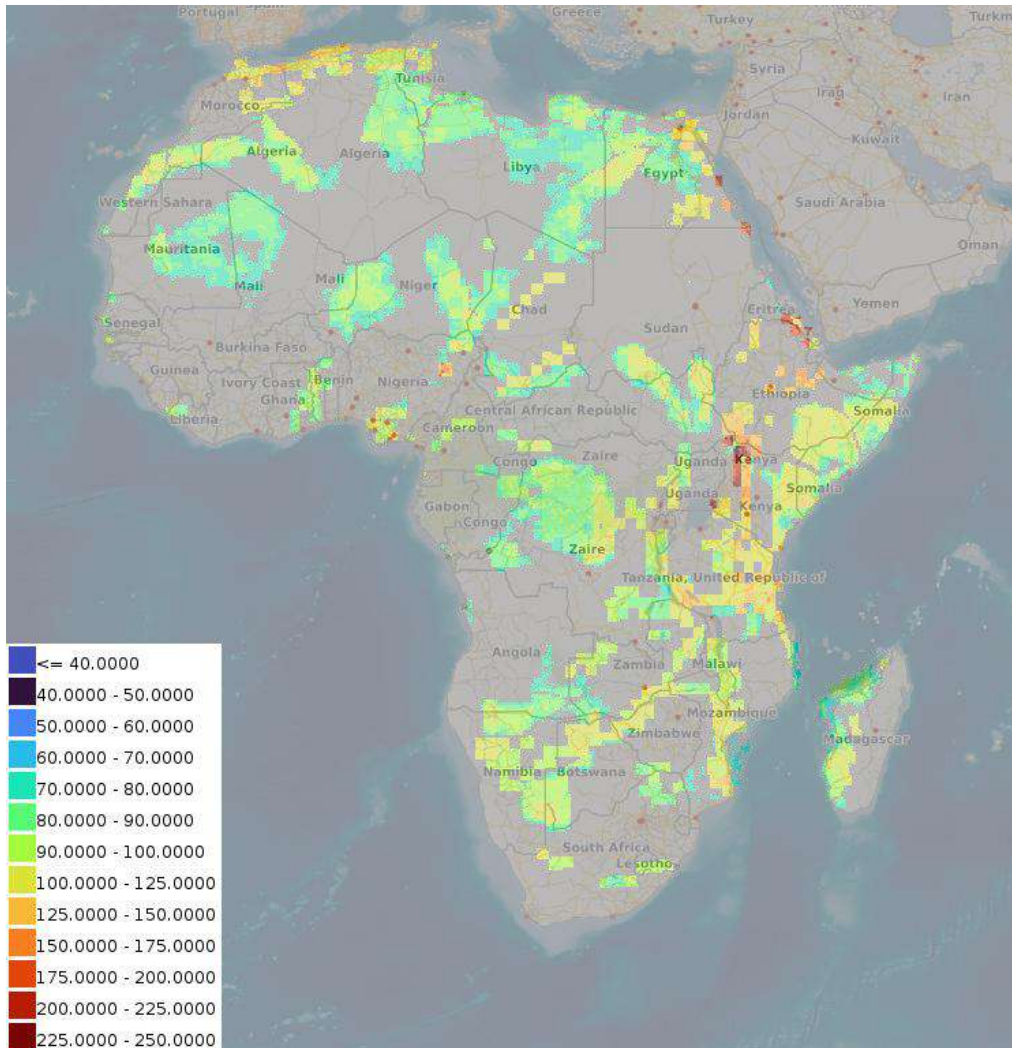
description: Chiller temperature at reservoir (upside)

keywords: Chiller, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller Levelized Costs of Energy (upside)**

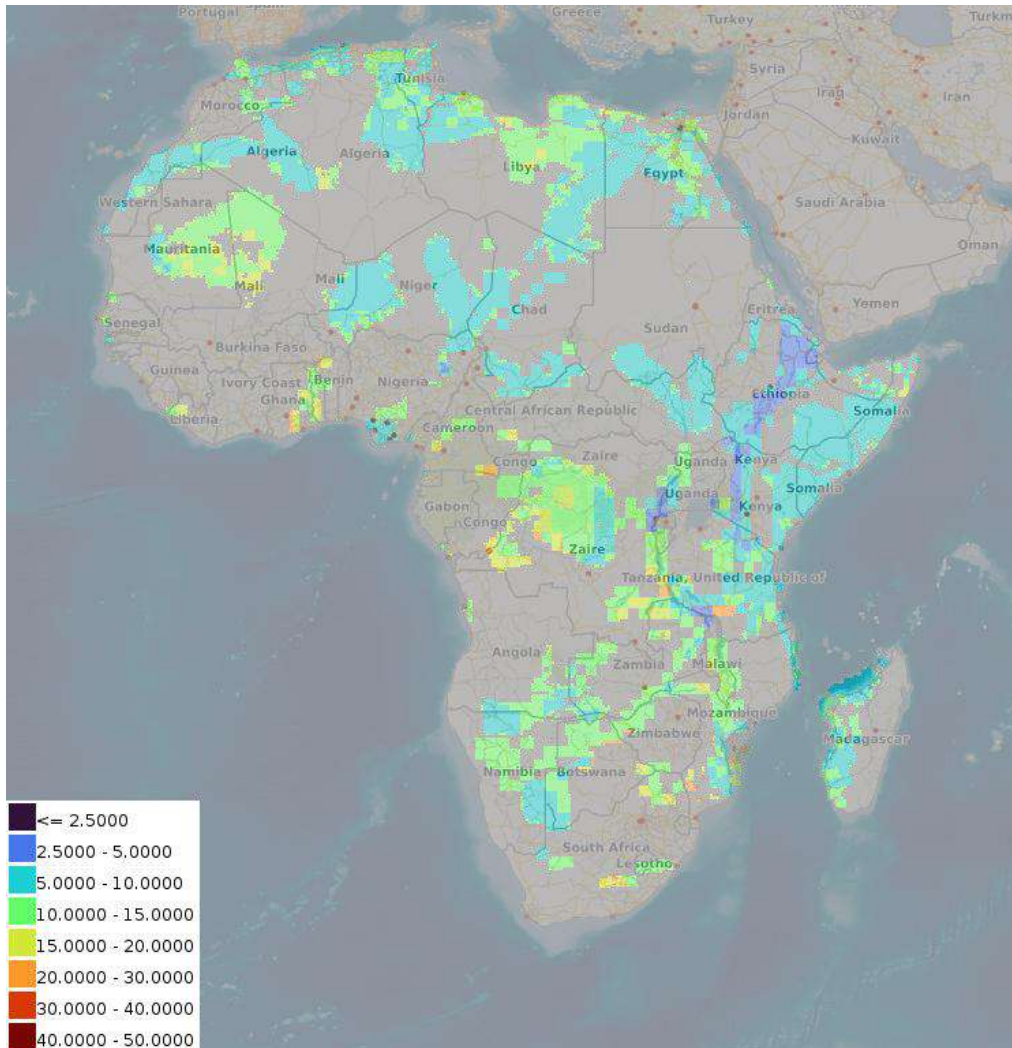
description: Chiller Levelized Costs of Energy (upside)

keywords: Chiller, Levelized Costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller coefficient of performance (upupside)**

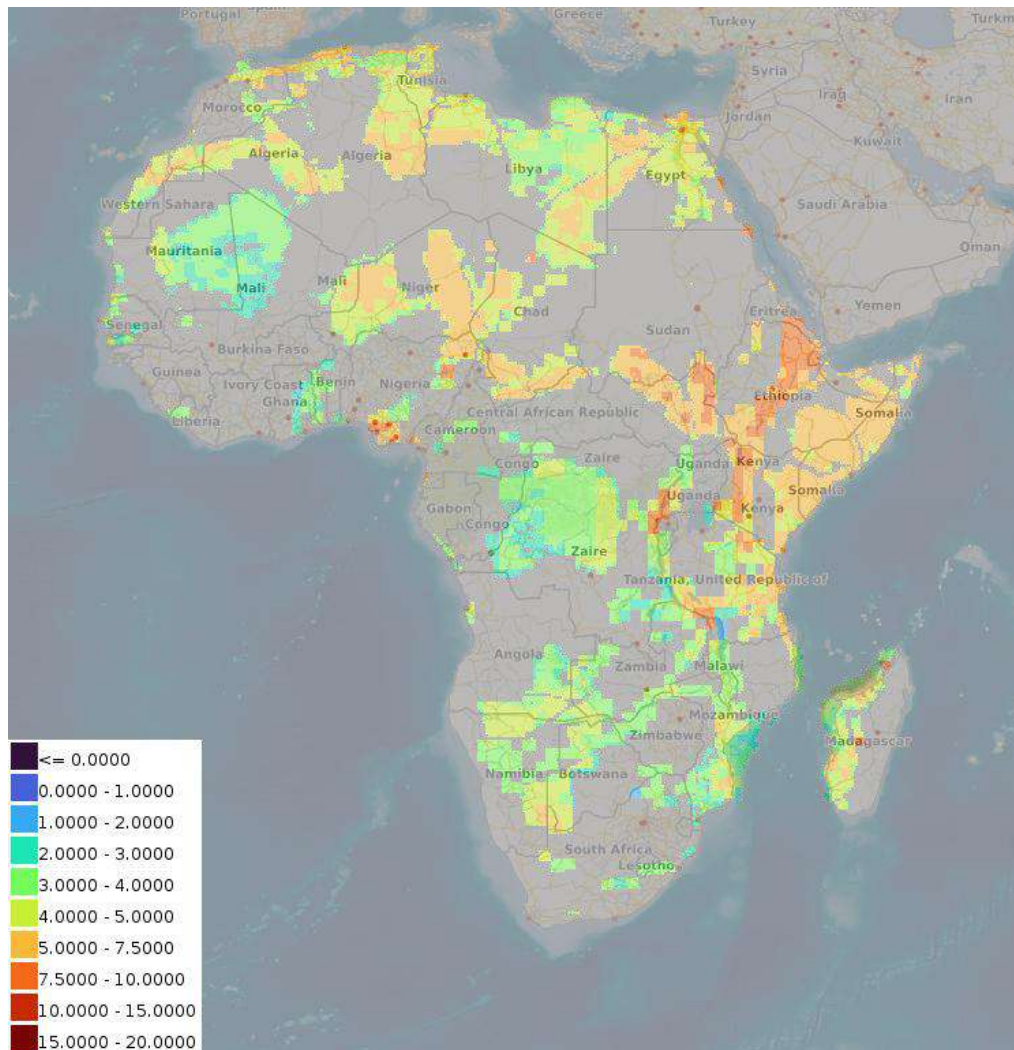
description: Chiller coefficient of performance (upupside)

keywords: Chiller, COP, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Pressure needed to drive pumps of the chiller (upupside)**

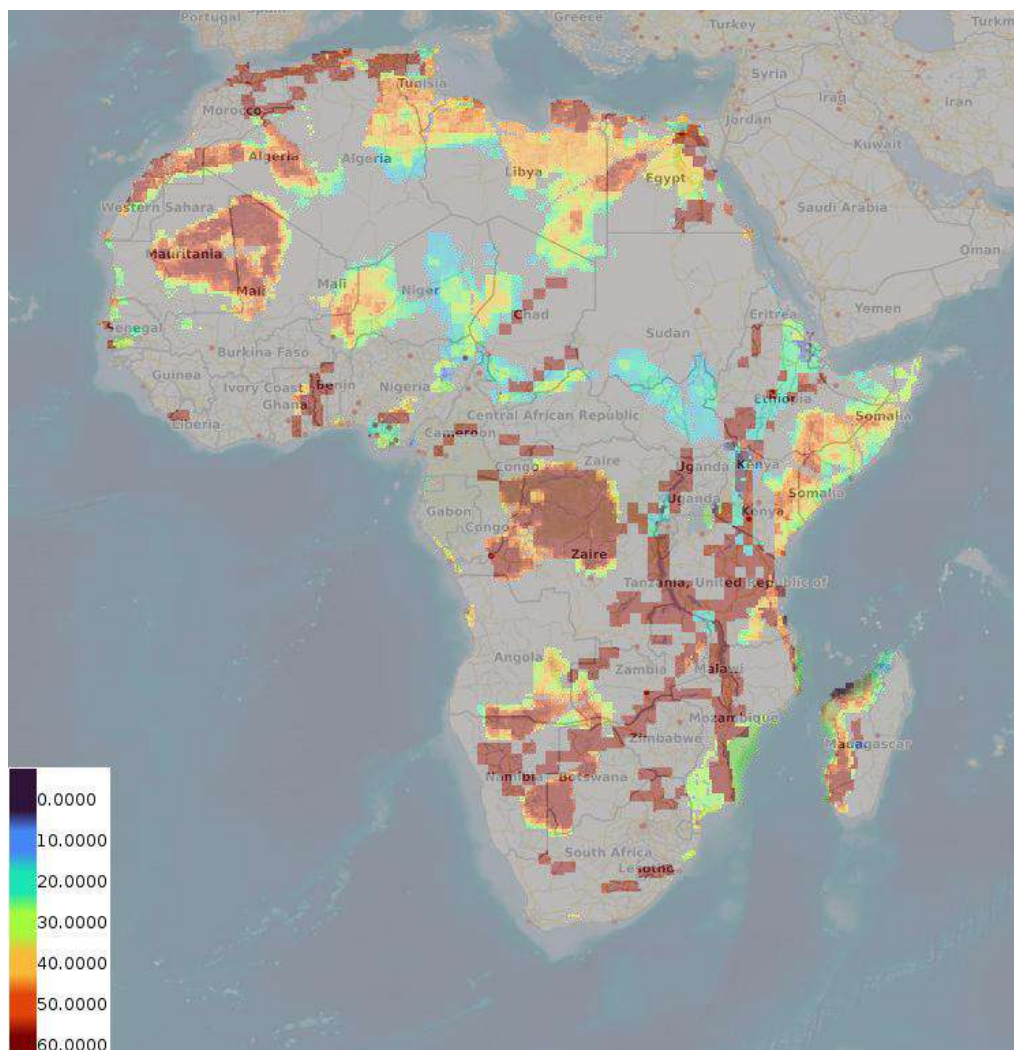
description: Pressure needed to drive pumps of the chiller (upupside)

keywords: Chiller, Pressure, Heat pump, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller production flow rate (upupside)**

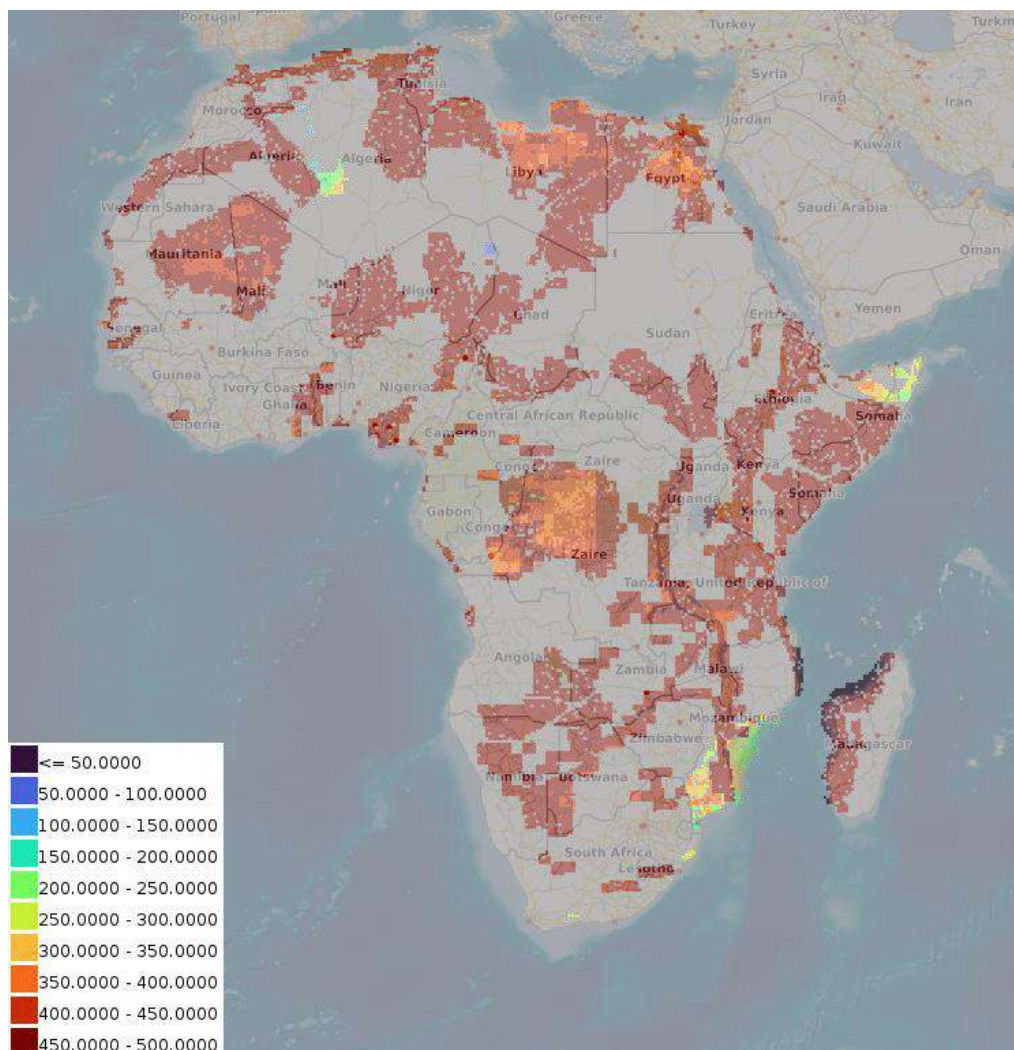
description: Chiller production flow rate (upupside)

keywords: Chiller, FLOWRATE, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller doublet net production (upupside)**

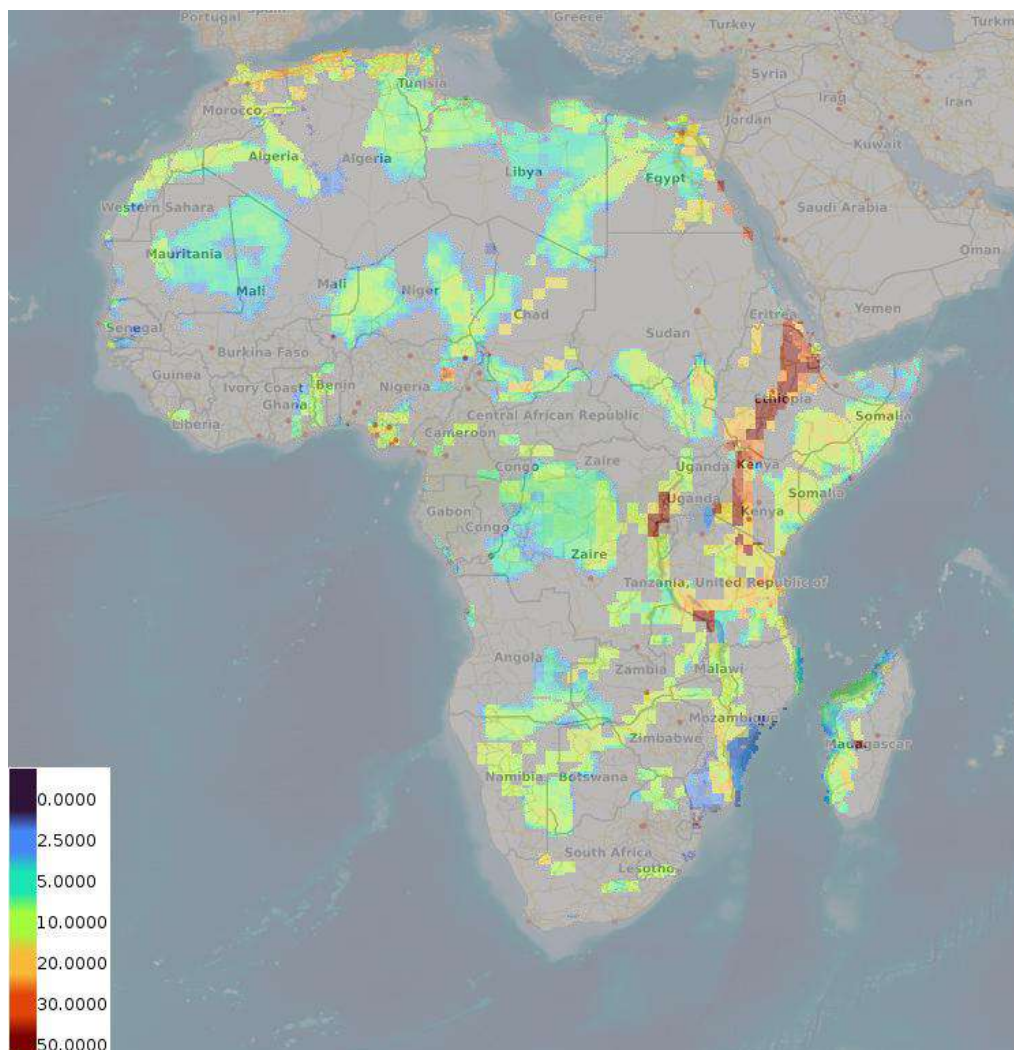
description: Chiller doublet net production (upupside)

keywords: Chiller, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller transmissivity (upupside)**

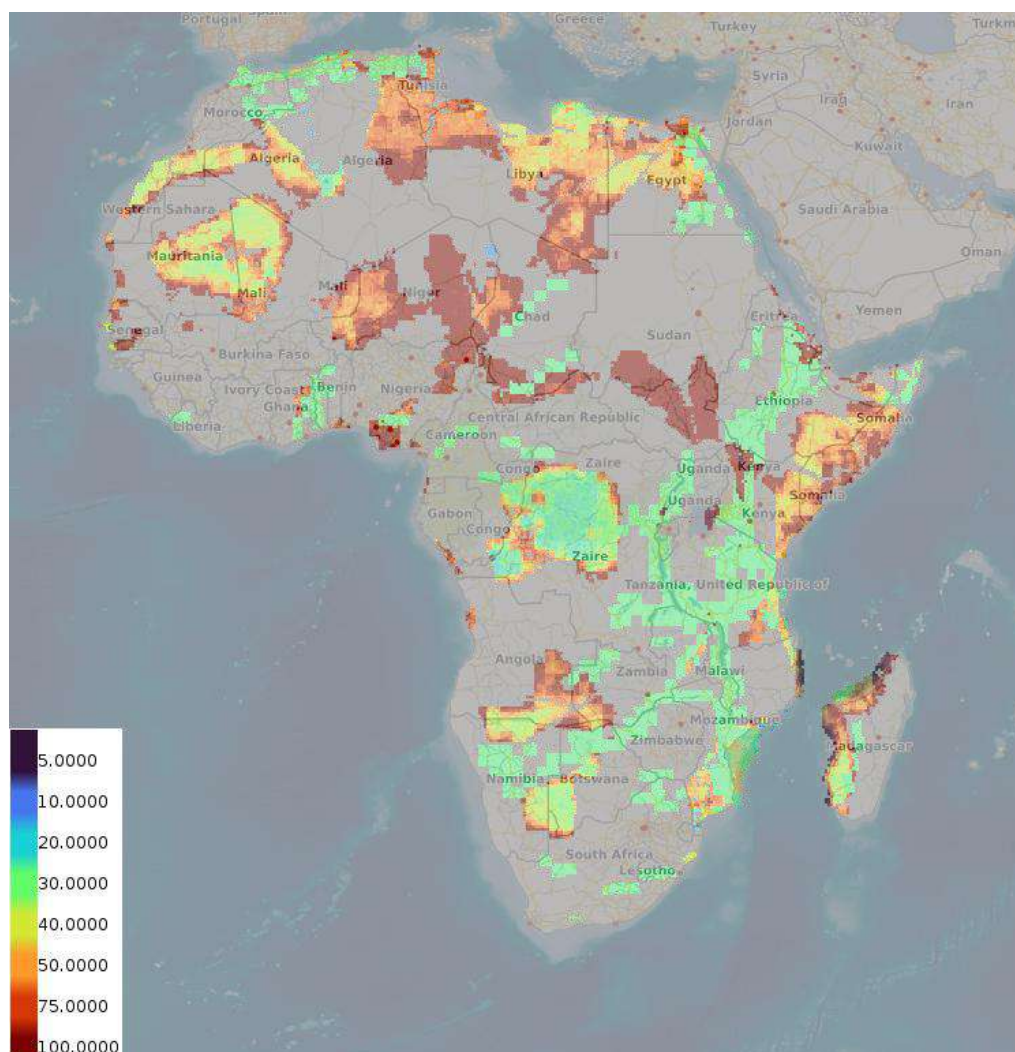
description: Chiller transmissivity (upupside)

keywords: Chiller, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller well distance (upupside)**

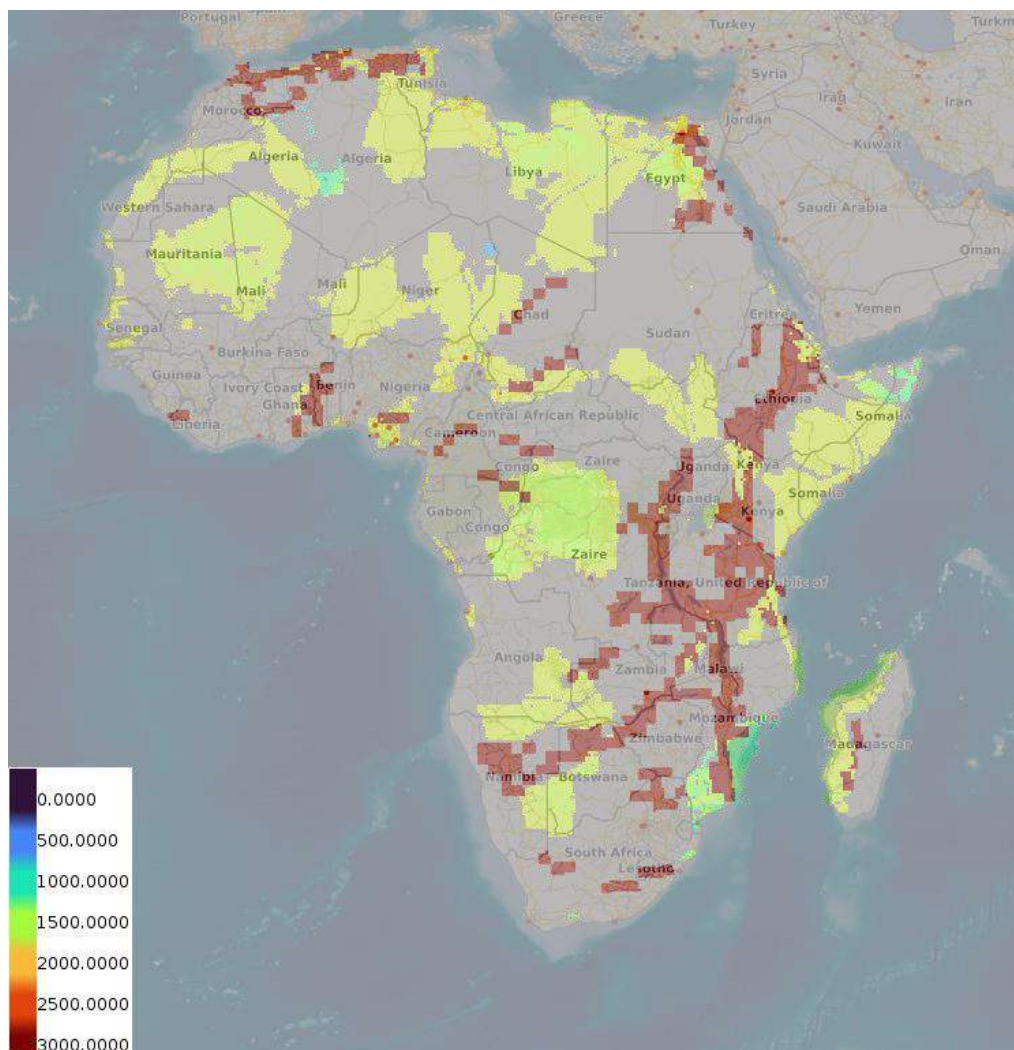
description: Chiller well distance (upupside)

keywords: Chiller, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller optimized depth of the aquifer (upupside)**

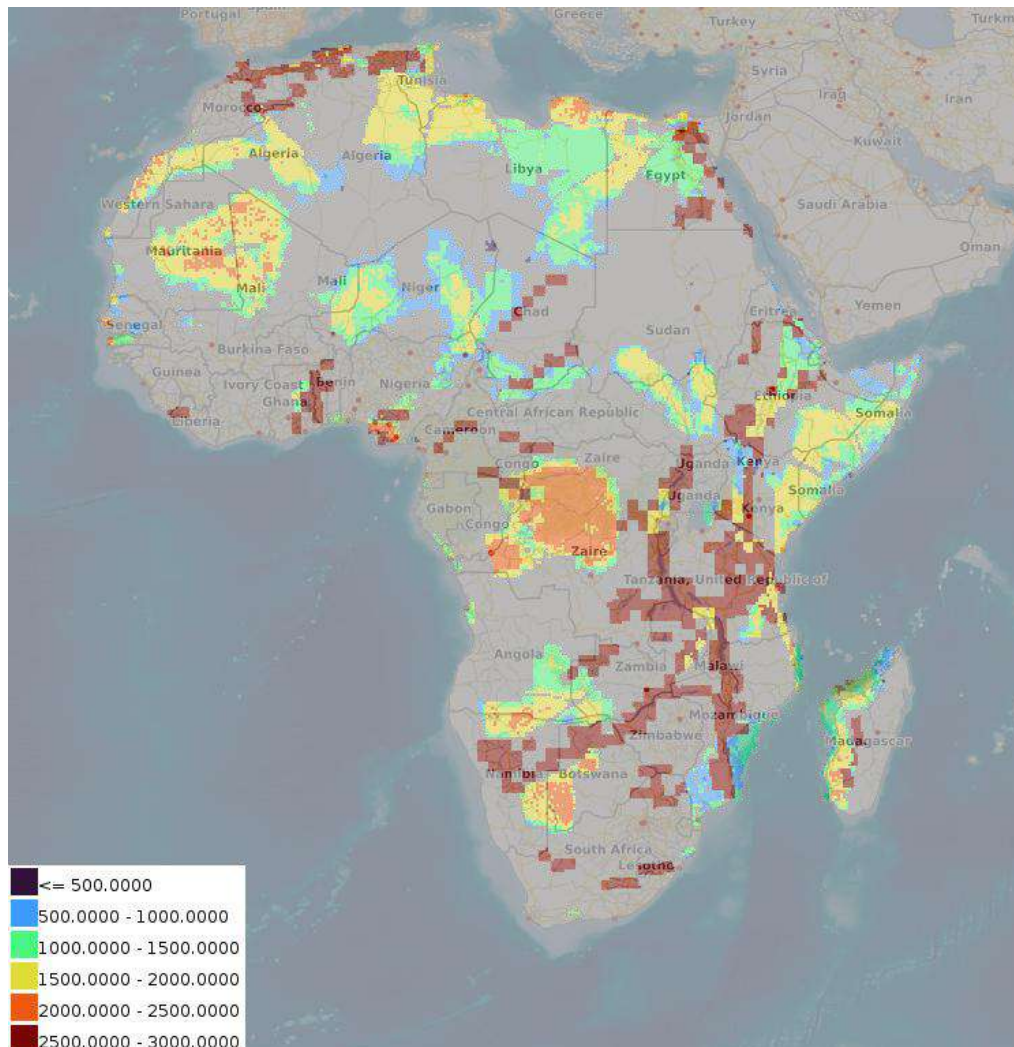
description: Chiller optimized depth of the aquifer (upupside)

keywords: Chiller, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller temperature at reservoir (upupside)**

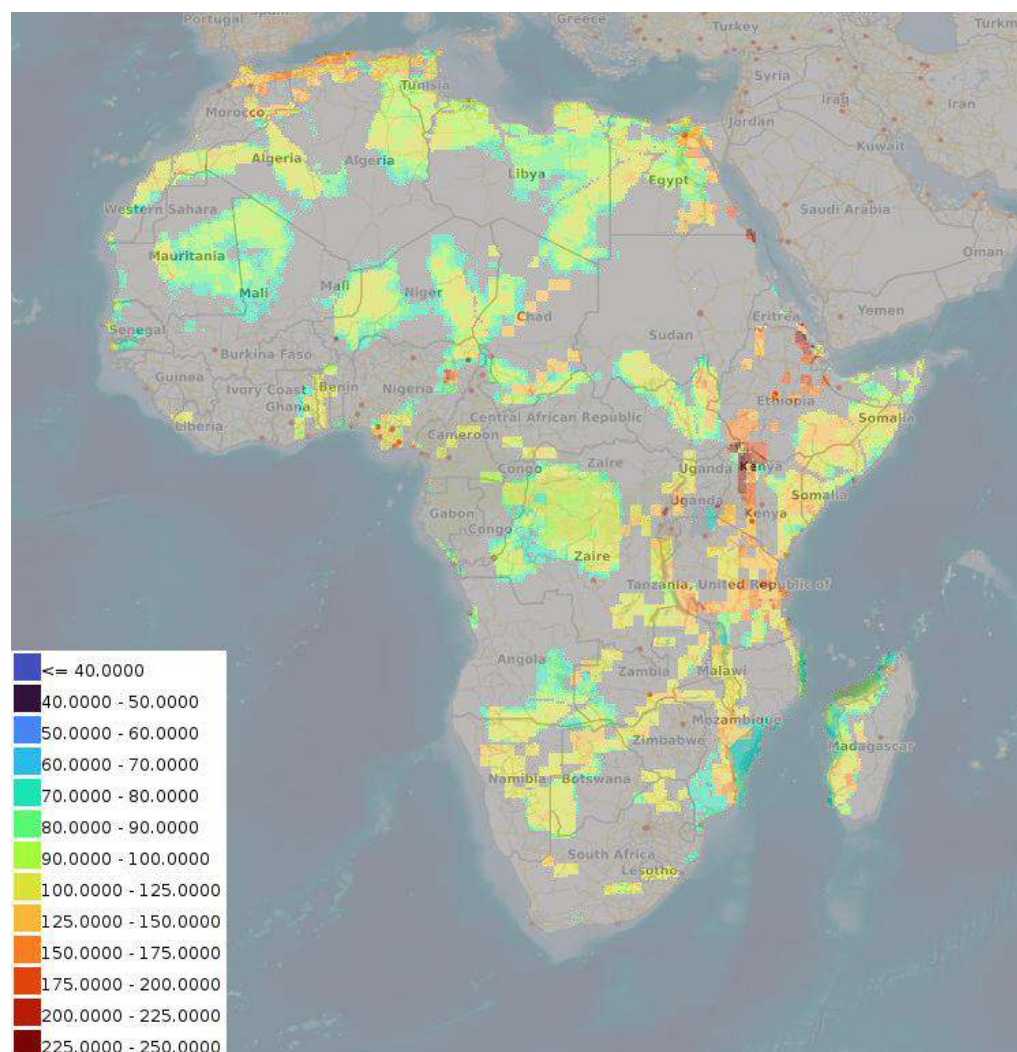
description: Chiller temperature at reservoir (upupside)

keywords: Chiller, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Chiller Levelized Costs of Energy (upupside)**

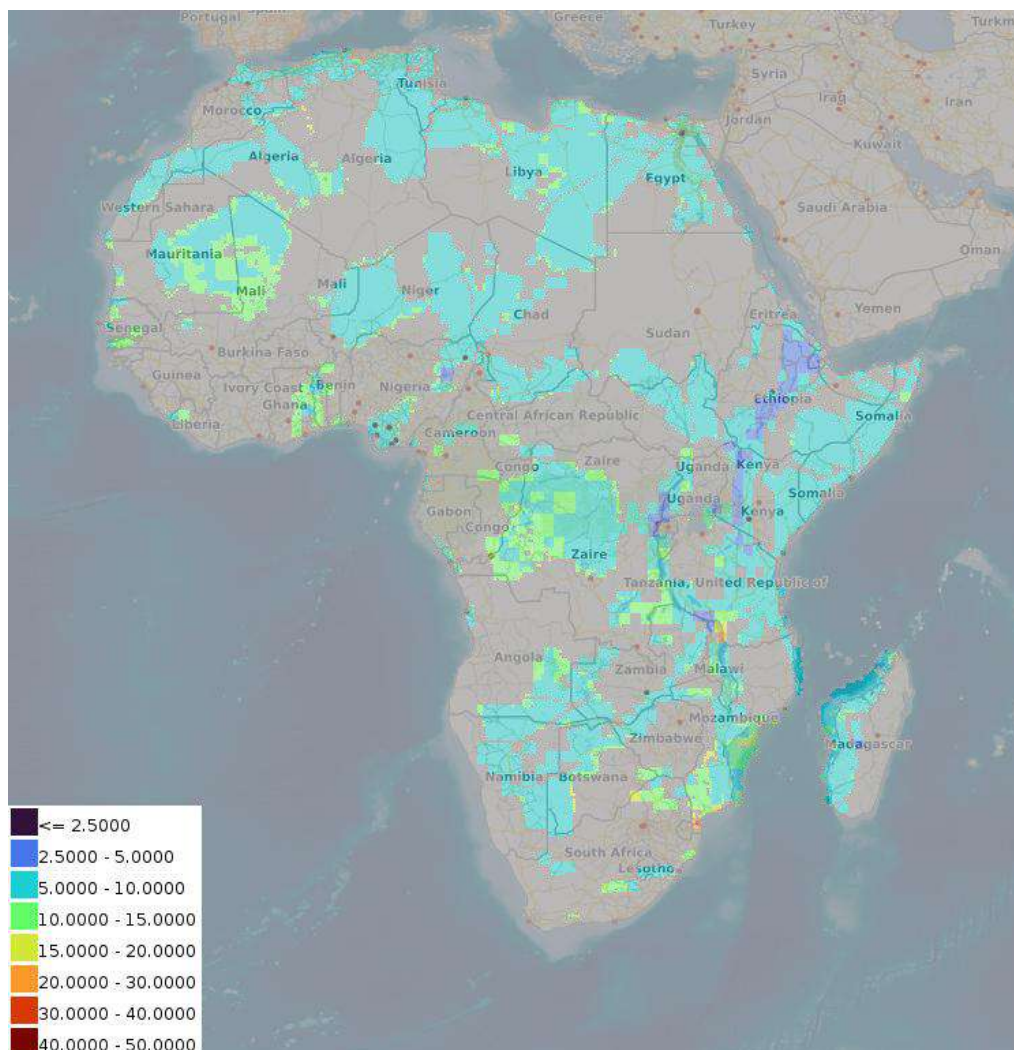
description: Chiller Levelized Costs of Energy (upupside)

keywords: Chiller, Levelized Costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Refrigeration Absorption System (upside)**

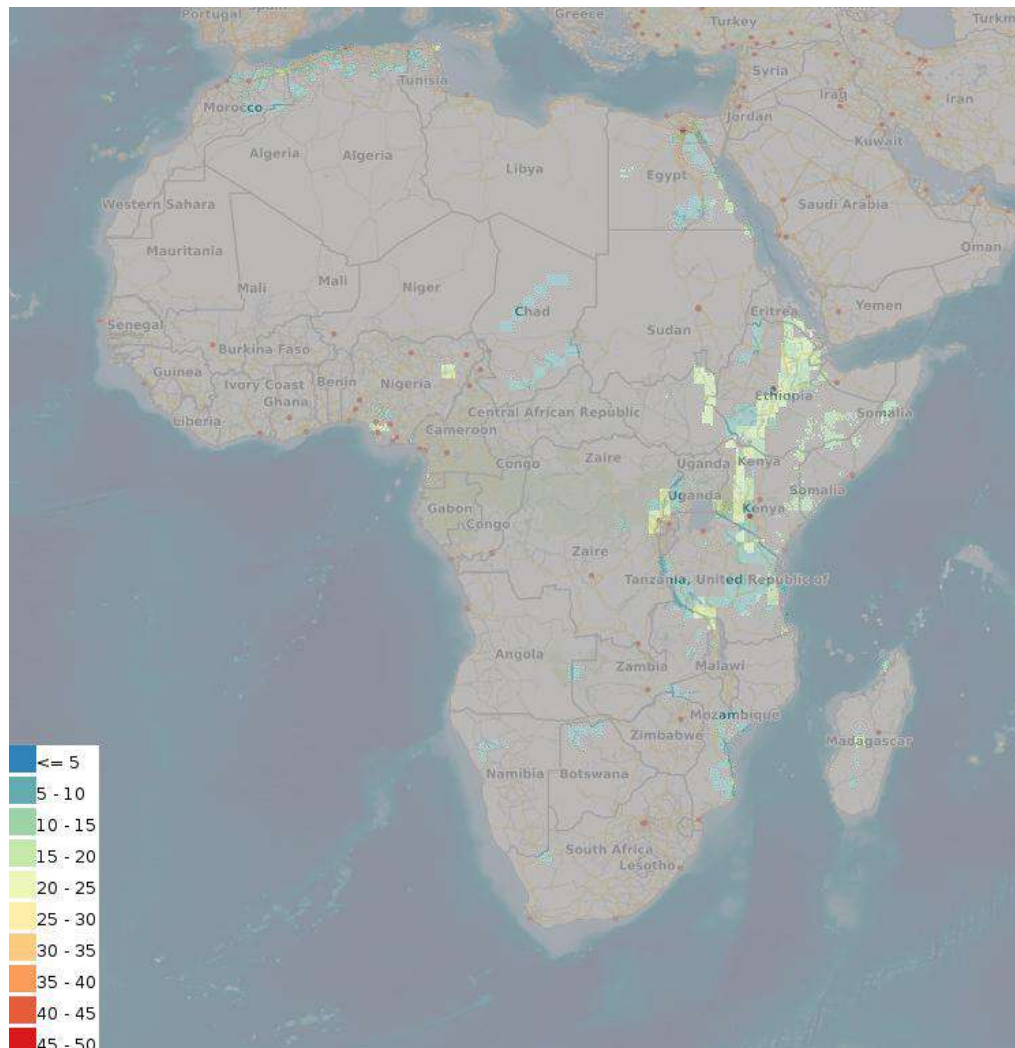
description: Possible cooling capacity for a Refrigeration Absorption System for the refrigeration in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Refrigeration Absorption System (base case)**

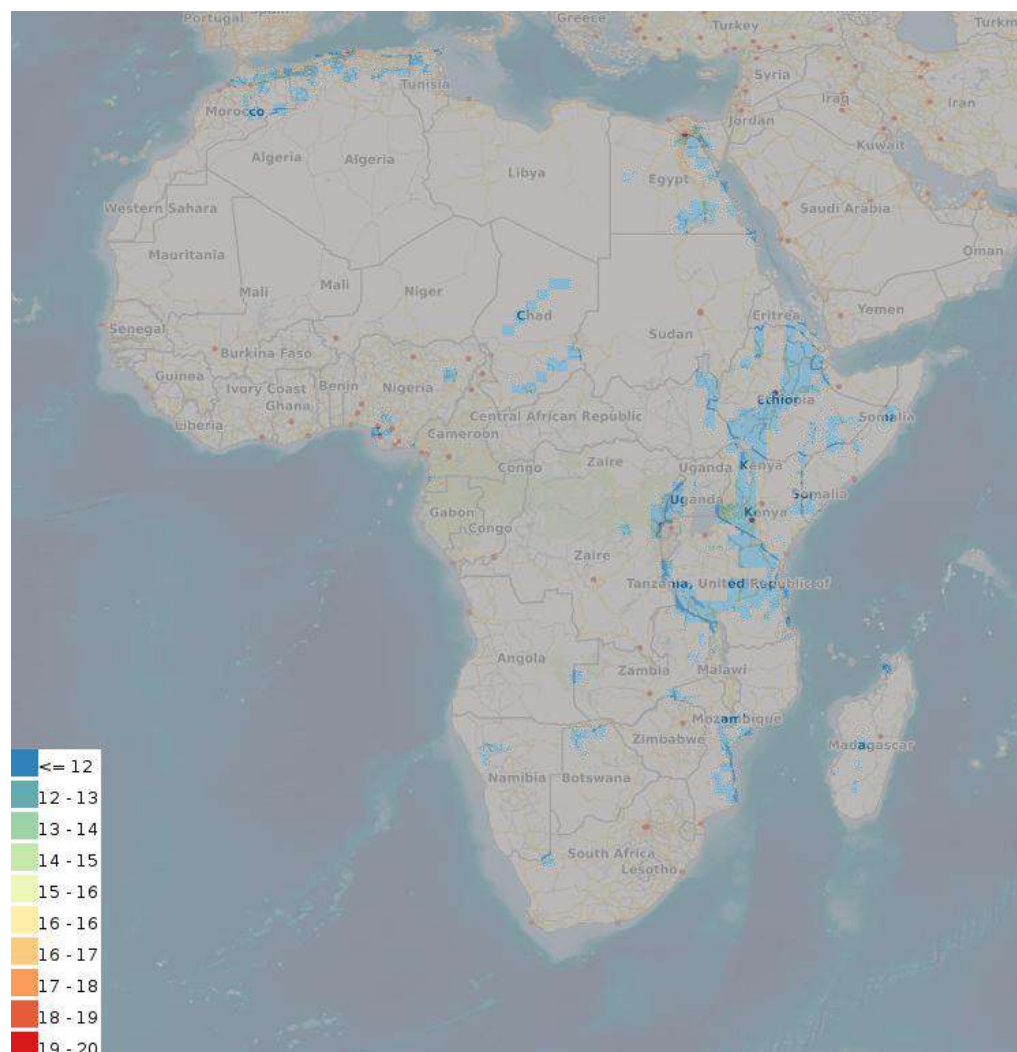
description: Possible cost of cold for a Refrigeration Absorption System for the refrigeration in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Refrigeration Absorption System (base case)**

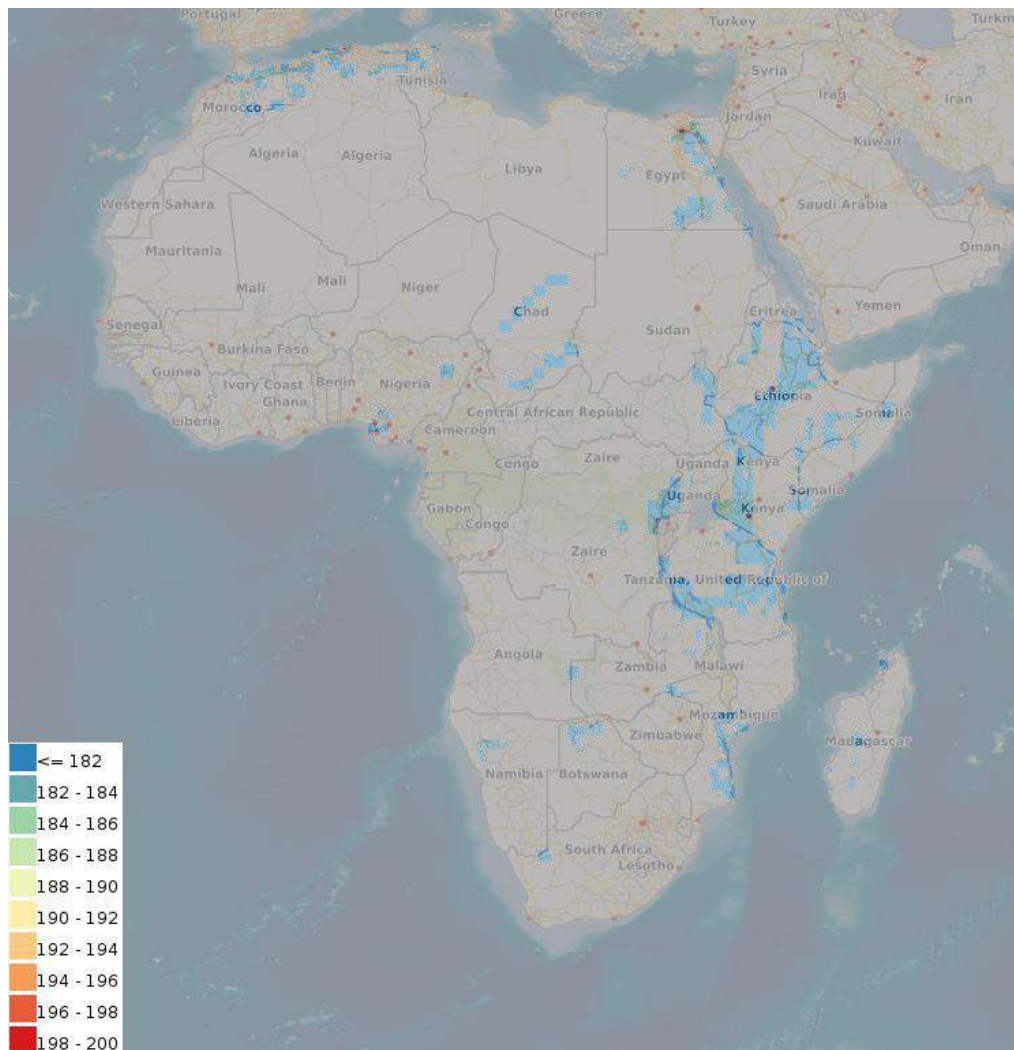
description: Possible environmental impact of climate change for a Refrigeration Absorption System for the refrigeration in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Refrigeration Absorption System (upside)**

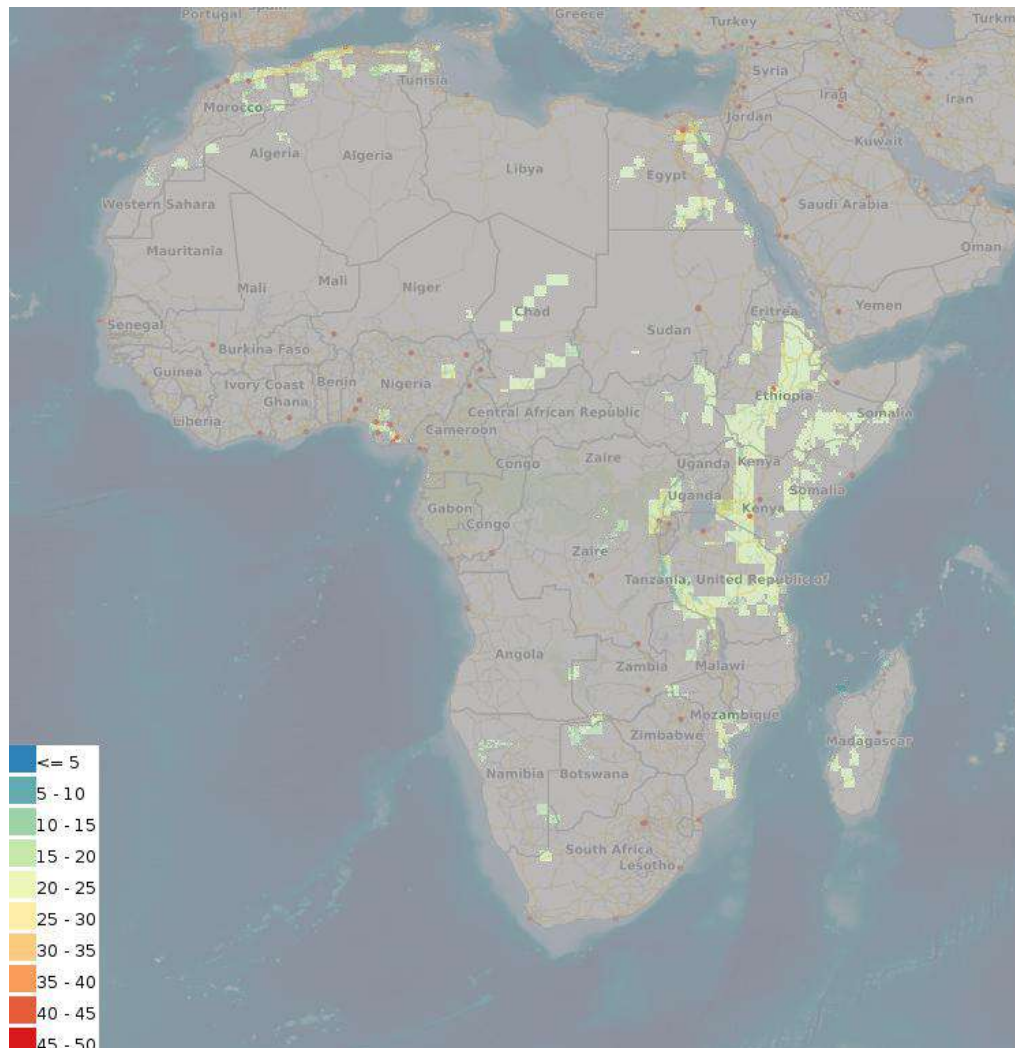
description: Possible cooling capacity for a Refrigeration Absorption System for the refrigeration in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Refrigeration Absorption System (upside)**

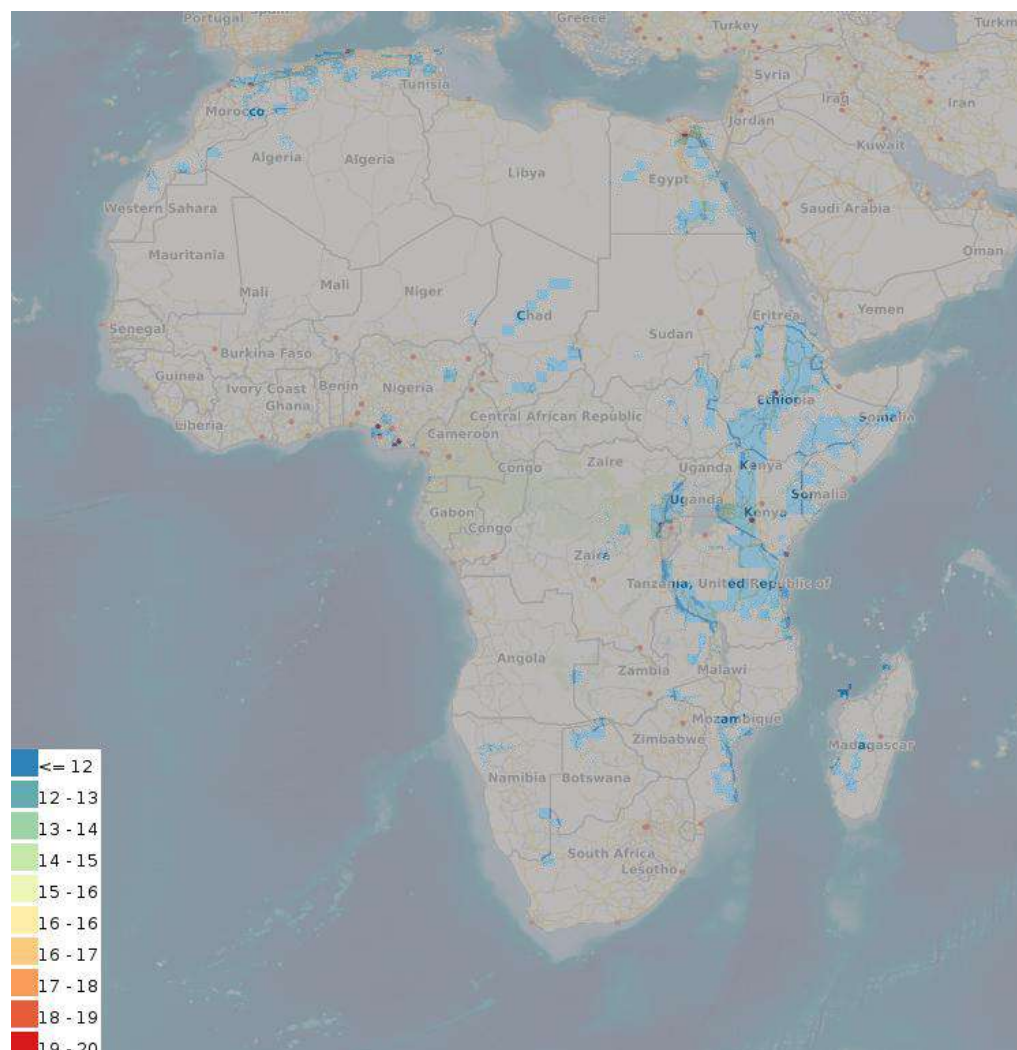
description: Possible cost of cold for a Refrigeration Absorption System for the refrigeration in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Refrigeration Absorption System (upside)**

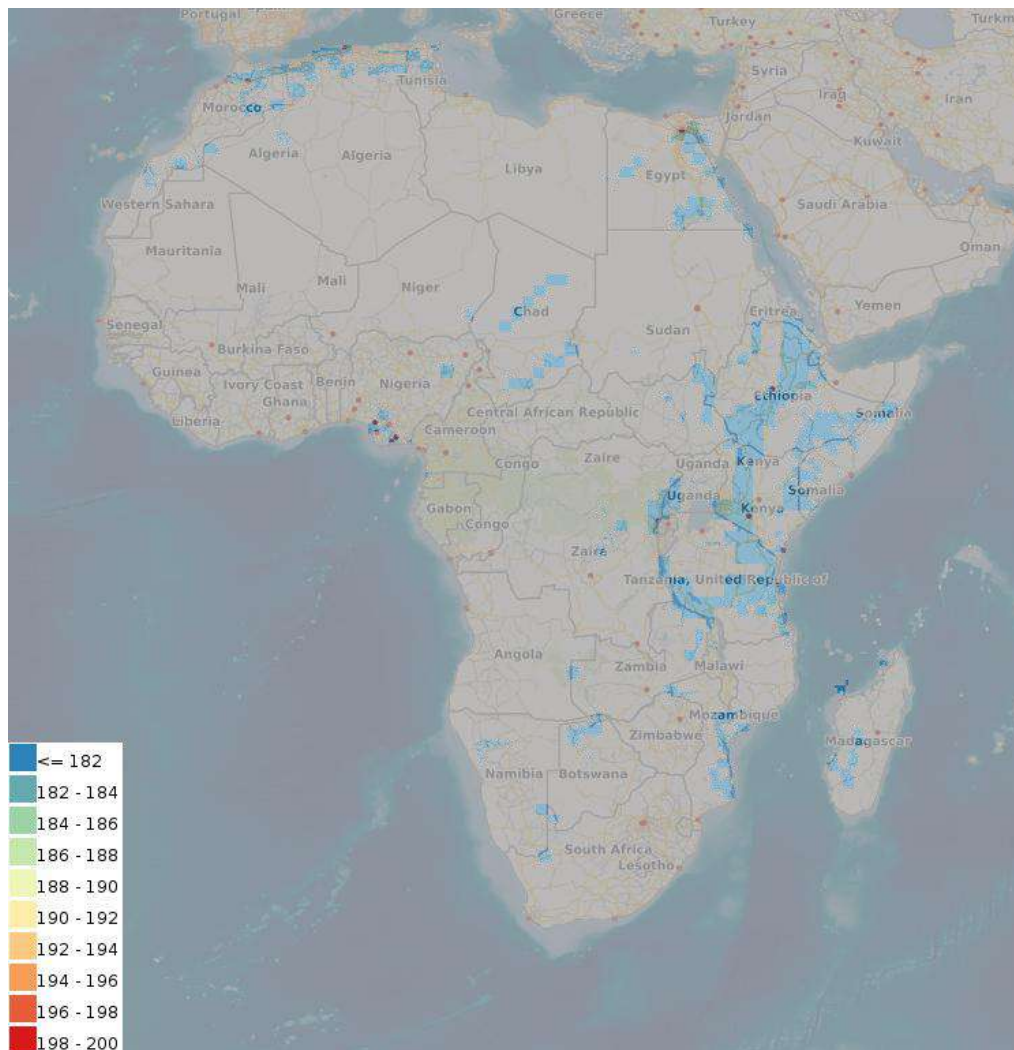
description: Possible environmental impact of climate change for a Refrigeration Absorption System for the refrigeration in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Refrigeration Absorption System (upupside)**

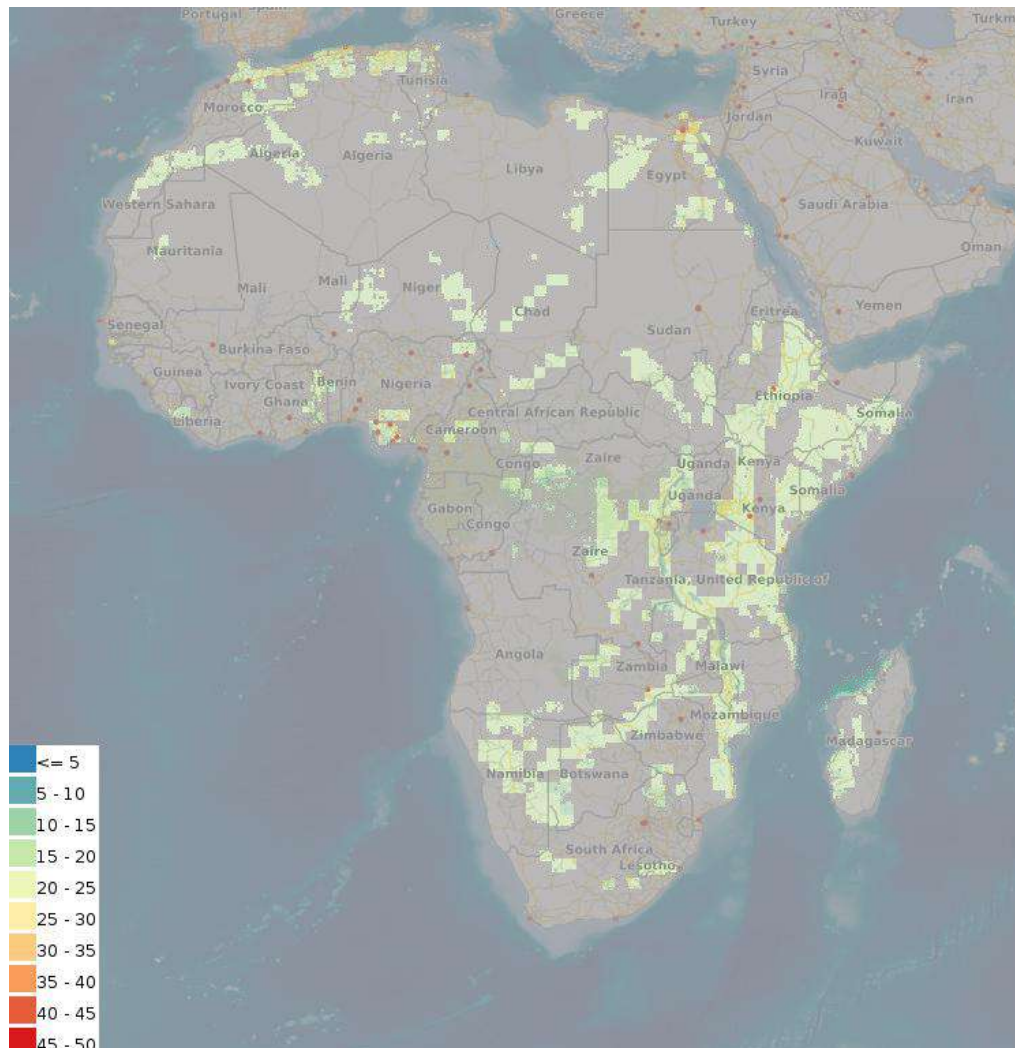
description: Possible cooling capacity for a Refrigeration Absorption System for the refrigeration in the upupside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Refrigeration Absorption System (upside)**

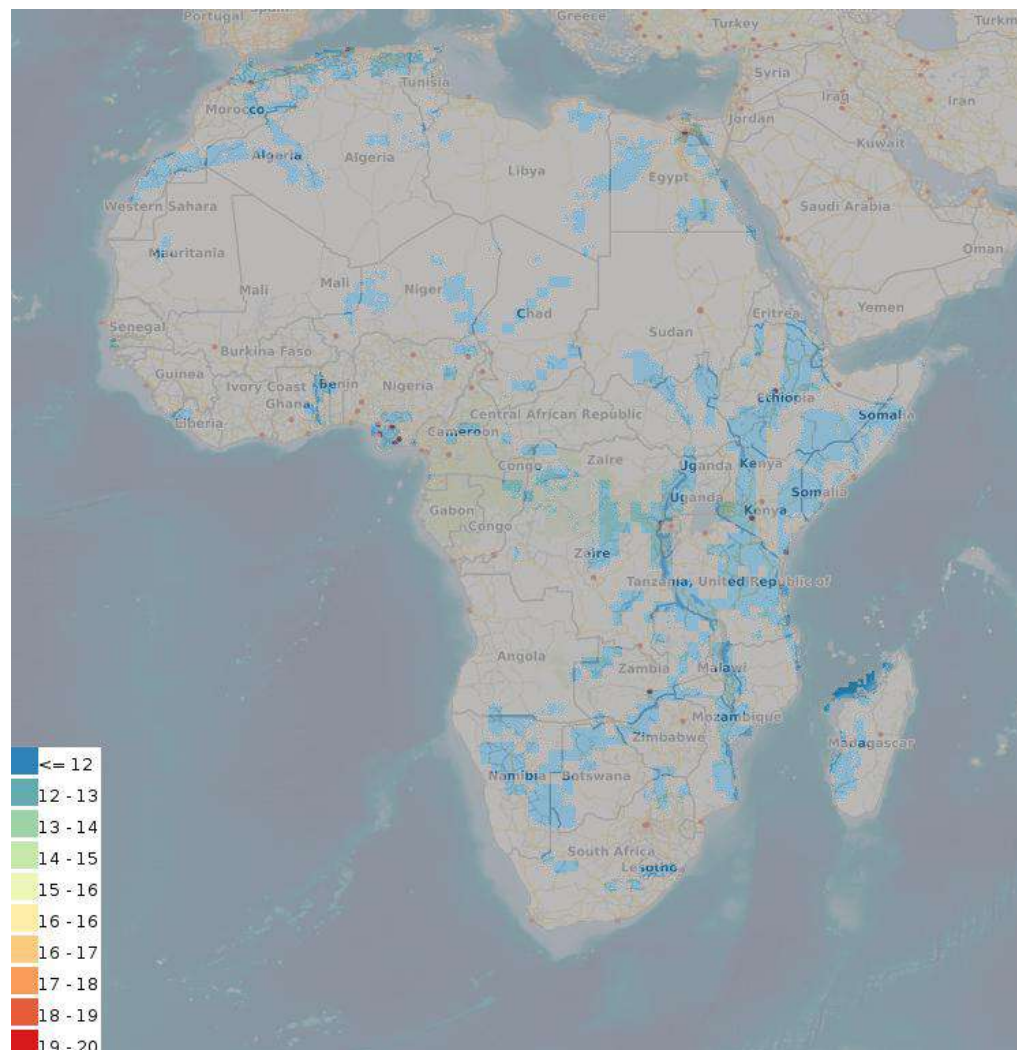
description: Possible cost of cold for a Refrigeration Absorption System for the refrigeration in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Refrigeration Absorption System (upupside)**

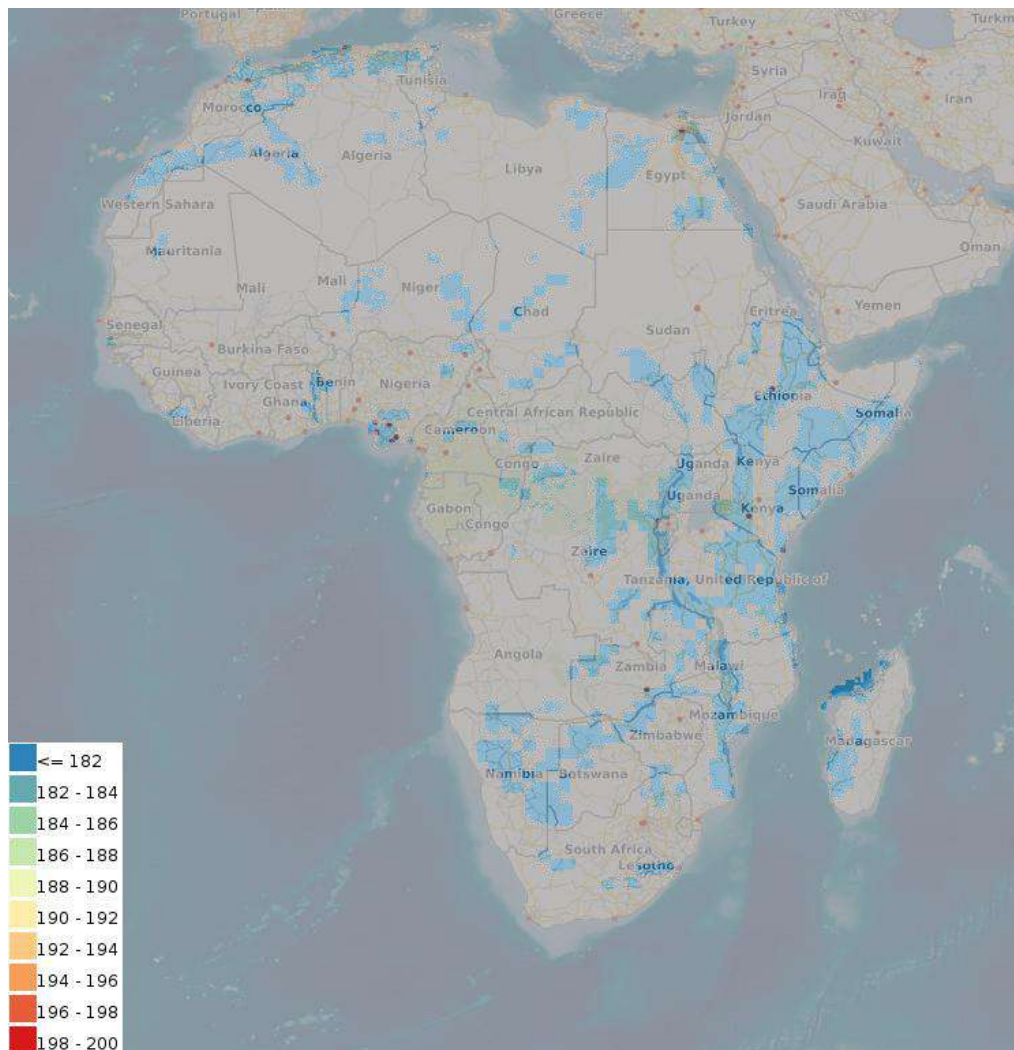
description: Possible environmental impact of climate change for a Refrigeration Absorption System for the refrigeration in the upupside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Cooling Absorption System (base case)**

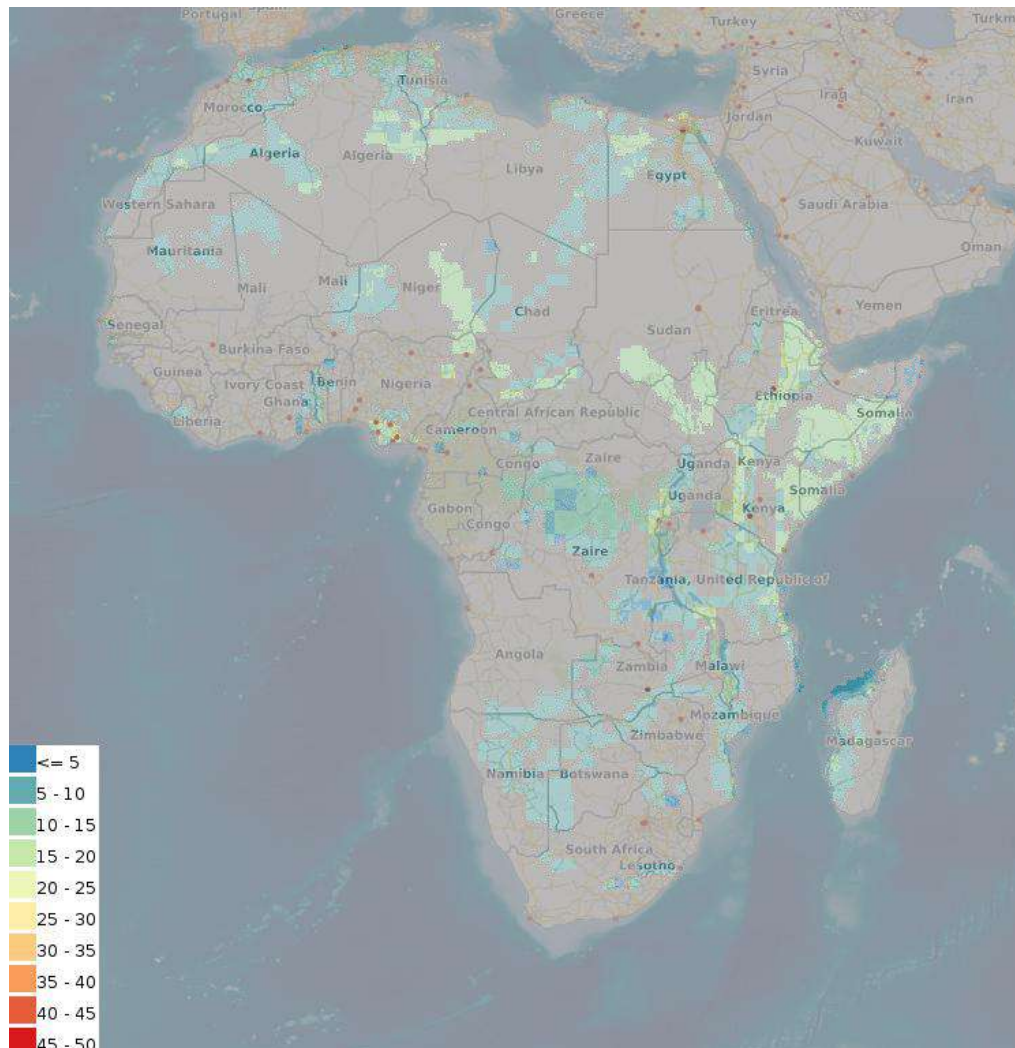
description: Possible cooling capacity for a Cooling Absorption System for Building cooling in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Cooling Absorption System (base case)**

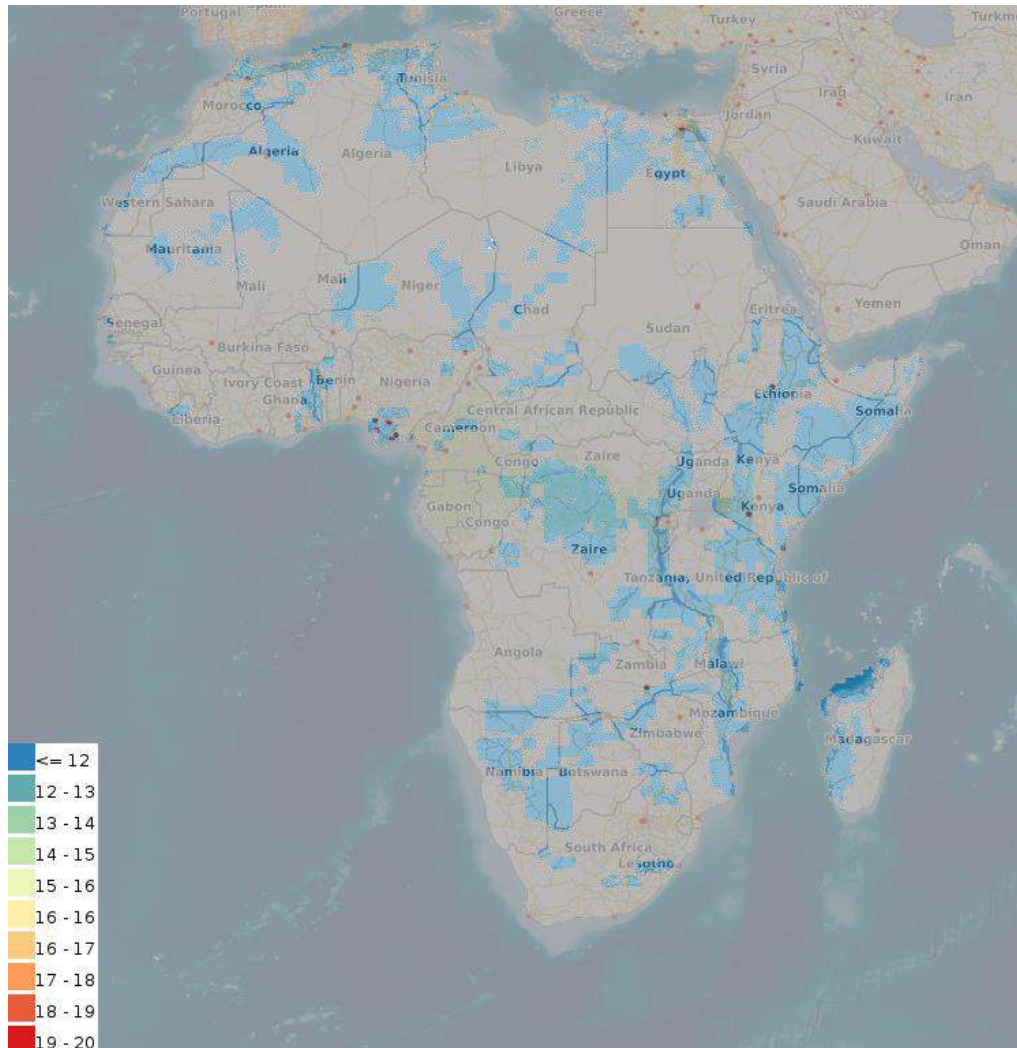
description: Possible cost of cold for a Cooling Absorption System for Building cooling in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Cooling Absorption System (base case)**

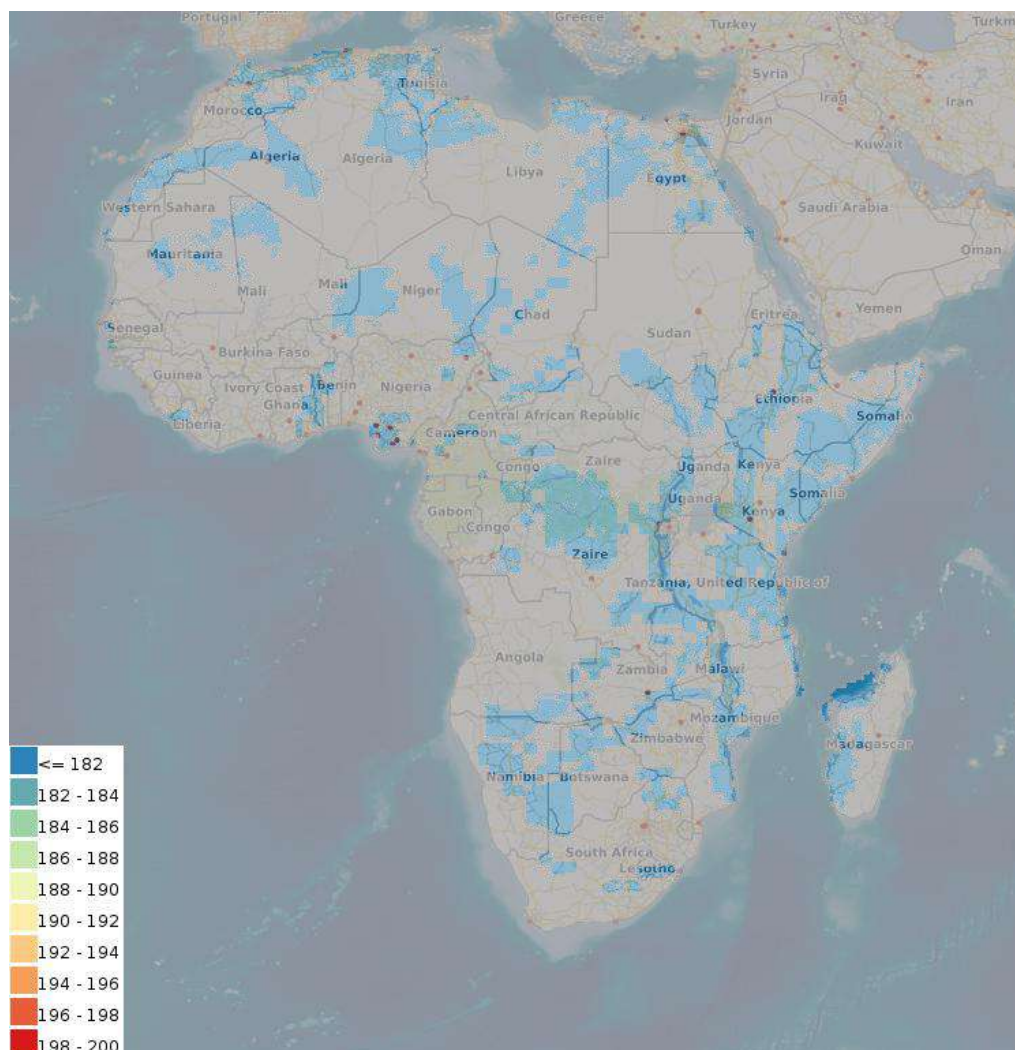
description: Possible environmental impact of climate change for a Cooling Absorption System for Building cooling in the basecase scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Cooling Absorption System (upside)**

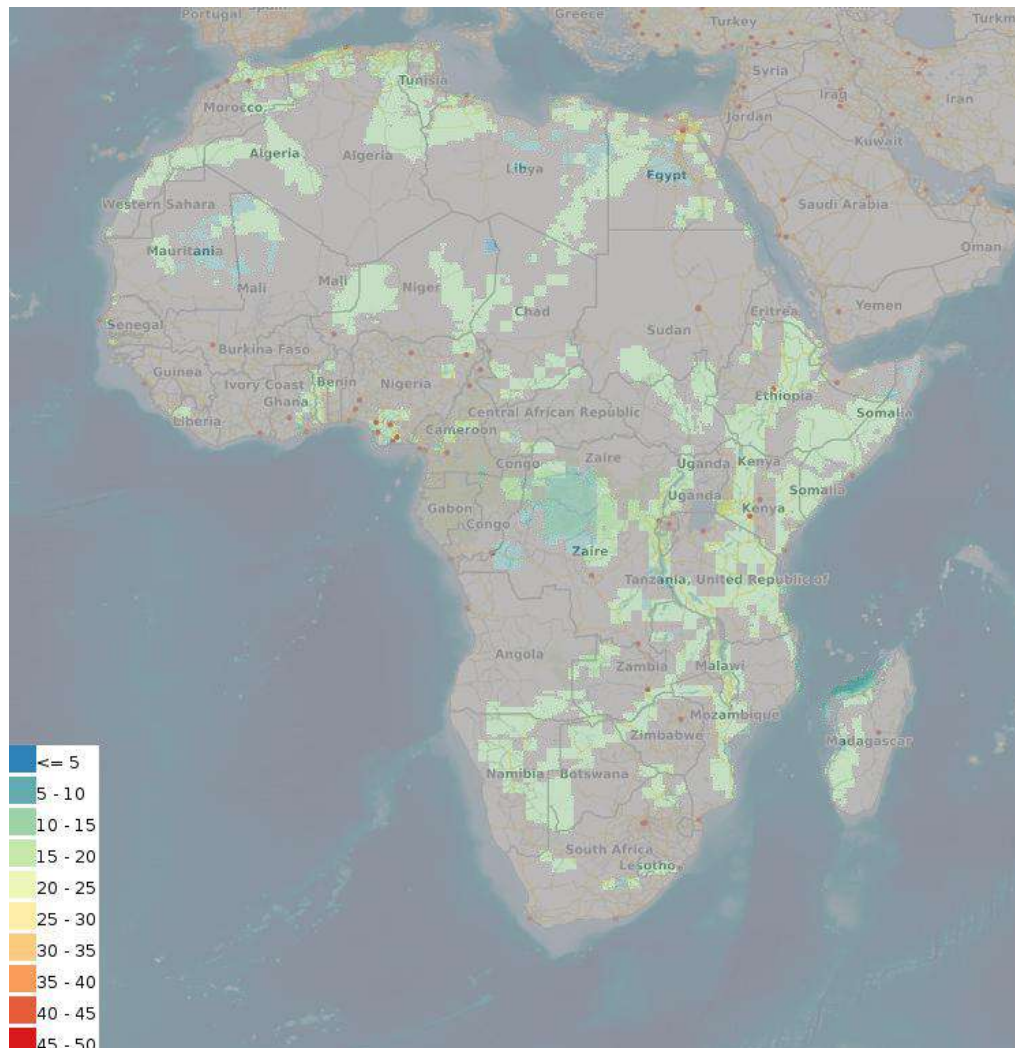
description: Possible cooling capacity for a Cooling Absorption System for Building cooling in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Cooling Absorption System (upside)**

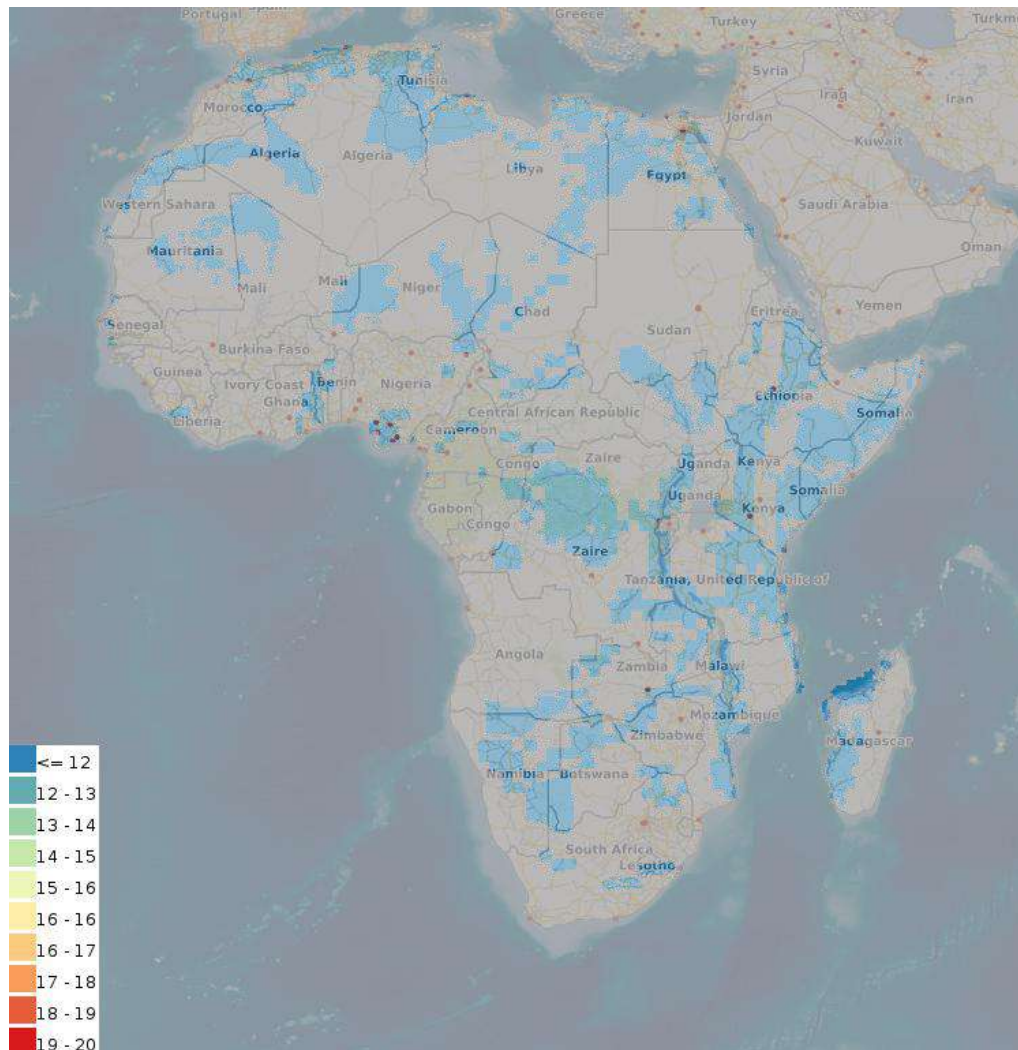
description: Possible cost of cold for a Cooling Absorption System for Building cooling in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Cooling Absorption System (upside)**

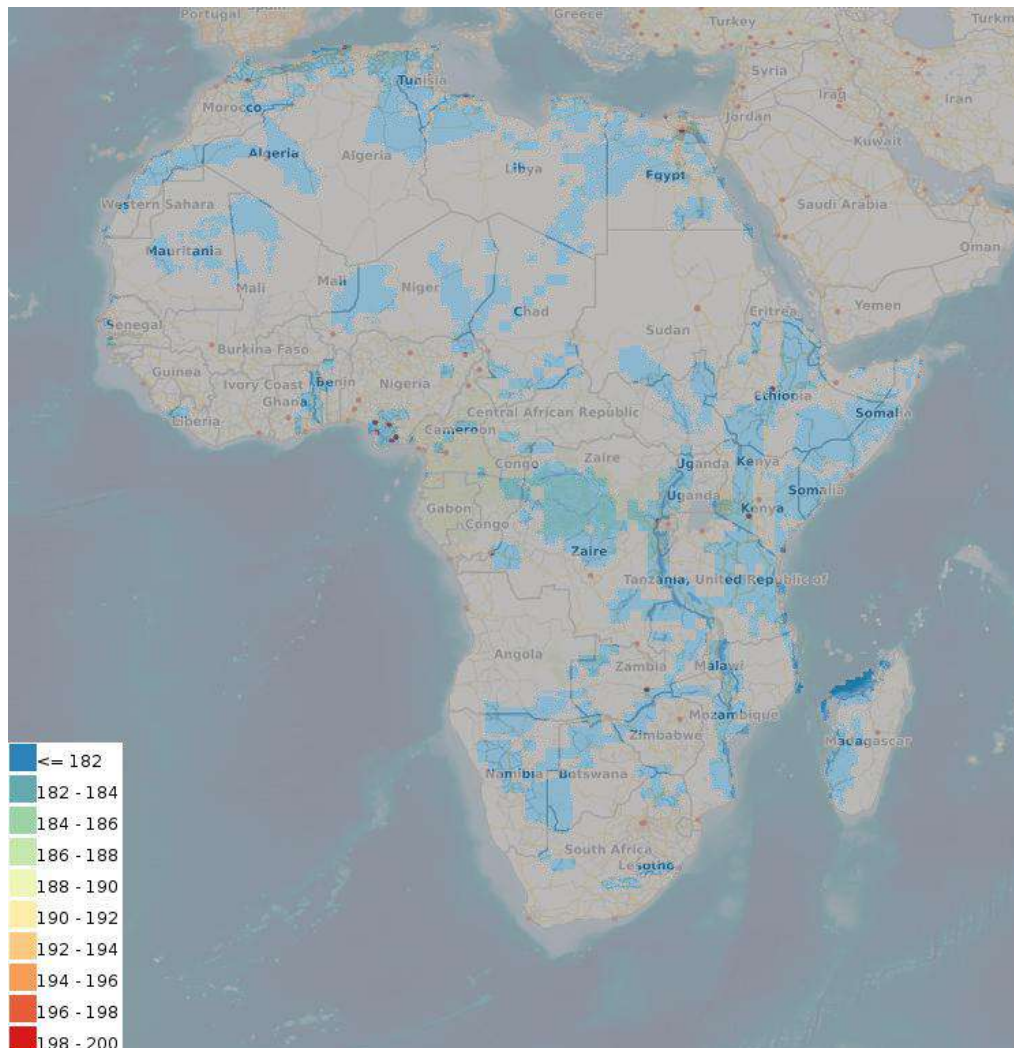
description: Possible environmental impact of climate change for a Cooling Absorption System for Building cooling in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible cooling capacity for Cooling Absorption System (upupside)**

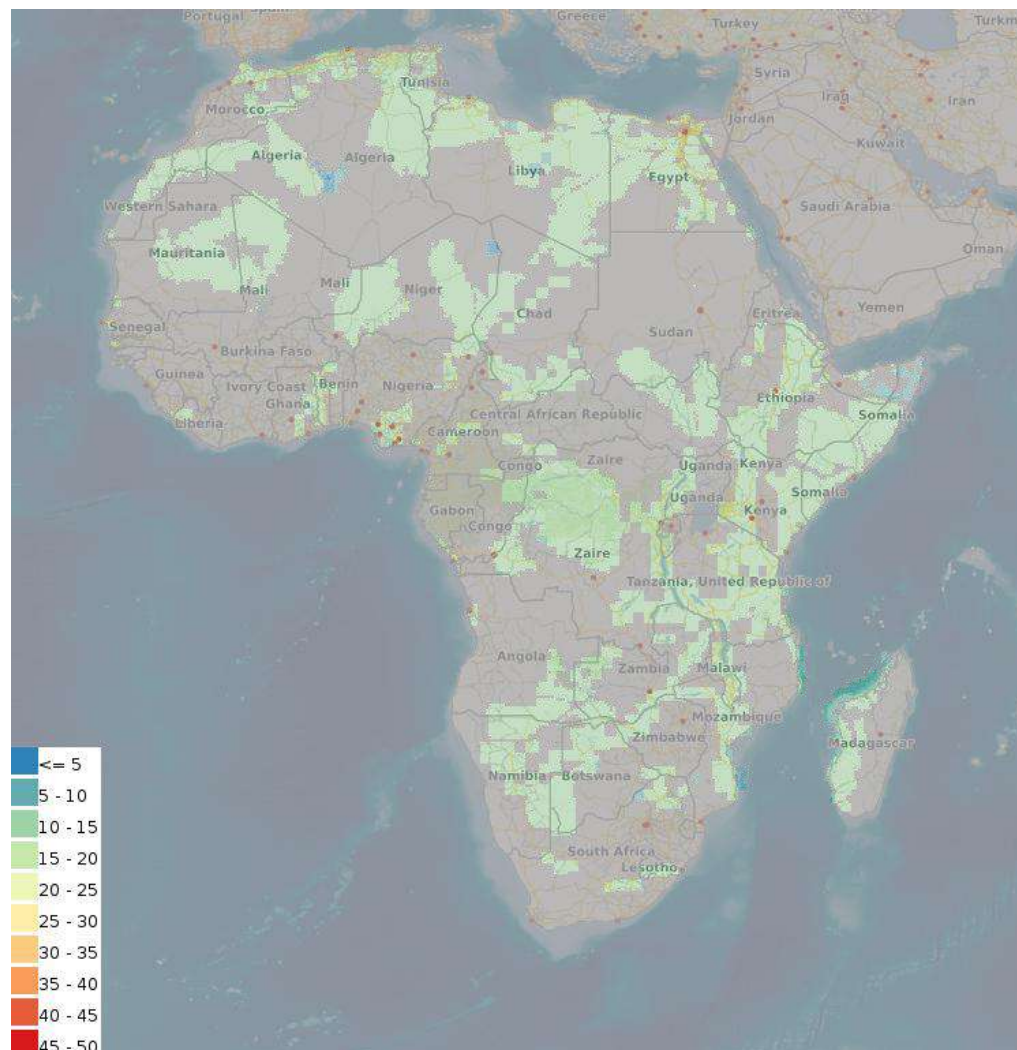
description: Possible cooling capacity for a Cooling Absorption System for Building cooling in the upupside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Cold for Cooling Absorption System (upupside)**

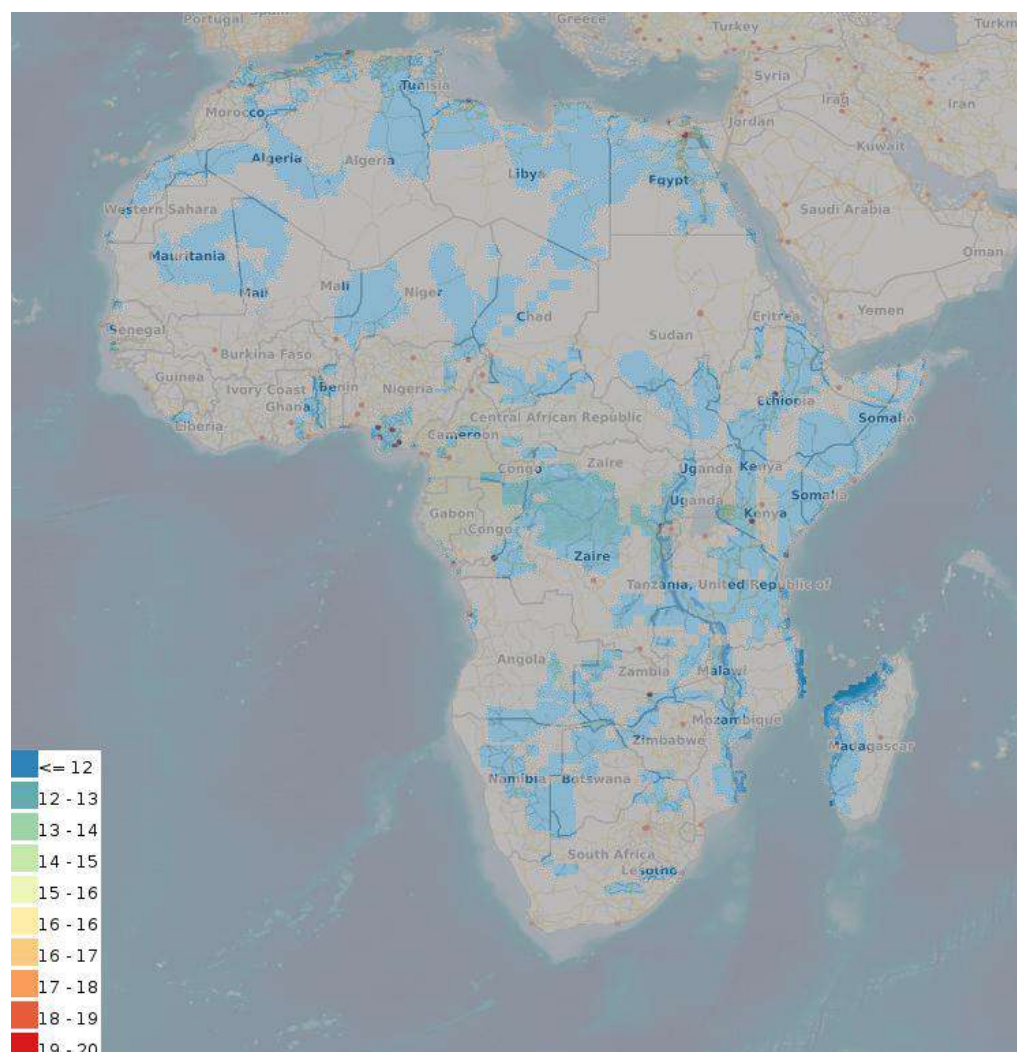
description: Possible cost of cold for a Cooling Absorption System for Building cooling in the upside scenario

keywords: Absorption Refrigeration System, Cold production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Cooling Absorption System (upupside)**

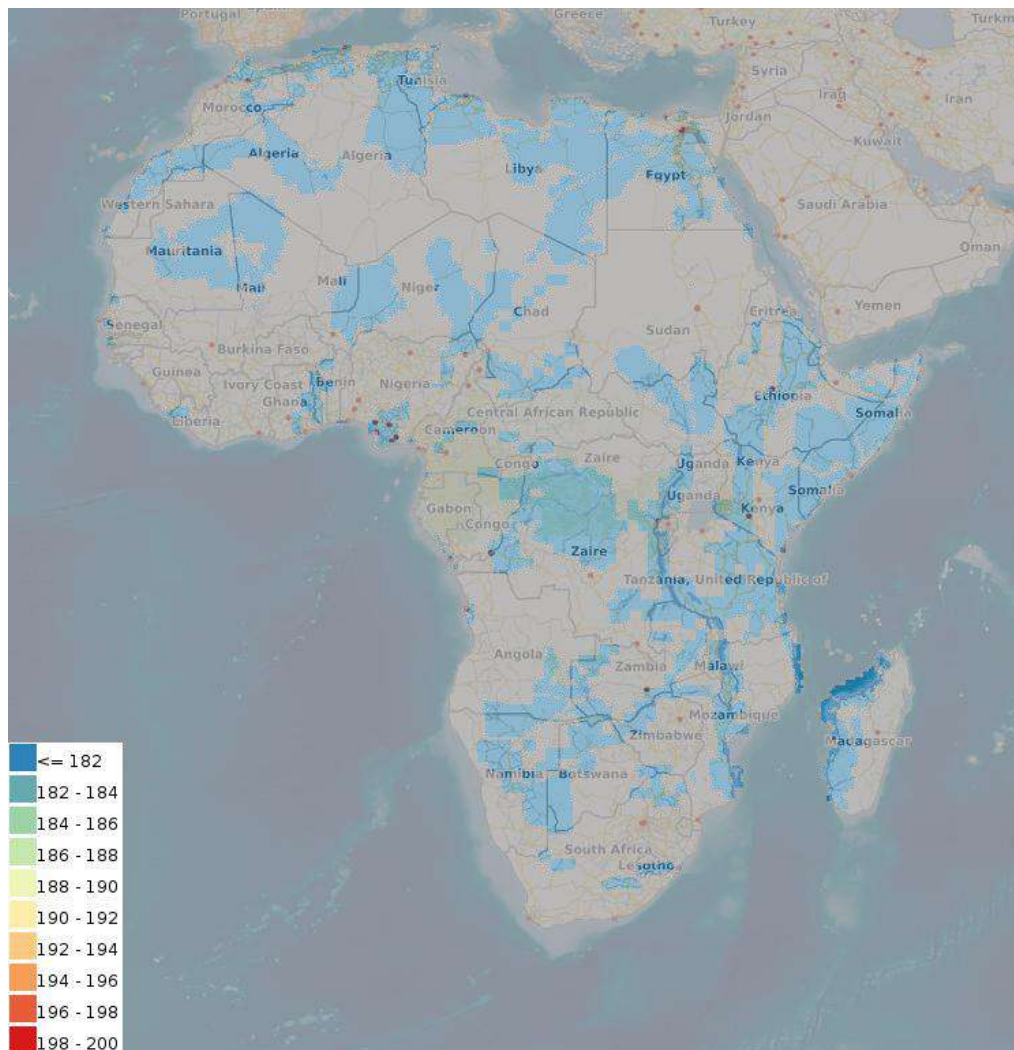
description: Possible environmental impact of climate change for a Cooling Absorption System for Building cooling in the upupside scenario

keywords: Absorption Refrigeration System, Cooling system, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat coefficient of performance (basecase)**

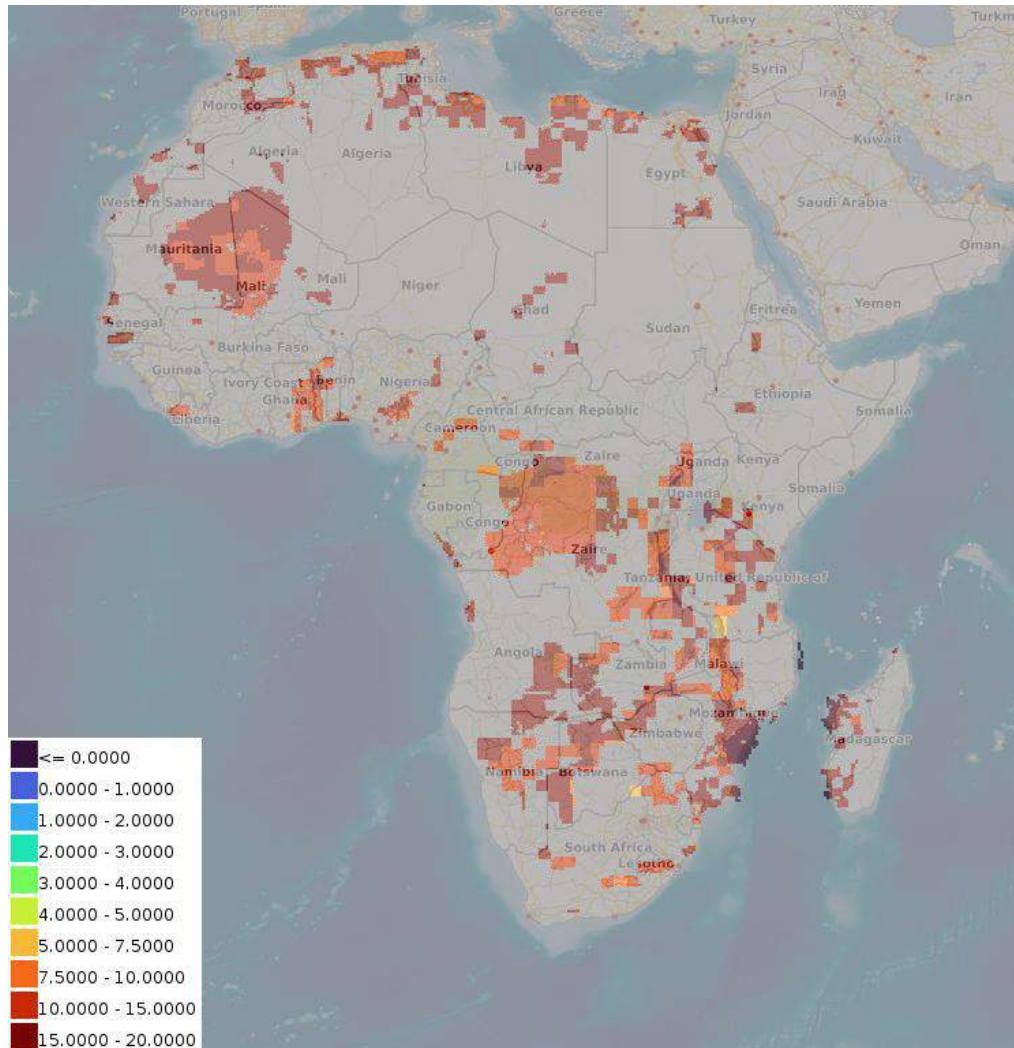
description: Direct heat coefficient of performance (basecase)

keywords: Direct heat, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat: pump pressure needed to drive pumps (basecase)**

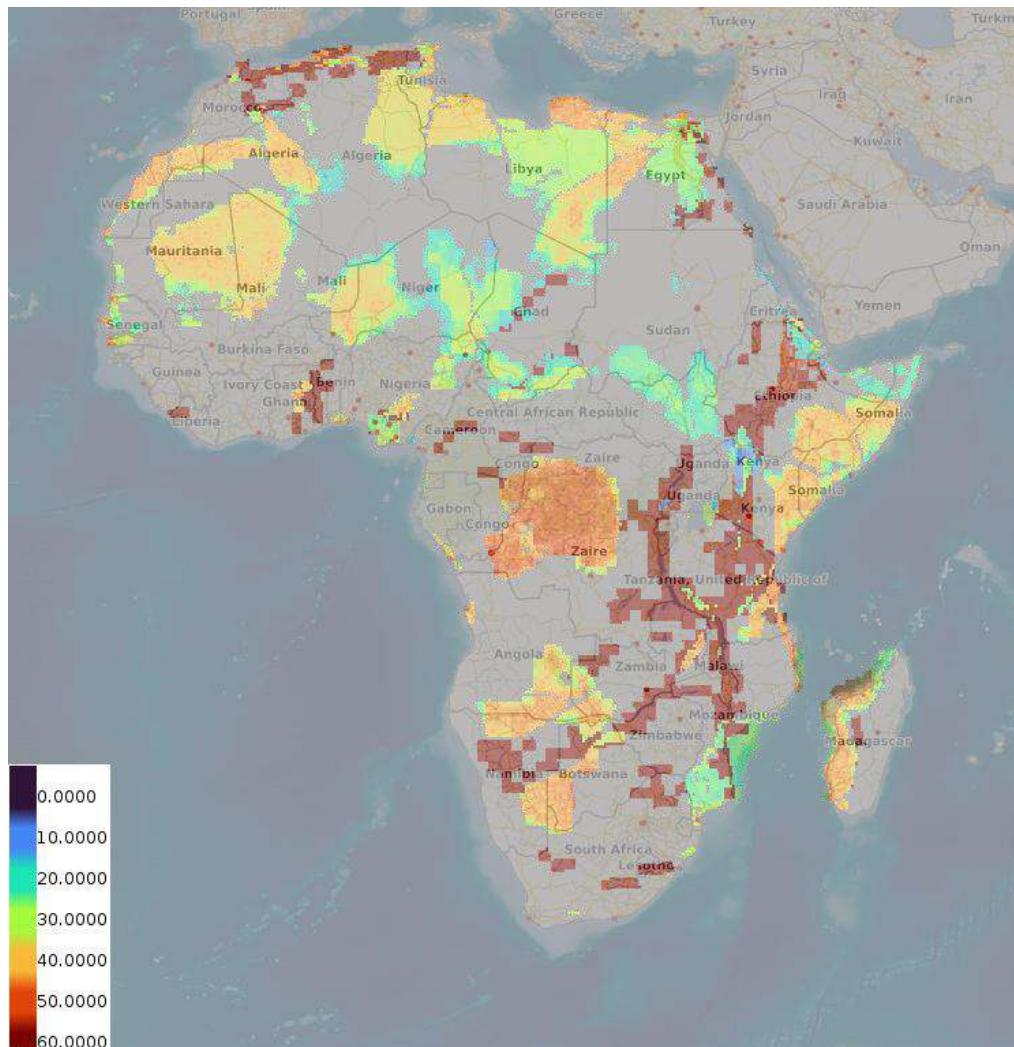
description: Direct heat: pump pressure needed to drive pumps (basecase)

keywords: Direct Heat, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat production flow rate (basecase)**

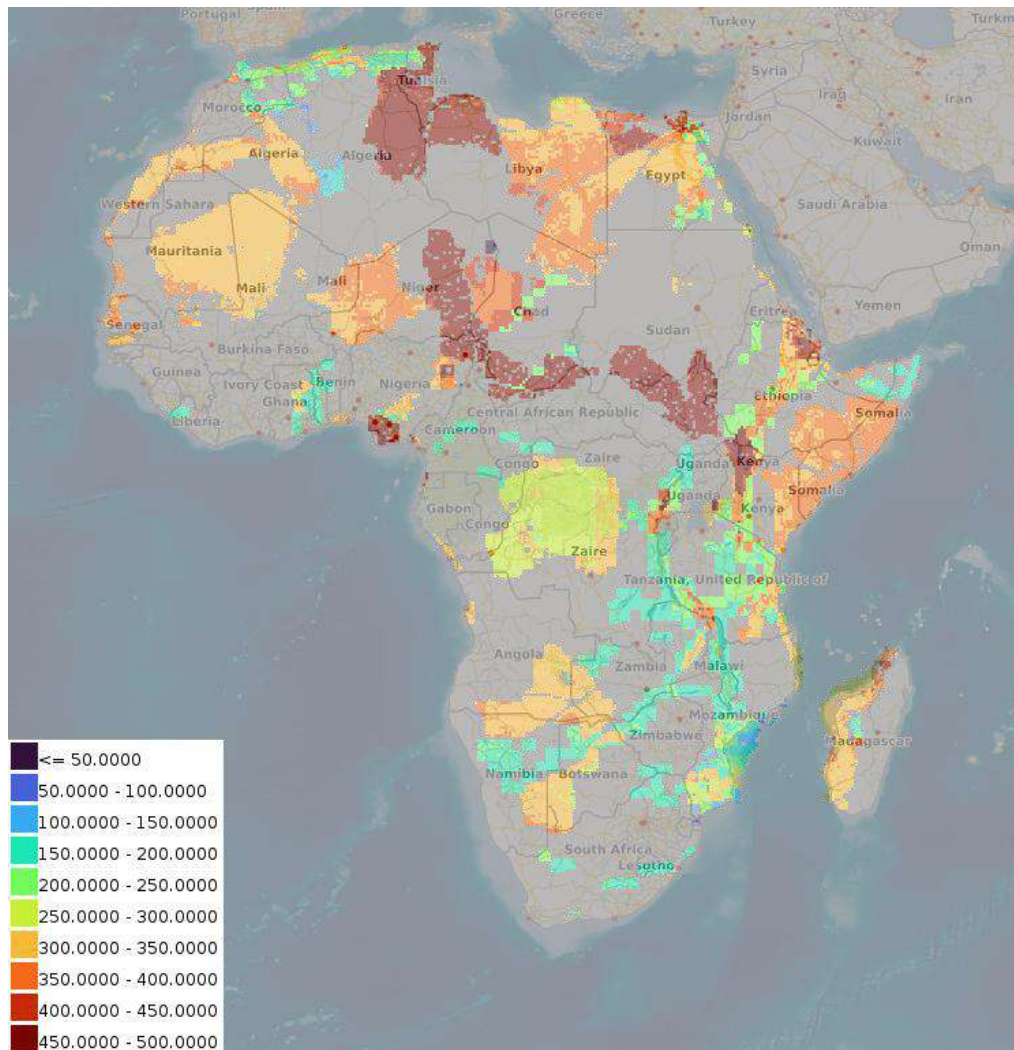
description: Direct heat production flow rate (basecase)

keywords: Direct heat, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat doublet net production (basecase)**

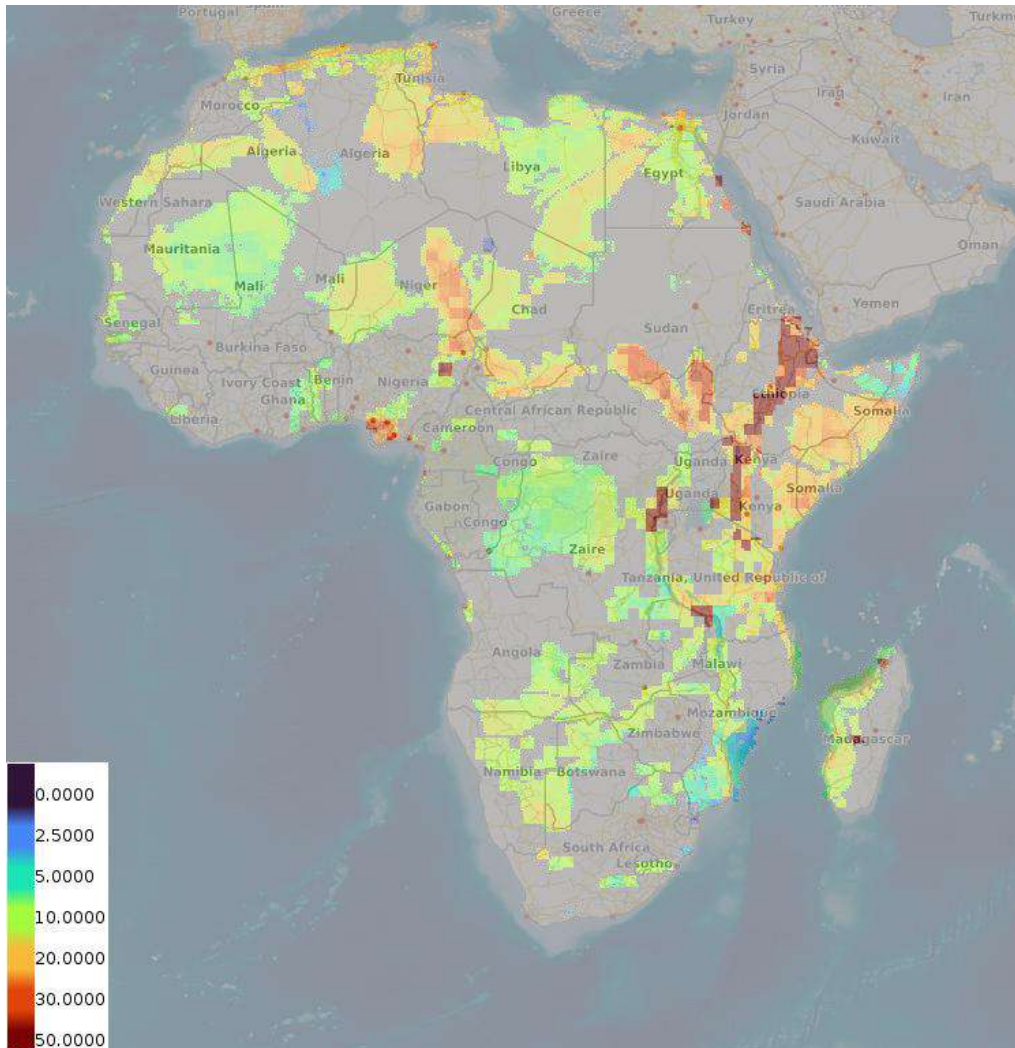
description: Direct heat doublet net production (basecase)

keywords: Direct heat, doublet net production, Africa

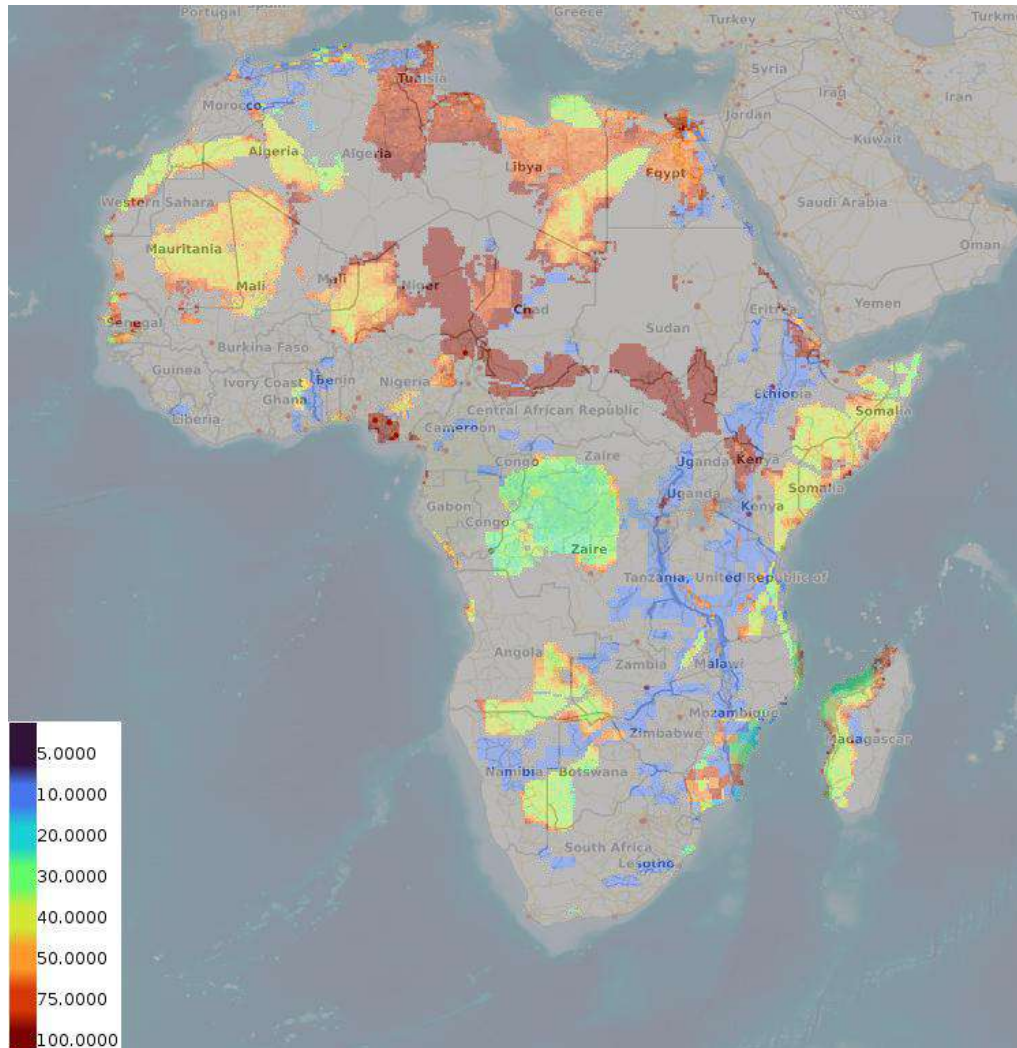
source: [link](#)

date: 2024

coverage: Africa



coverage: Africa



- **Direct heat well distance (basecase)**

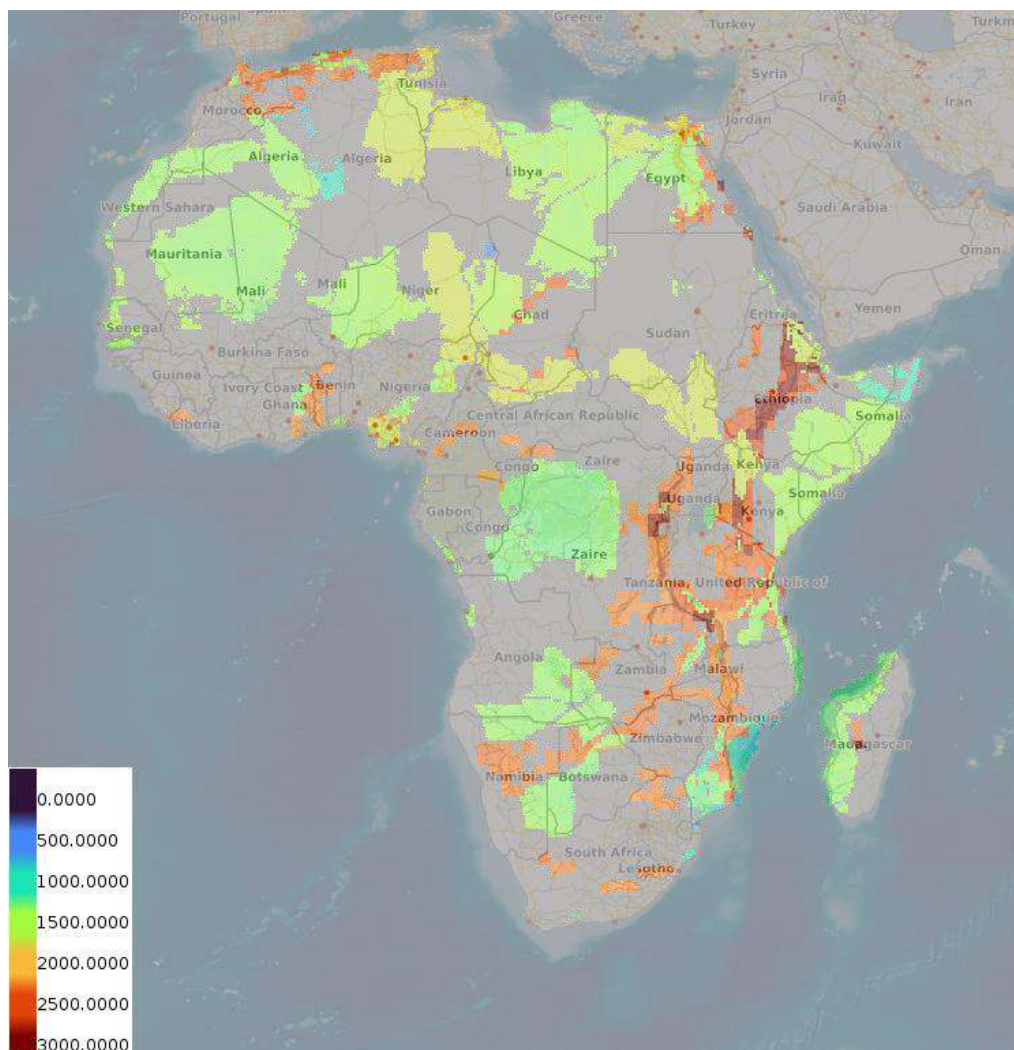
description: Direct heat well distance (basecase)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat optimized depth of the aquifer (basecase)**

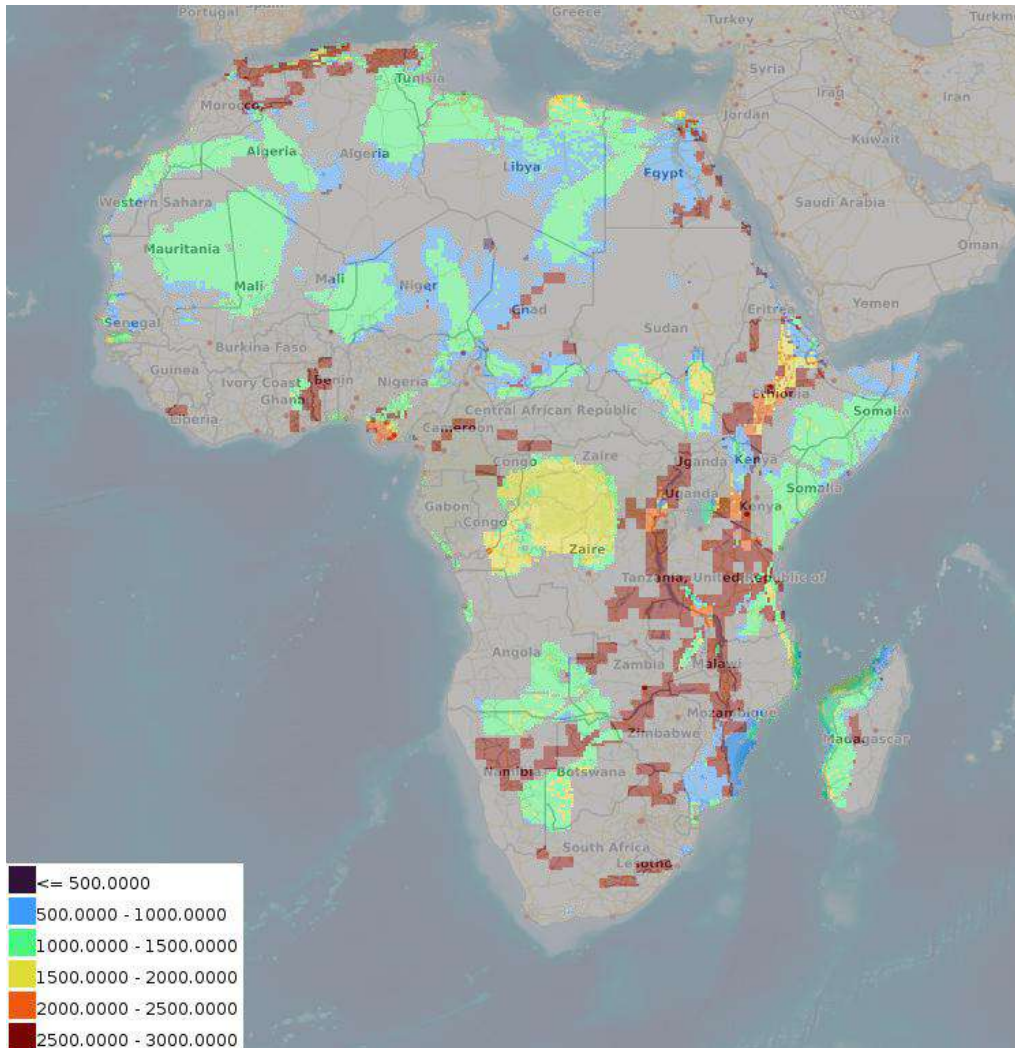
description: Direct heat optimized depth of the aquifer (basecase)

keywords: Direct heat, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat temperature at reservoir (basecase)**

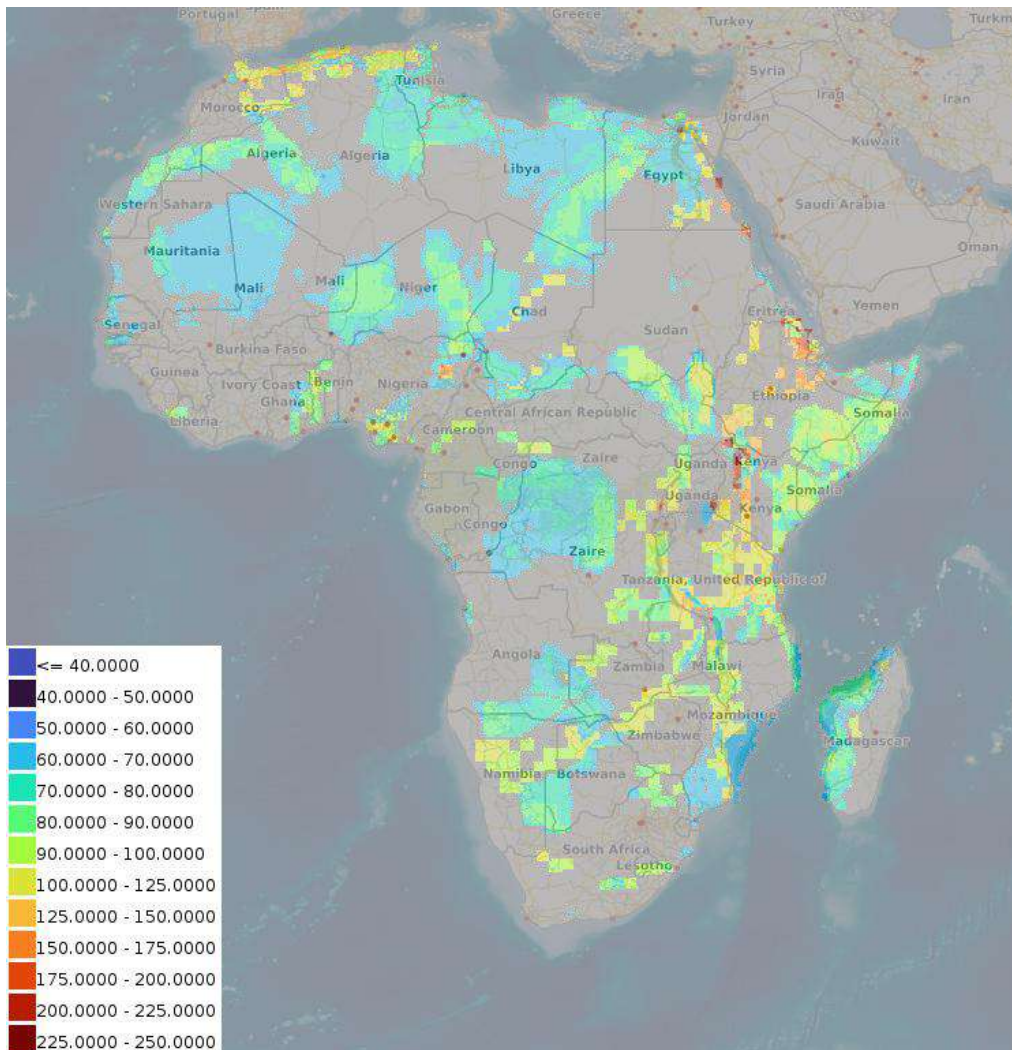
description: Direct heat temperature at reservoir (basecase)

keywords: Direct heat, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat Levelized Costs of Energy (basecase)**

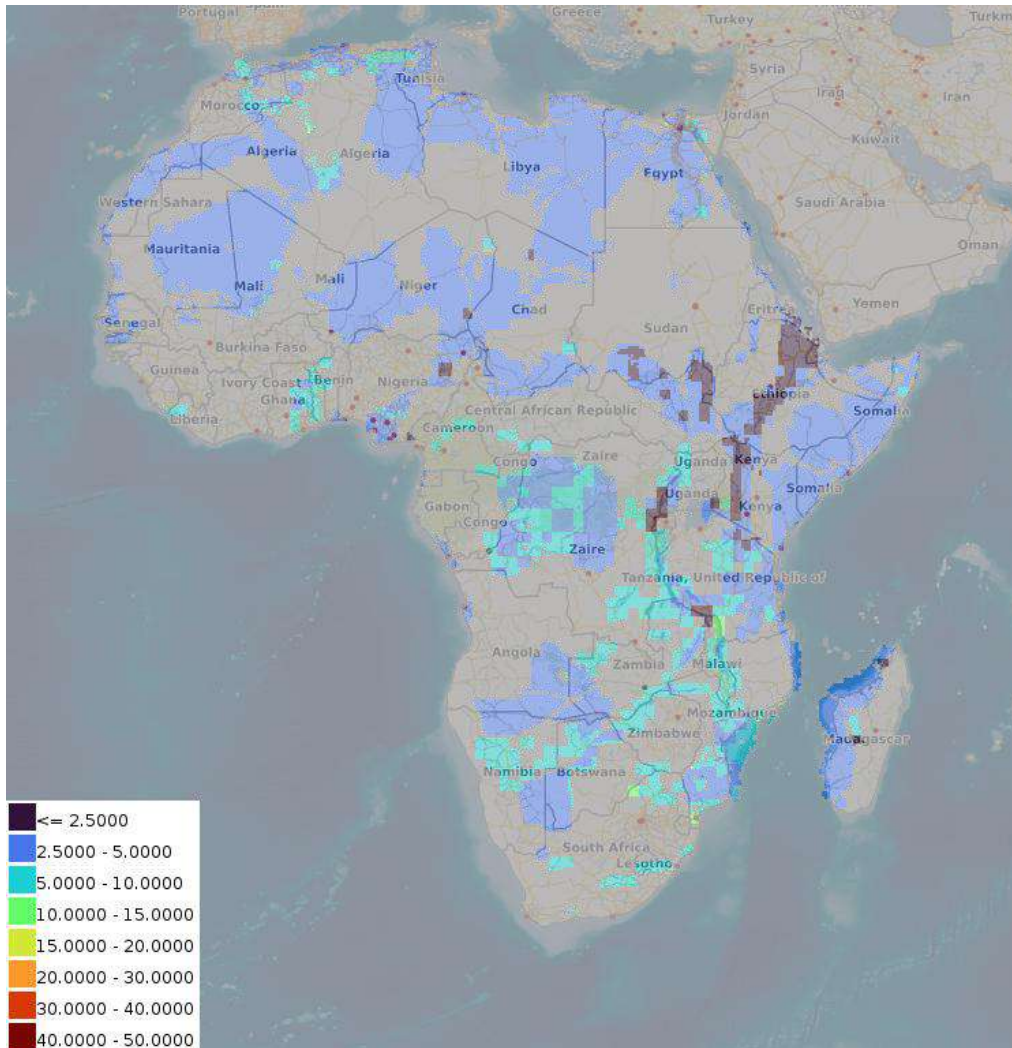
description: Direct heat Levelized Costs of Energy (basecase)

keywords: Direct heat, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat coefficient of performance (upside)**

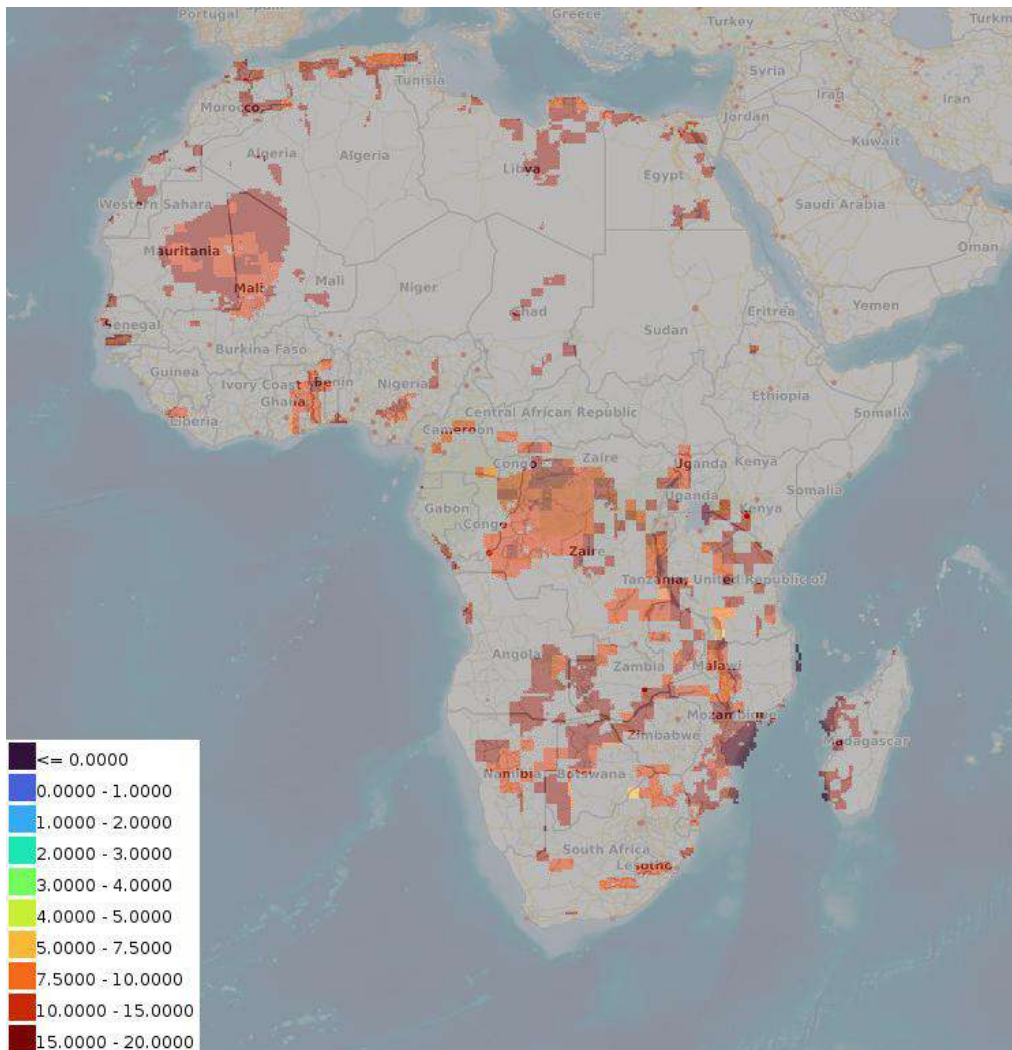
description: Direct heat coefficient of performance (upside)

keywords: Direct heat, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat: pump pressure needed to drive pumps (upside)**

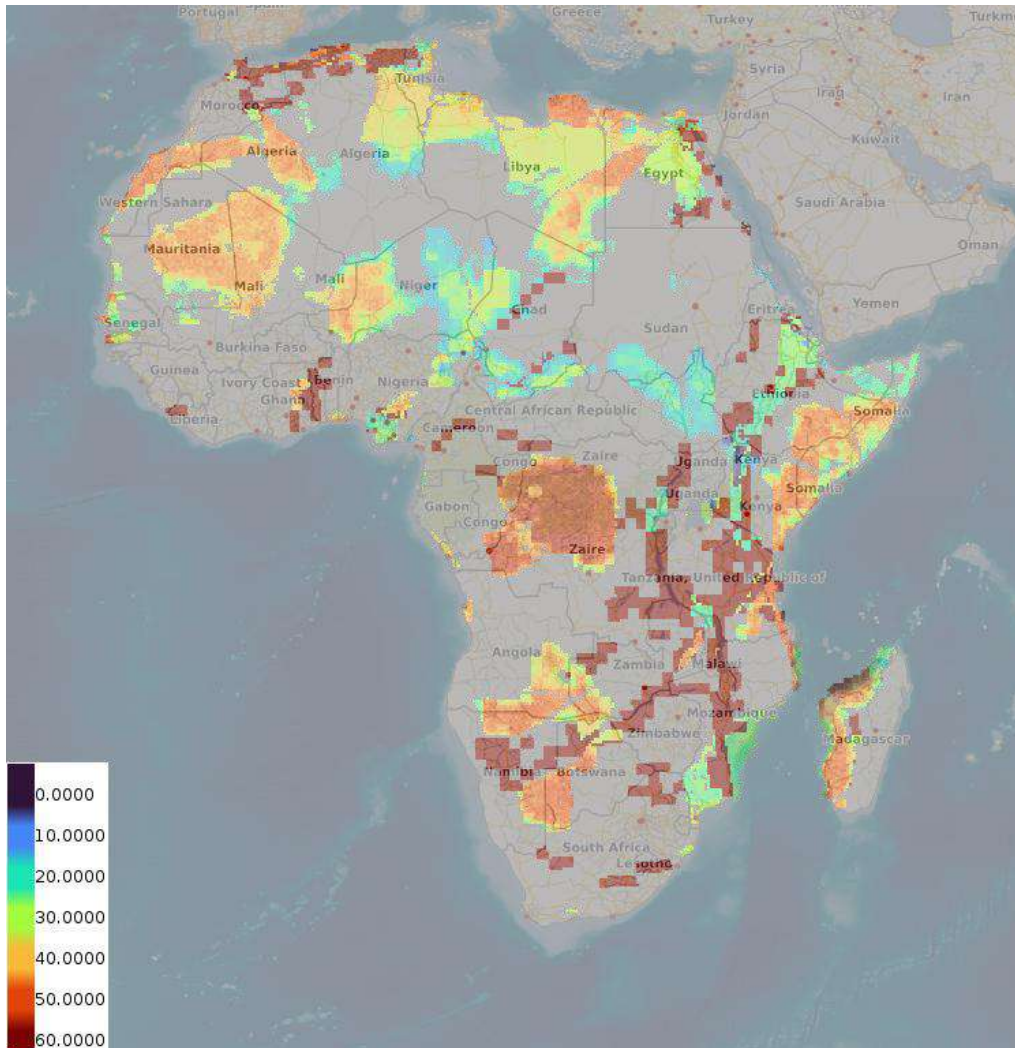
description: Direct heat: pump pressure needed to drive pumps (upside)

keywords: Direct Heat, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat production flow rate (upside)**

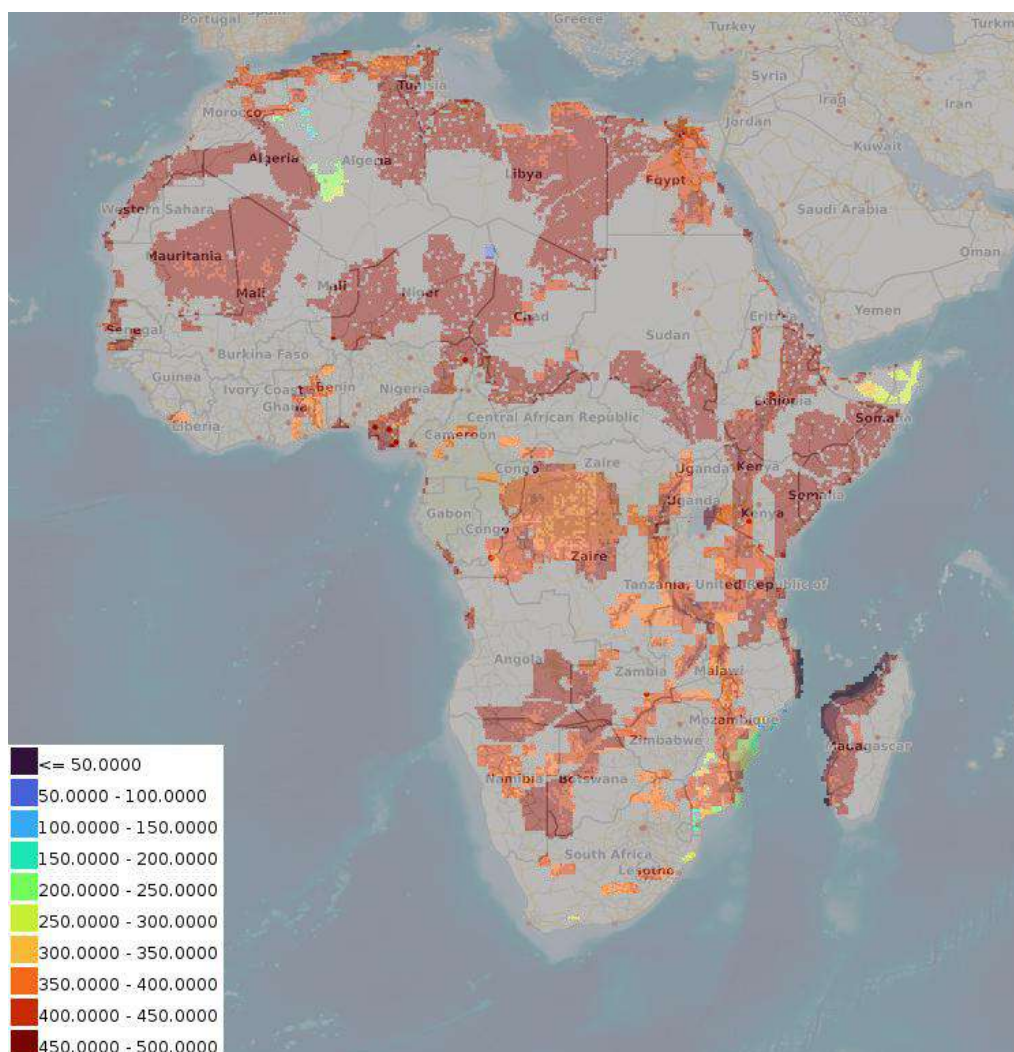
description: Direct heat production flow rate (upside)

keywords: Direct heat, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat doublet net production (upside)**

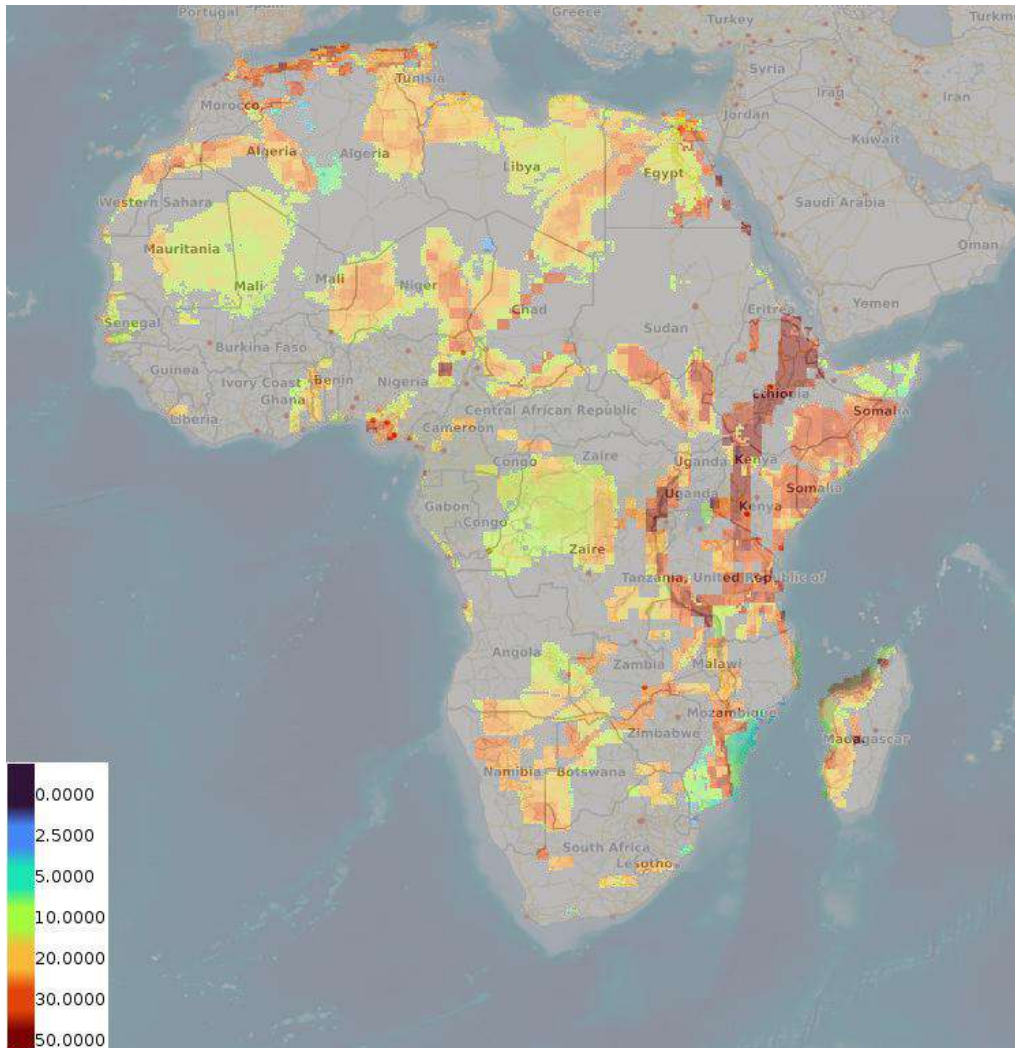
description: Direct heat doublet net production (upside)

keywords: Direct heat, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat transmissivity (upside)**

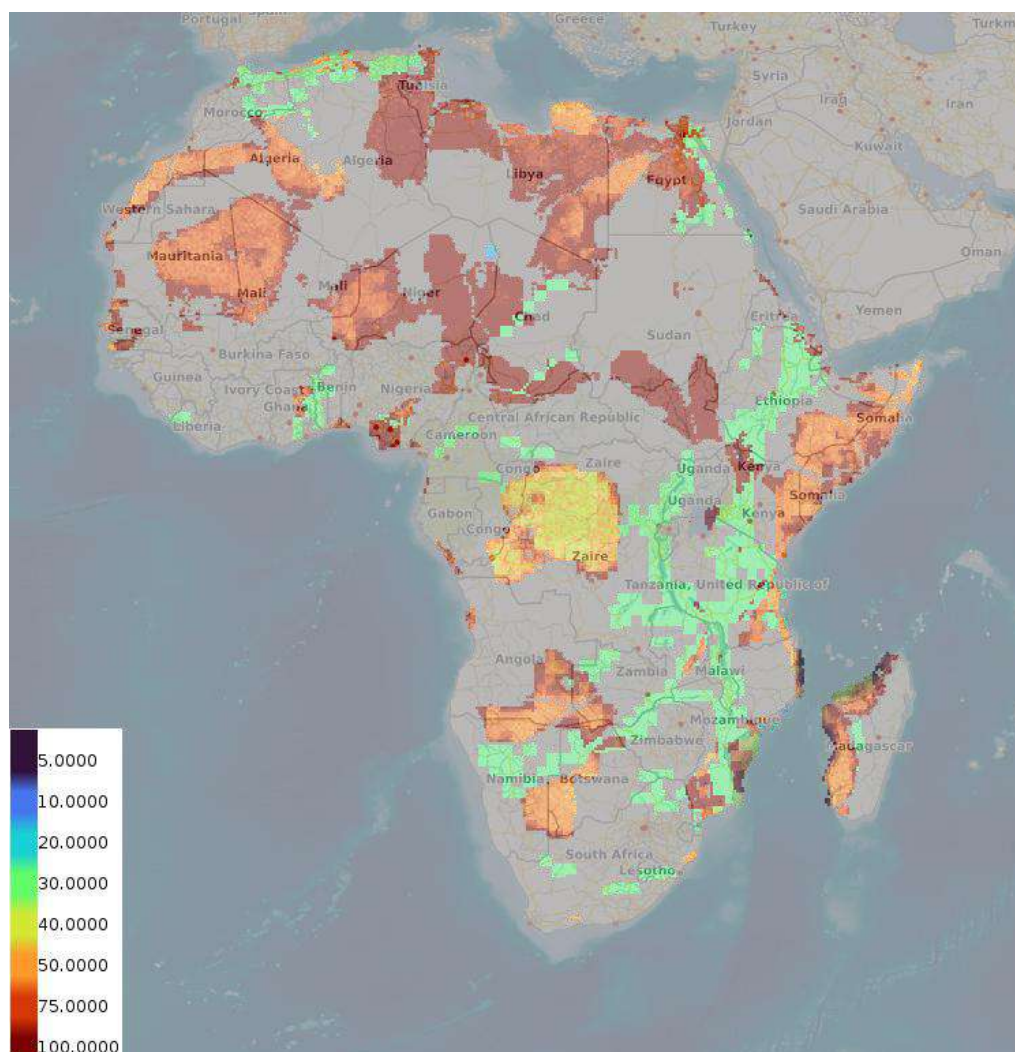
description: Direct heat transmissivity (upside)

keywords: Direct heat, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat well distance (upside)**

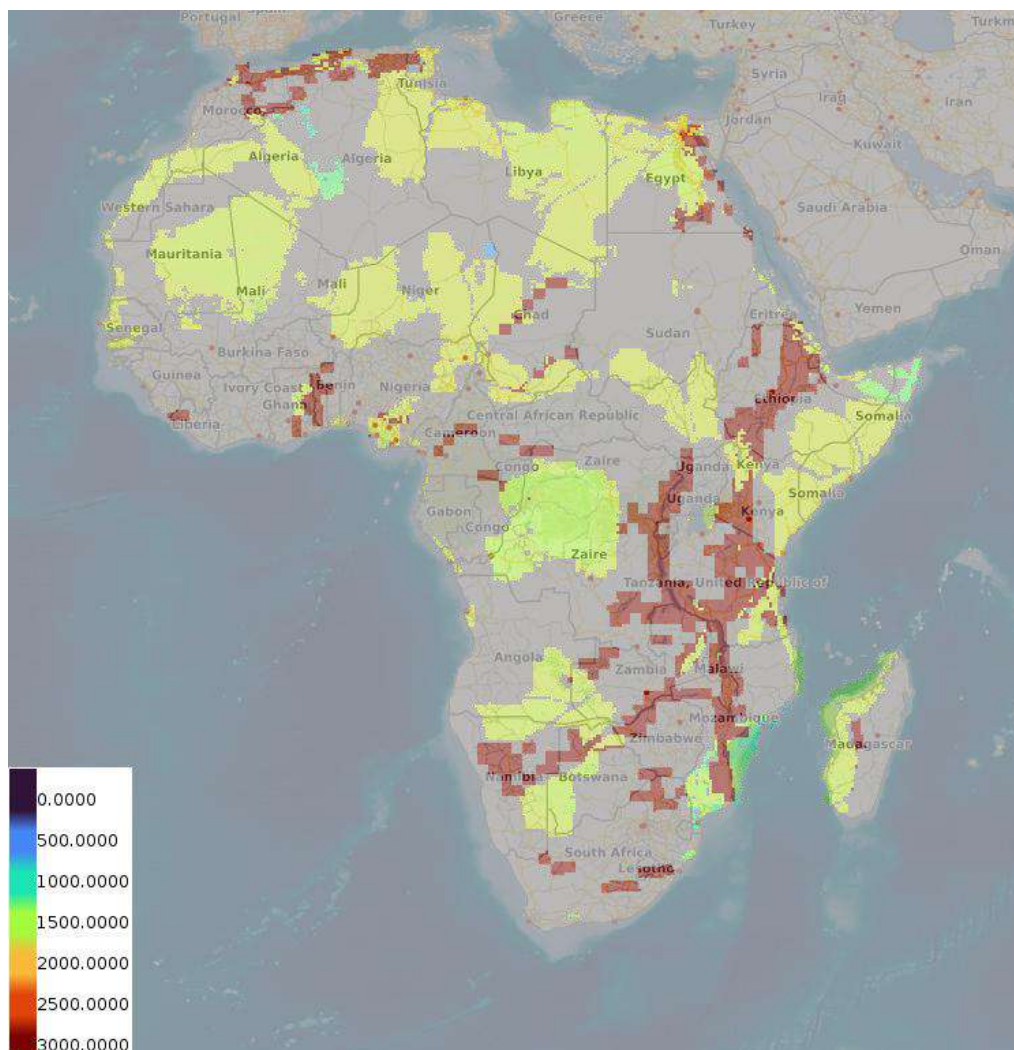
description: Direct heat well distance (upside)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat optimized depth of the aquifer (upside)**

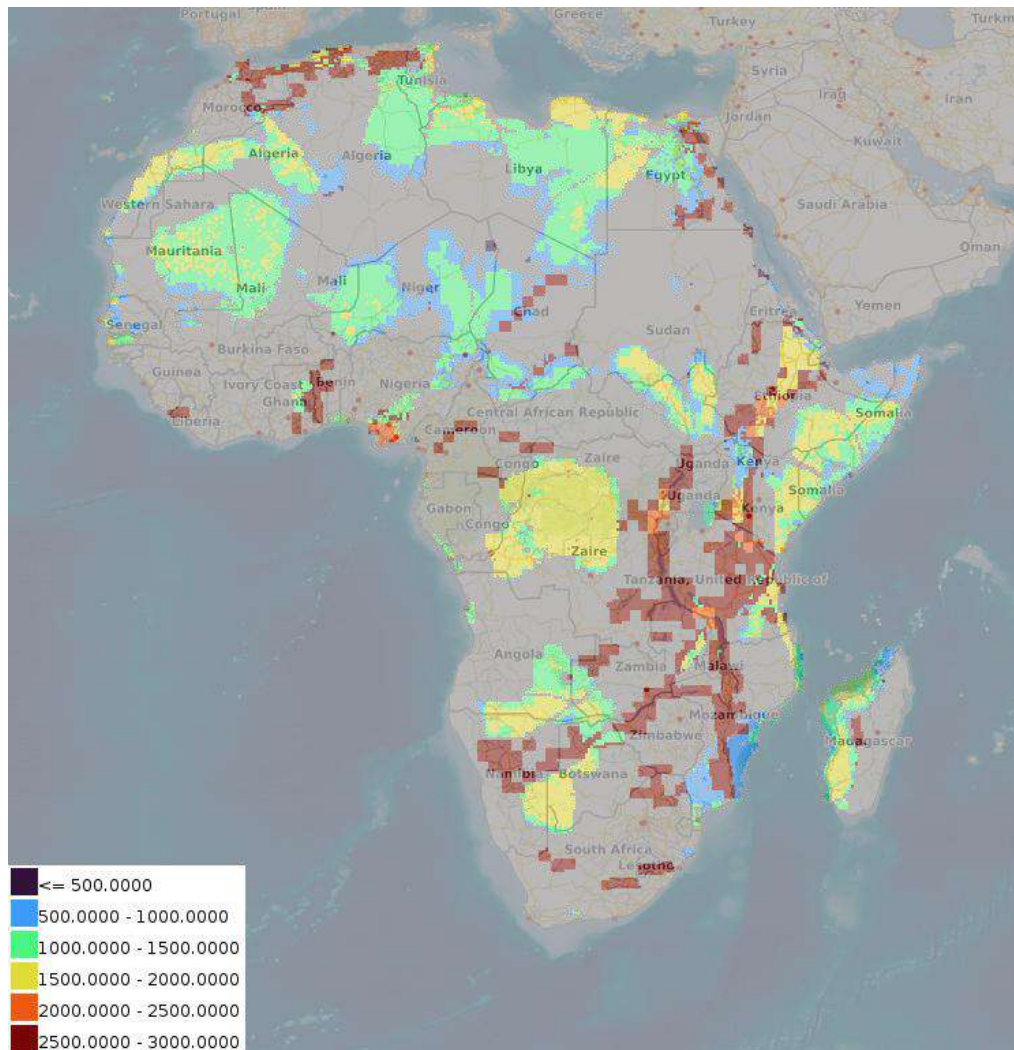
description: Direct heat optimized depth of the aquifer (upside)

keywords: Direct heat, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat temperature at reservoir (upside)**

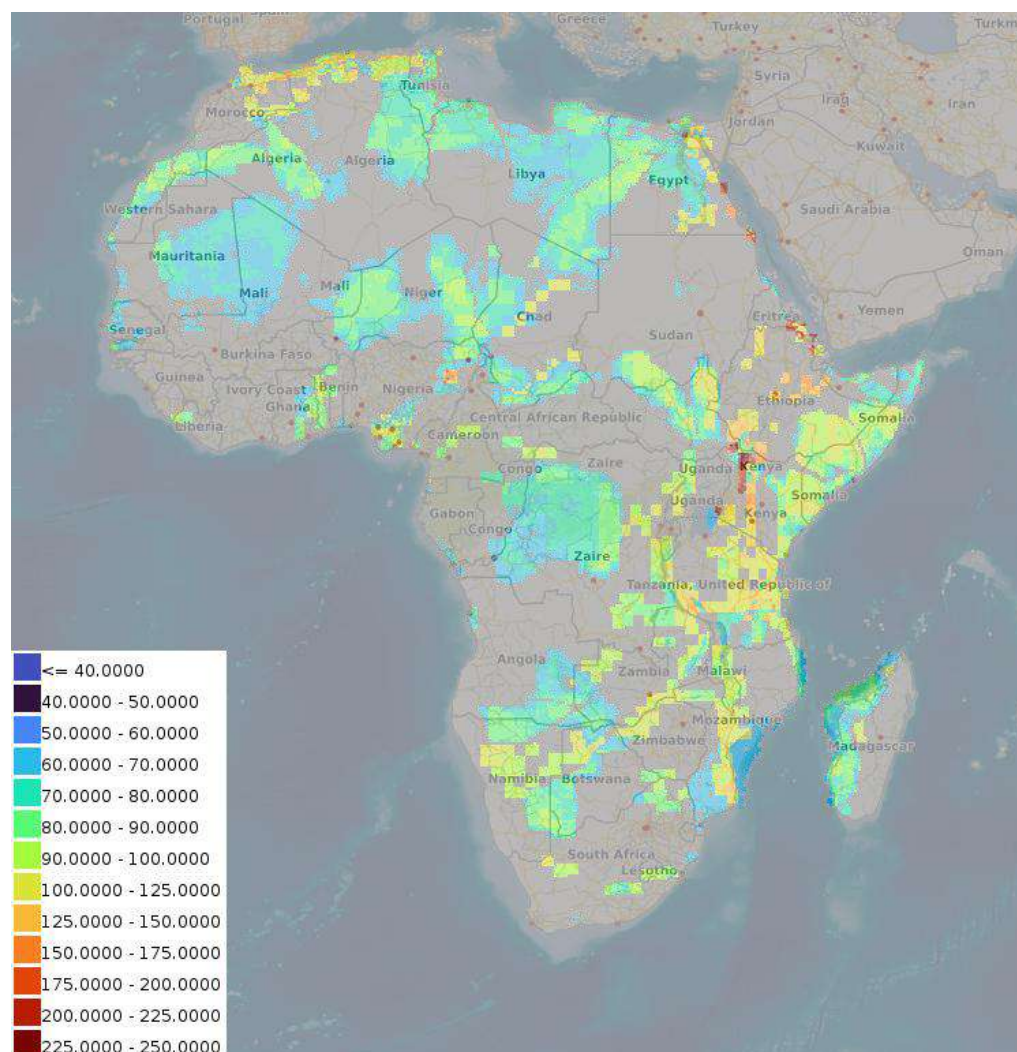
description: Direct heat temperature at reservoir (upside)

keywords: Direct heat, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat Levelized Costs of Energy (upside)**

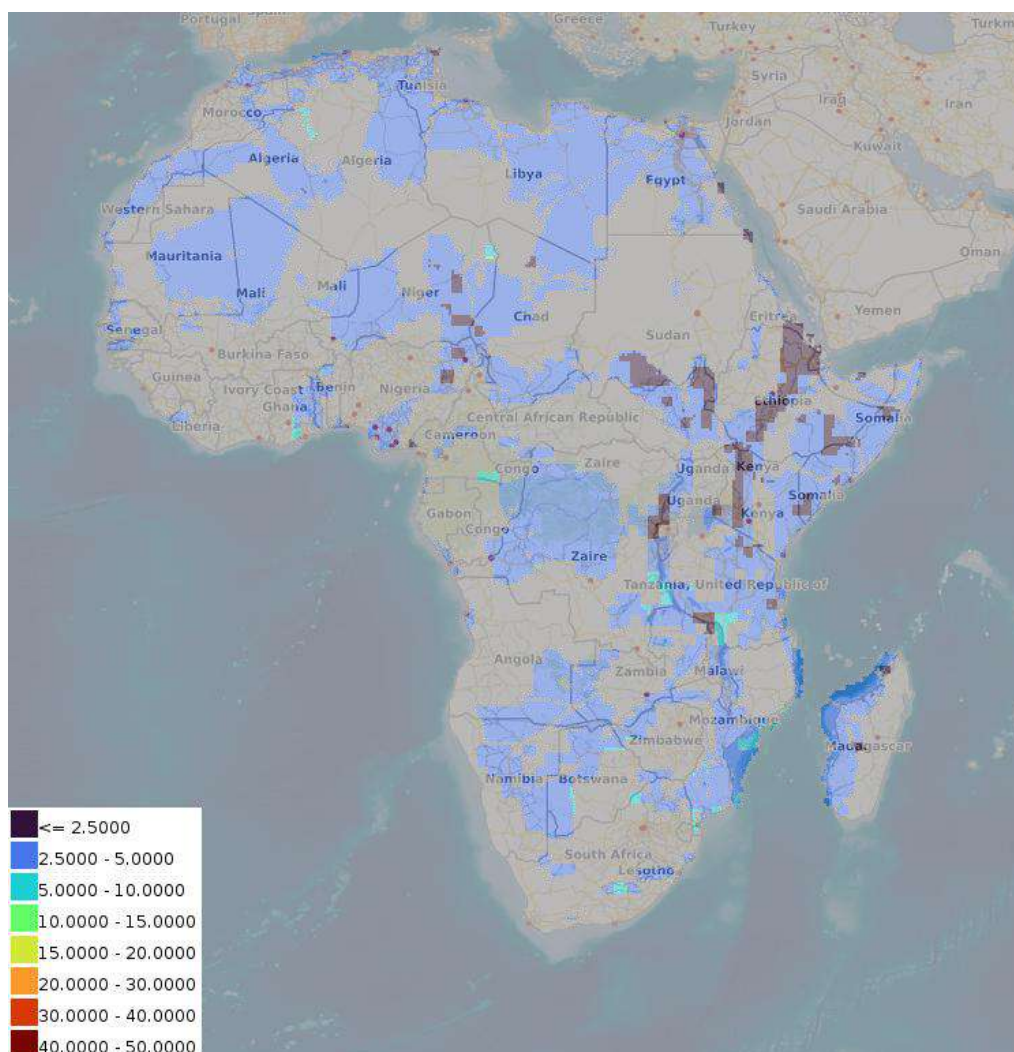
description: Direct heat Levelized Costs of Energy (upside)

keywords: Direct heat, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat coefficient of performance (upupside)**

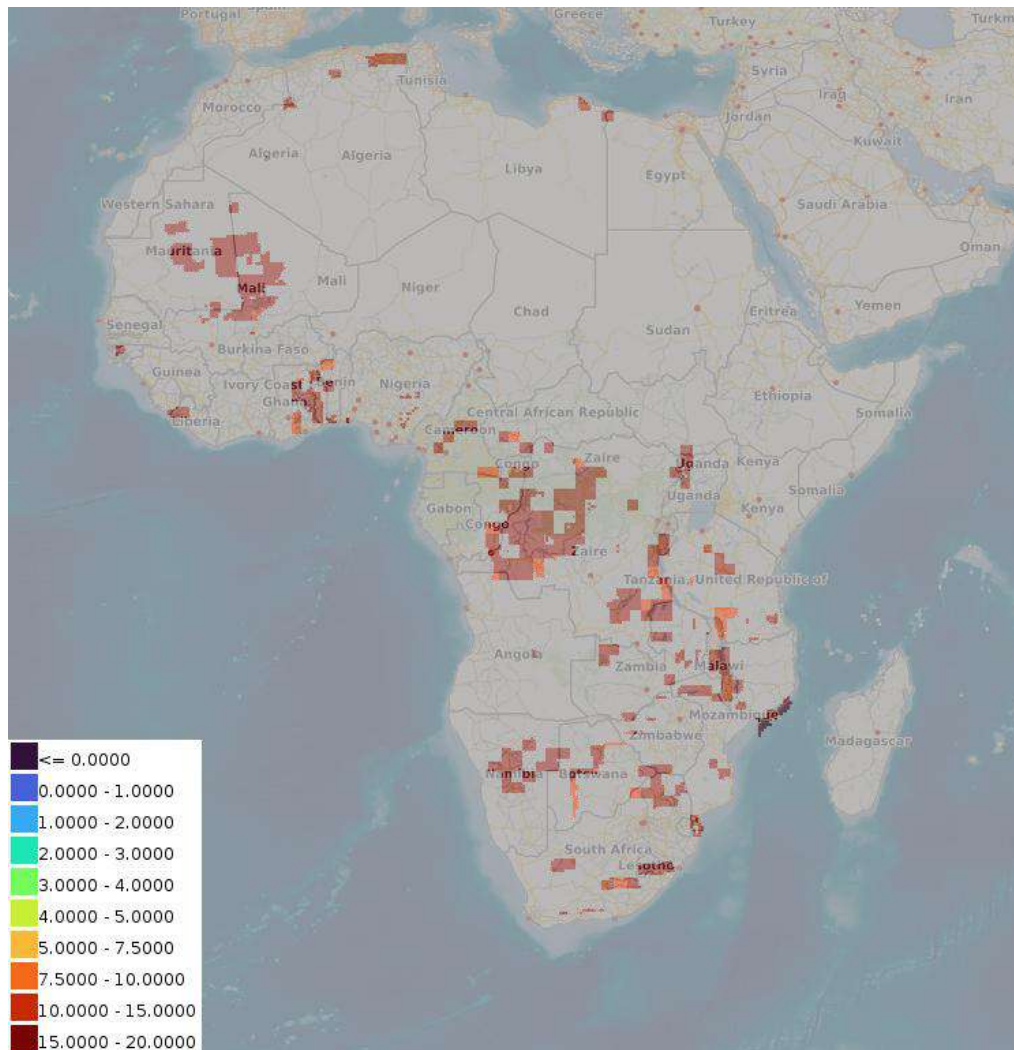
description: Direct heat coefficient of performance (upupside)

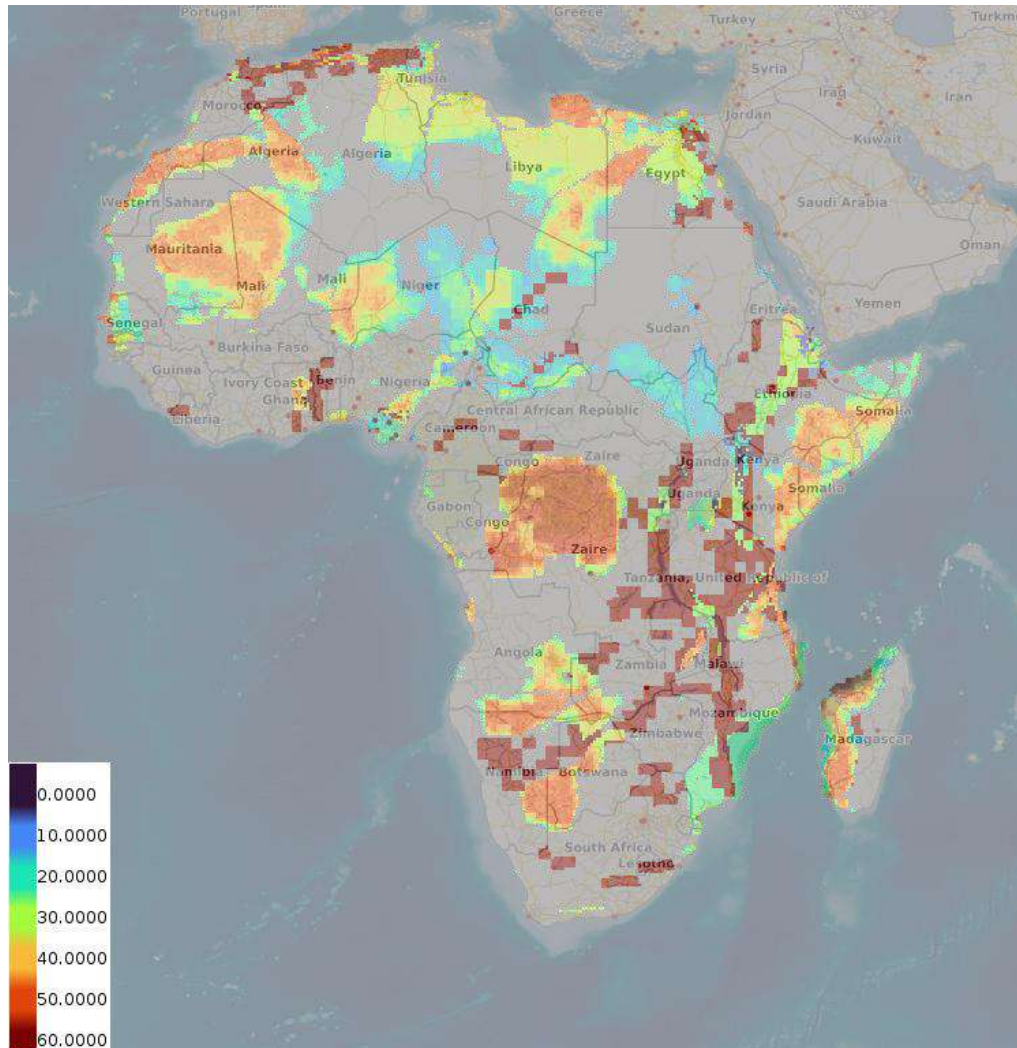
keywords: Direct heat, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa





- **Direct heat production flow rate (upupside)**

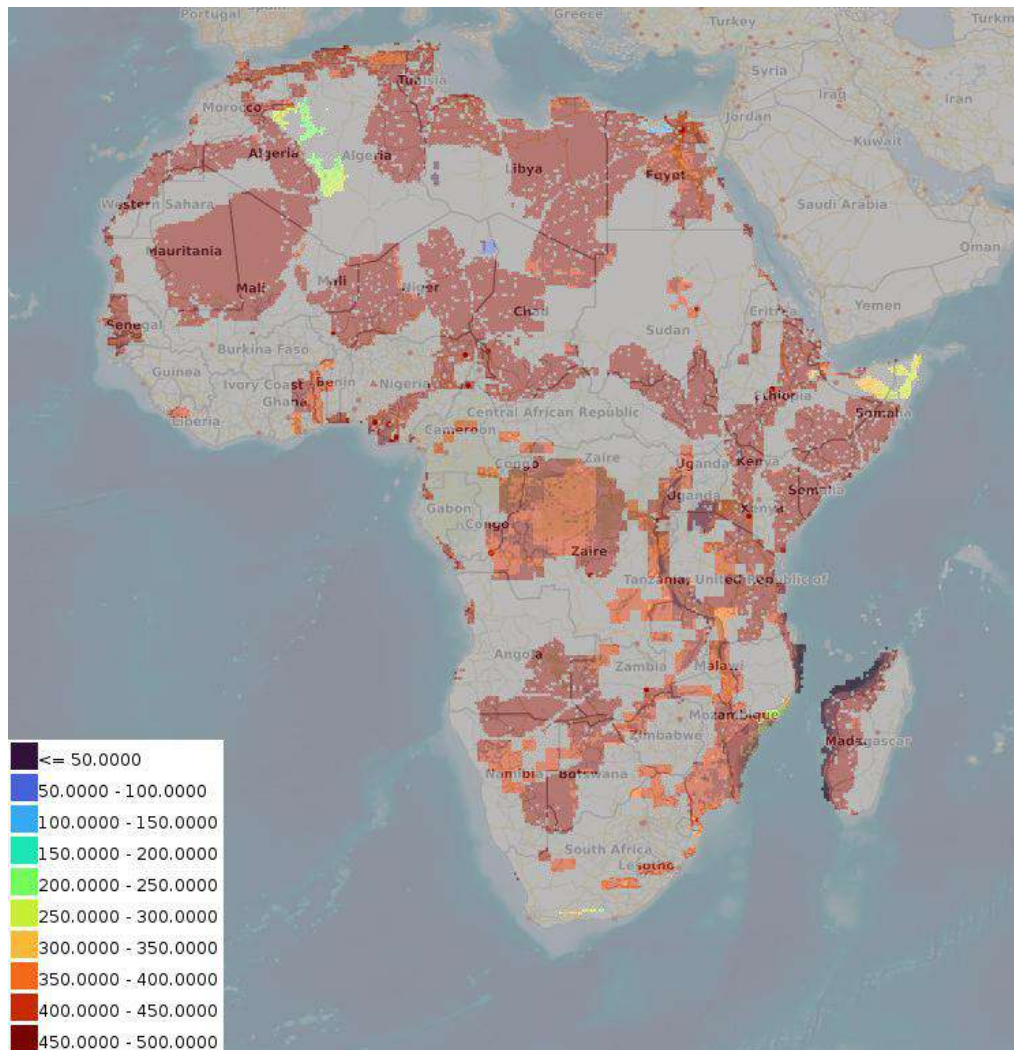
description: Direct heat production flow rate (upupside)

keywords: Direct heat, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat doublet net production (upupside)**

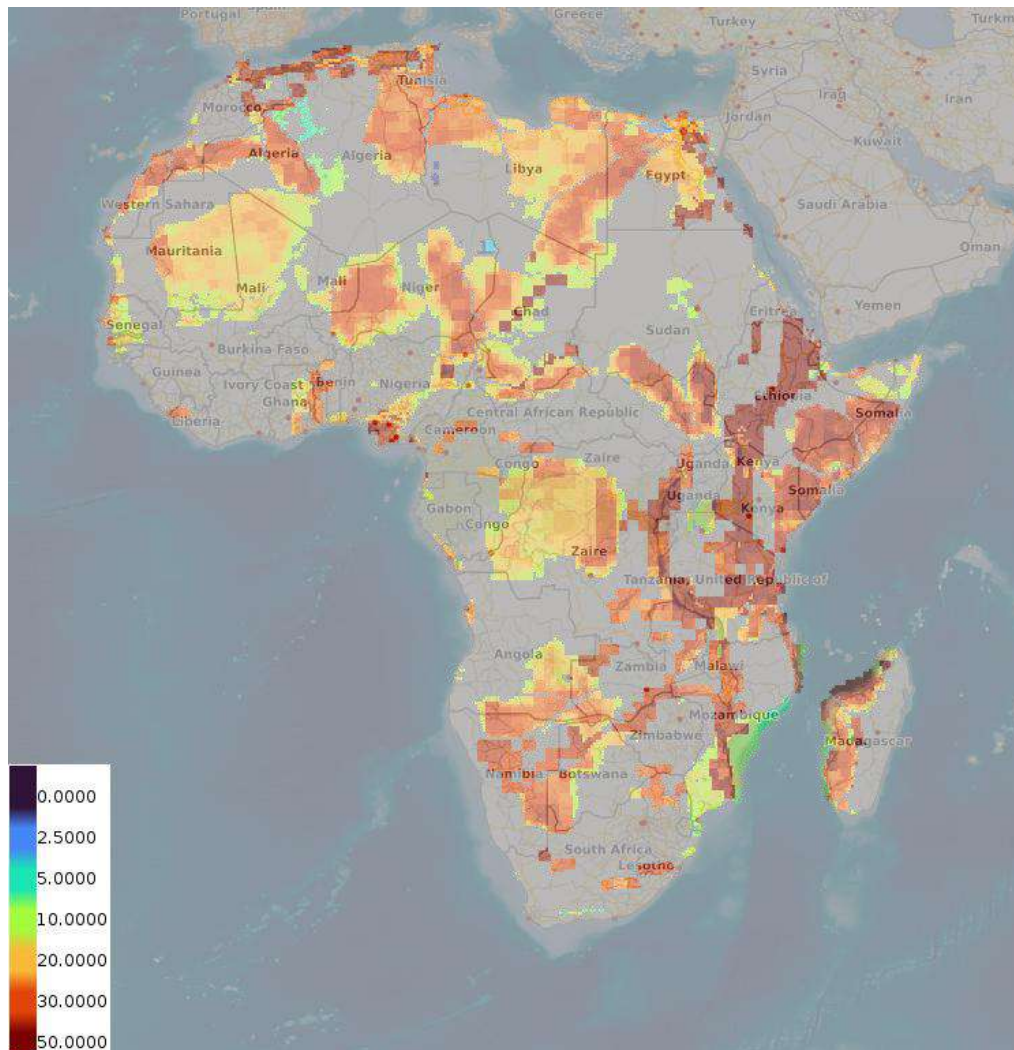
description: Direct heat doublet net production (upupside)

keywords: Direct heat, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat transmissivity (upupside)**

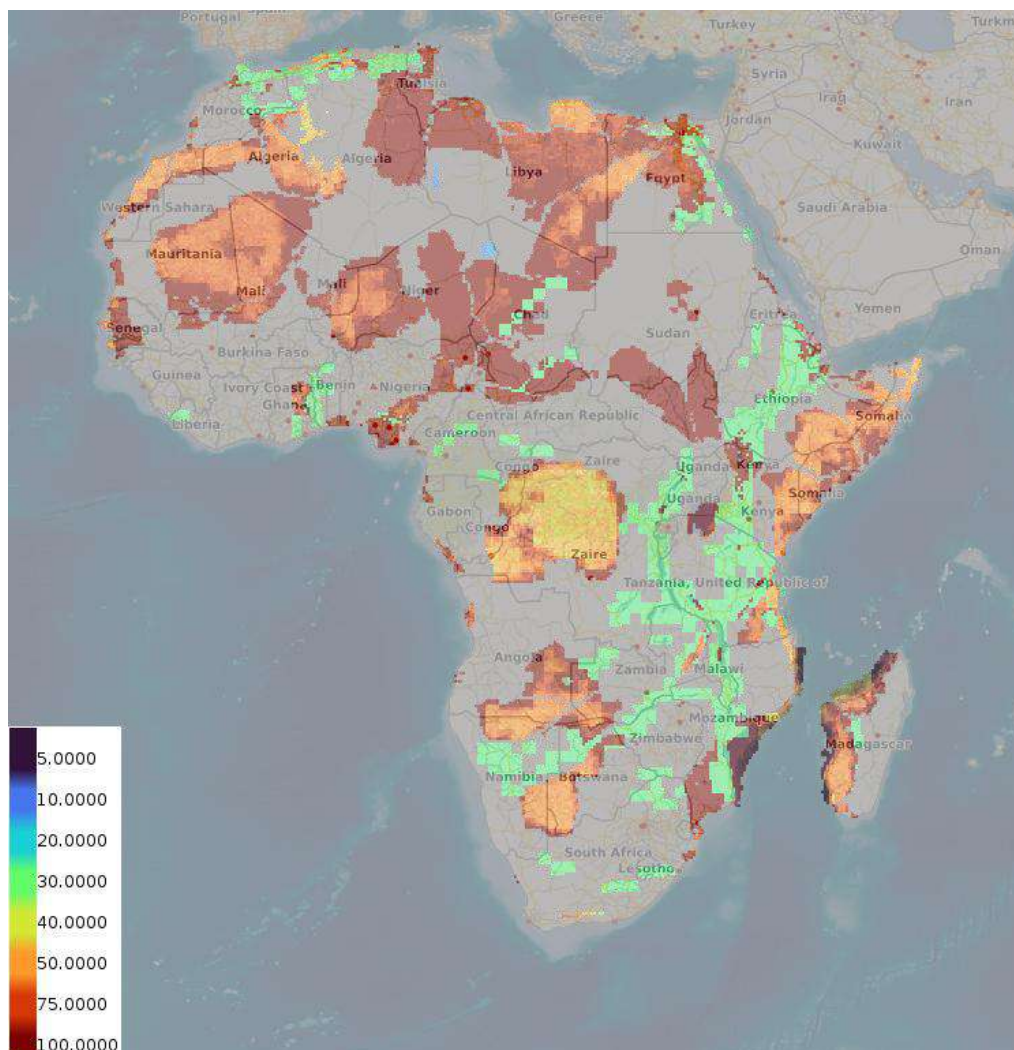
description: Direct heat transmissivity (upupside)

keywords: Direct heat, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat well distance (upupside)**

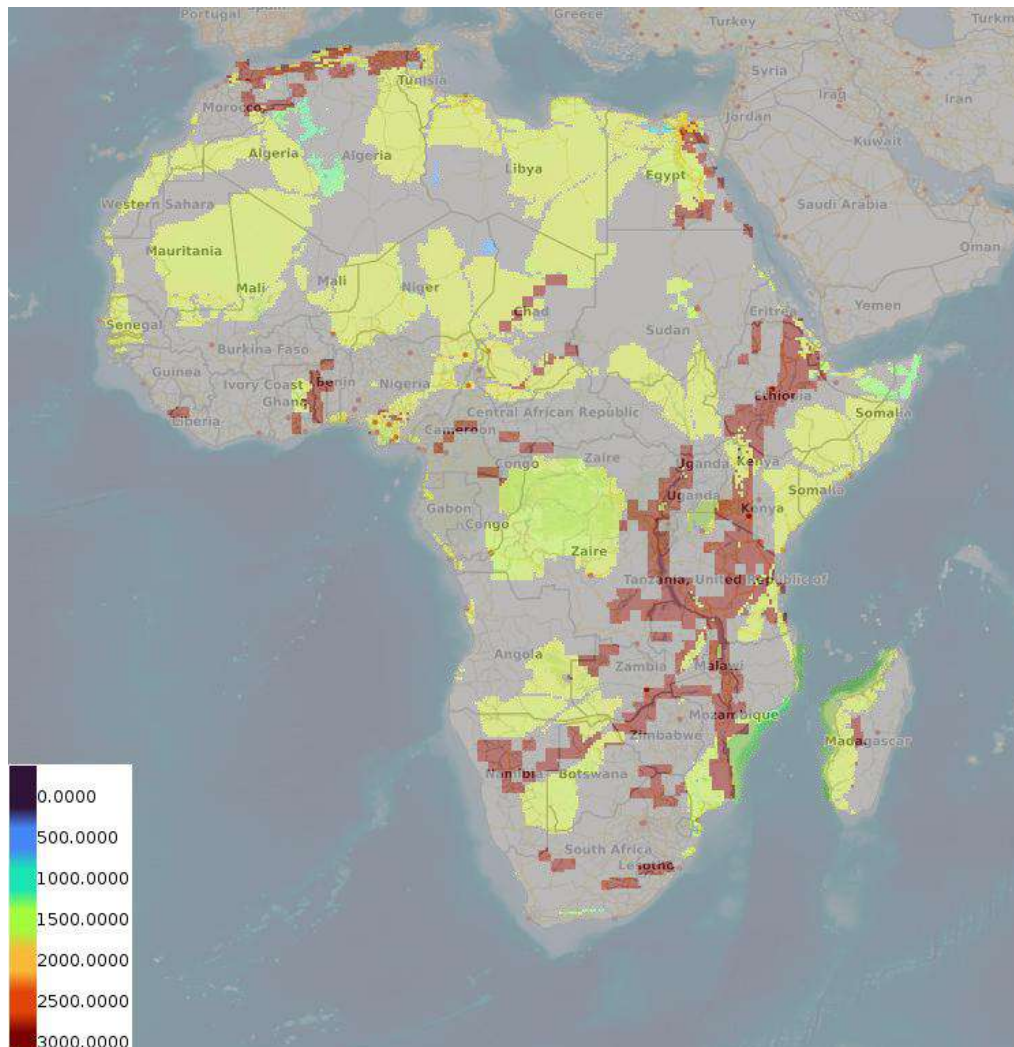
description: Direct heat well distance (upupside)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat optimized depth of the aquifer (upupside)**

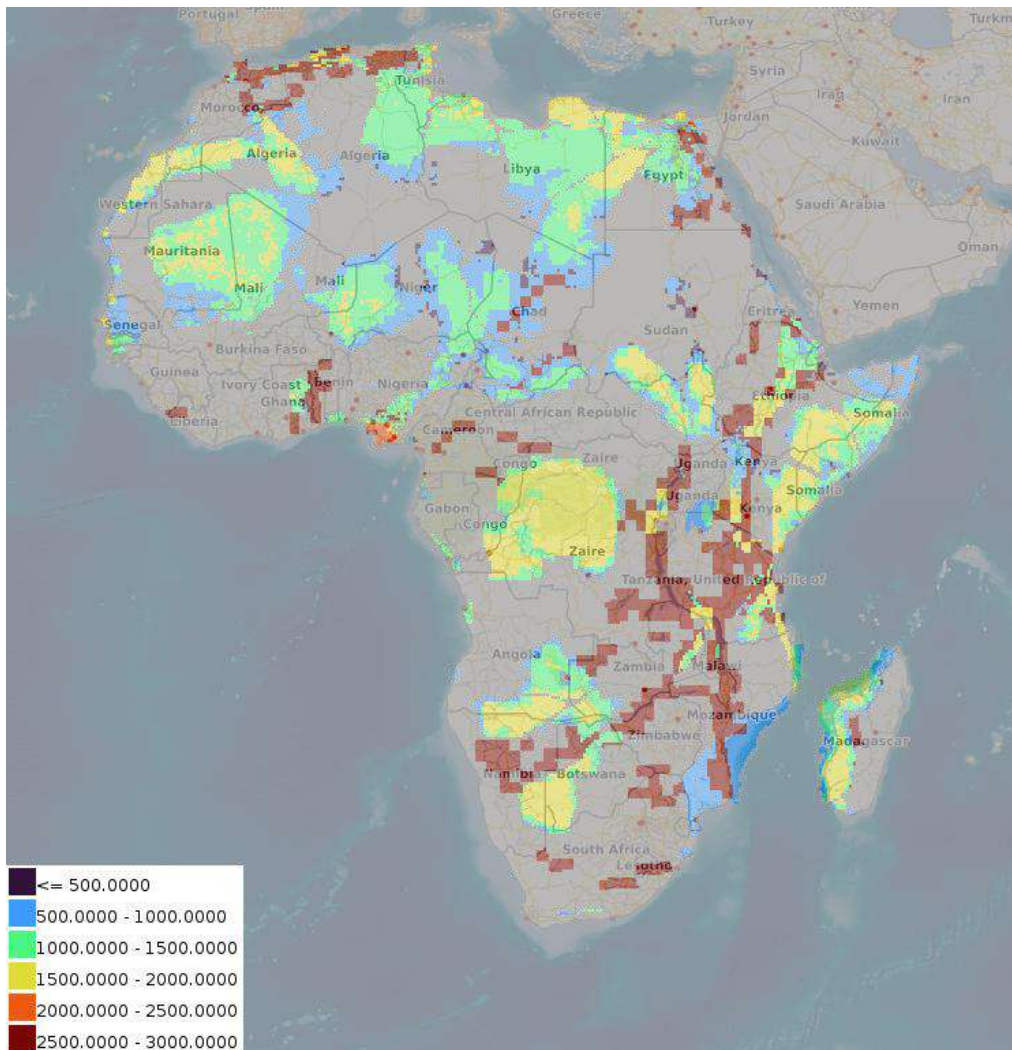
description: Direct heat optimized depth of the aquifer (upupside)

keywords: Direct heat, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat temperature at reservoir (upupside)**

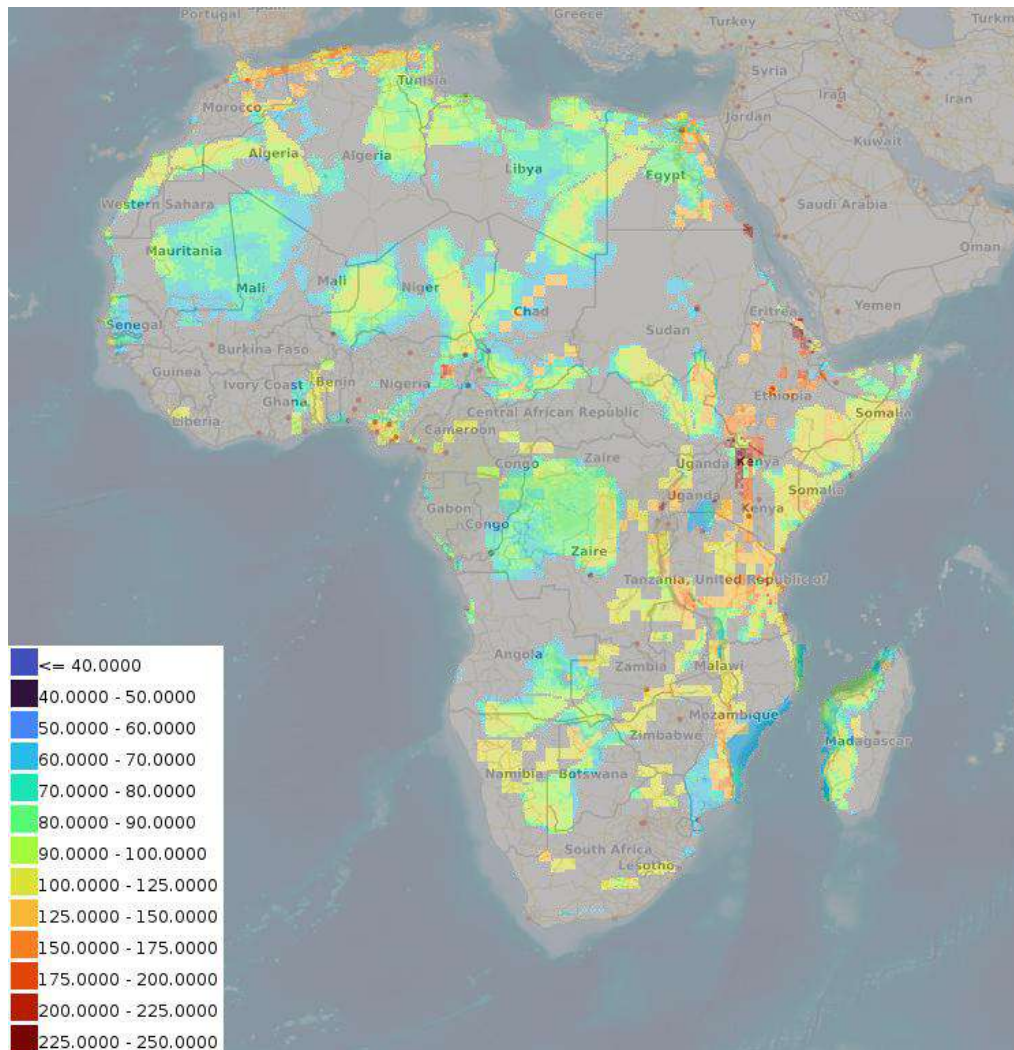
description: Direct heat temperature at reservoir (upupside)

keywords: Direct heat, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat Levelized Costs of Energy (upupside)**

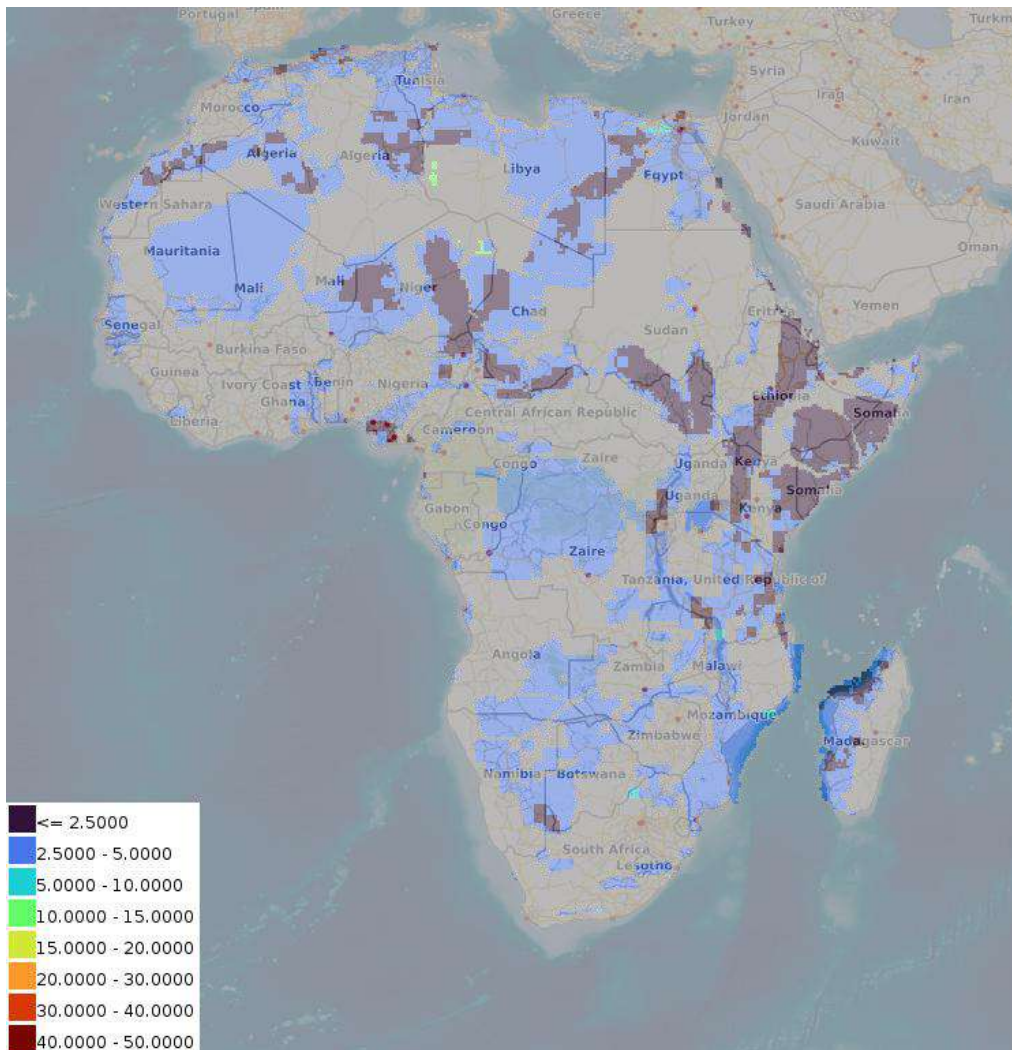
description: Direct heat Levelized Costs of Energy (upupside)

keywords: Direct heat, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for Direct Use (base case)**

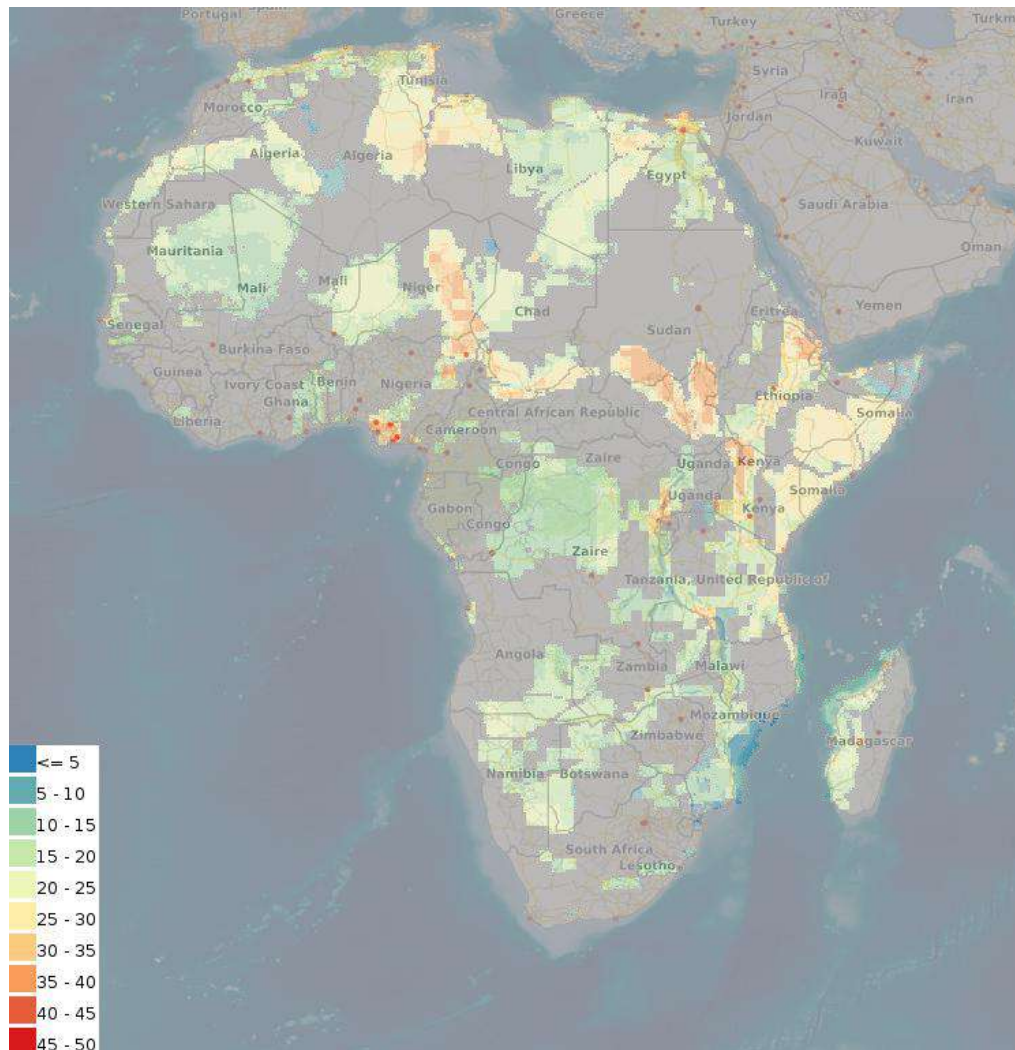
description: Possible heat capacity for a Direct Use in the basecase scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for Direct Use (base case)**

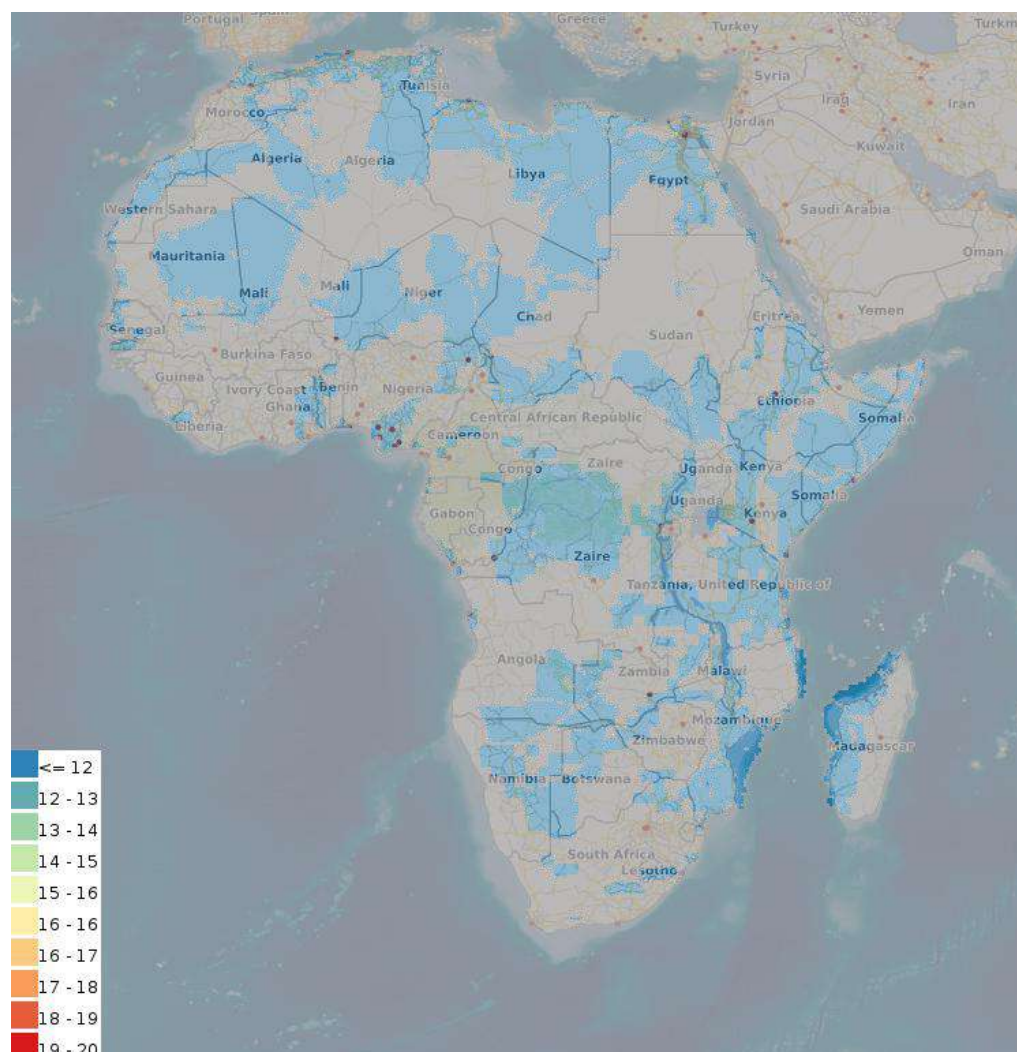
description: Possible cost of electricity for a Direct Use in the basecase scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Direct Use (base case)**

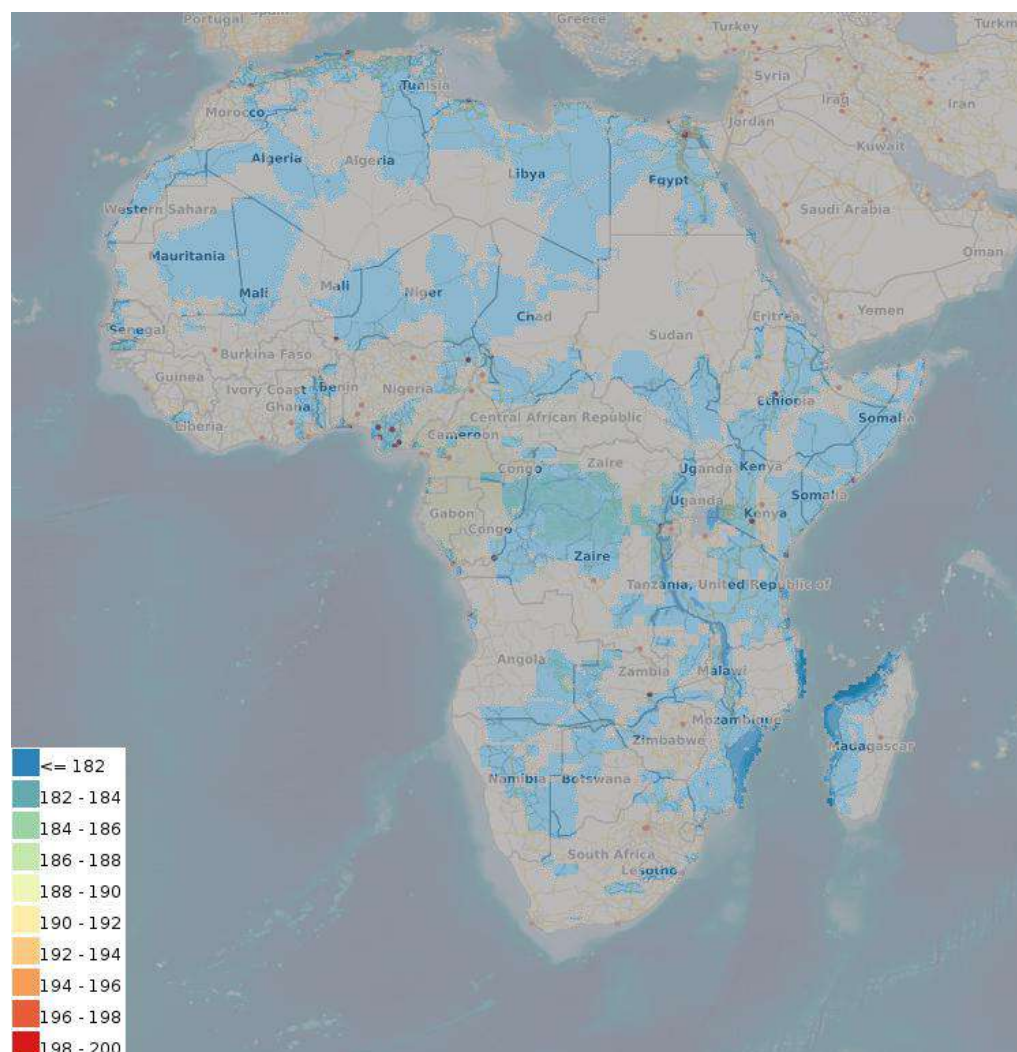
description: Possible environmental impact of climate change for a Direct Use in the basecase scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for Direct Use (upside)**

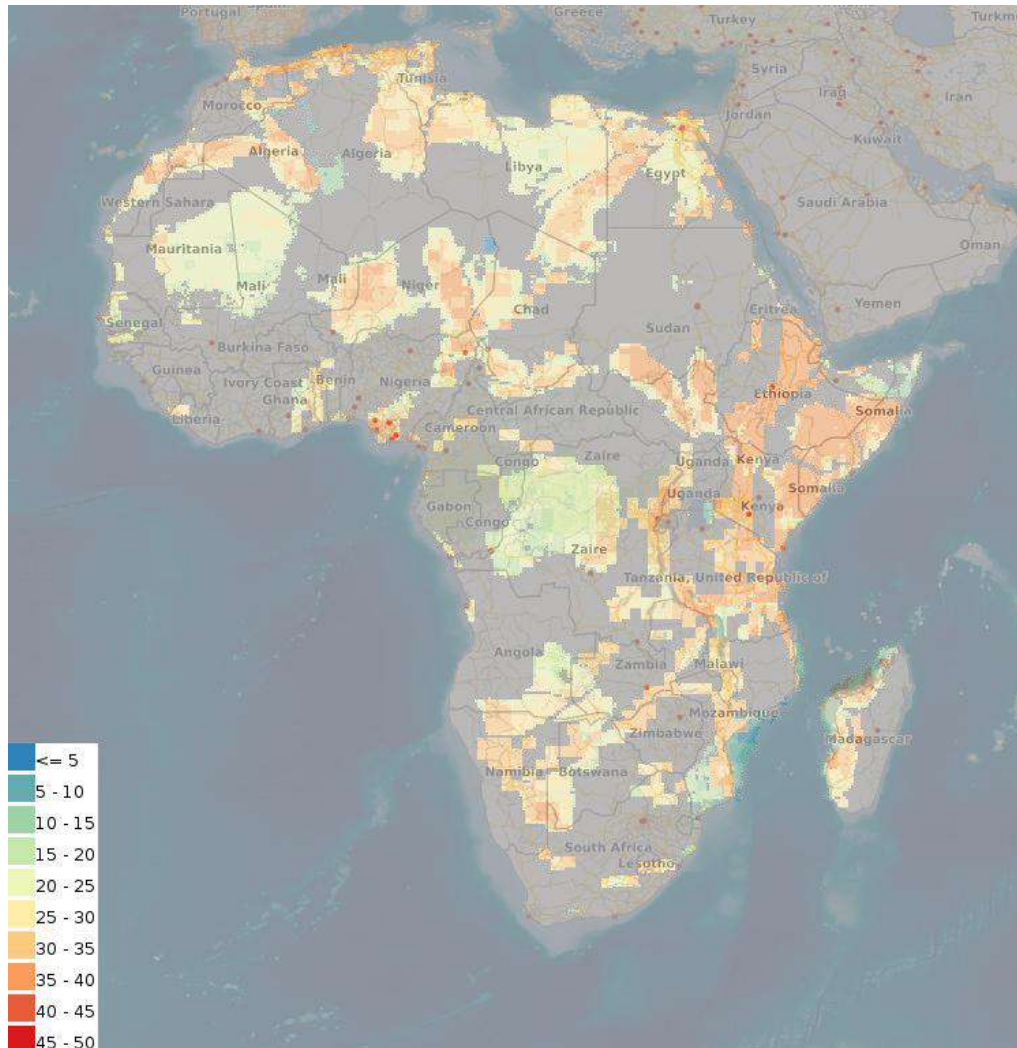
description: Possible heat capacity for a Direct Use in the upside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for Direct Use (upside)**

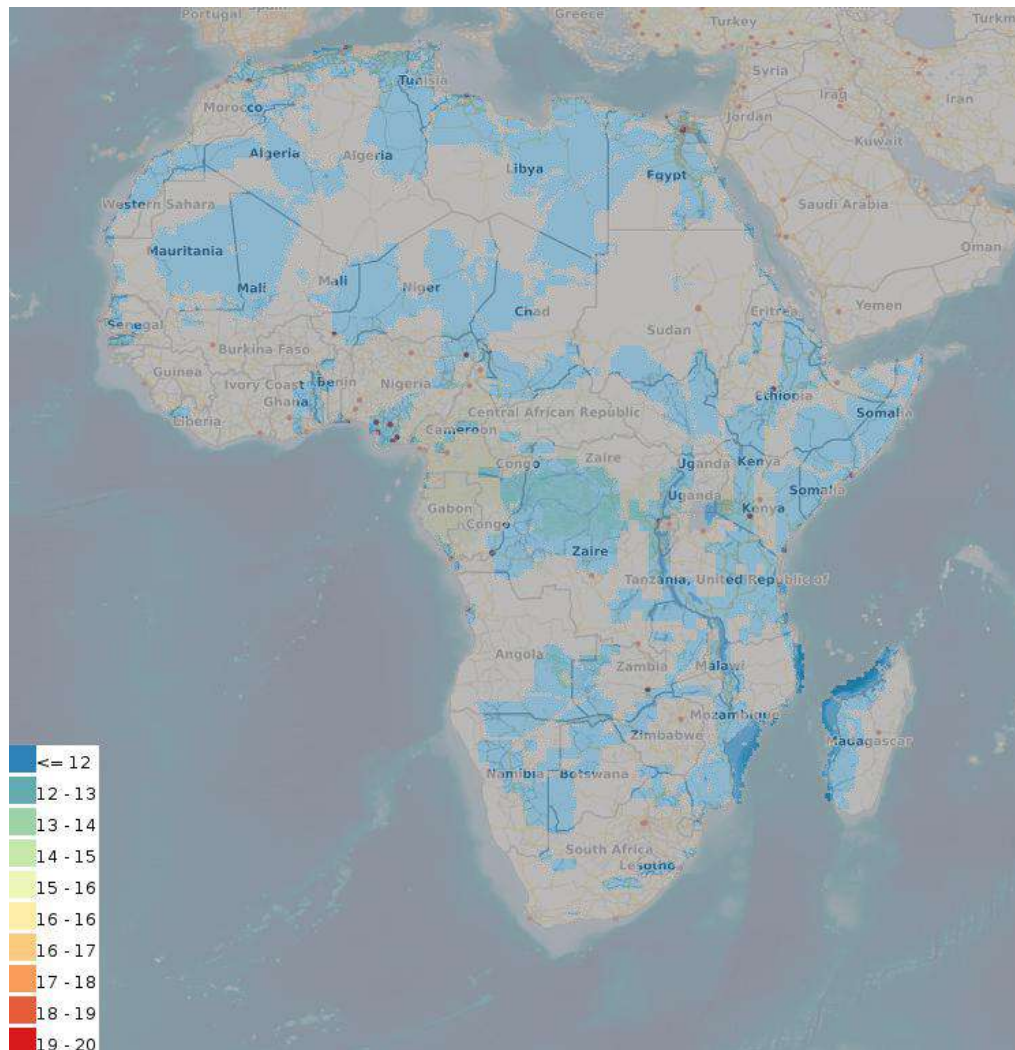
description: Possible cost of electricity for a Direct Use in the upside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Direct Use (upside)**

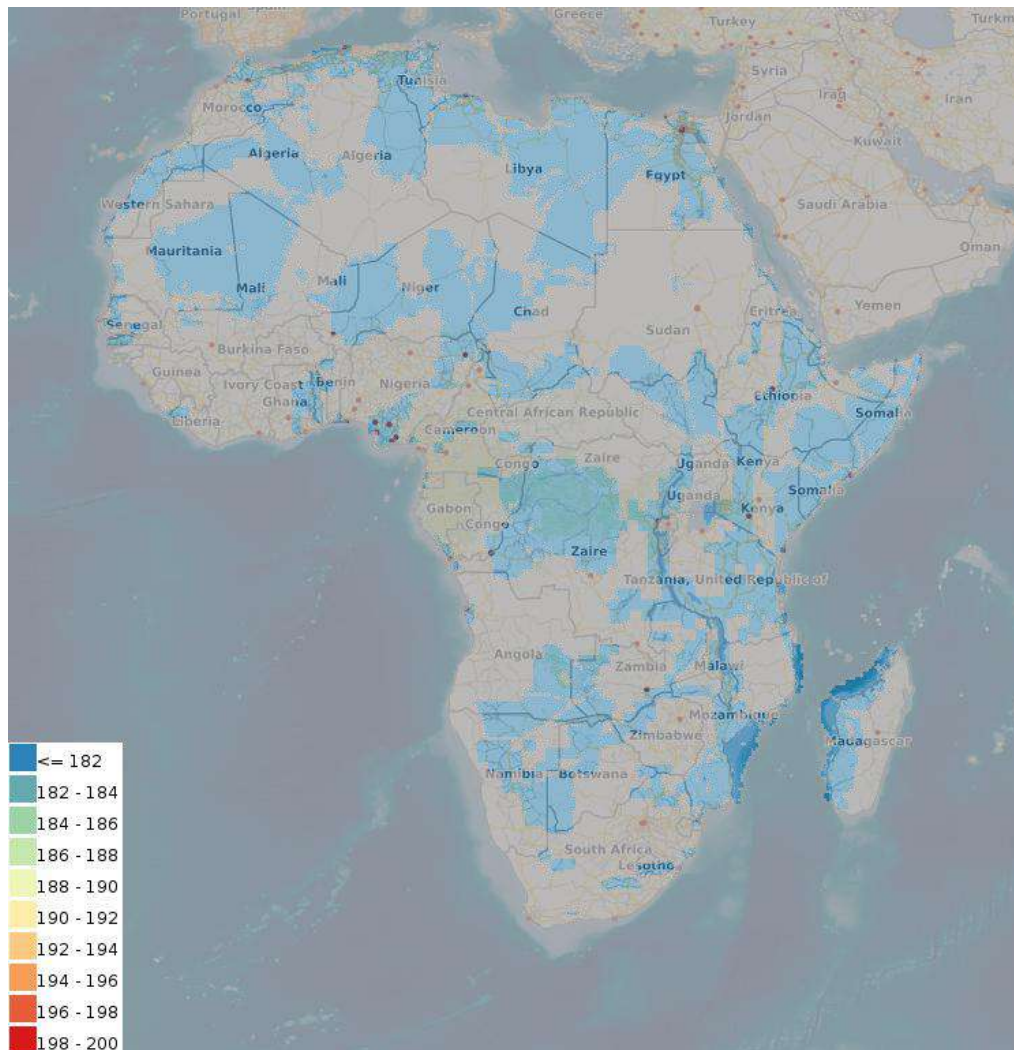
description: Possible environmental impact of climate change for a Direct Use in the upside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for Direct Use (upupside)**

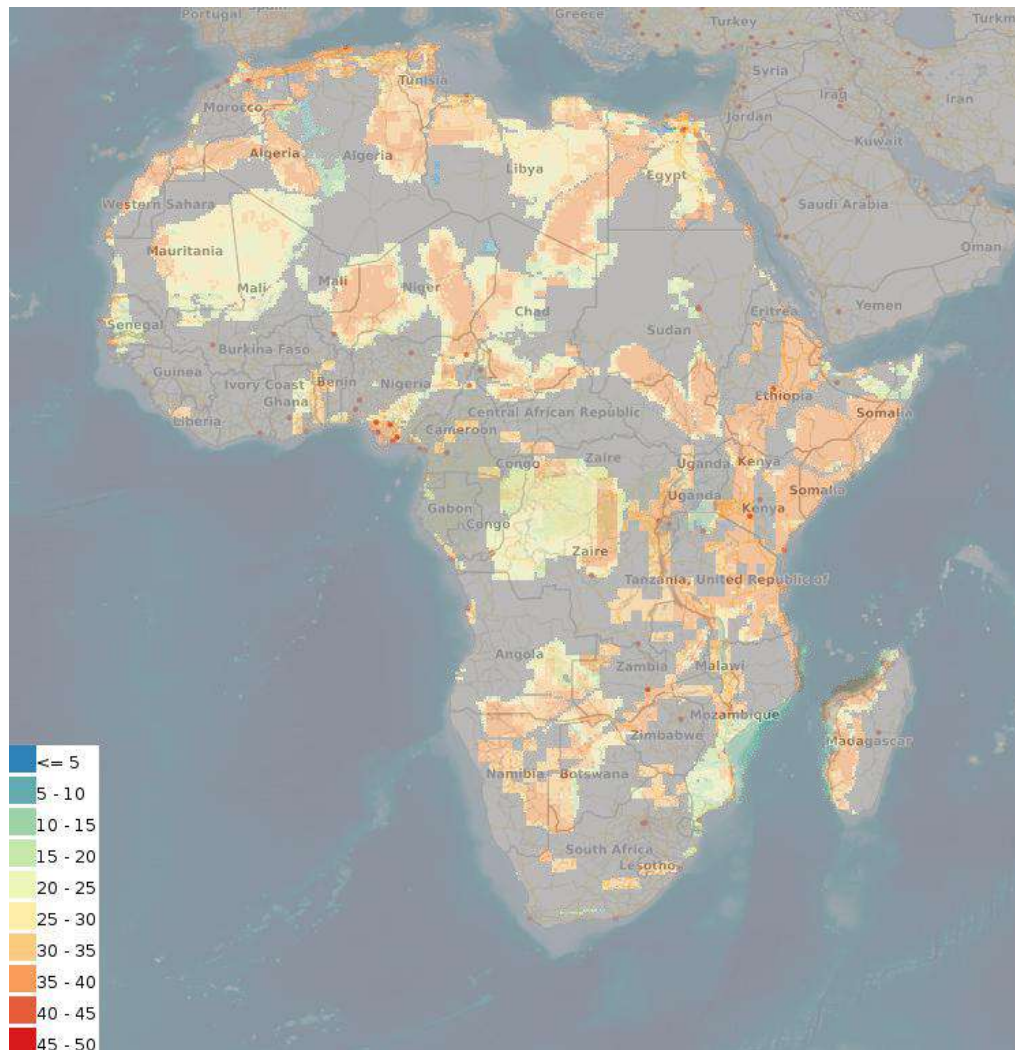
description: Possible heat capacity for a Direct Use in the upupside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for Direct Use (upupside)**

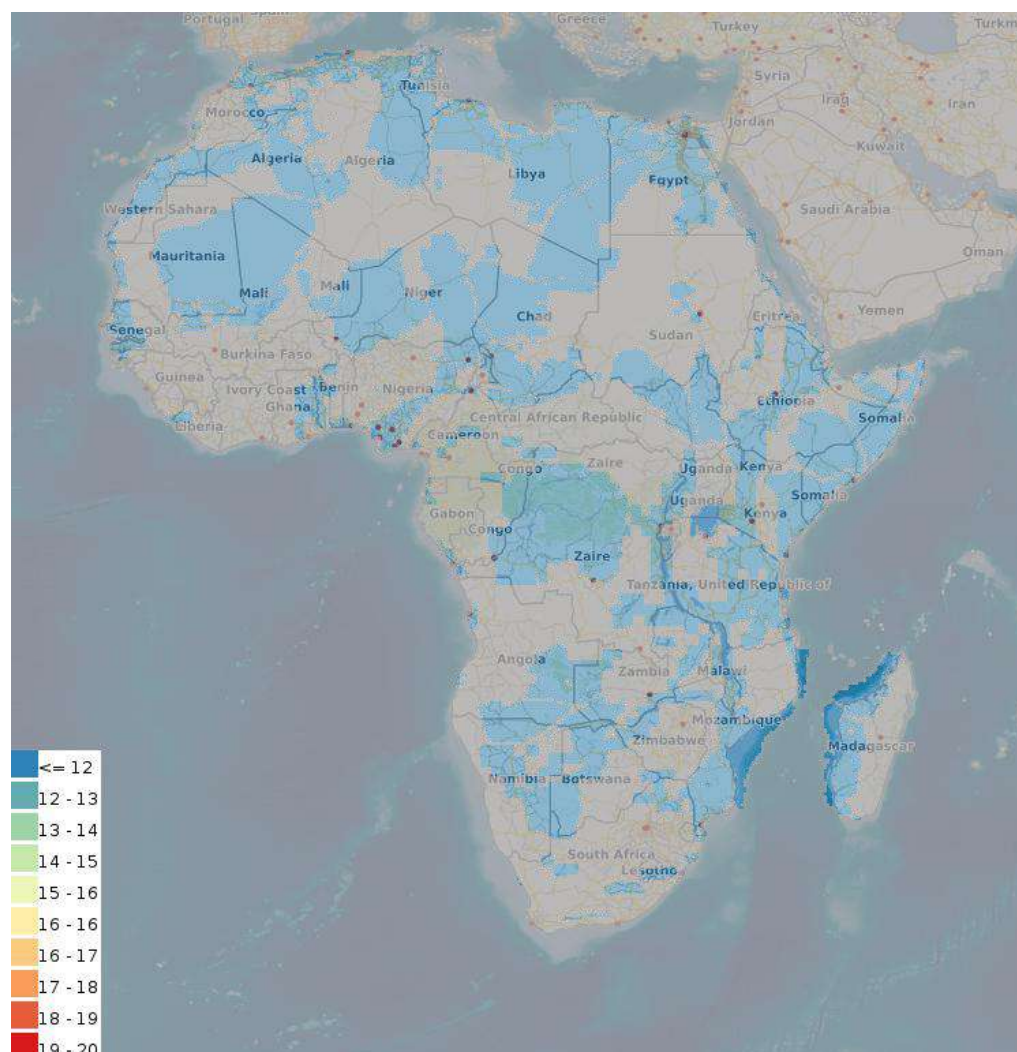
description: Possible cost of electricity for a Direct Use in the upupside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Direct Use (upupside)**

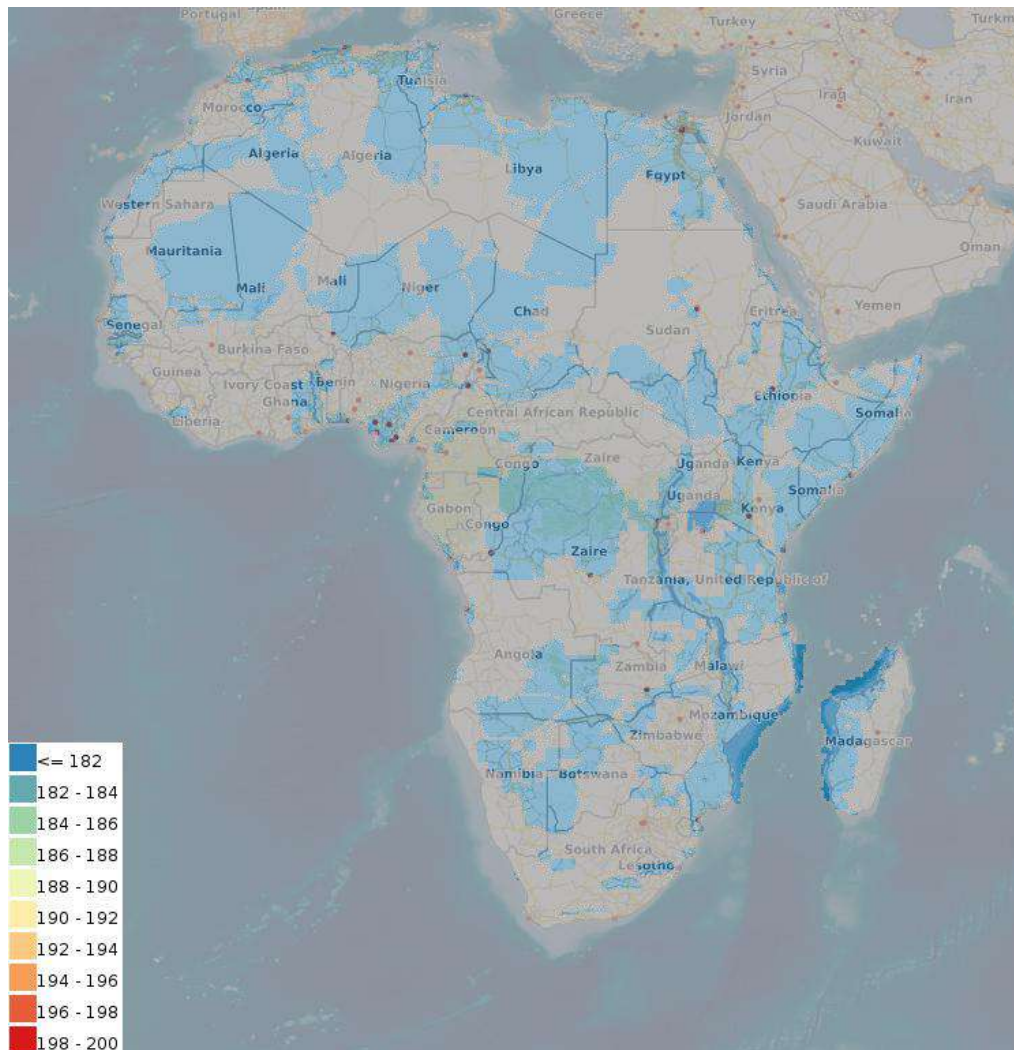
description: Possible environmental impact of climate change for a Direct Use in the upupside scenario

keywords: Direct Use, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump coefficient of performance (basecase)**

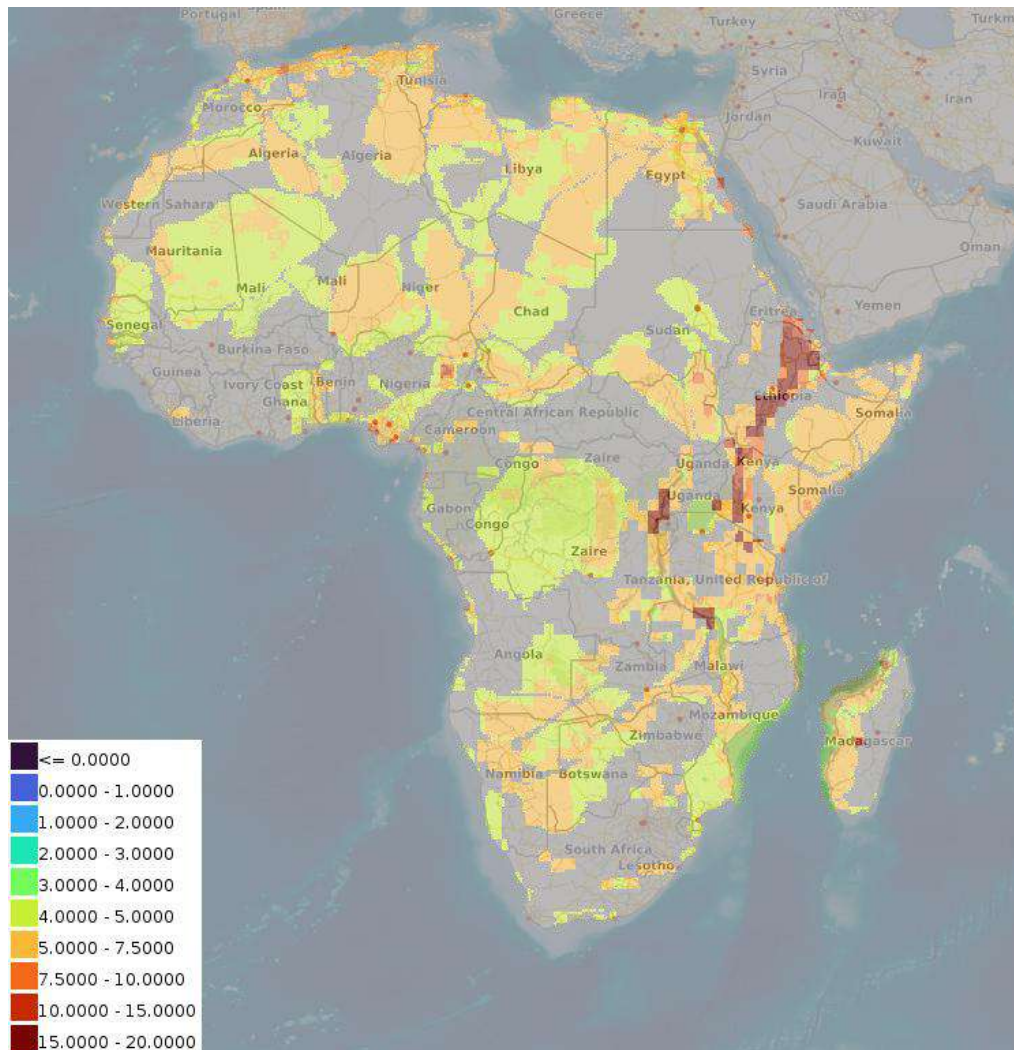
description: Direct heat with heat pump coefficient of performance (basecase)

keywords: Direct heat, heat pump, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump: pump pressure needed to drive pumps (basecase)**

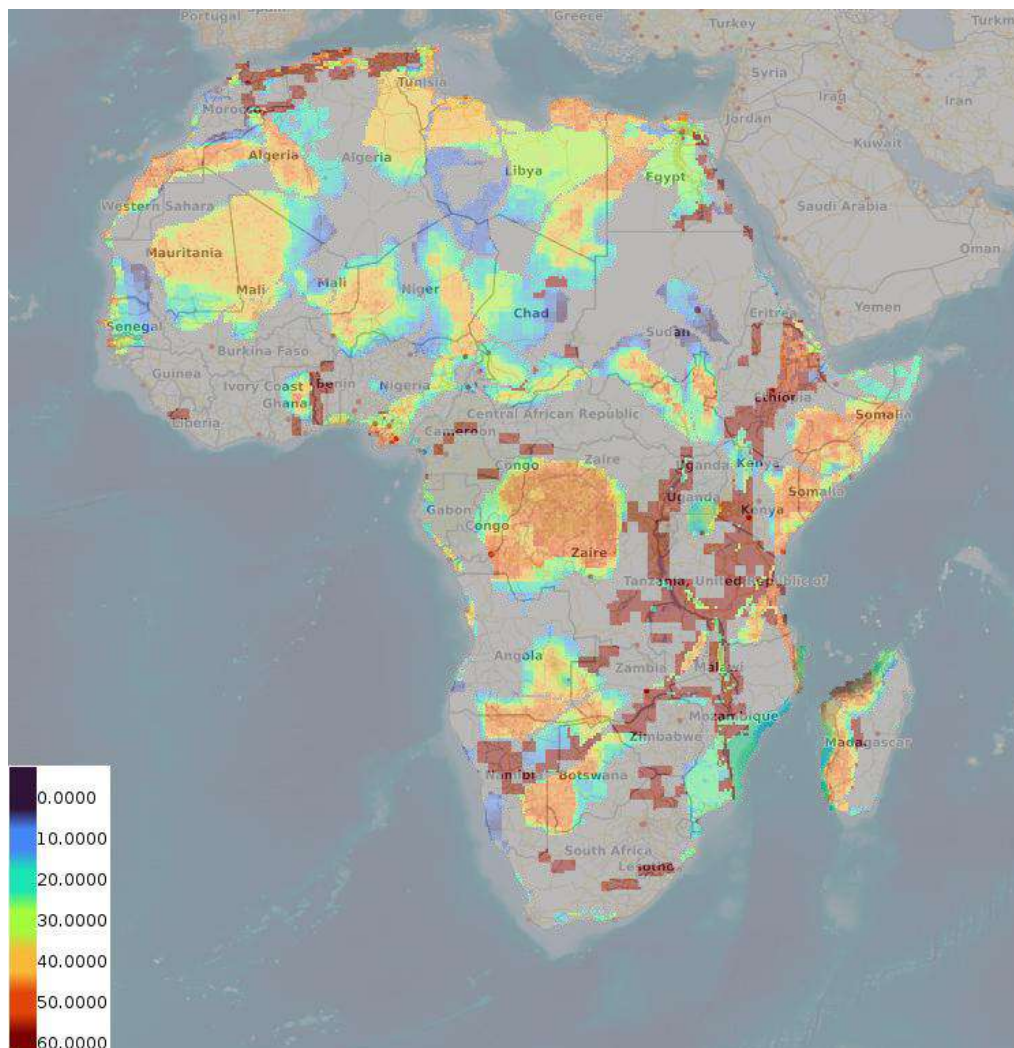
description: Direct heat with heat pump: pump pressure needed to drive pumps (basecase)

keywords: Direct Heat, heat pump, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump production flow rate (basecase)**

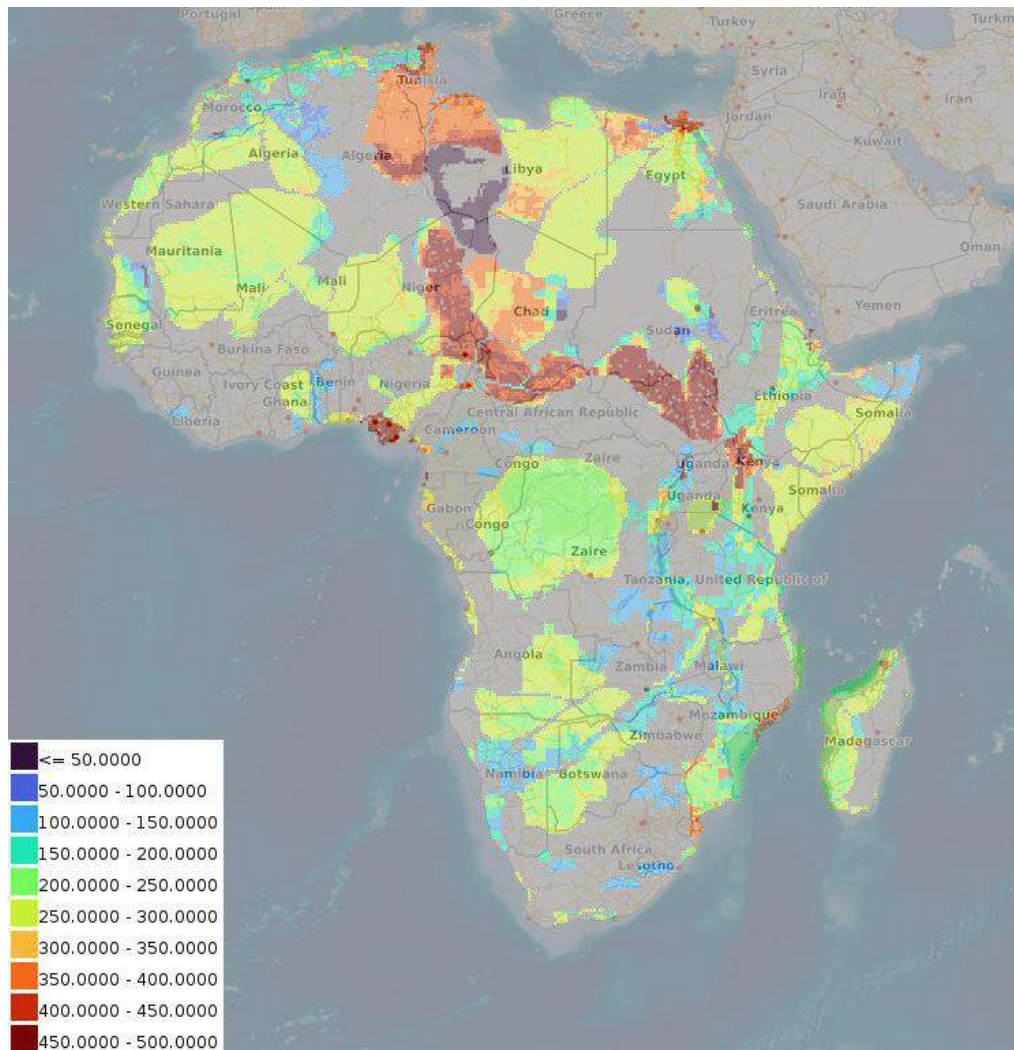
description: Direct heat with heat pump production flow rate (basecase)

keywords: Direct heat, heat pump, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump doublet net production (basecase)**

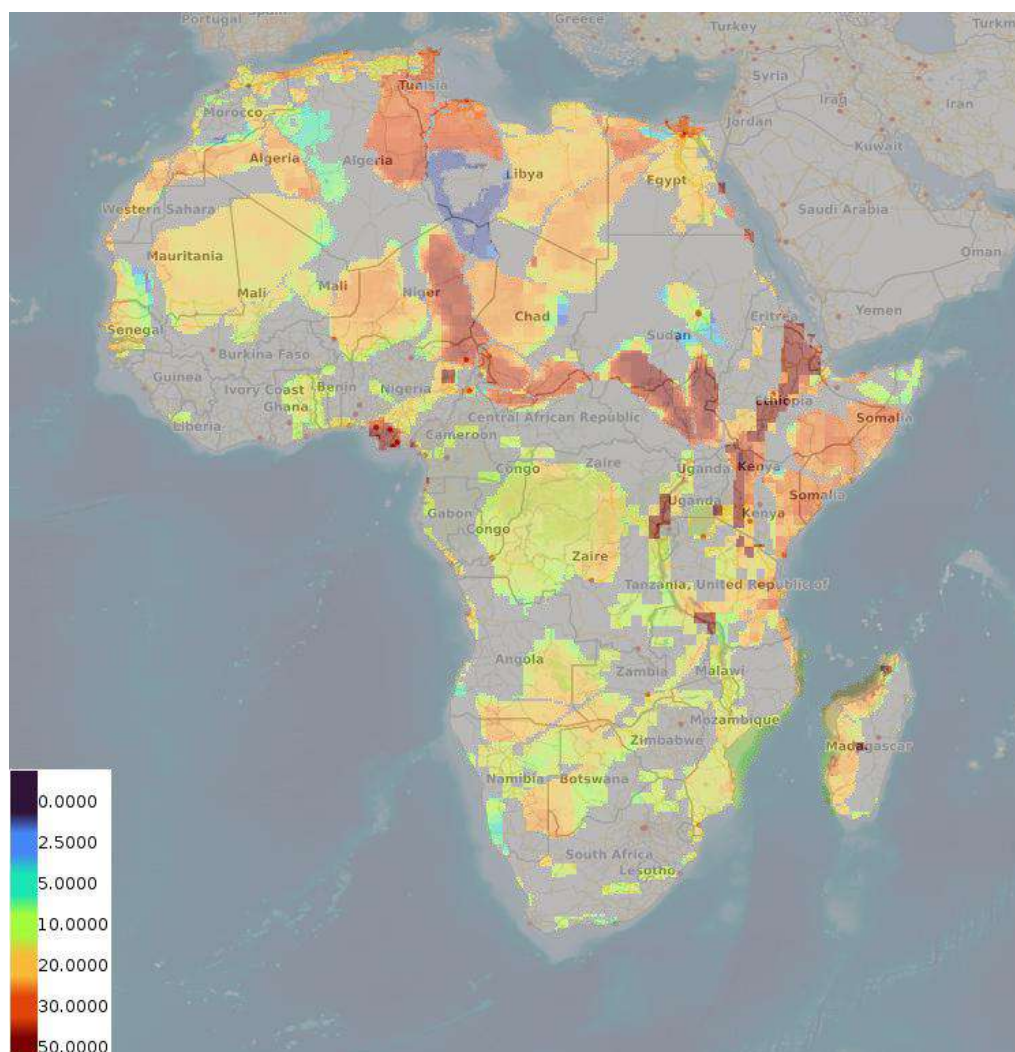
description: Direct heat with heat pump doublet net production (basecase)

keywords: Direct heat, heat pump, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump transmissivity (basecase)**

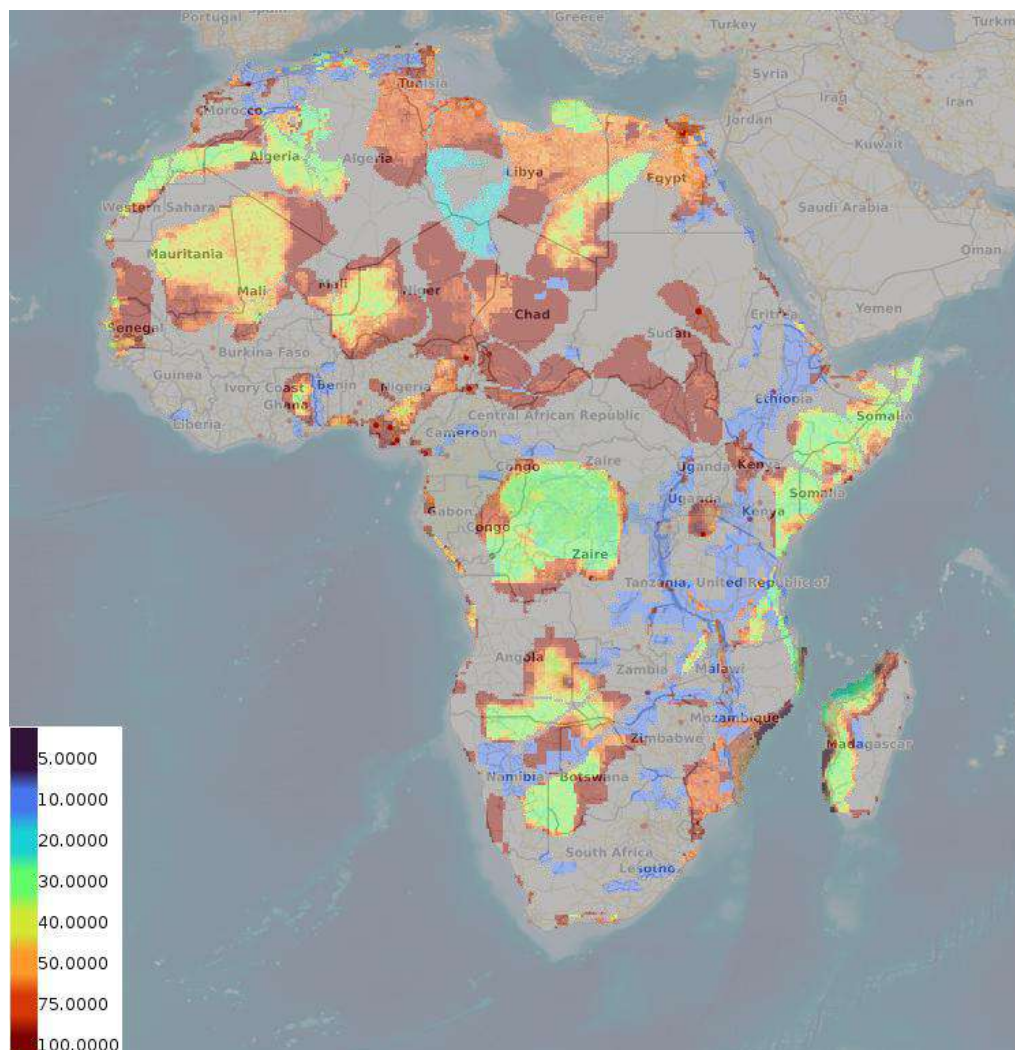
description: Direct heat with heat pump transmissivity (basecase)

keywords: Direct heat, heat pump, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump well distance (basecase)**

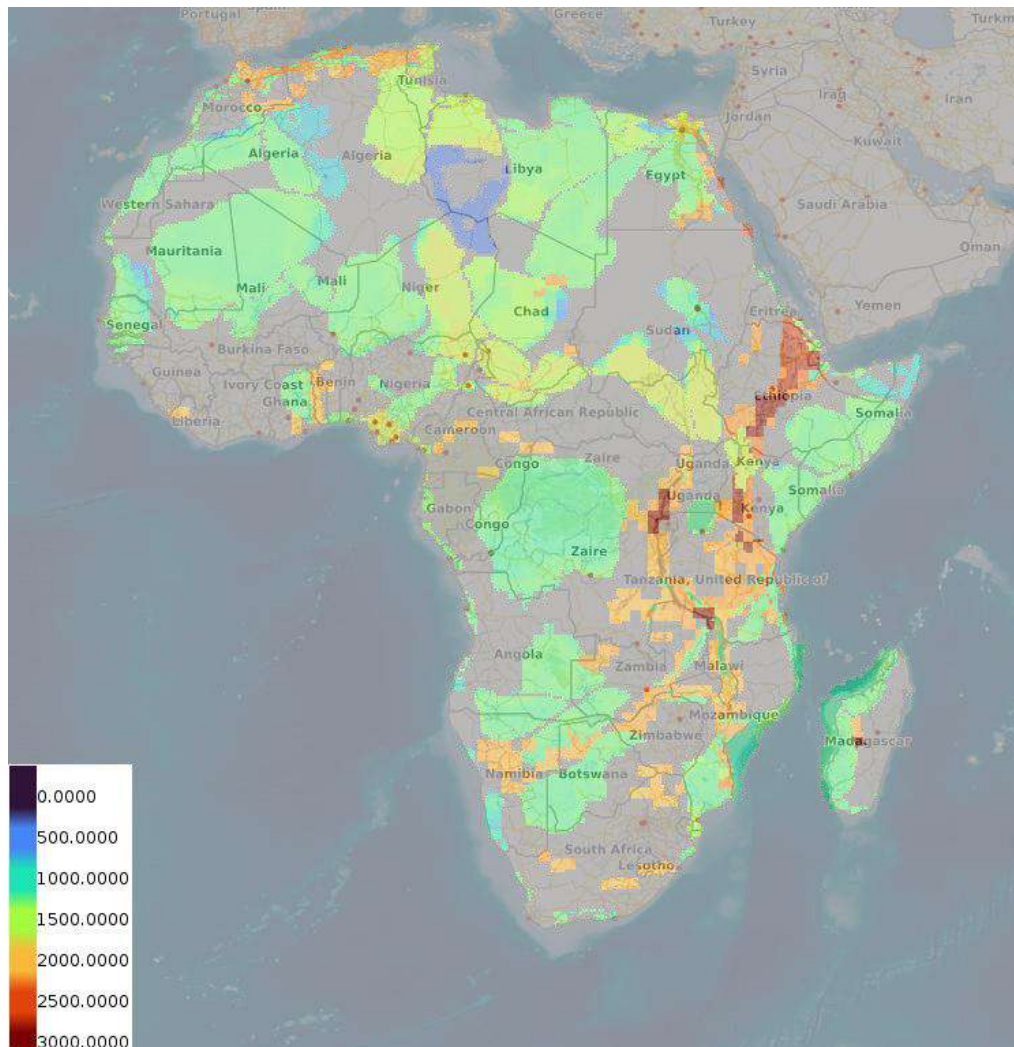
description: Direct heat with heat pump well distance (basecase)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump optimized depth of the aquifer (basecase)**

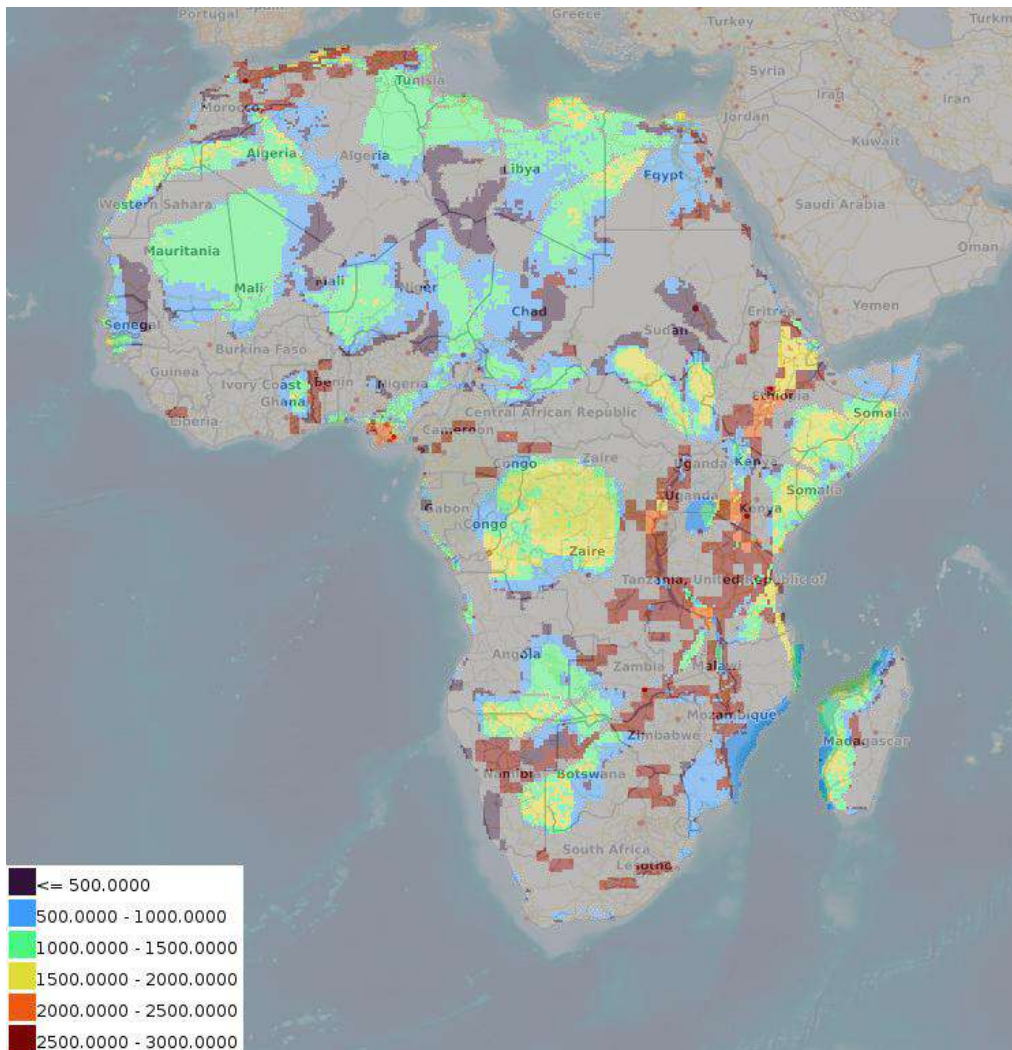
description: Direct heat with heat pump optimized depth of the aquifer (basecase)

keywords: Direct heat, heat pump, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump temperature at reservoir (basecase)**

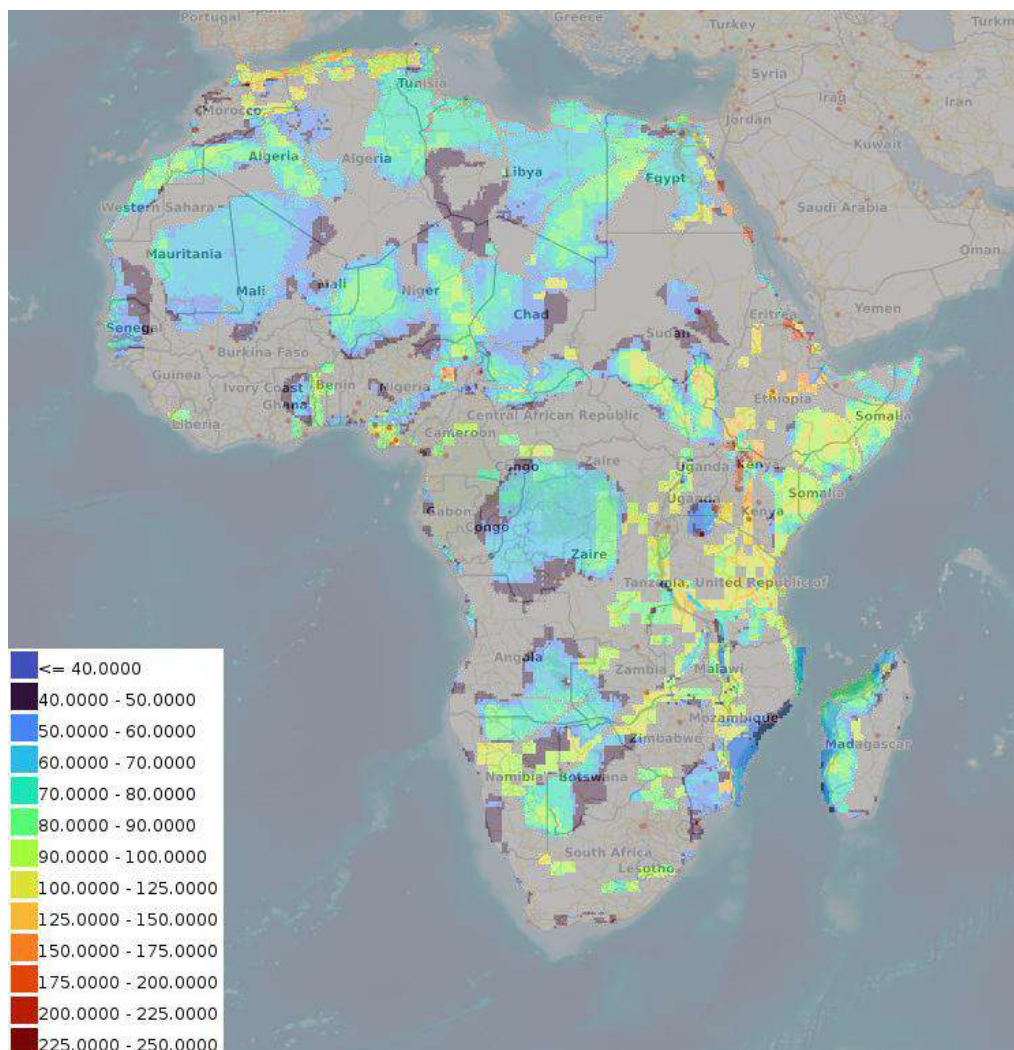
description: Direct heat with heat pump temperature at reservoir (basecase)

keywords: Direct heat, heat pump, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump Levelized Costs of Energy (basecase)**

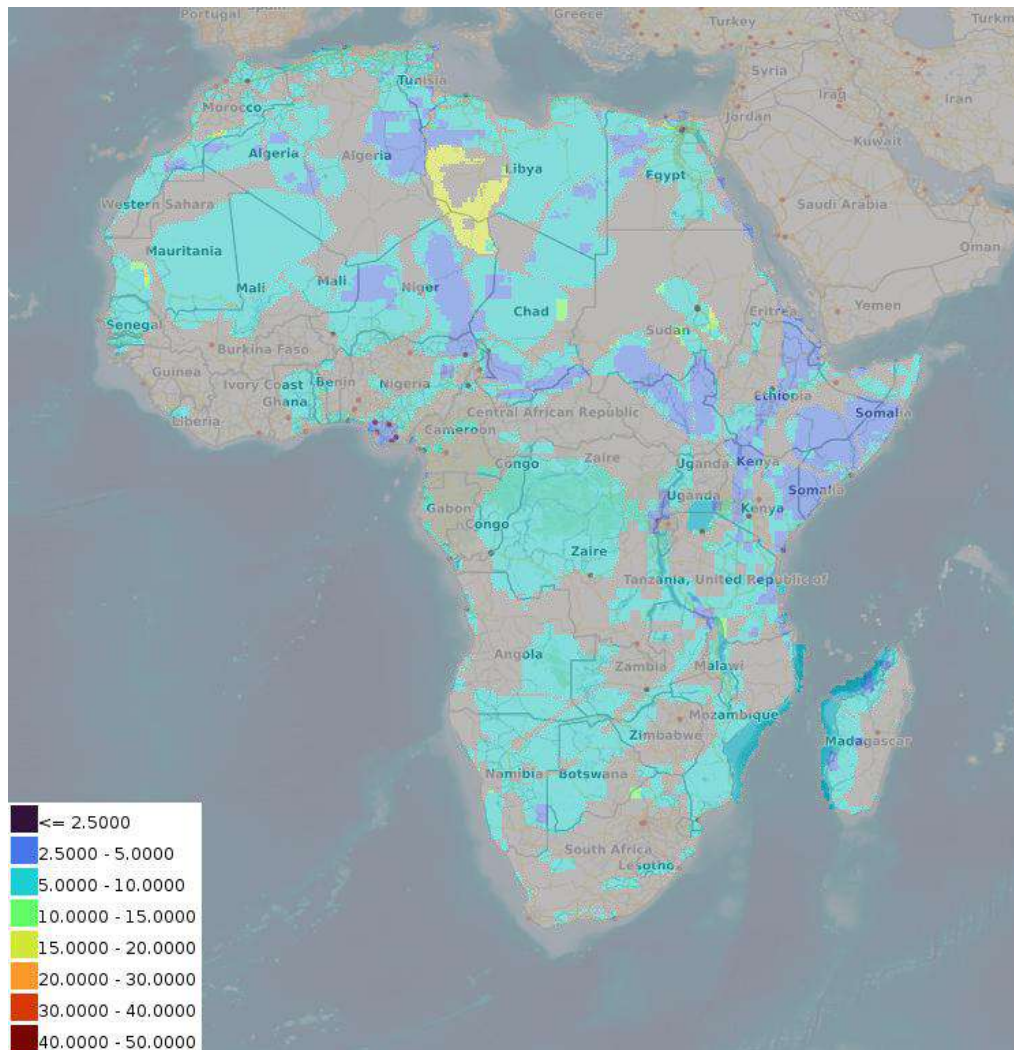
description: Direct heat with heat pump Levelized Costs of Energy (basecase)

keywords: Direct heat, heat pump, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump coefficient of performance (upside)**

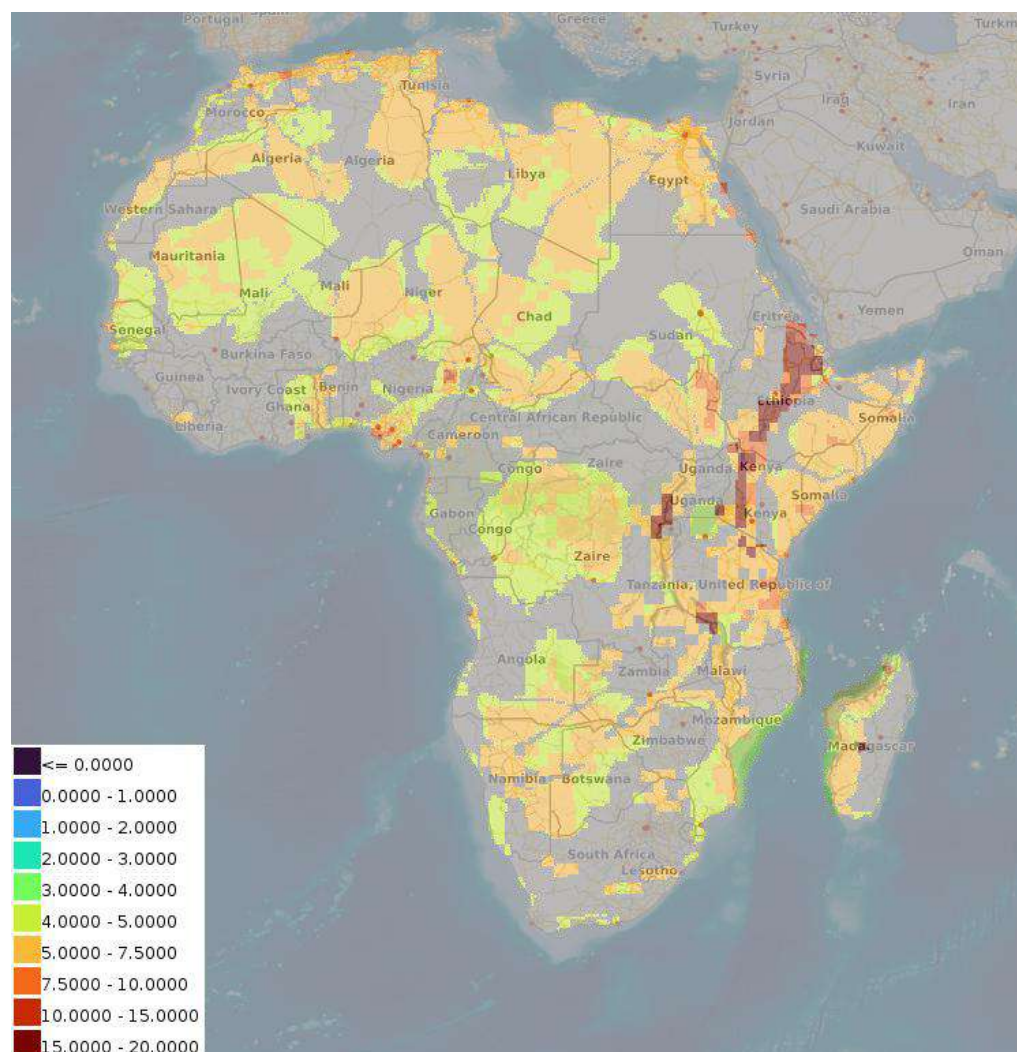
description: Direct heat with heat pump coefficient of performance (upside)

keywords: Direct heat, heat pump, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump: pump pressure needed to drive pumps (upside)**

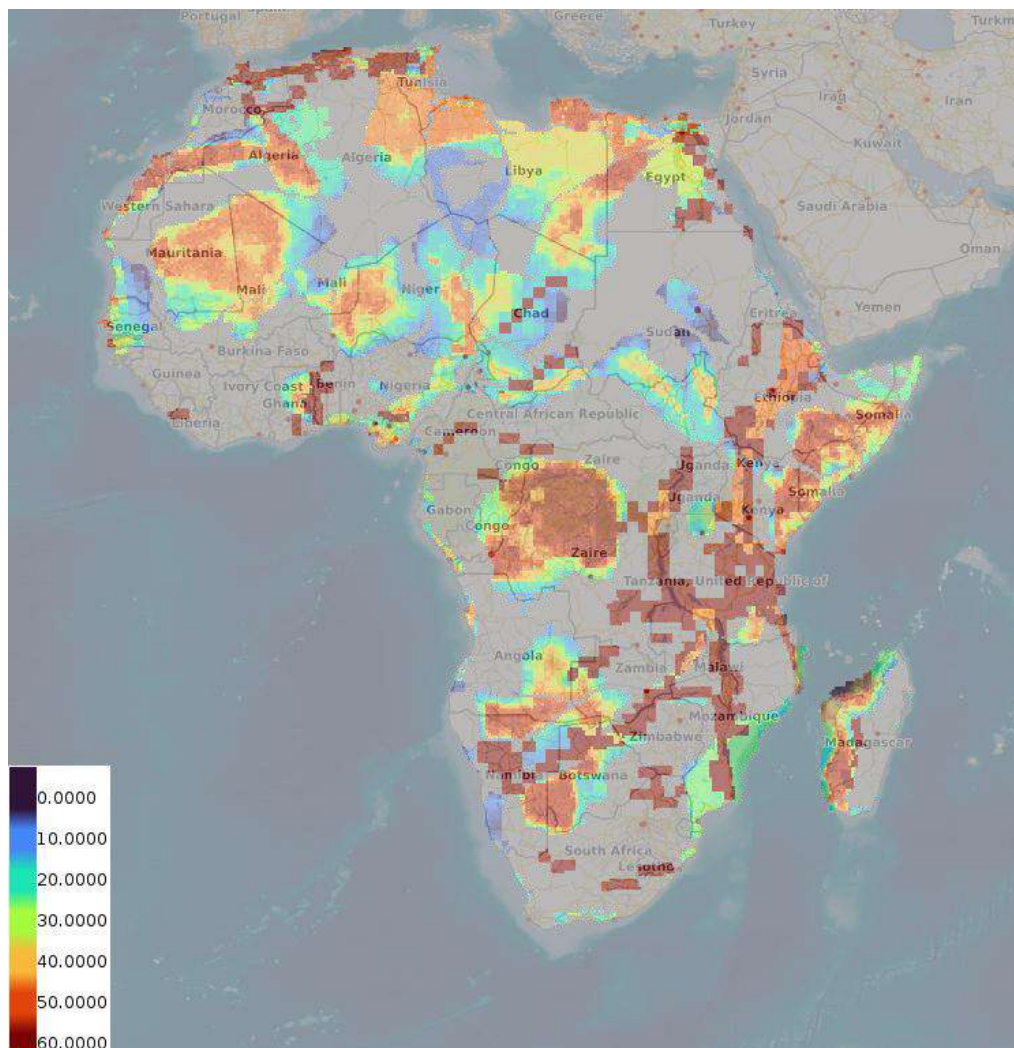
description: Direct heat with heat pump: pump pressure needed to drive pumps (upside)

keywords: Direct Heat, heat pump, pump pressure, Africa

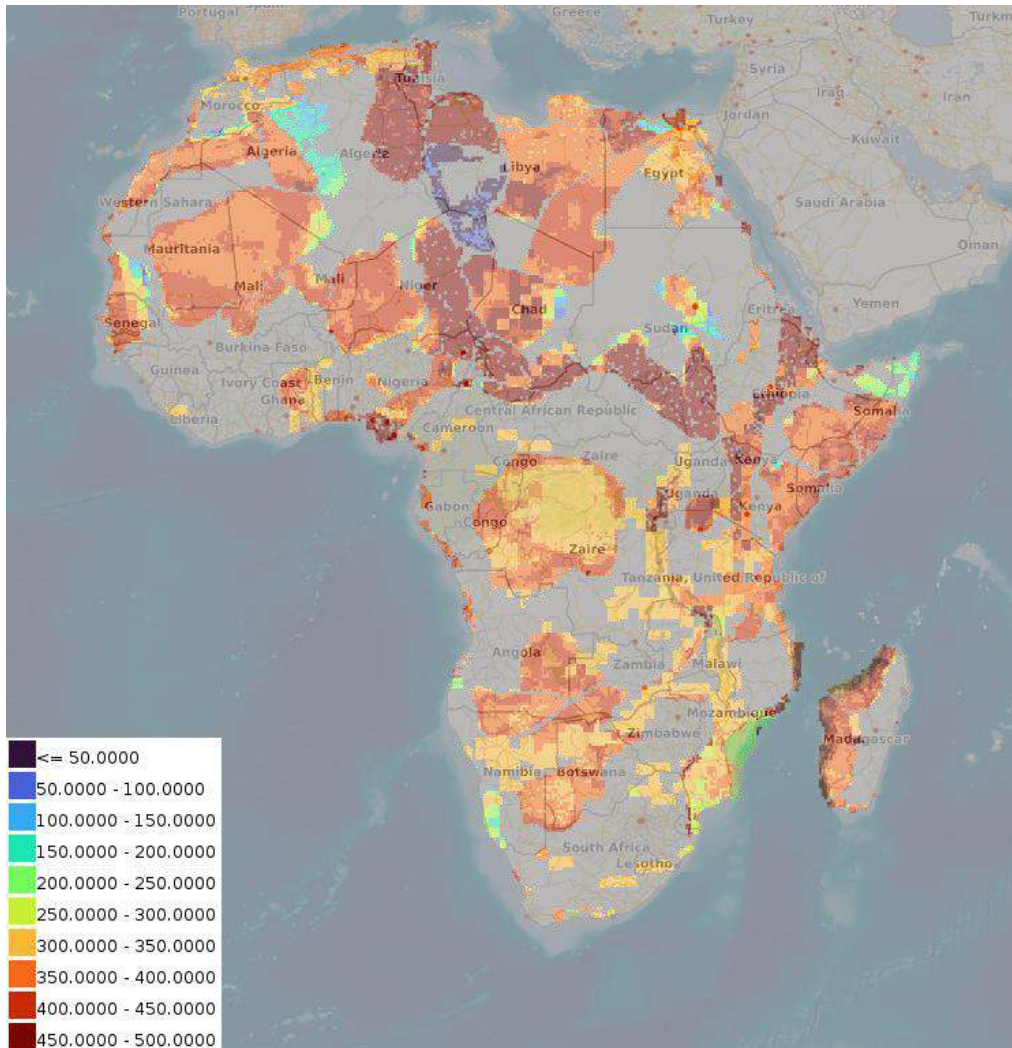
source: [link](#)

date: 2024

coverage: Africa



coverage: Africa



- **Direct heat with heat pump doublet net production (upside)**

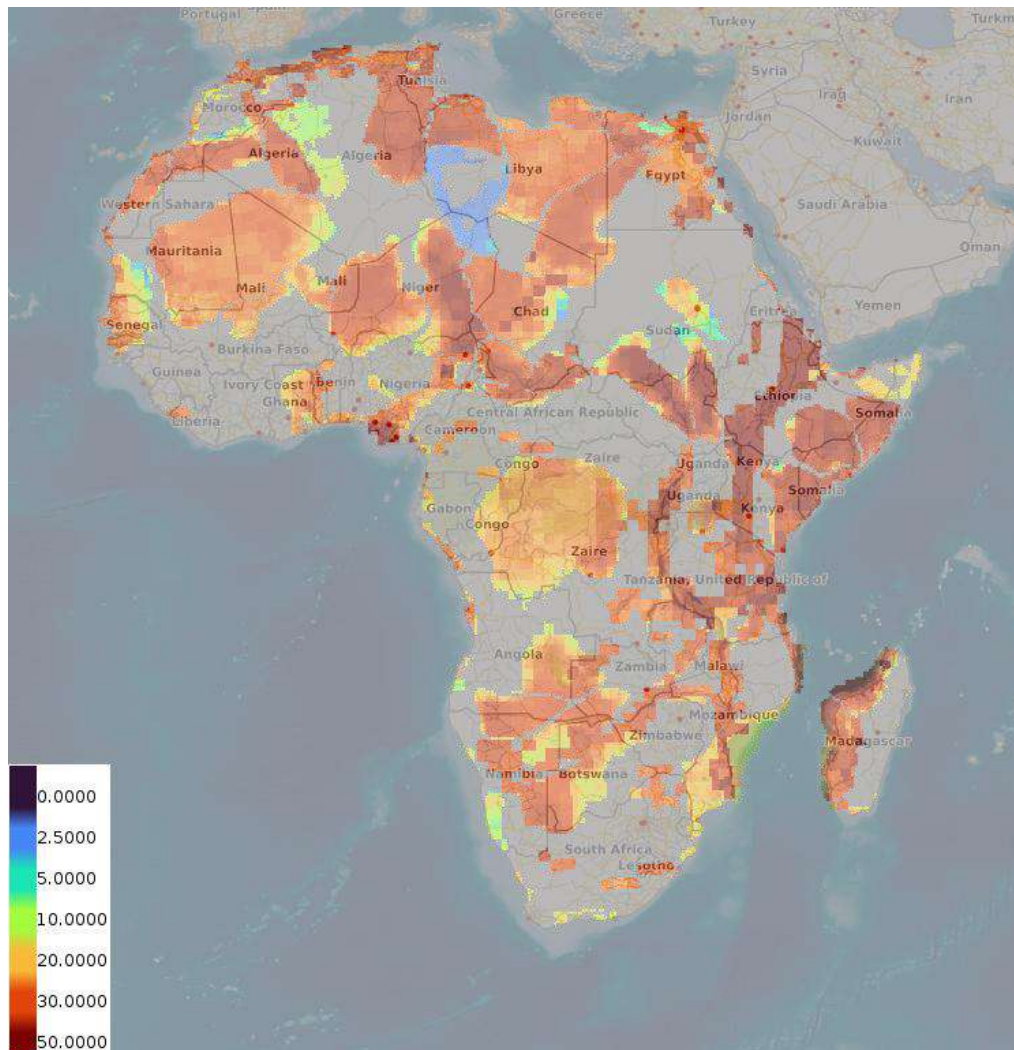
description: Direct heat with heat pump doublet net production (upside)

keywords: Direct heat, heat pump, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump transmissivity (upside)**

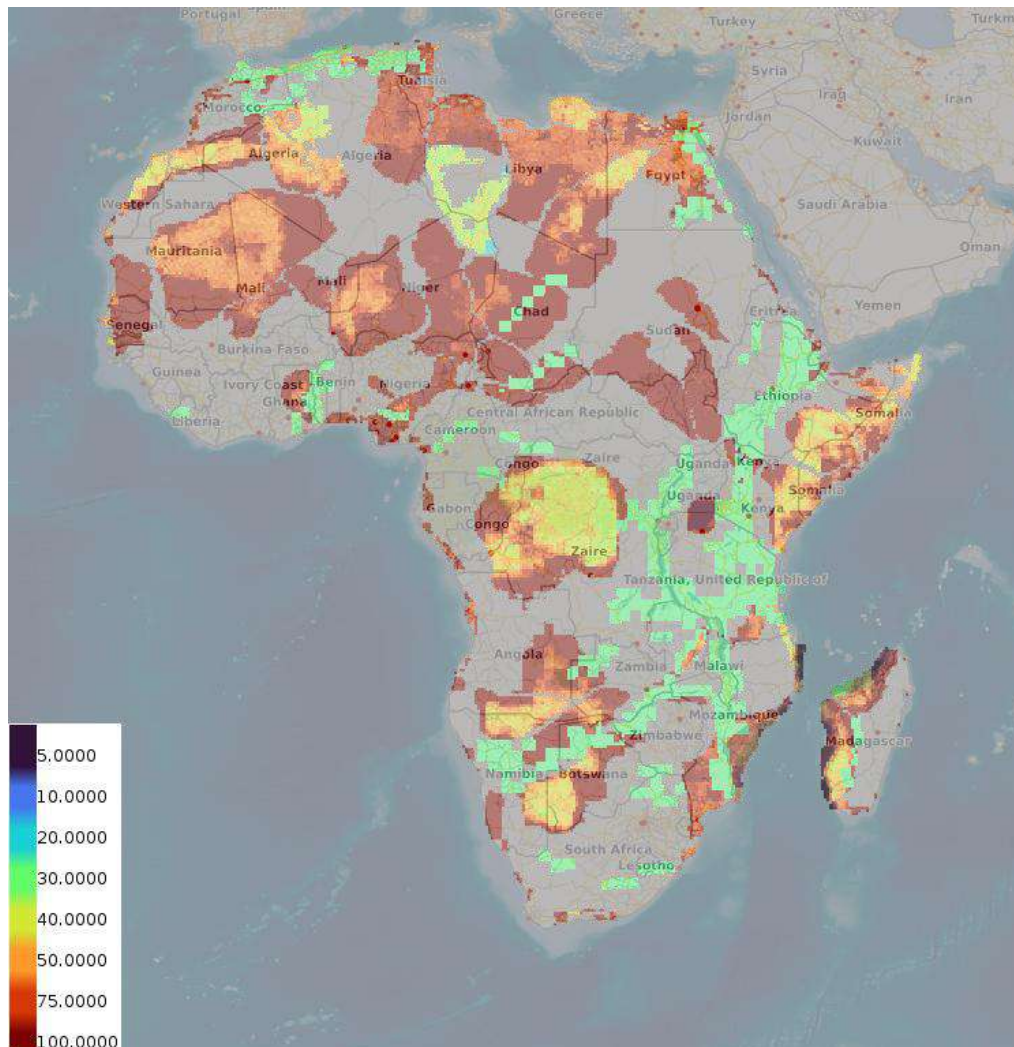
description: Direct heat with heat pump transmissivity (upside)

keywords: Direct heat, heat pump, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump well distance (upside)**

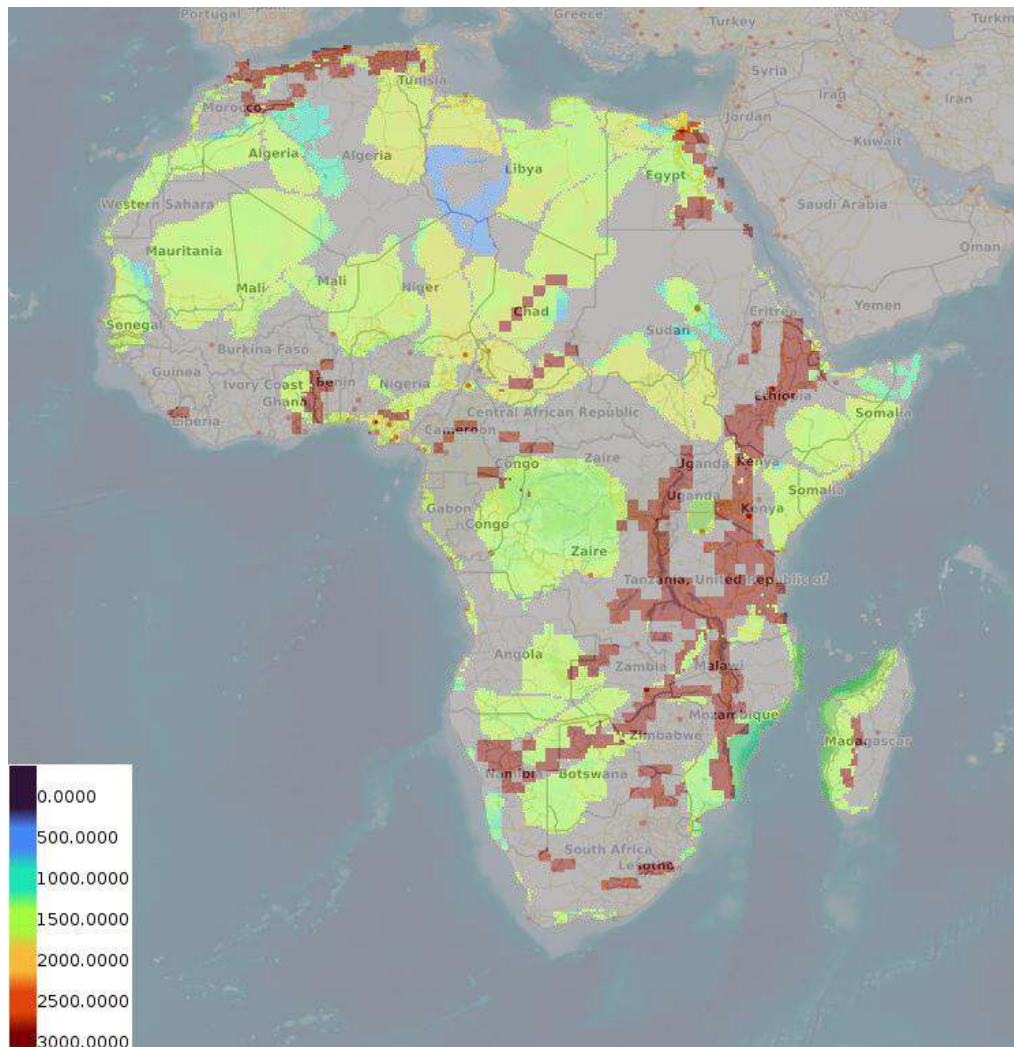
description: Direct heat with heat pump well distance (upside)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump optimized depth of the aquifer (upside)**

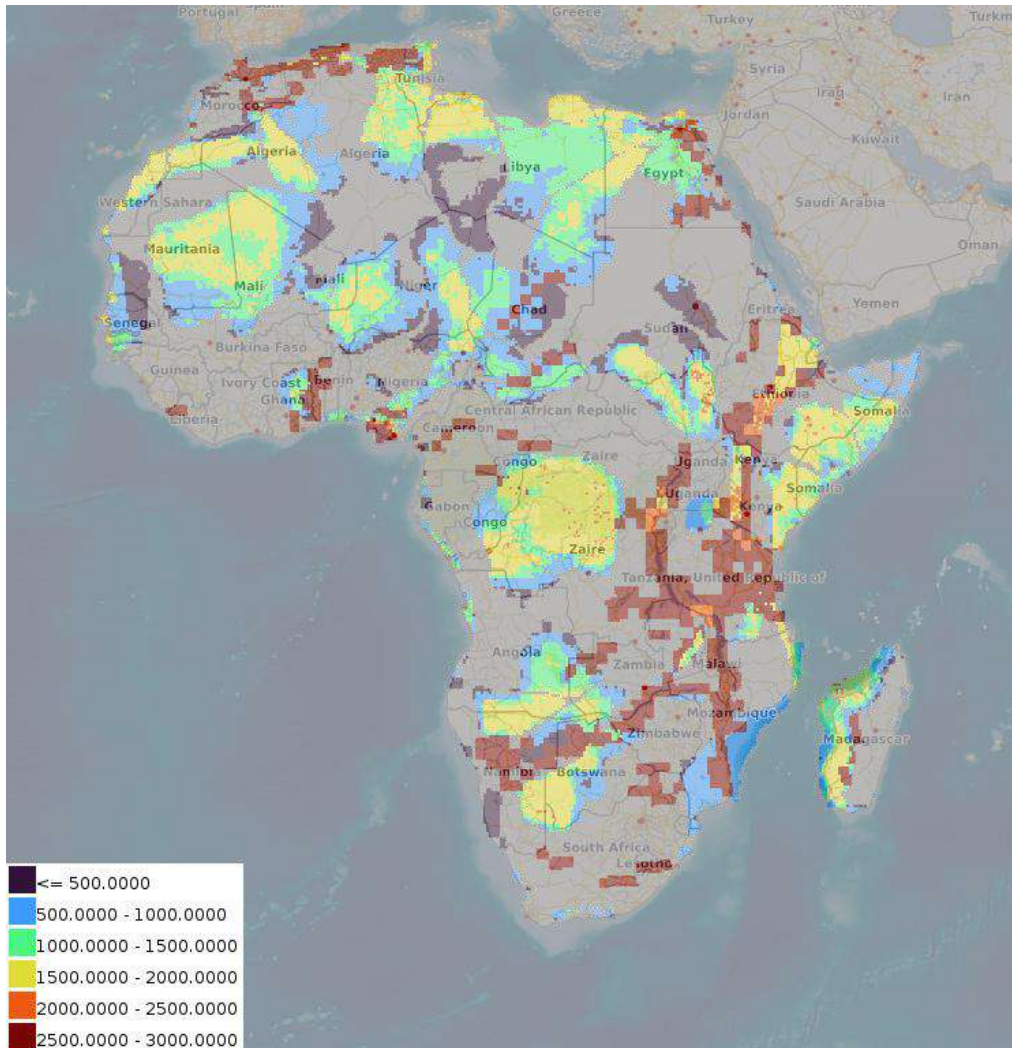
description: Direct heat with heat pump optimized depth of the aquifer (upside)

keywords: Direct heat, heat pump, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump temperature at reservoir (upside)**

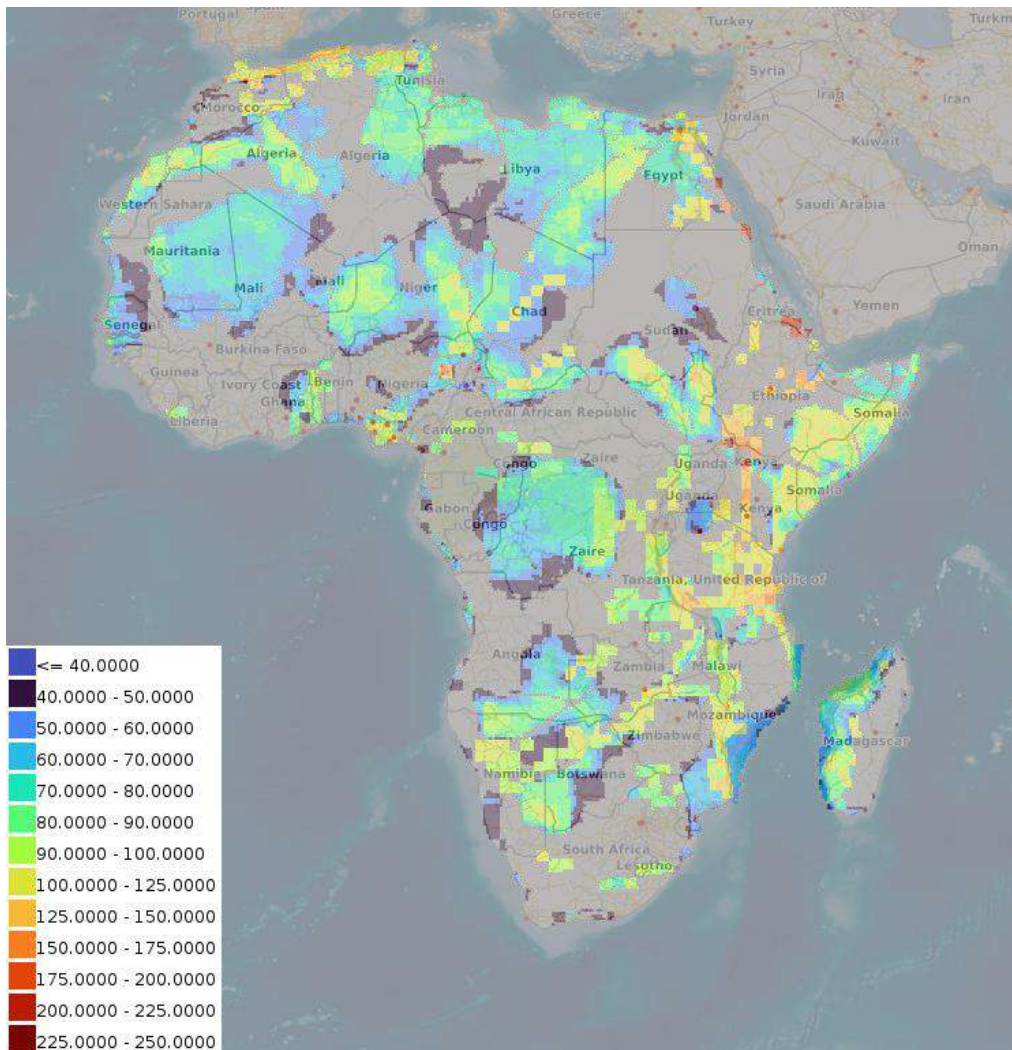
description: Direct heat with heat pump temperature at reservoir (upside)

keywords: Direct heat, heat pump, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump Levelized Costs of Energy (upside)**

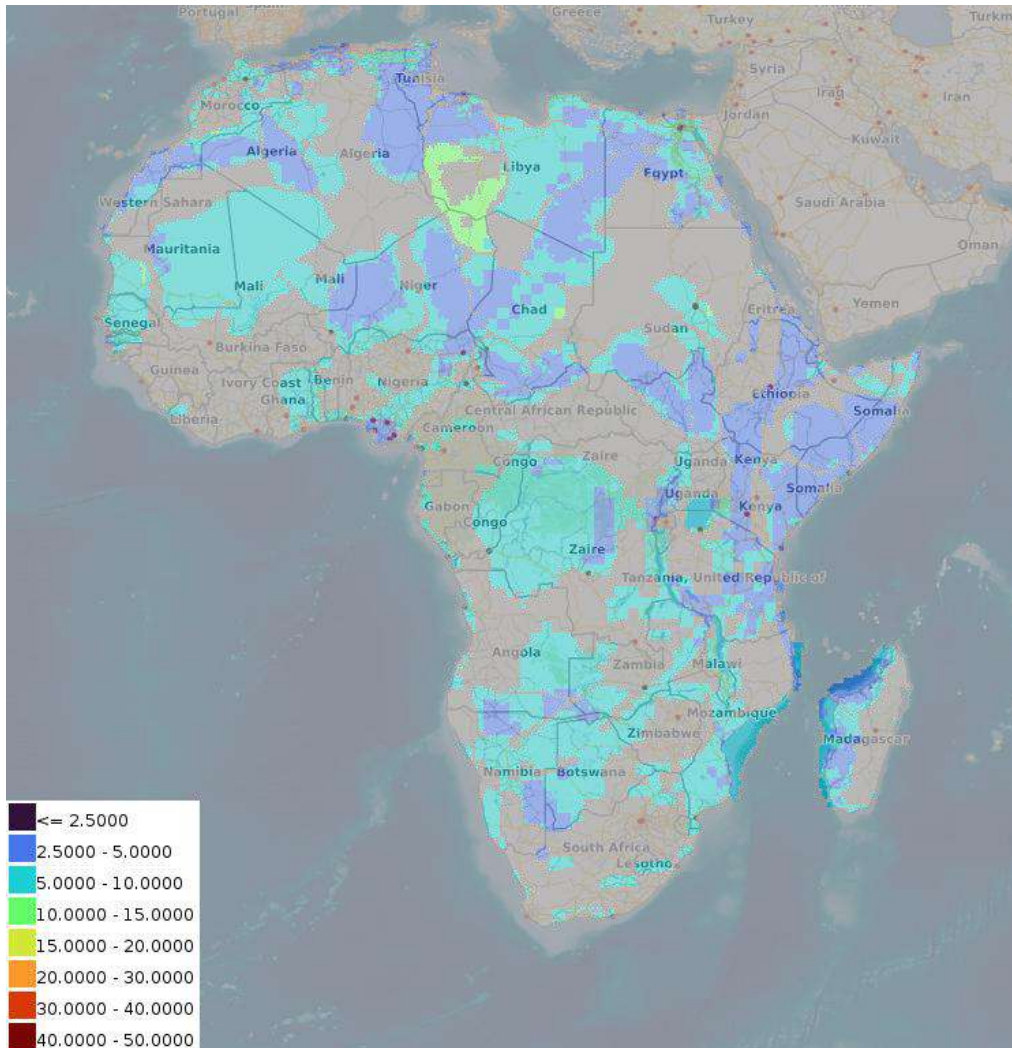
description: Direct heat with heat pump Levelized Costs of Energy (upside)

keywords: Direct heat, heat pump, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump coefficient of performance (upupside)**

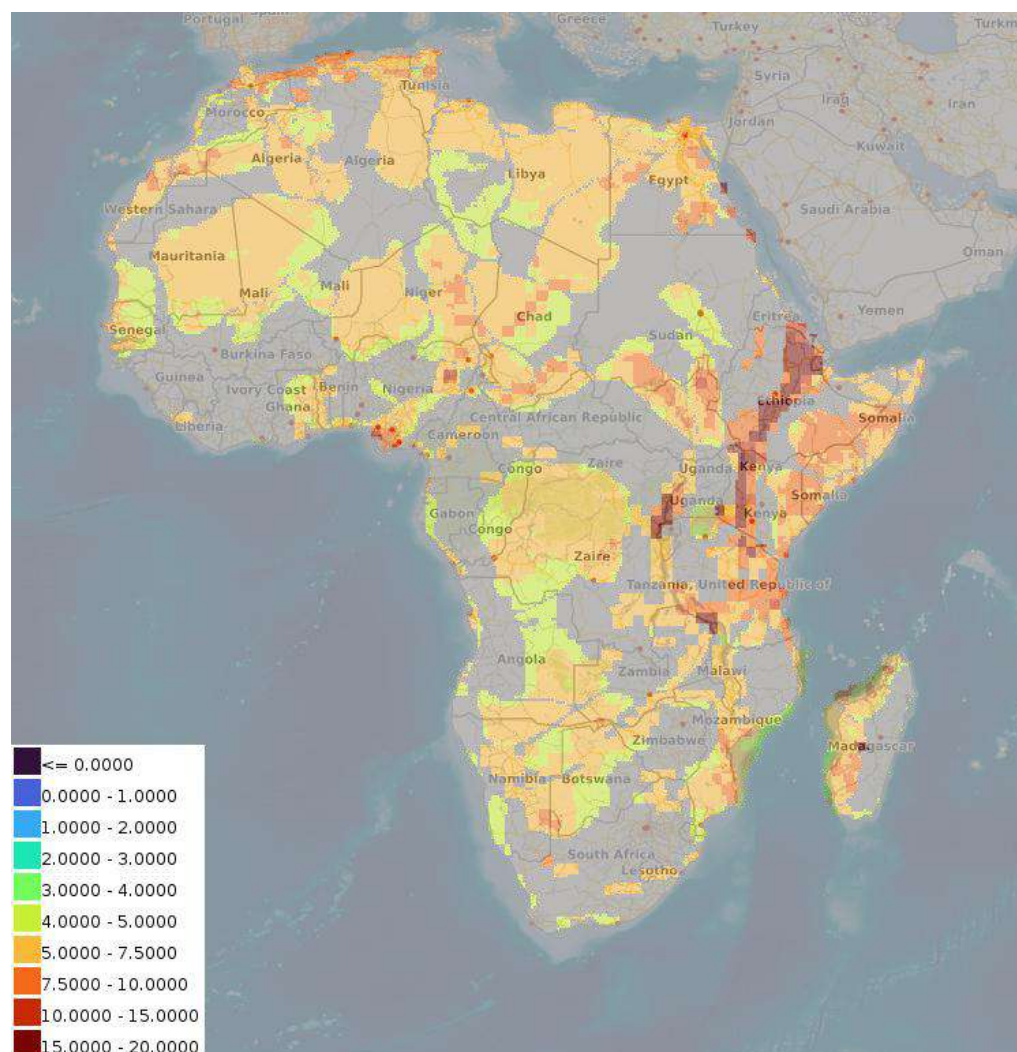
description: Direct heat with heat pump coefficient of performance (upupside)

keywords: Direct heat, heat pump, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump: pump pressure needed to drive pumps (upupside)**

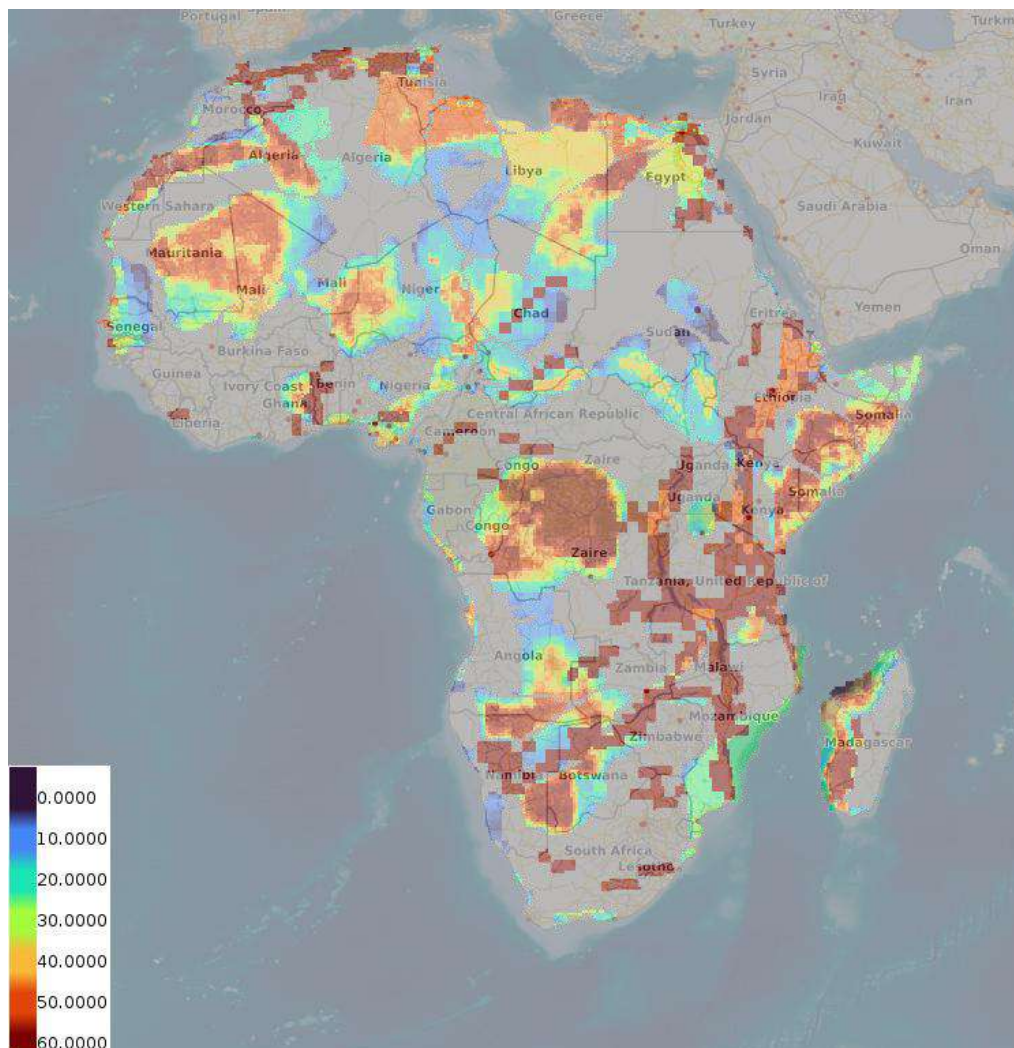
description: Direct heat with heat pump: pump pressure needed to drive pumps (upupside)

keywords: Direct Heat, heat pump, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump production flow rate (upupside)**

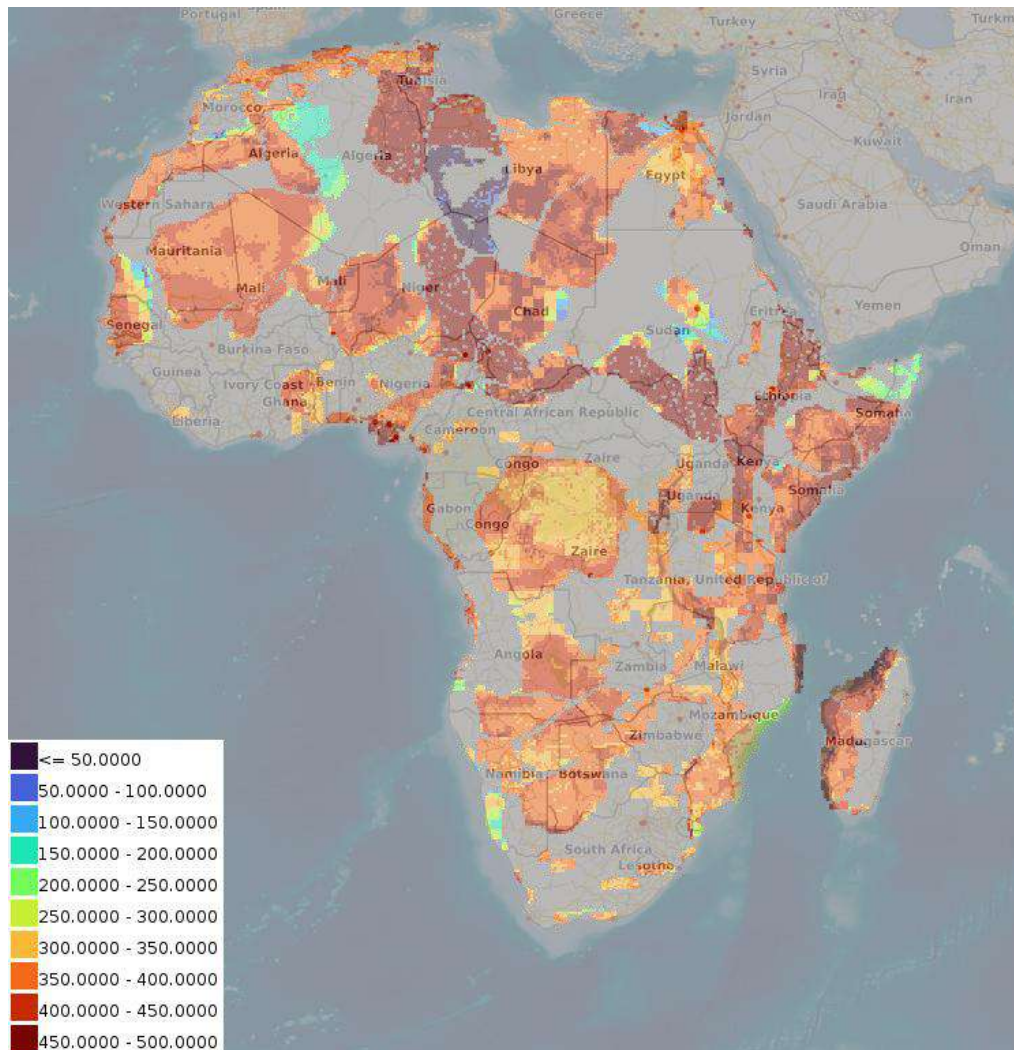
description: Direct heat with heat pump production flow rate (upupside)

keywords: Direct heat, heat pump, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump doublet net production (upupside)**

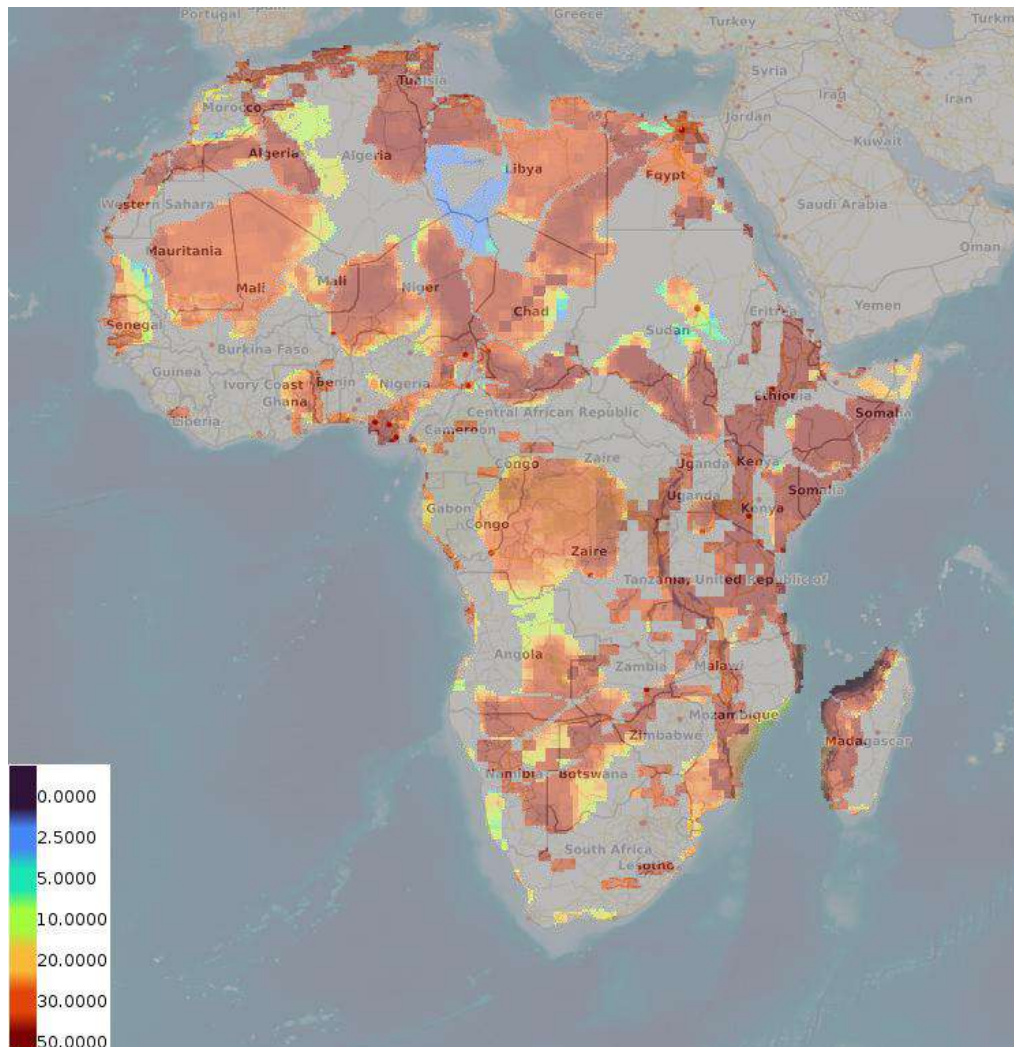
description: Direct heat with heat pump doublet net production (upupside)

keywords: Direct heat, heat pump, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump transmissivity (upupside)**

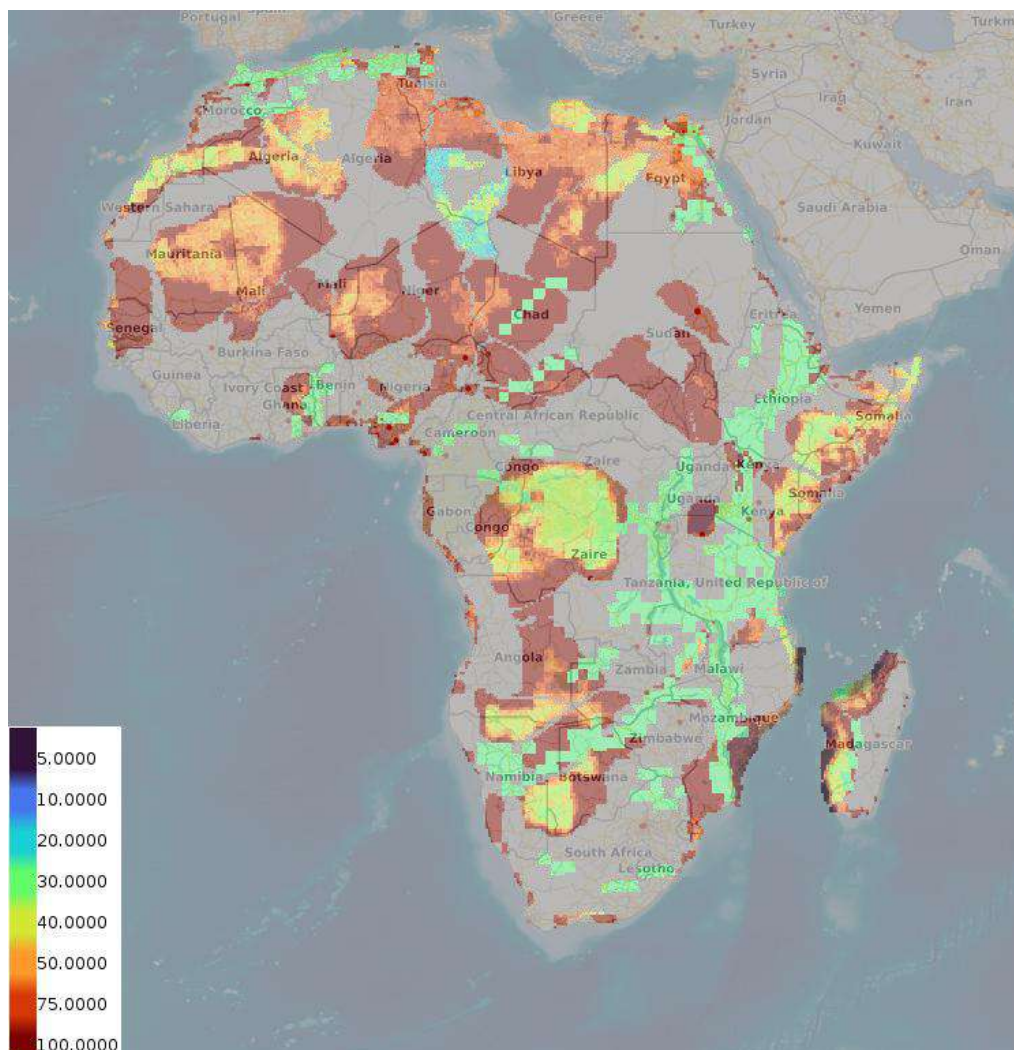
description: Direct heat with heat pump transmissivity (upupside)

keywords: Direct heat, heat pump, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump well distance (upupside)**

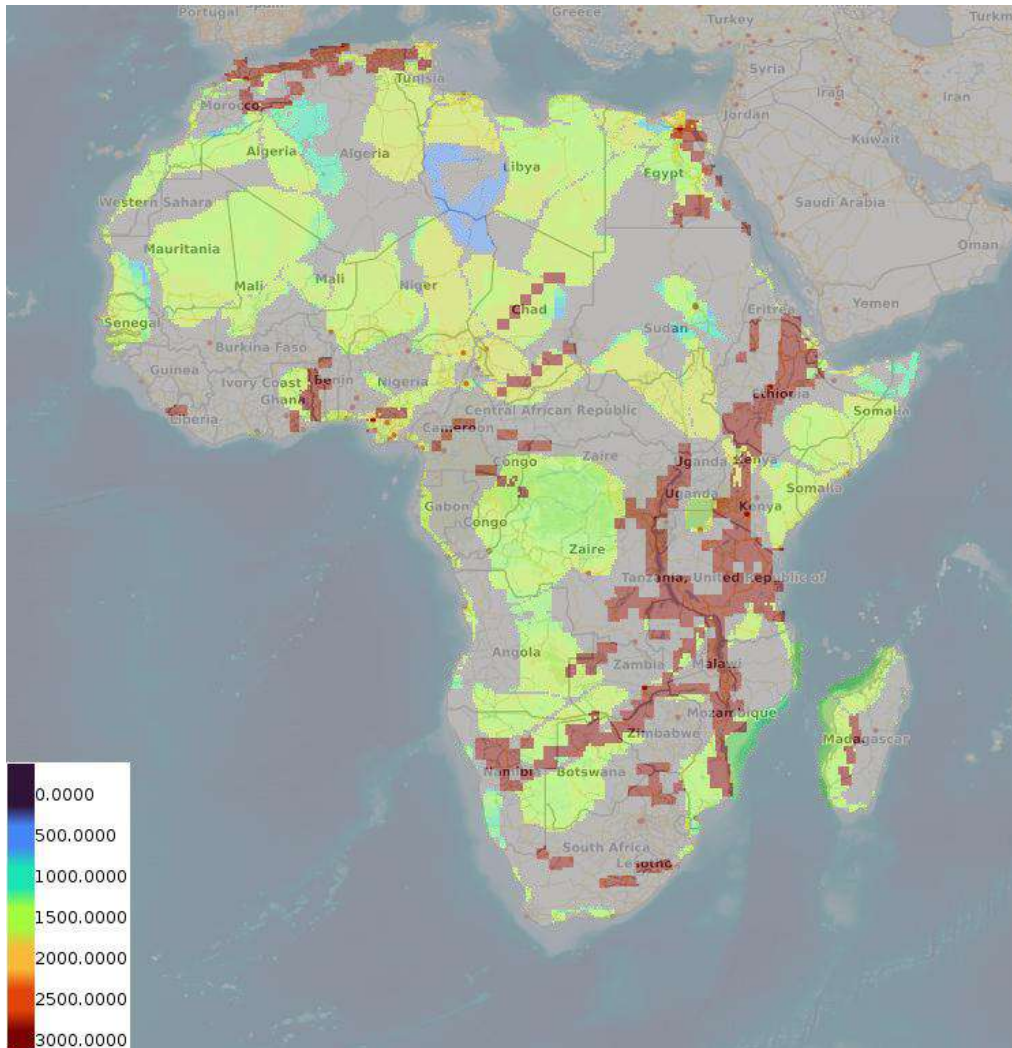
description: Direct heat with heat pump well distance (upupside)

keywords: Direct heat, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump optimized depth of the aquifer (upupside)**

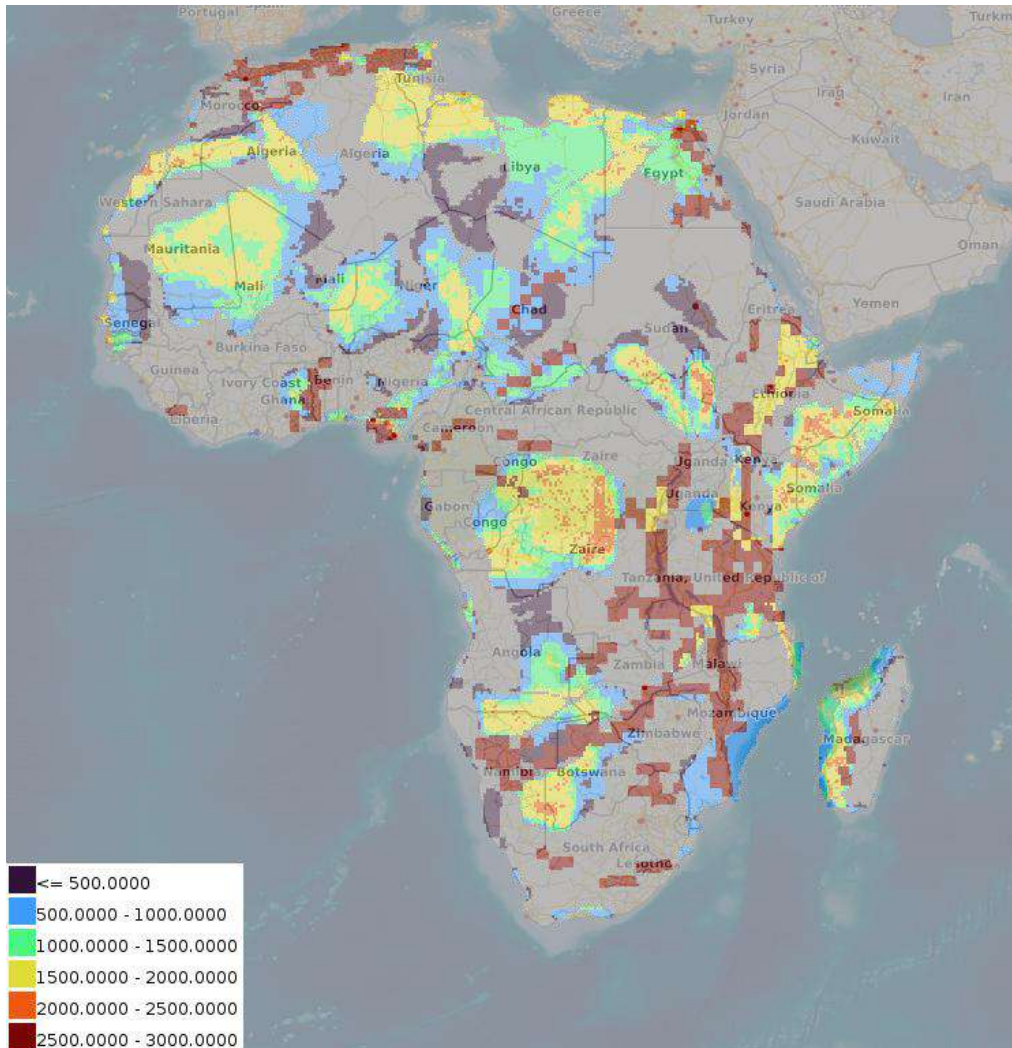
description: Direct heat with heat pump optimized depth of the aquifer (upupside)

keywords: Direct heat, heat pump, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump temperature at reservoir (upupside)**

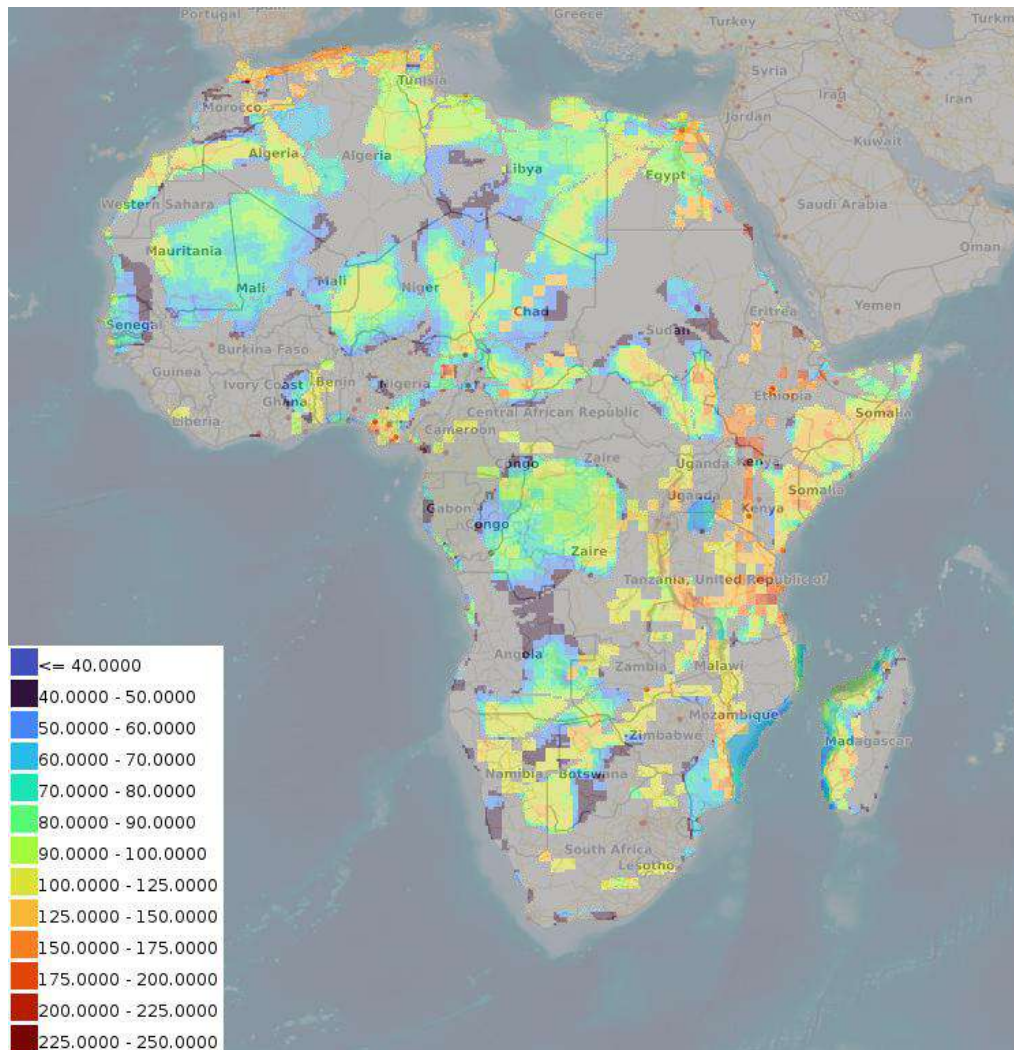
description: Direct heat with heat pump temperature at reservoir (upupside)

keywords: Direct heat, heat pump, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Direct heat with heat pump Levelized Costs of Energy (upupside)**

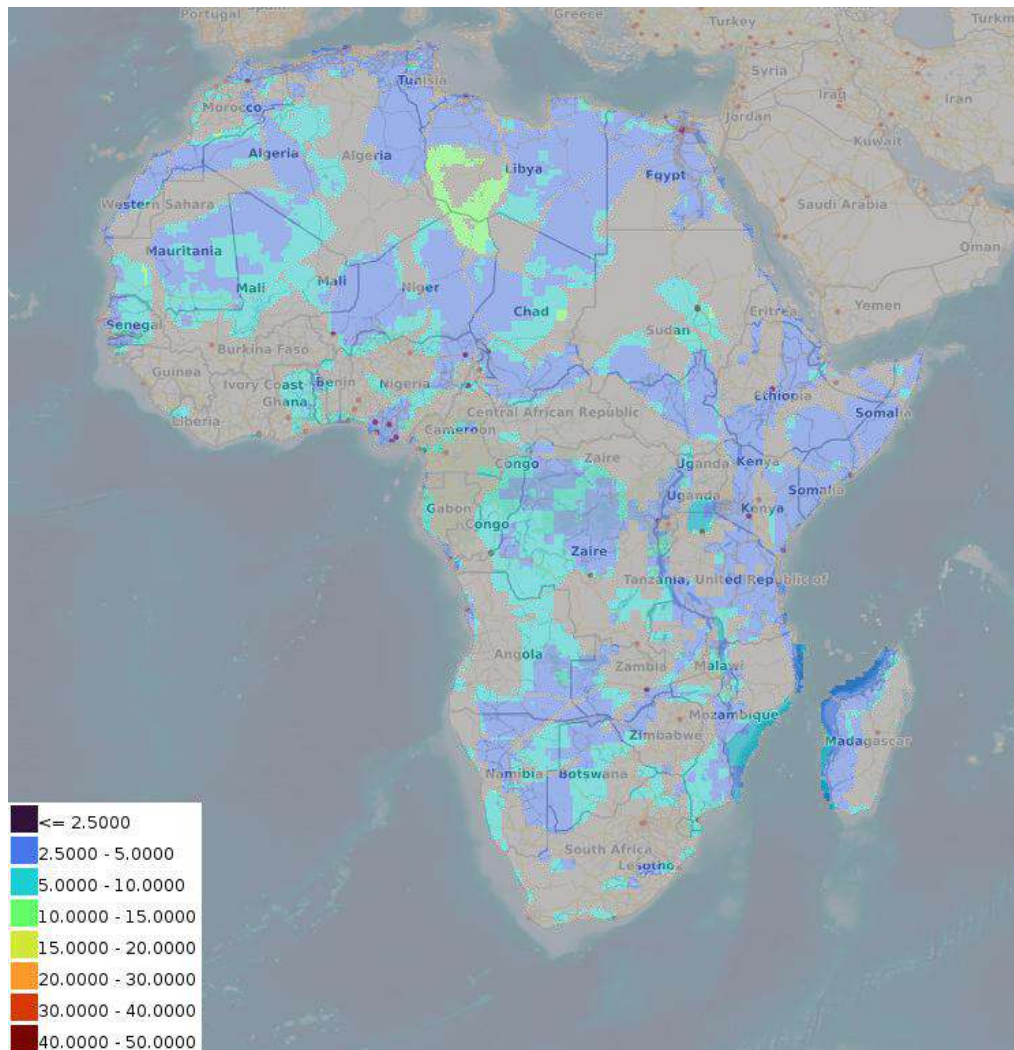
description: Direct heat with heat pump Levelized Costs of Energy (upupside)

keywords: Direct heat, heat pump, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for High Temperature Heat Pump (base case)**

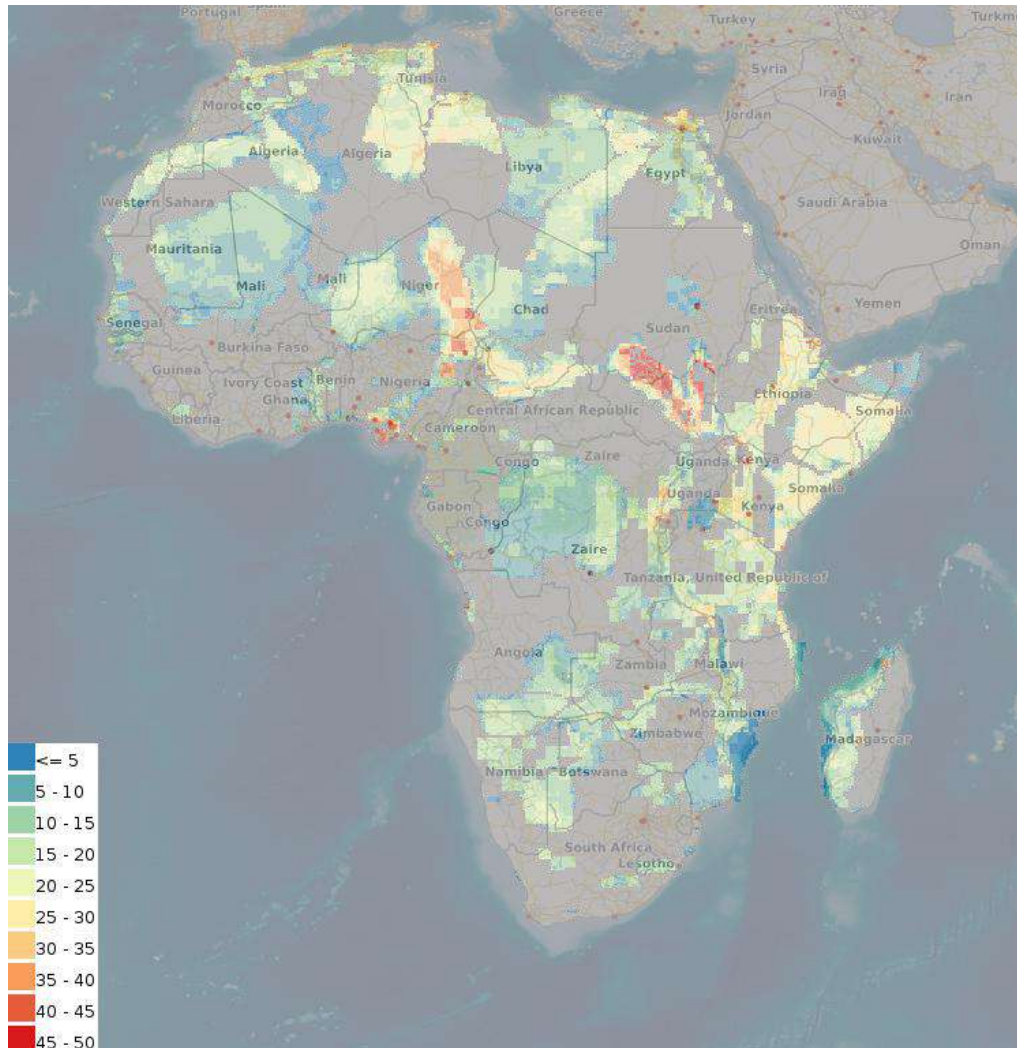
description: Possible heat capacity for a High Temperature Heat Pump in the basecase scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for High Temperature Heat Pump (base case)**

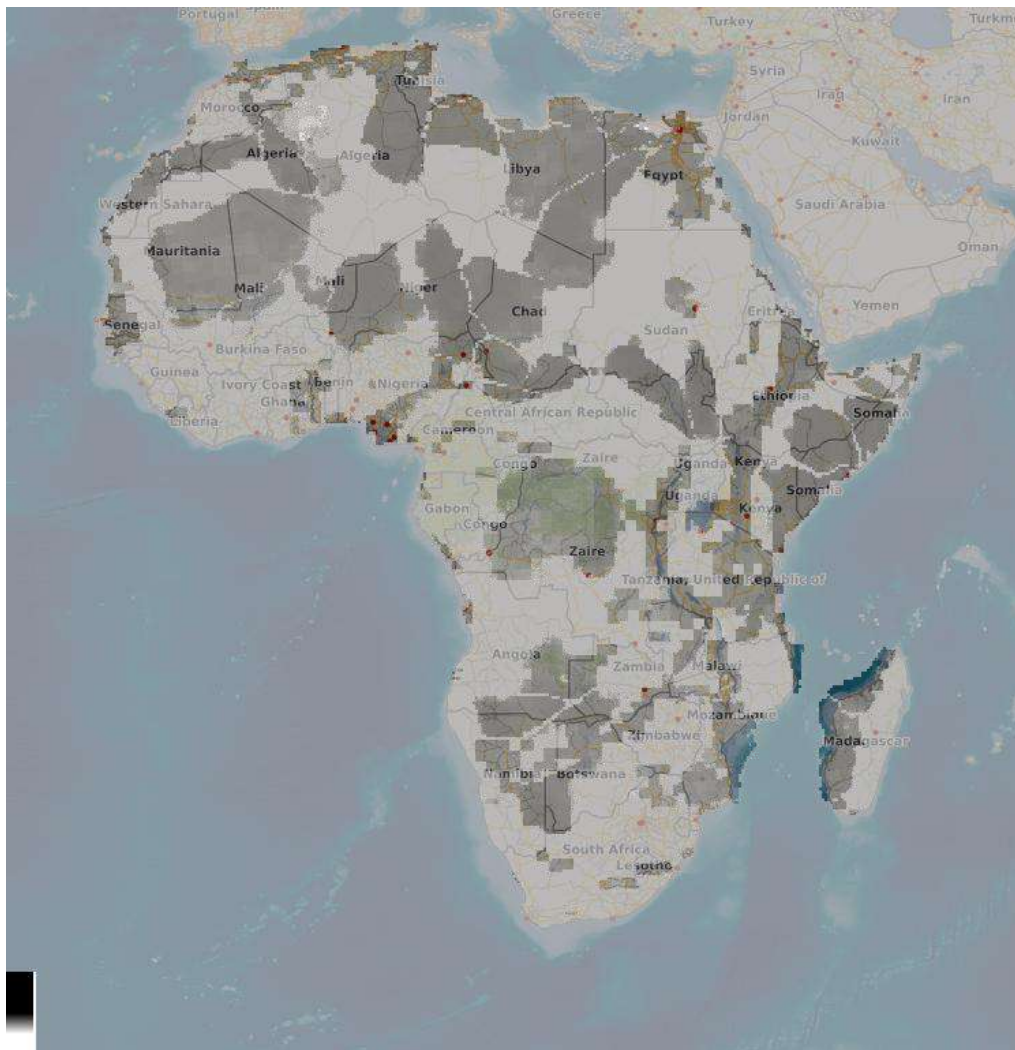
description: Possible cost of electricity for a High Temperature Heat Pump in the basecase scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for High Temperature Heat Pump (base case)**

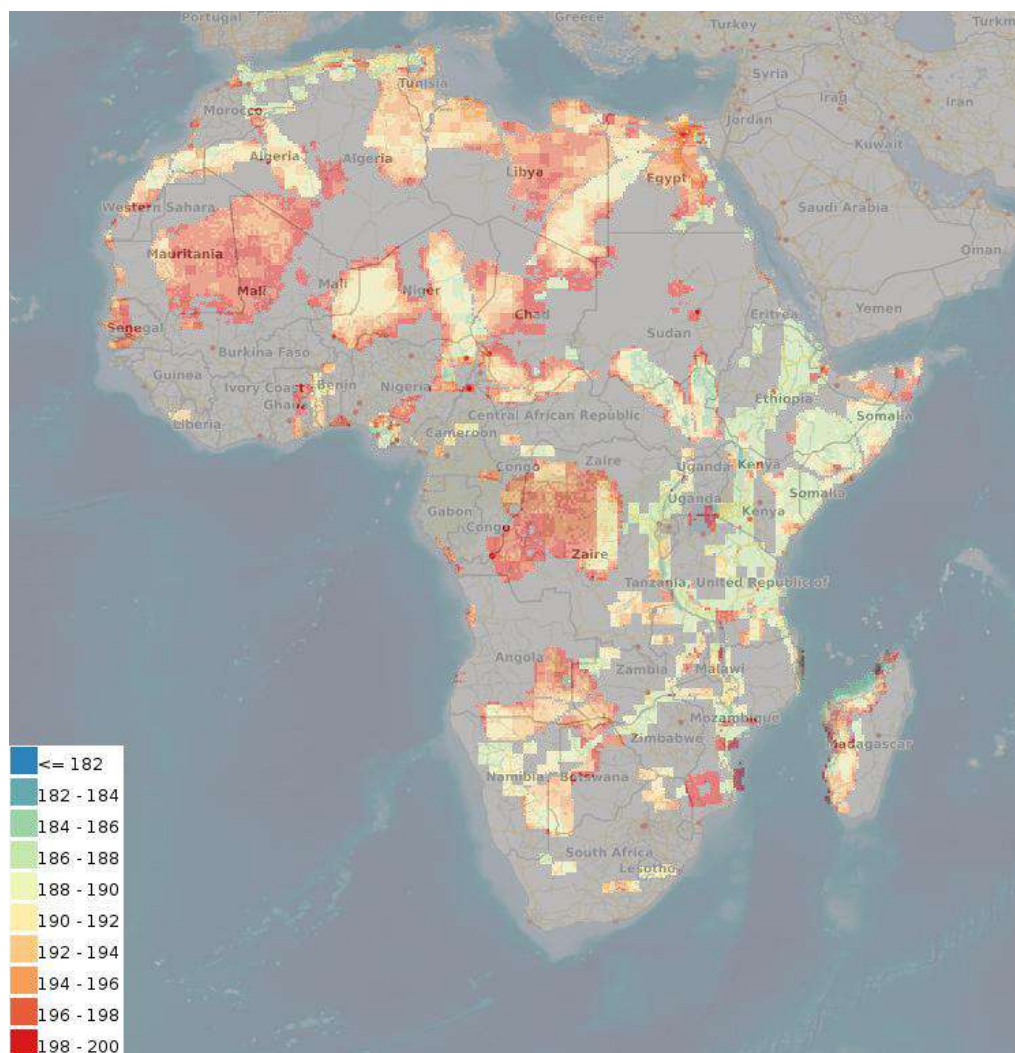
description: Possible environmental impact of climate change for a High Temperature Heat Pump in the basecase scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for High Temperature Heat Pump (upside)**

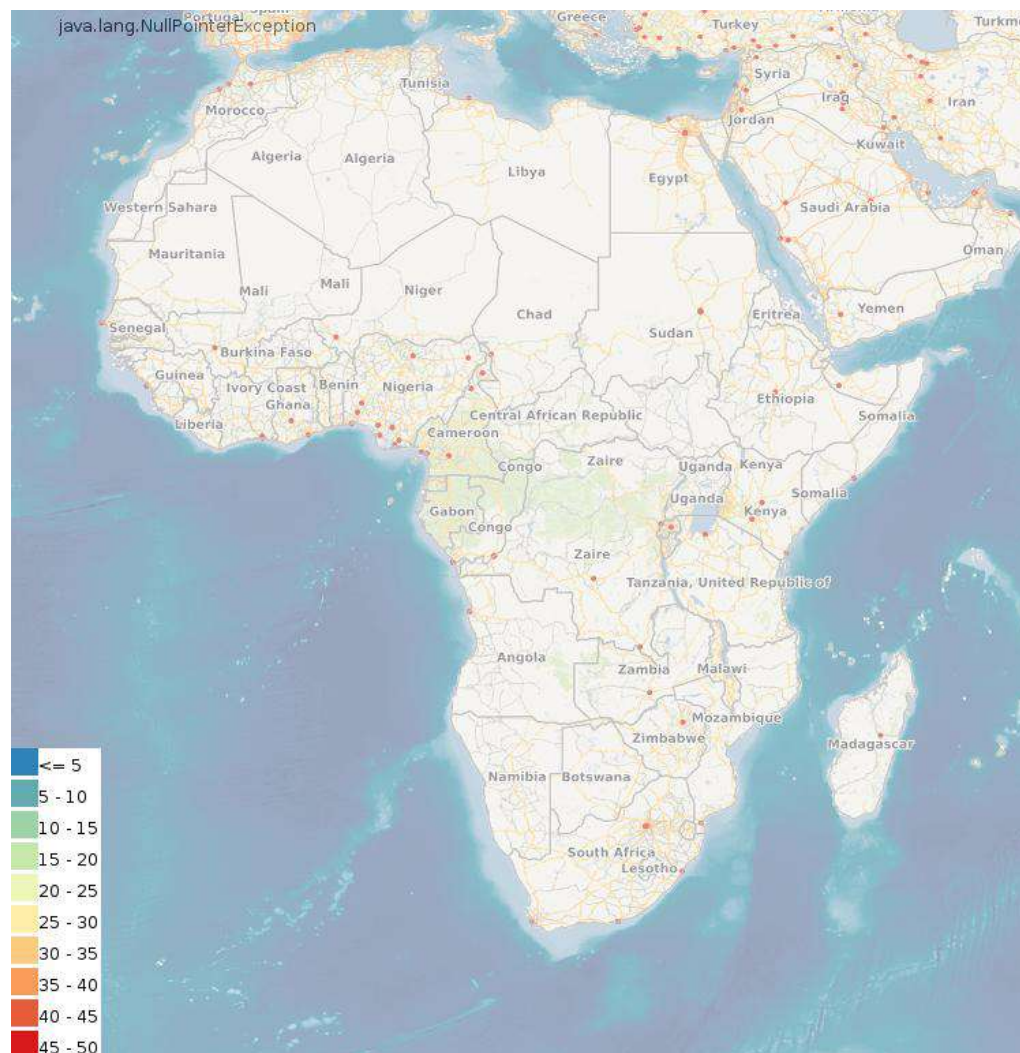
description: Possible heat capacity for a High Temperature Heat Pump in the upside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for High Temperature Heat Pump (upside)**

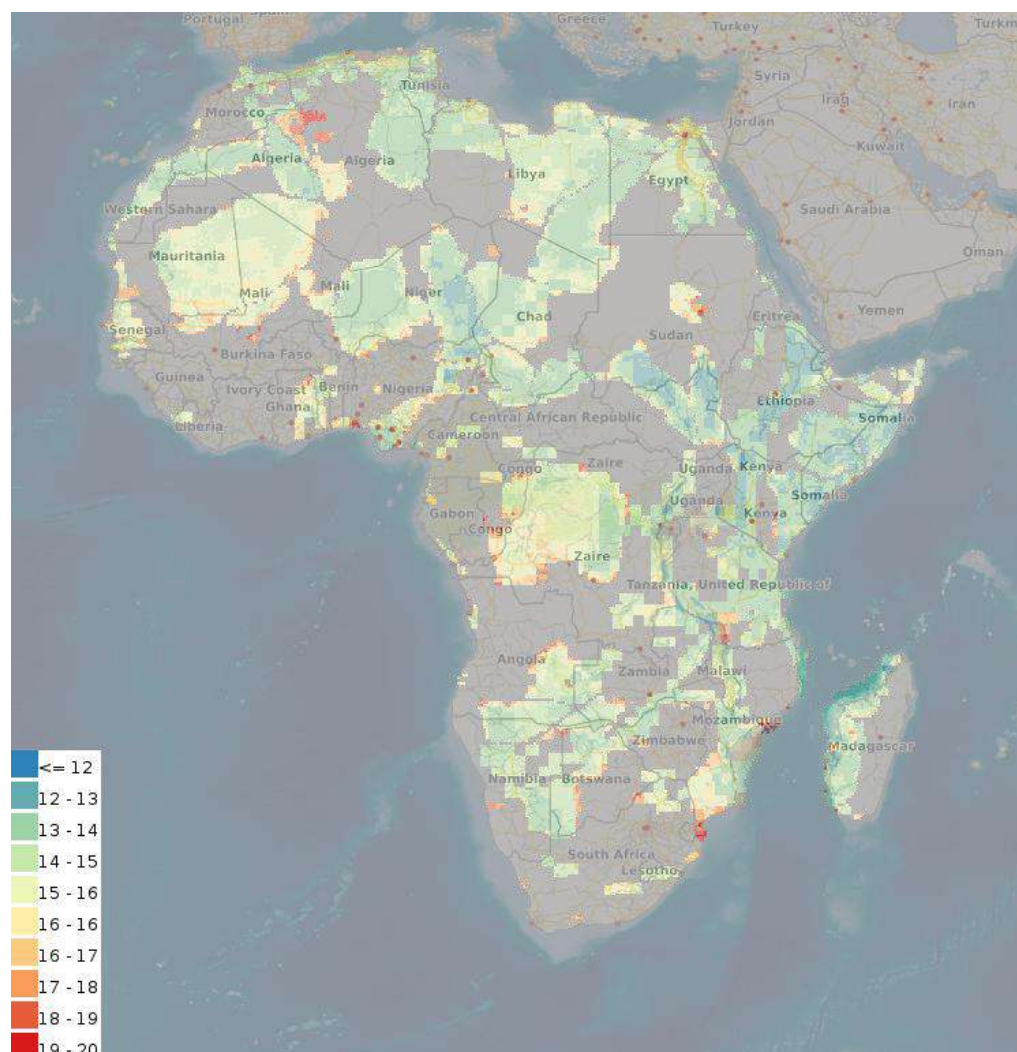
description: Possible cost of electricity for a High Temperature Heat Pump in the upside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for High Temperature Heat Pump (upside)**

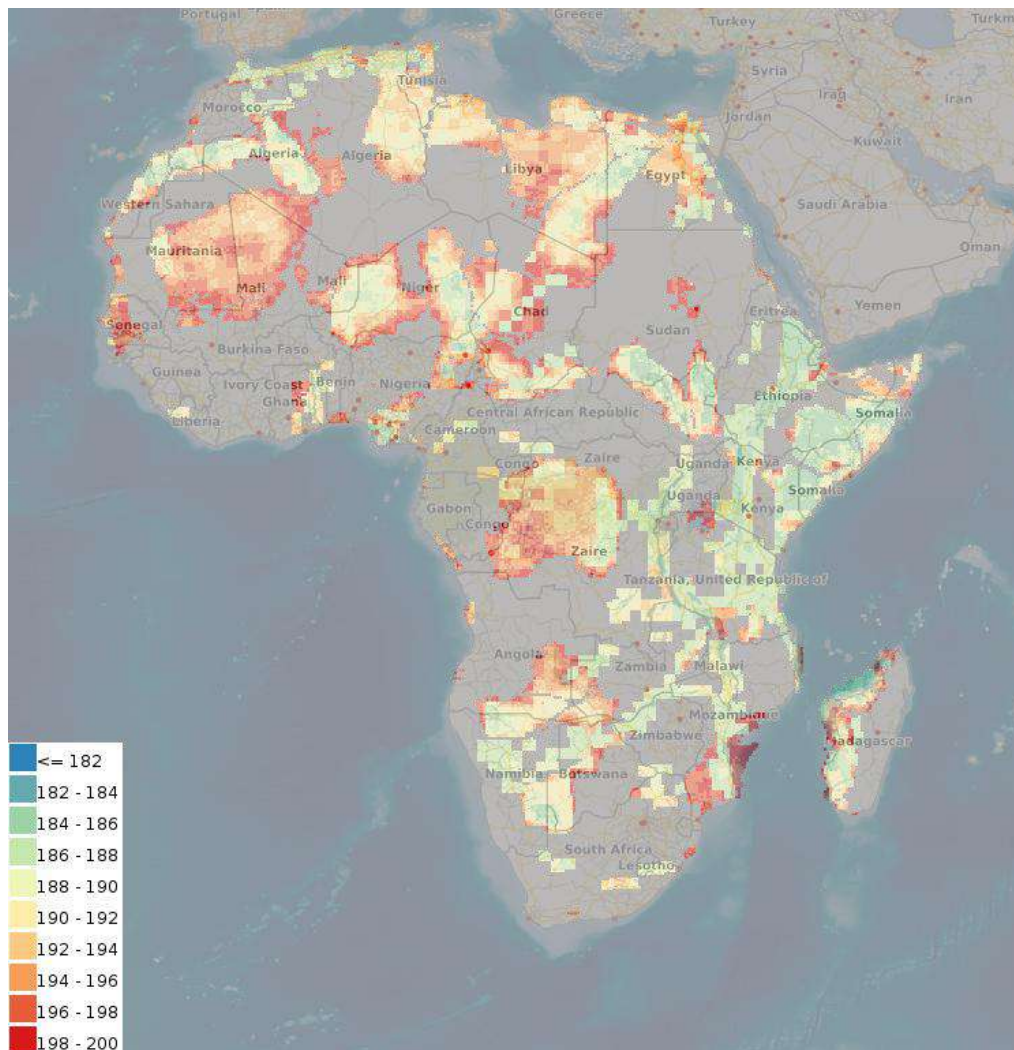
description: Possible environmental impact of climate change for a High Temperature Heat Pump in the upside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible heat capacity for High Temperature Heat Pump (upupside)**

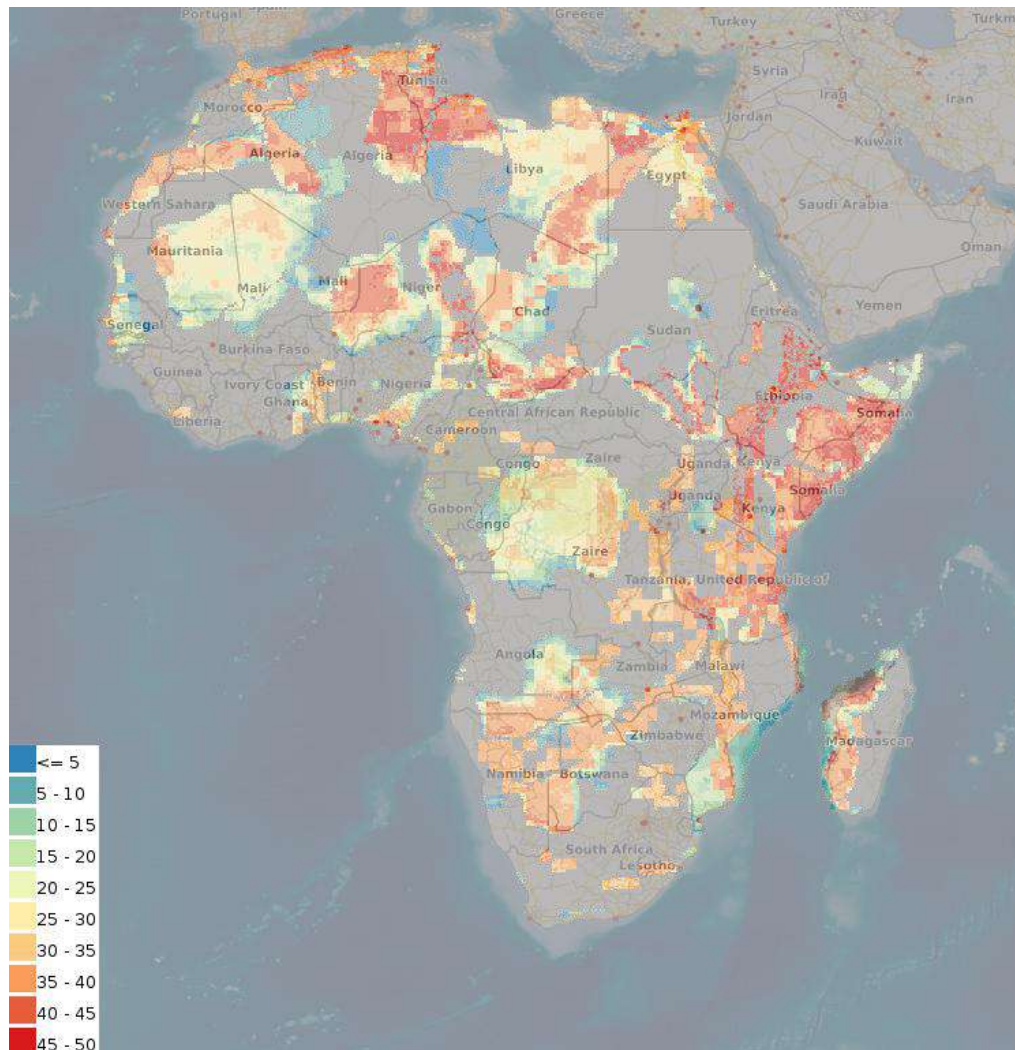
description: Possible heat capacity for a High Temperature Heat Pump in the upupside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Heat for High Temperature Heat Pump (upupside)**

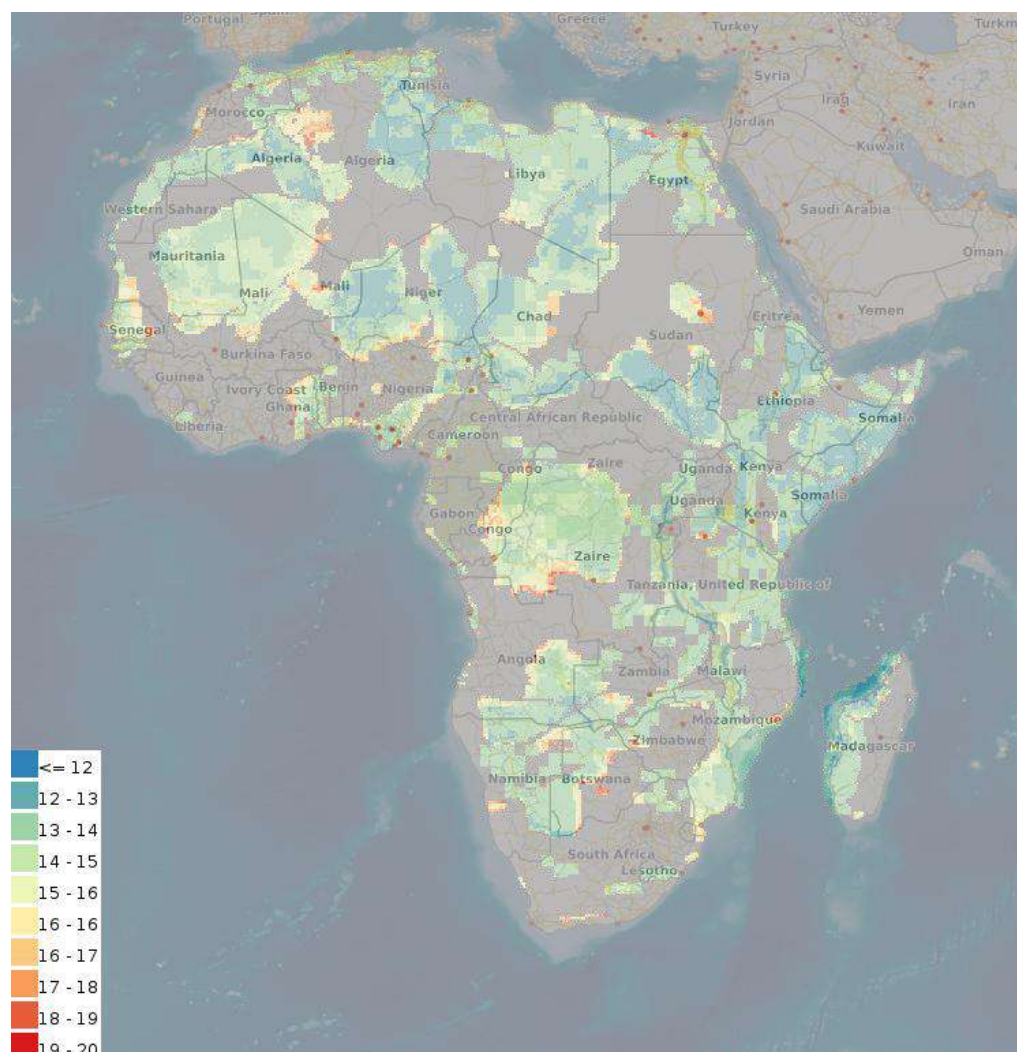
description: Possible cost of electricity for a High Temperature Heat Pump in the upupside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for High Temperature Heat Pump (upupside)**

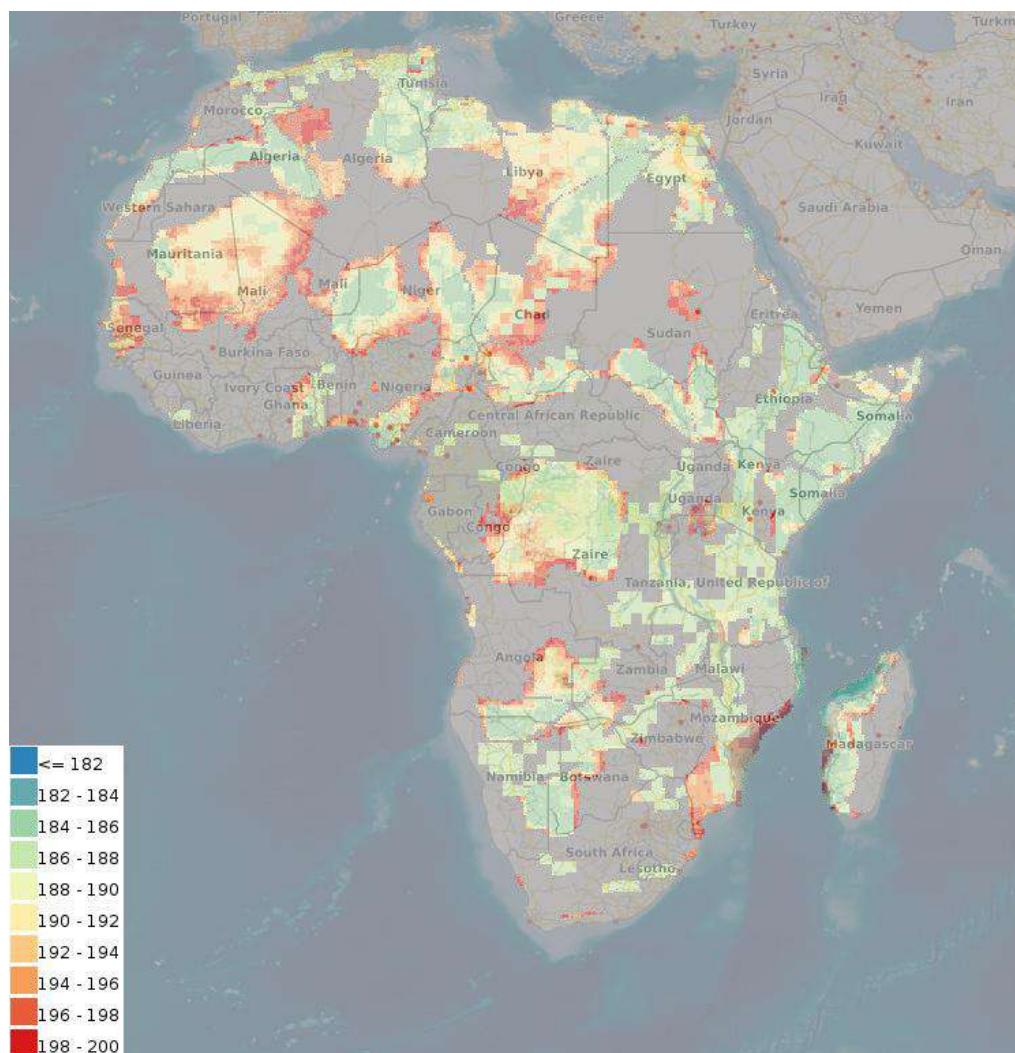
description: Possible environmental impact of climate change for a High Temperature Heat Pump in the upupside scenario

keywords: High Temperature Heat Pump, Heat Production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power coefficient of performance (basecase)**

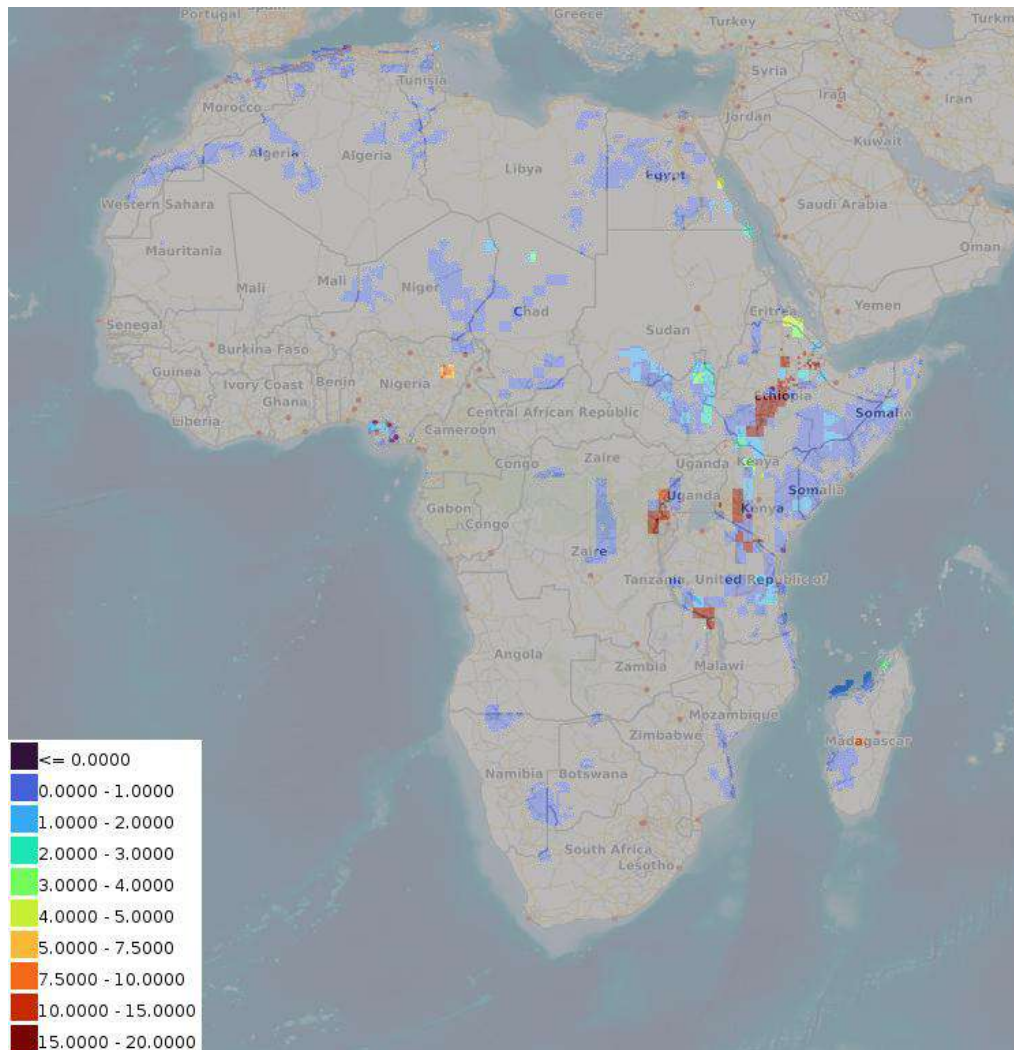
description: Organic Rankine Cycle for power coefficient of performance (basecase)

keywords: Organic Rankine Cycle, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power: pump pressure needed to drive pumps (basecase)**

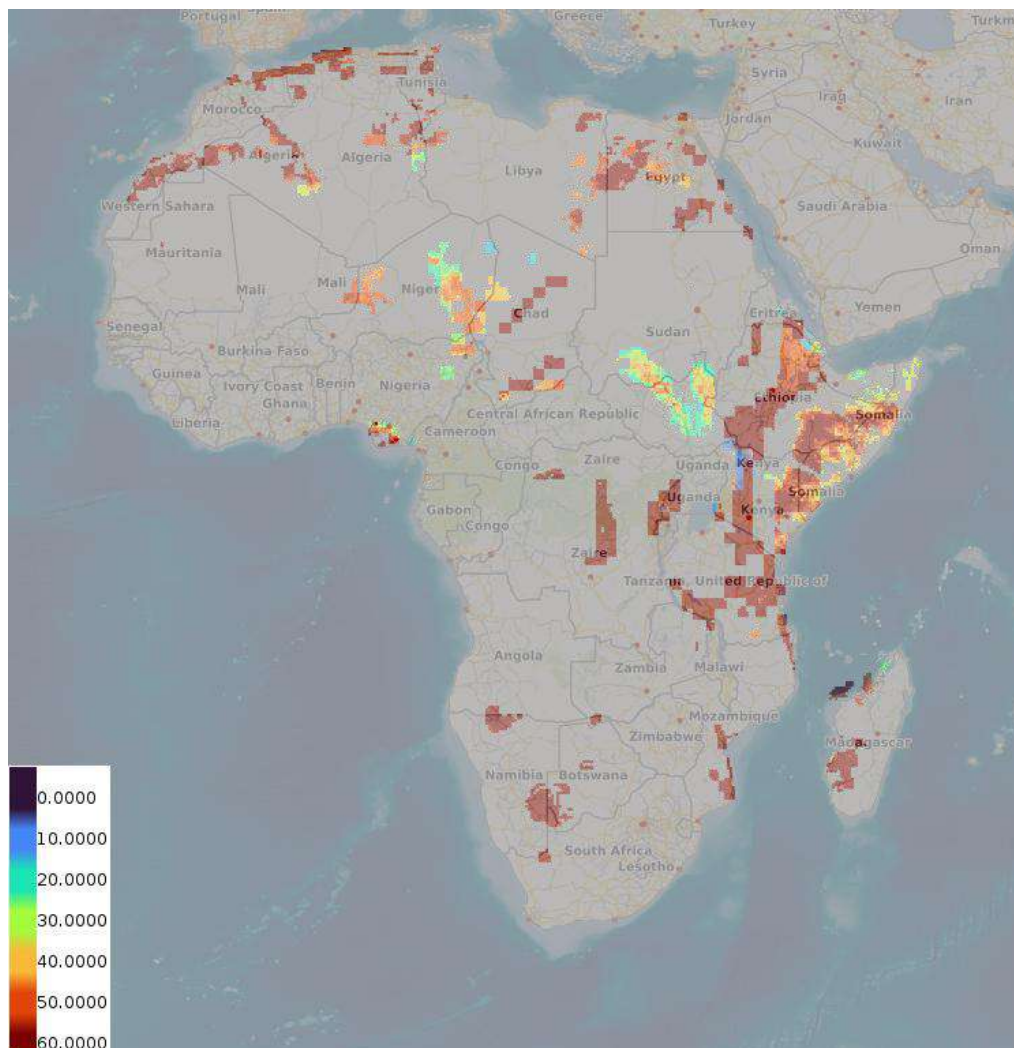
description: Organic Rankine Cycle for power: pump pressure needed to drive pumps (basecase)

keywords: Organic Rankine Cycle, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power production flow rate (basecase)**

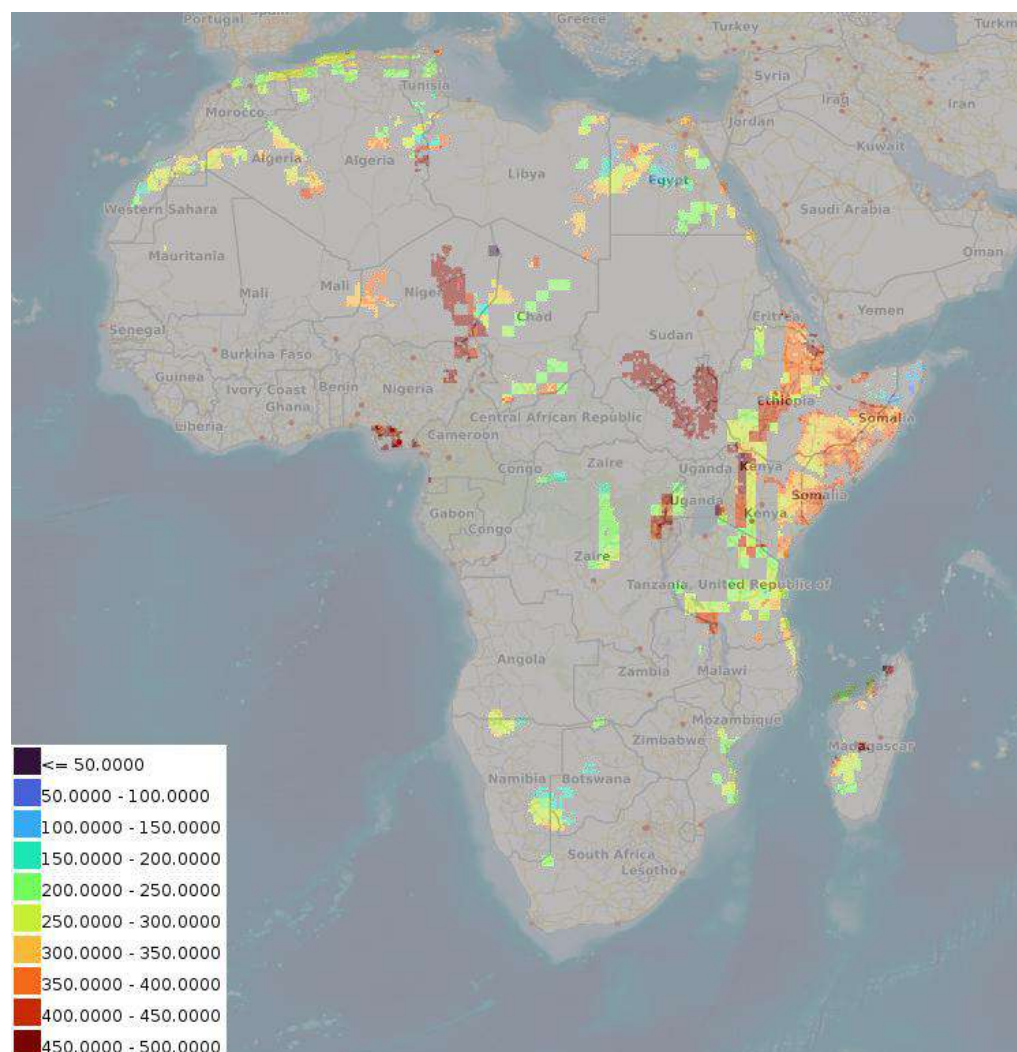
description: Organic Rankine Cycle for power production flow rate (basecase)

keywords: Organic Rankine Cycle, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power doublet net production (basecase)**

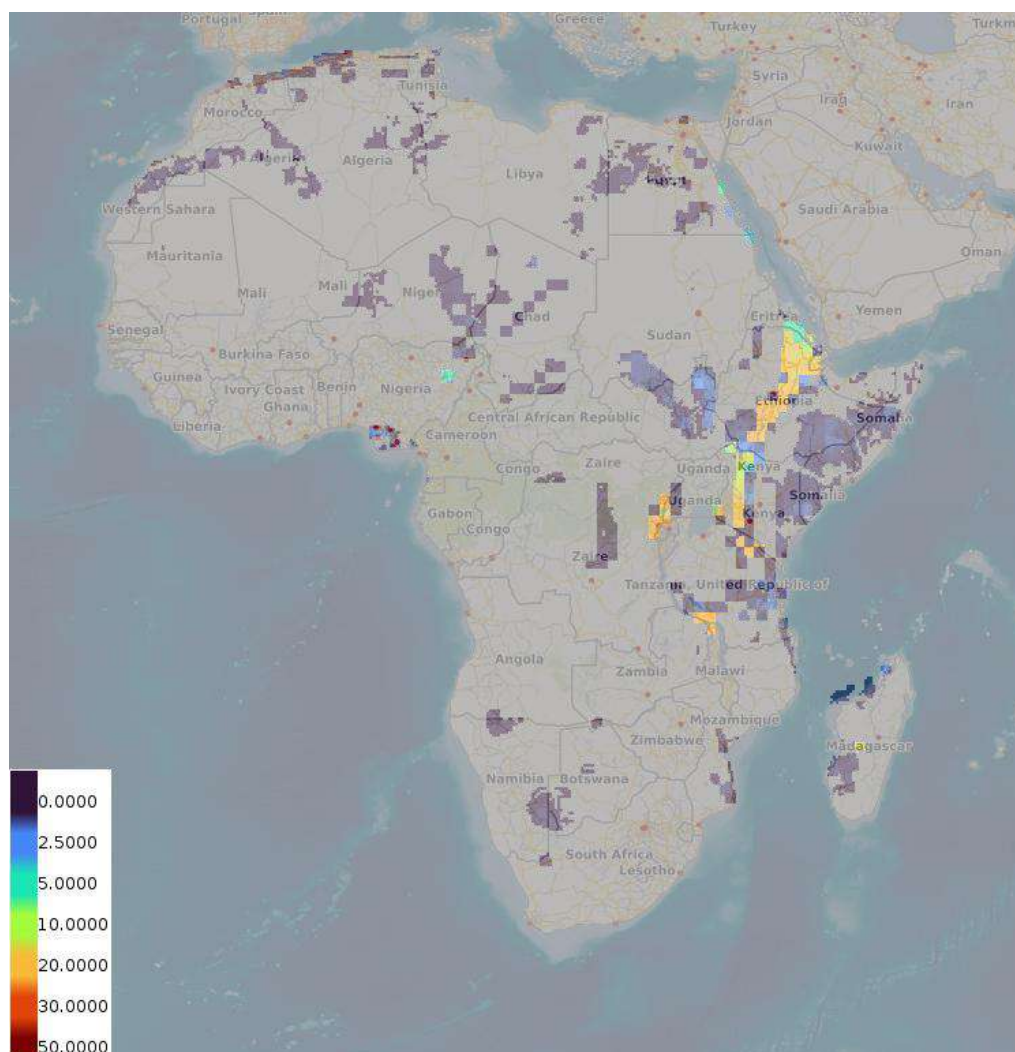
description: Organic Rankine Cycle for power doublet net production (basecase)

keywords: Organic Rankine Cycle, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power transmissivity (basecase)**

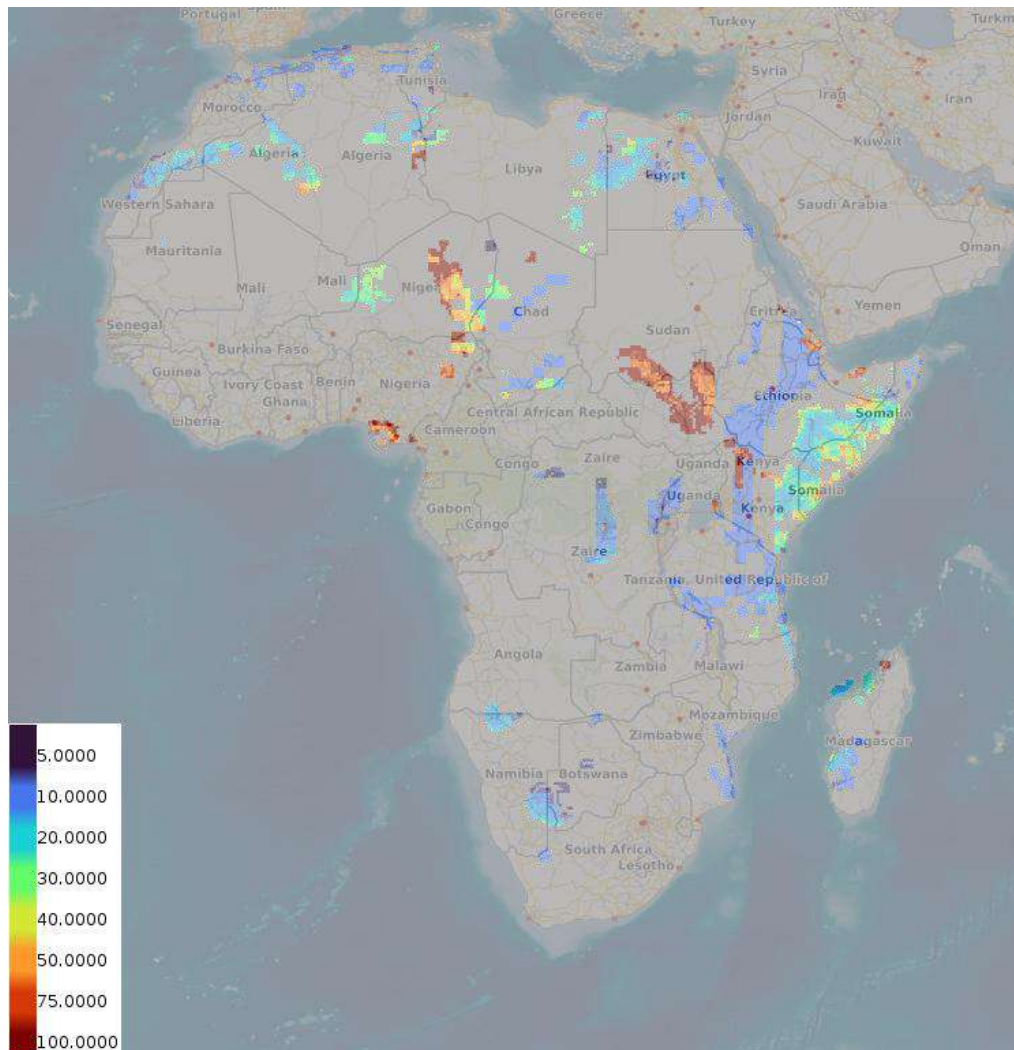
description: Organic Rankine Cycle for power transmissivity (basecase)

keywords: Organic Rankine Cycle, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power well distance (basecase)**

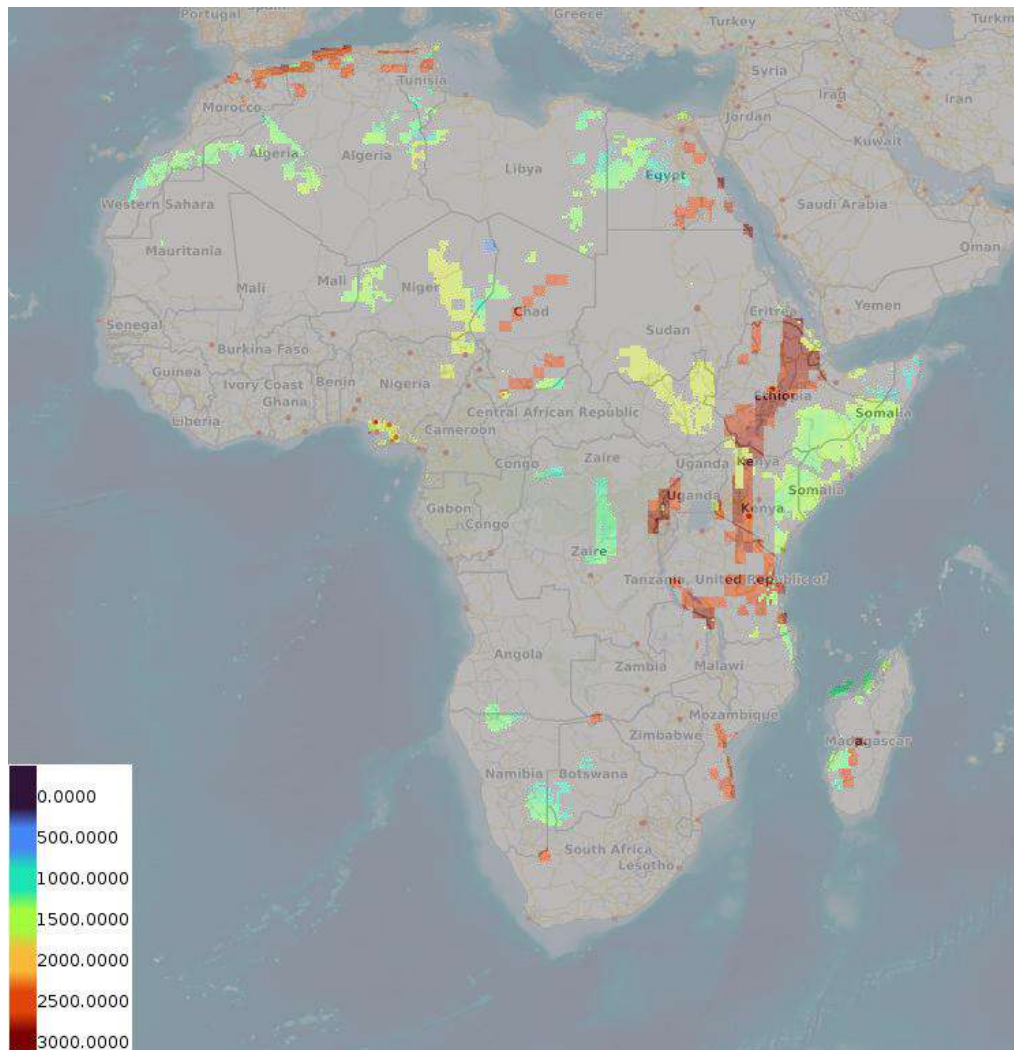
description: Organic Rankine Cycle for power well distance (basecase)

keywords: Organic Rankine Cycle, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power optimized depth of the aquifer (basecase)**

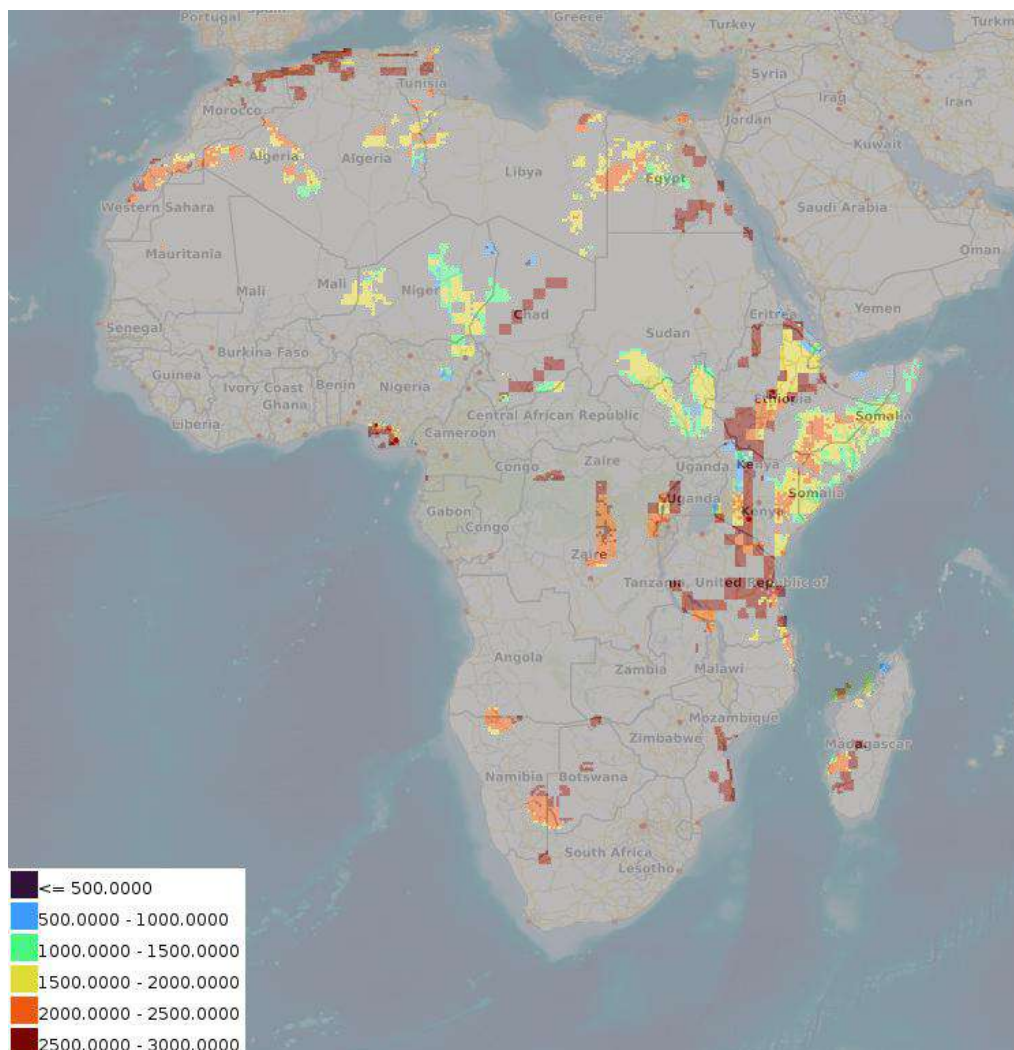
description: Organic Rankine Cycle for power optimized depth of the aquifer (basecase)

keywords: Organic Rankine Cycle, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power temperature at reservoir (basecase)**

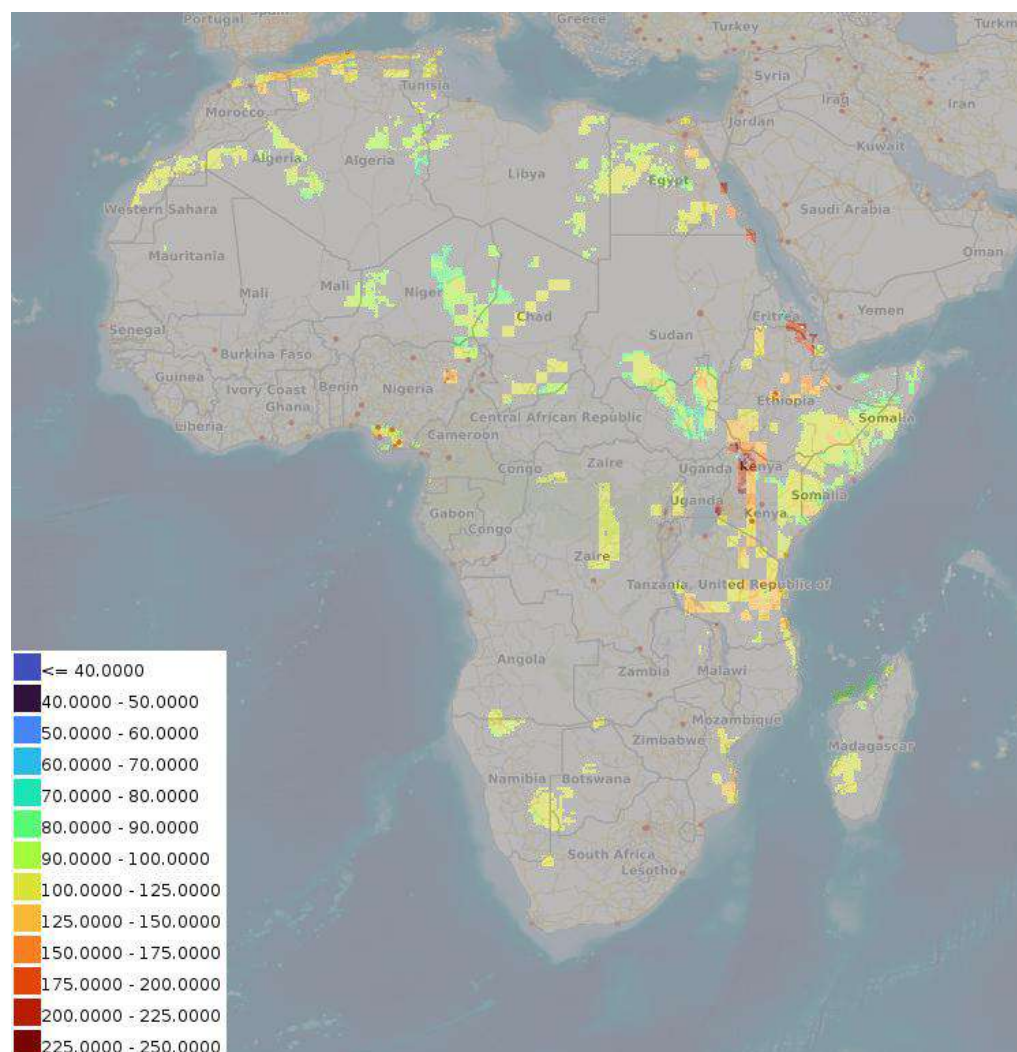
description: Organic Rankine Cycle for power temperature at reservoir (basecase)

keywords: Organic Rankine Cycle, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power Levelized Costs of Energy (basecase)**

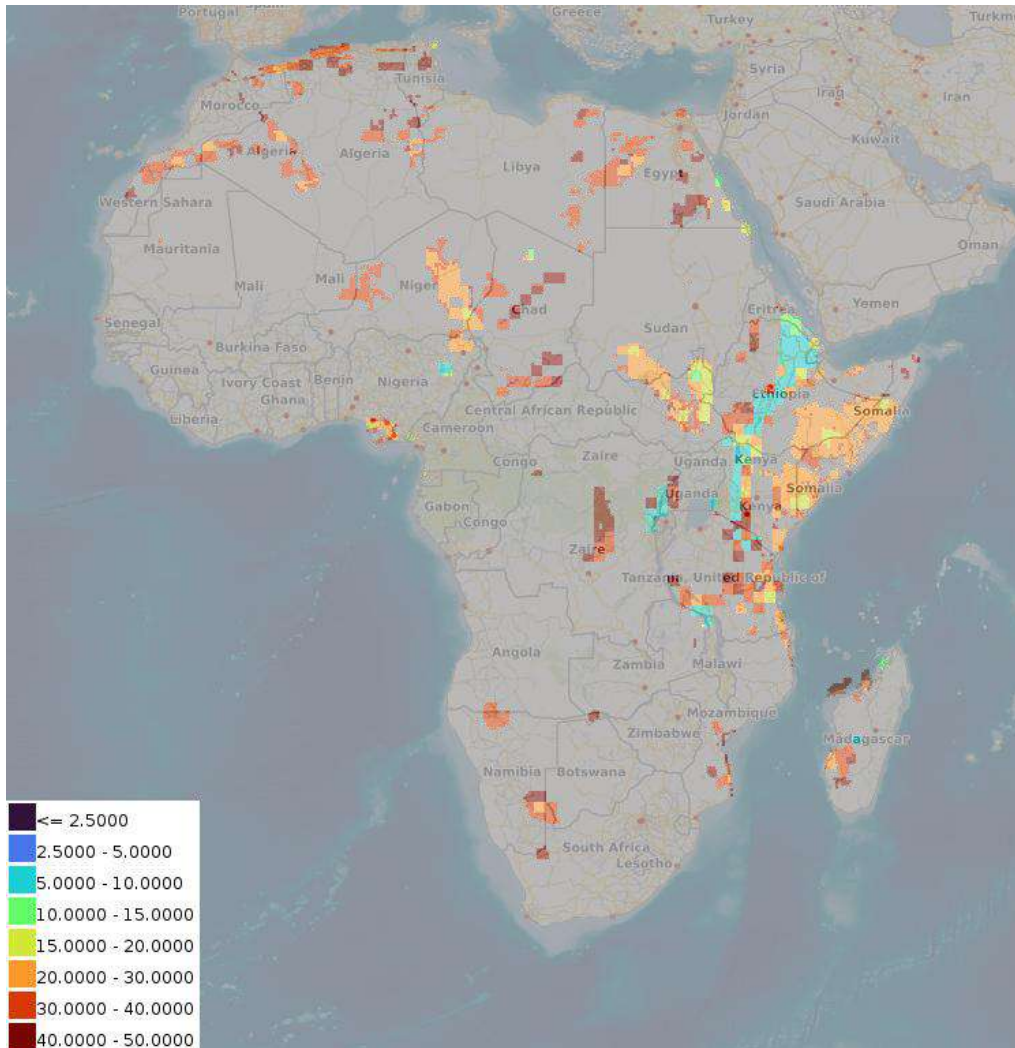
description: Organic Rankine Cycle for power Levelized Costs of Energy (basecase)

keywords: Organic Rankine Cycle, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power coefficient of performance (upside)**

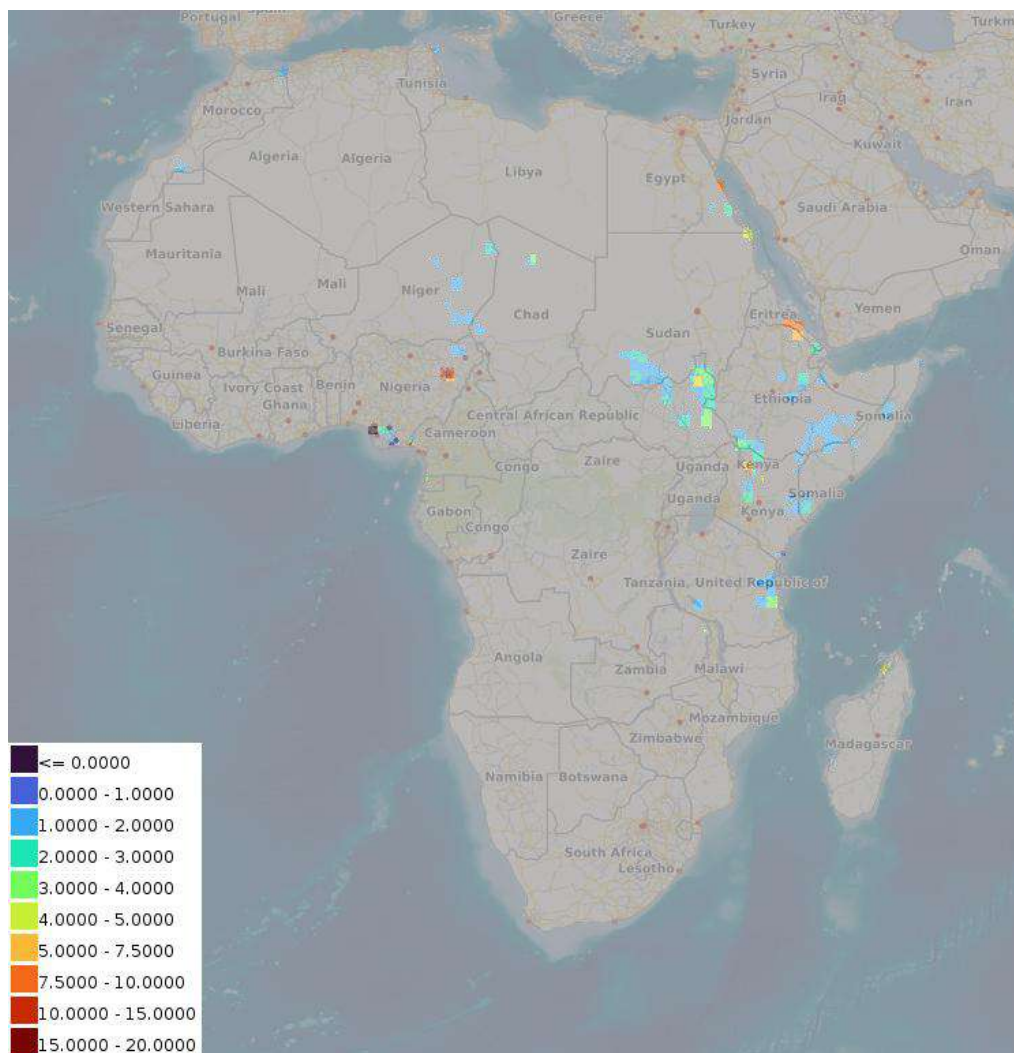
description: Organic Rankine Cycle for power coefficient of performance (upside)

keywords: Organic Rankine Cycle, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power: pump pressure needed to drive pumps (upside)**

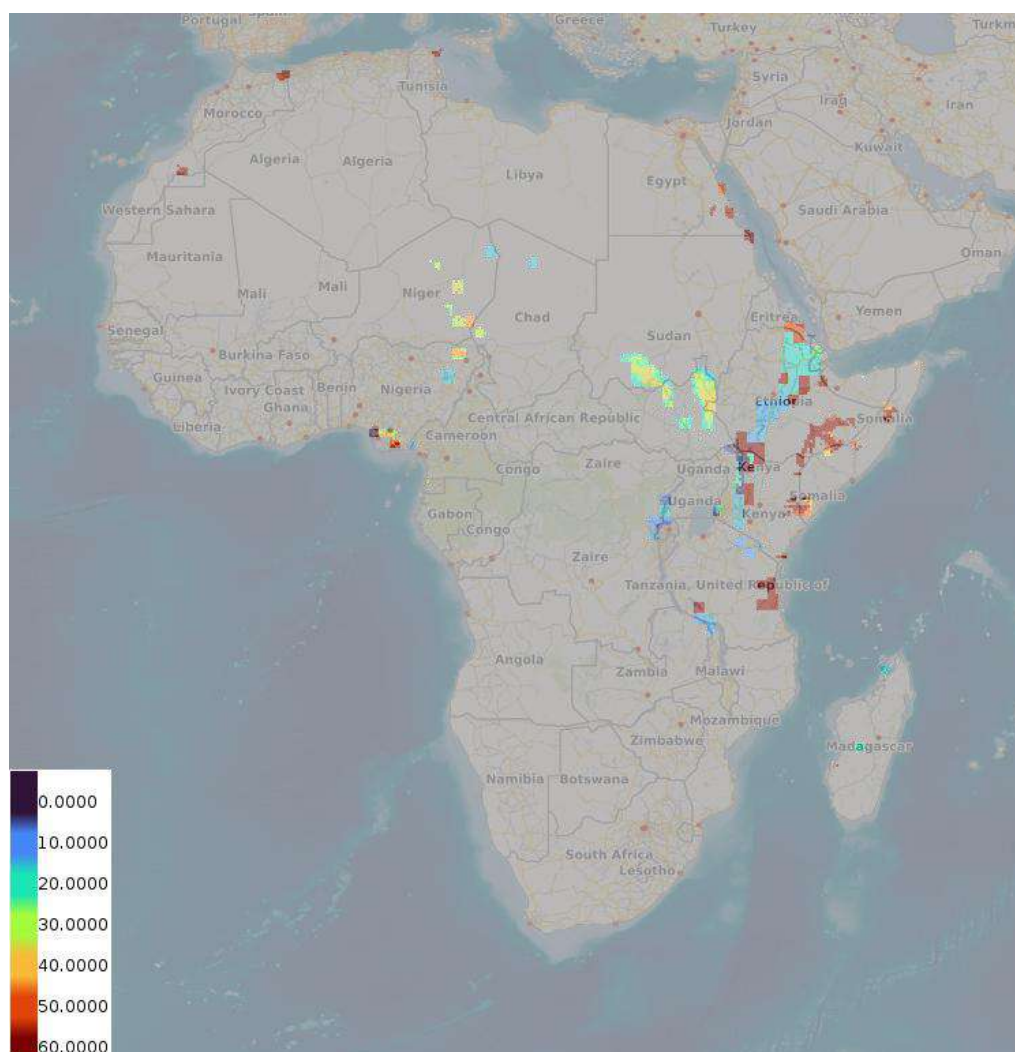
description: Organic Rankine Cycle for power: pump pressure needed to drive pumps (upside)

keywords: Organic Rankine Cycle, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power production flow rate (upside)**

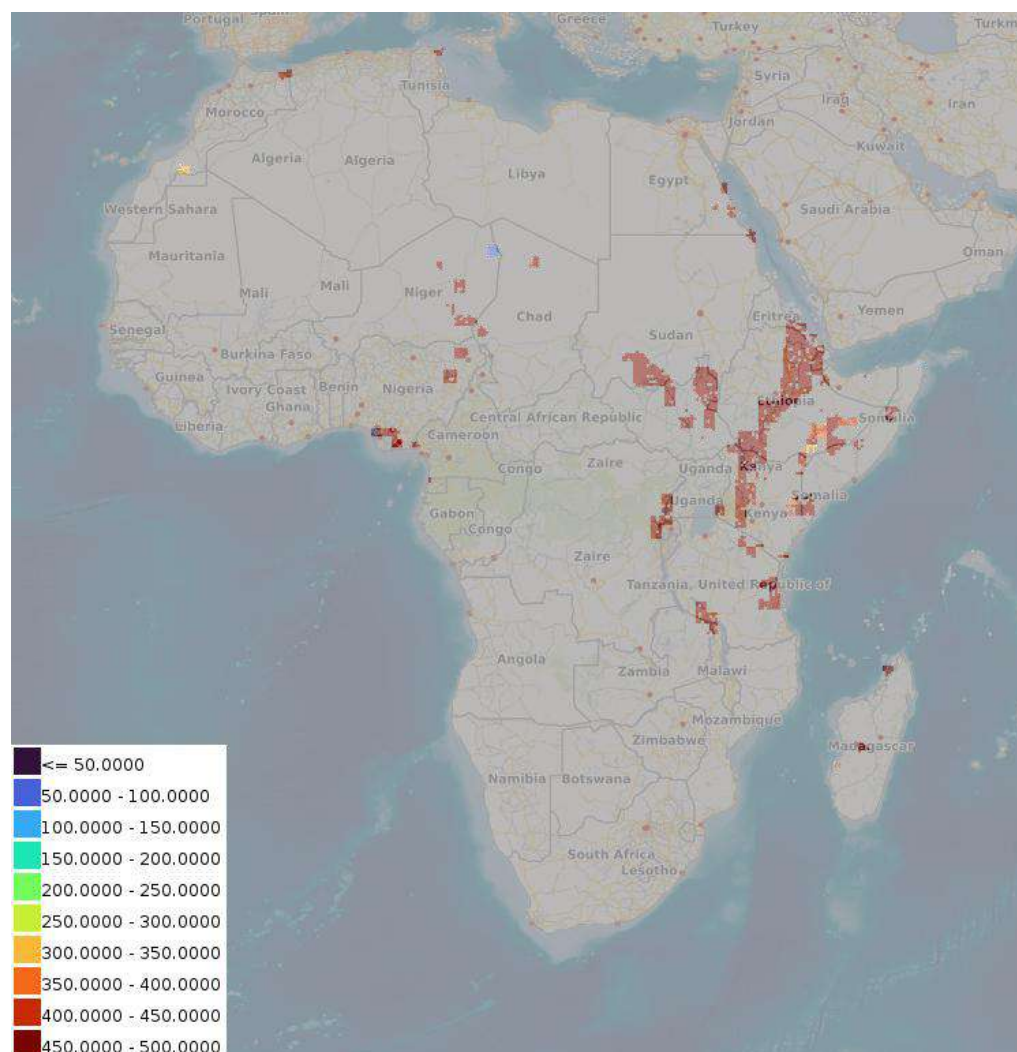
description: Organic Rankine Cycle for power production flow rate (upside)

keywords: Organic Rankine Cycle, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power doublet net production (upside)**

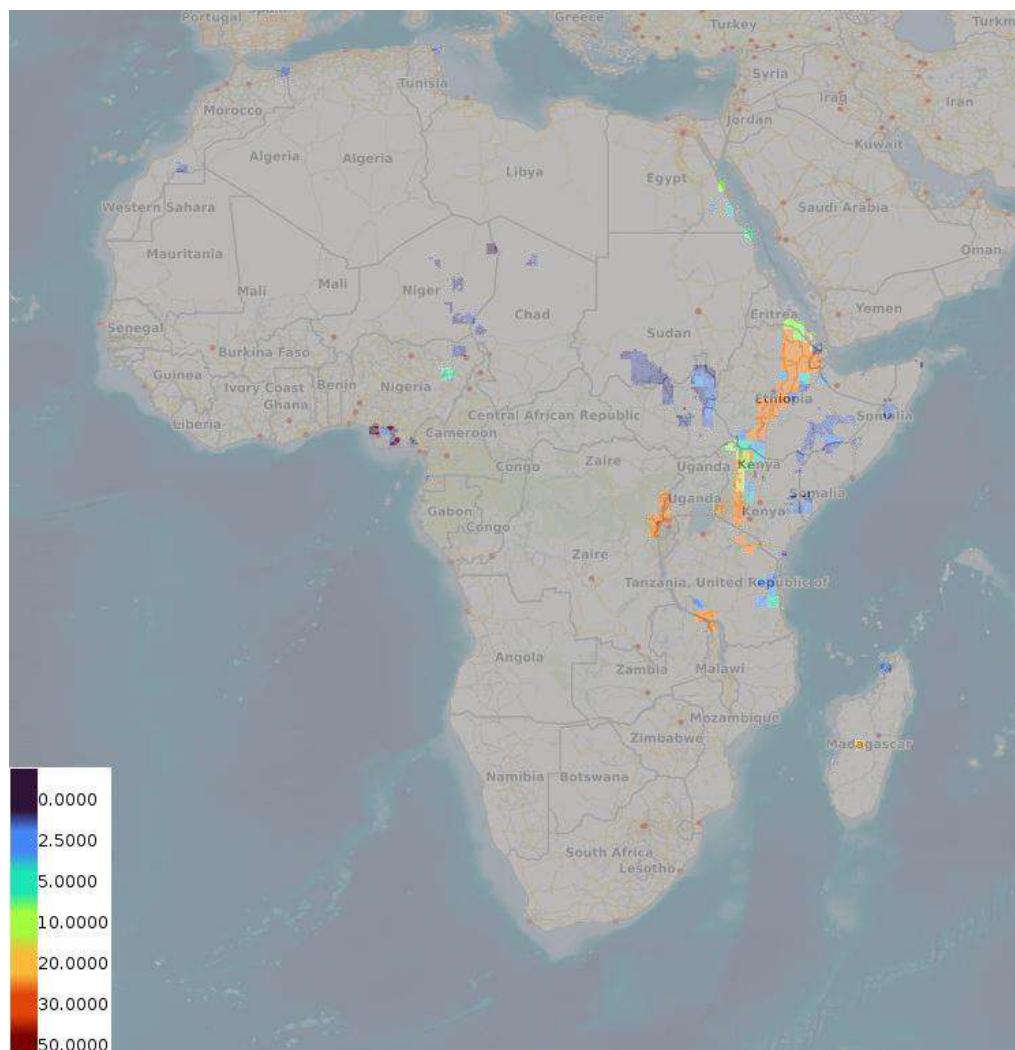
description: Organic Rankine Cycle for power doublet net production (upside)

keywords: Organic Rankine Cycle, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power transmissivity (upside)**

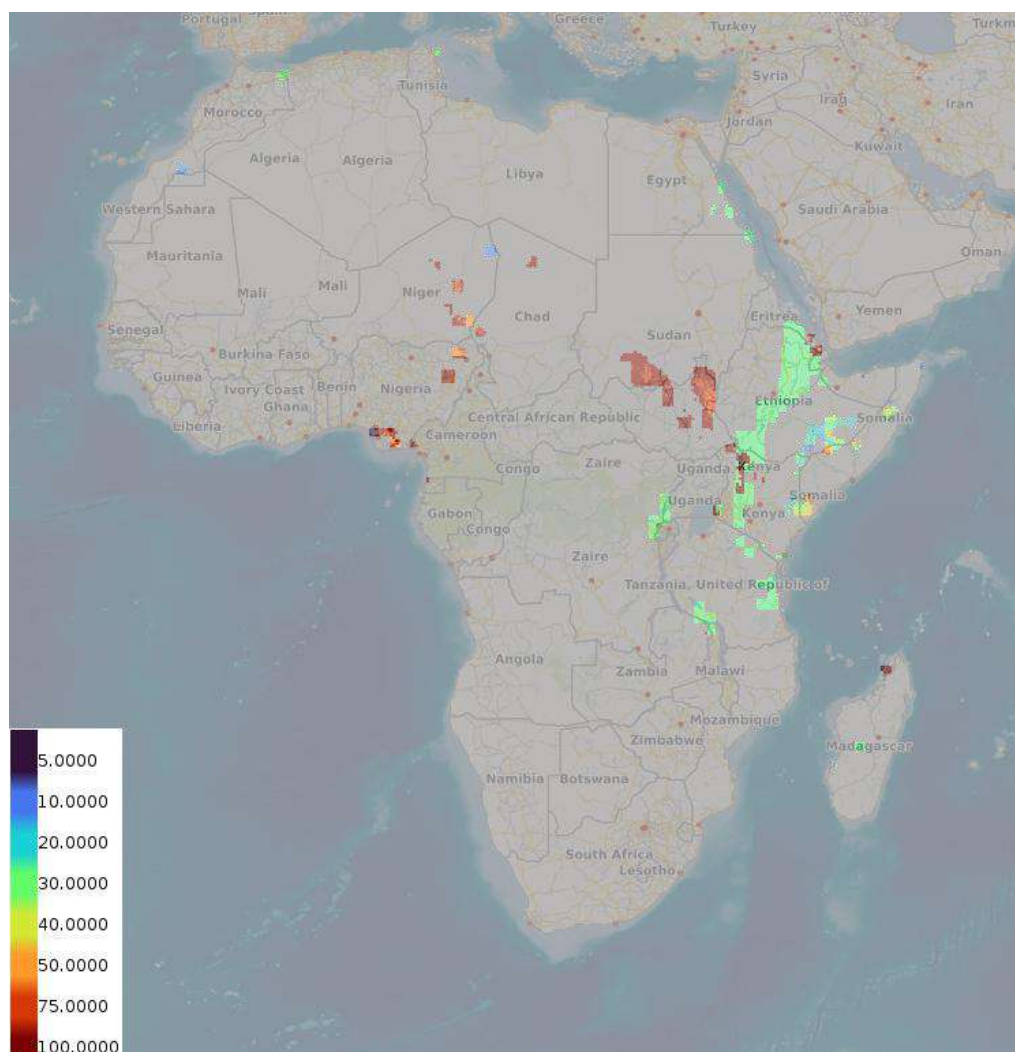
description: Organic Rankine Cycle for power transmissivity (upside)

keywords: Organic Rankine Cycle, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power well distance (upside)**

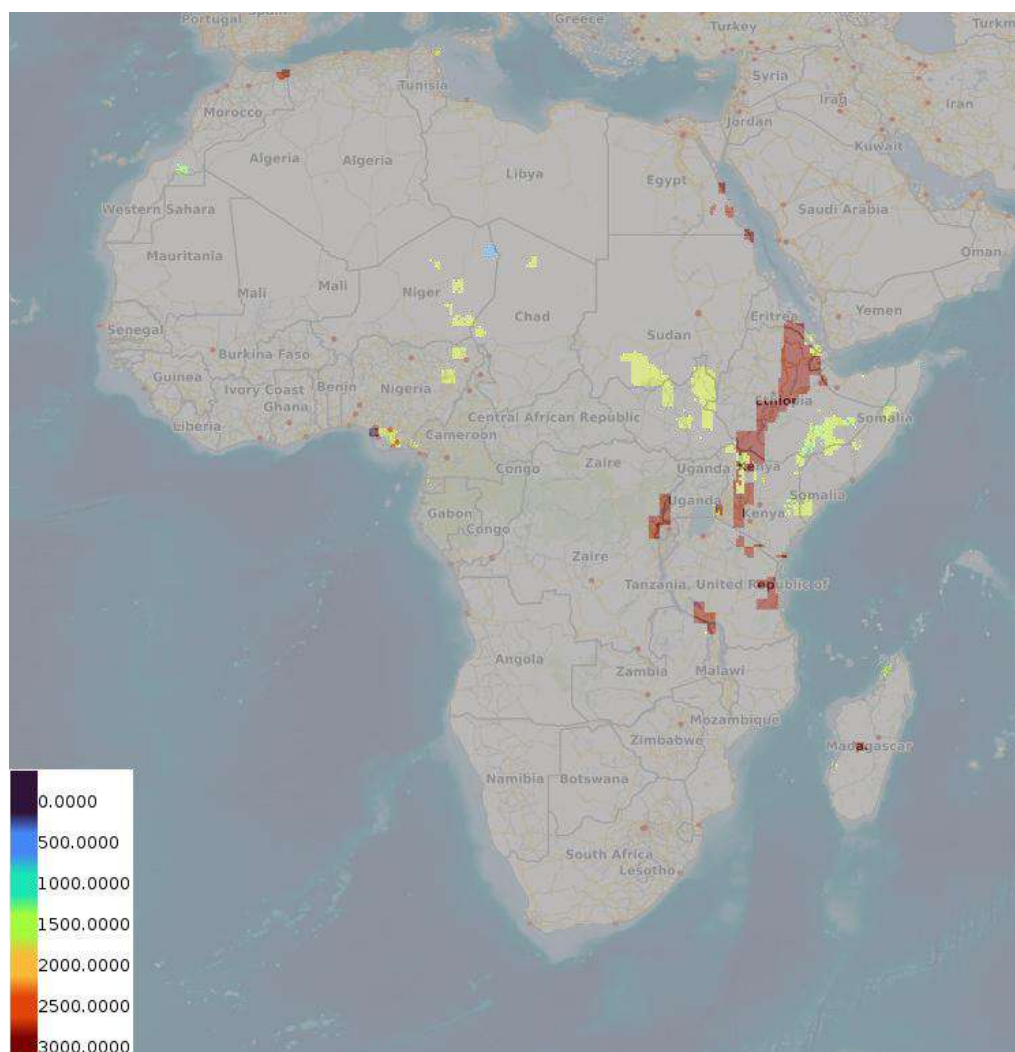
description: Organic Rankine Cycle for power well distance (upside)

keywords: Organic Rankine Cycle, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power optimized depth of the aquifer (upside)**

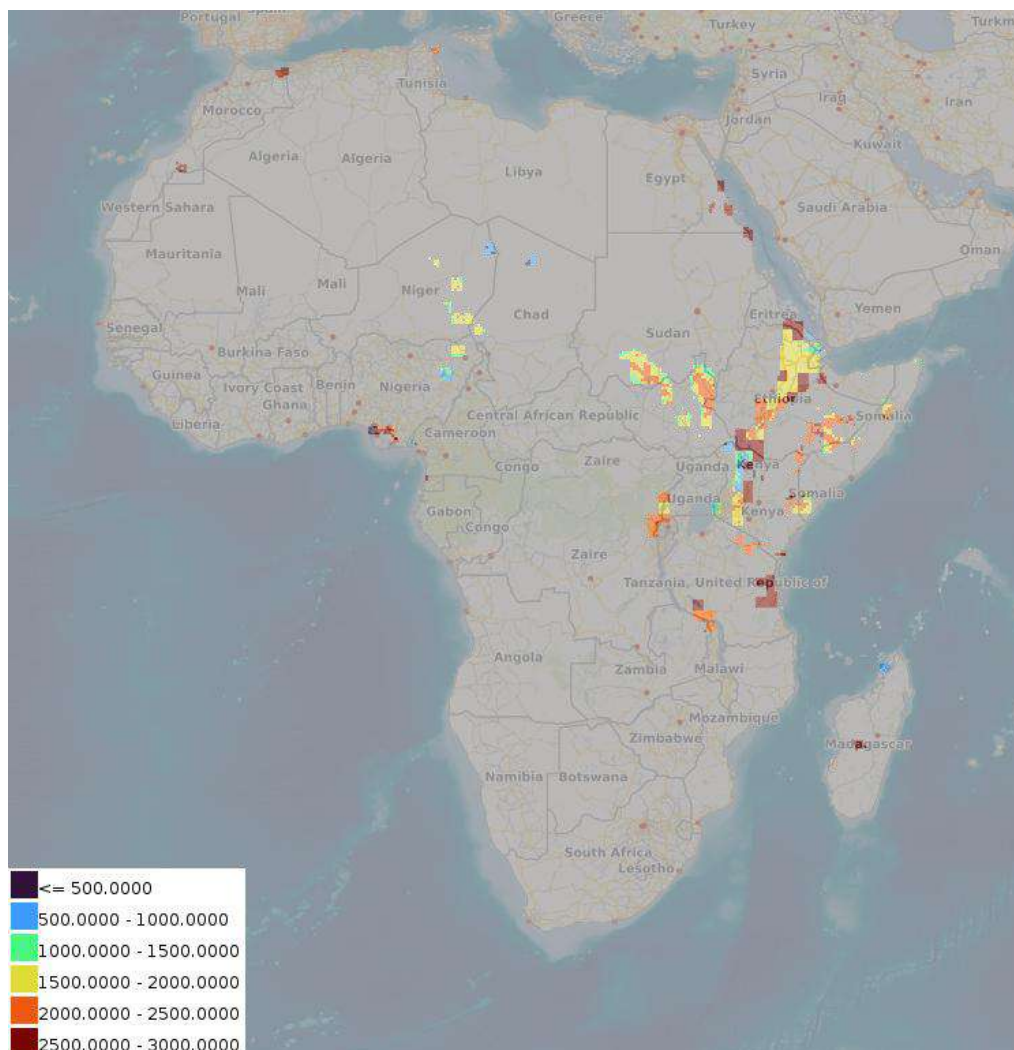
description: Organic Rankine Cycle for power optimized depth of the aquifer (upside)

keywords: Organic Rankine Cycle, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power temperature at reservoir (upside)**

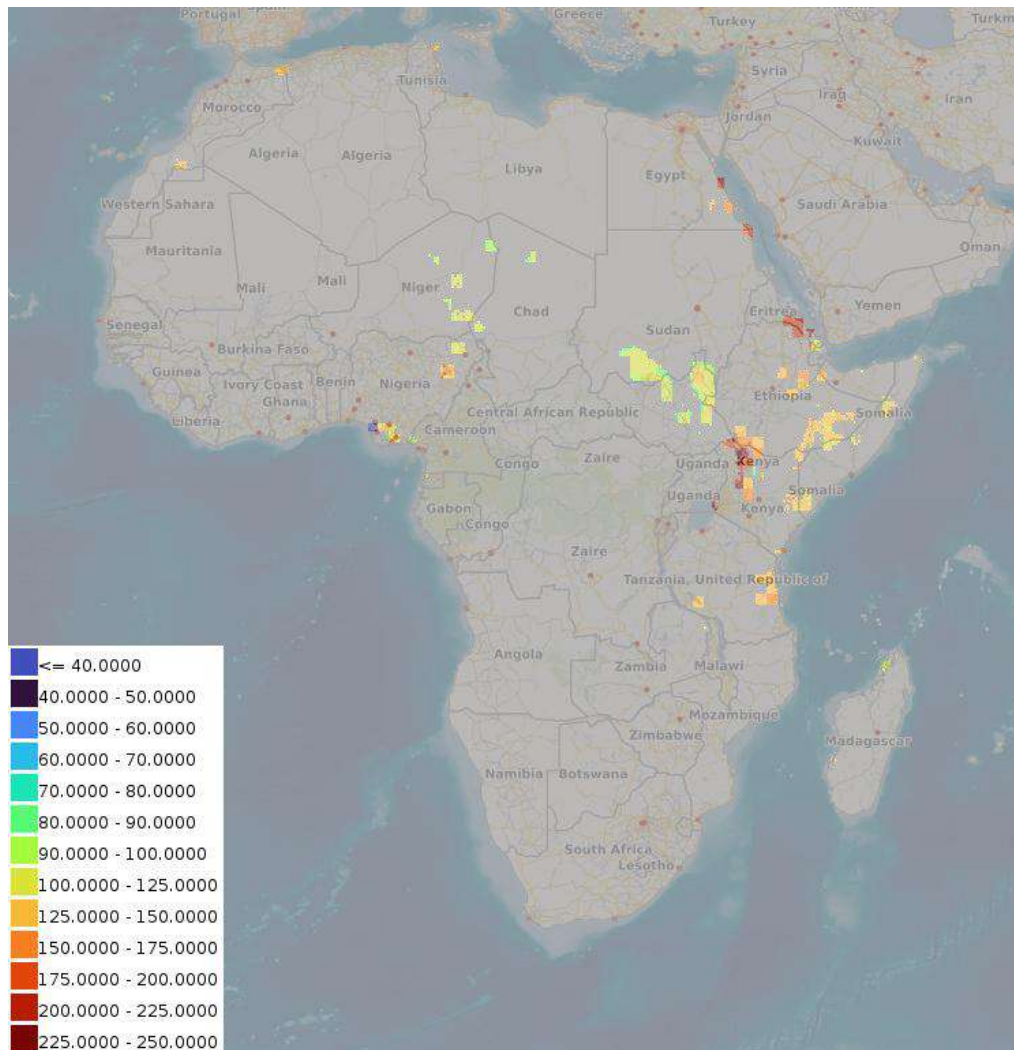
description: Organic Rankine Cycle for power temperature at reservoir (upside)

keywords: Organic Rankine Cycle, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power Levelized Costs of Energy (upside)**

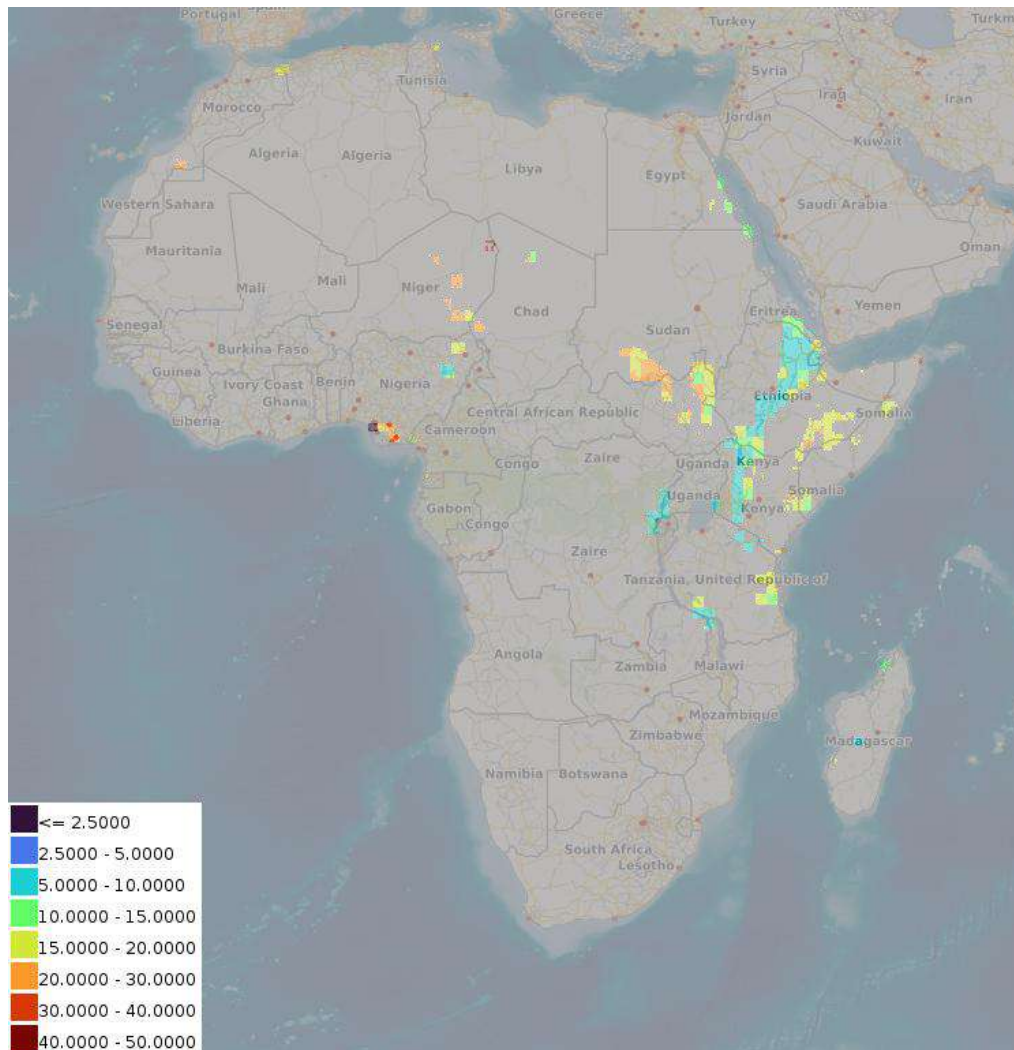
description: Organic Rankine Cycle for power Levelized Costs of Energy (upside)

keywords: Organic Rankine Cycle, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power coefficient of performance (upupside)**

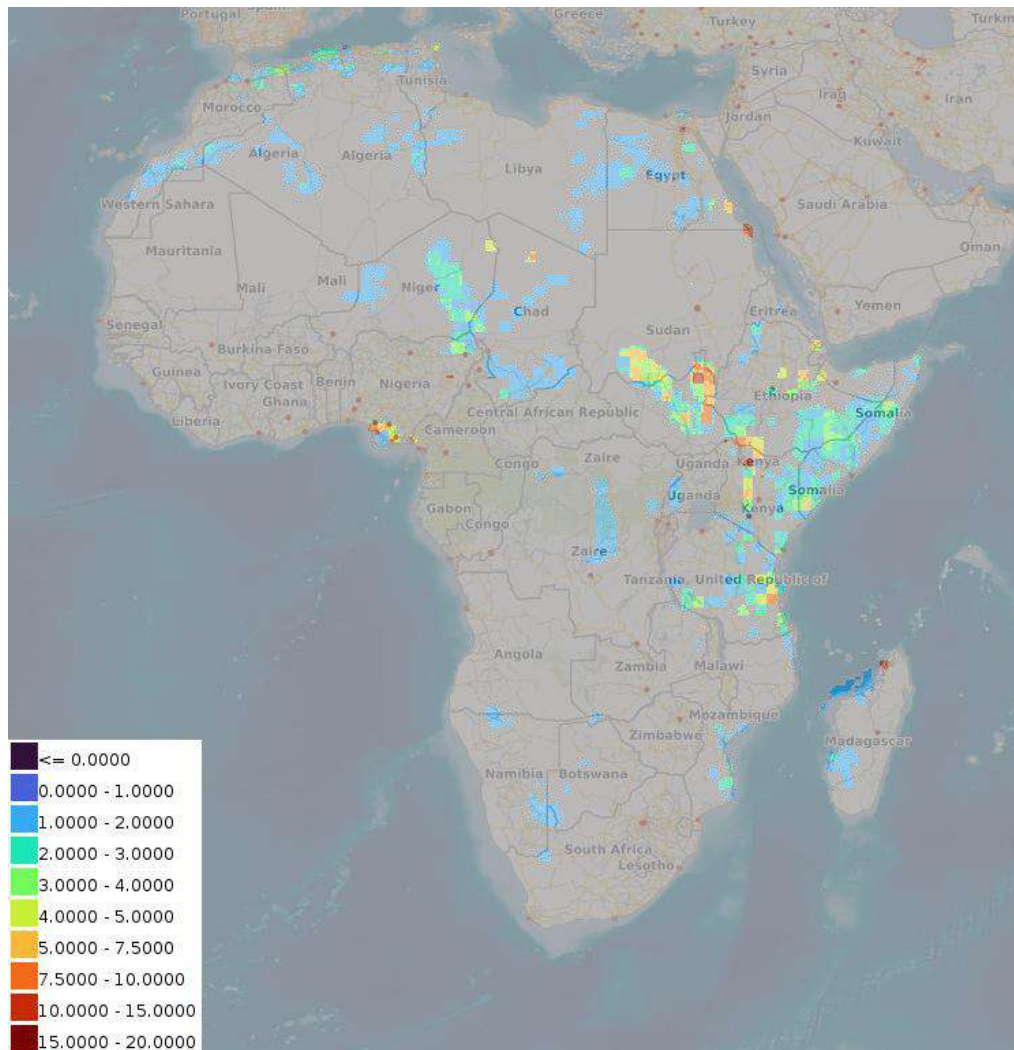
description: Organic Rankine Cycle for power coefficient of performance (upupside)

keywords: Organic Rankine Cycle, coefficient of performance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power: pump pressure needed to drive pumps (upupside)**

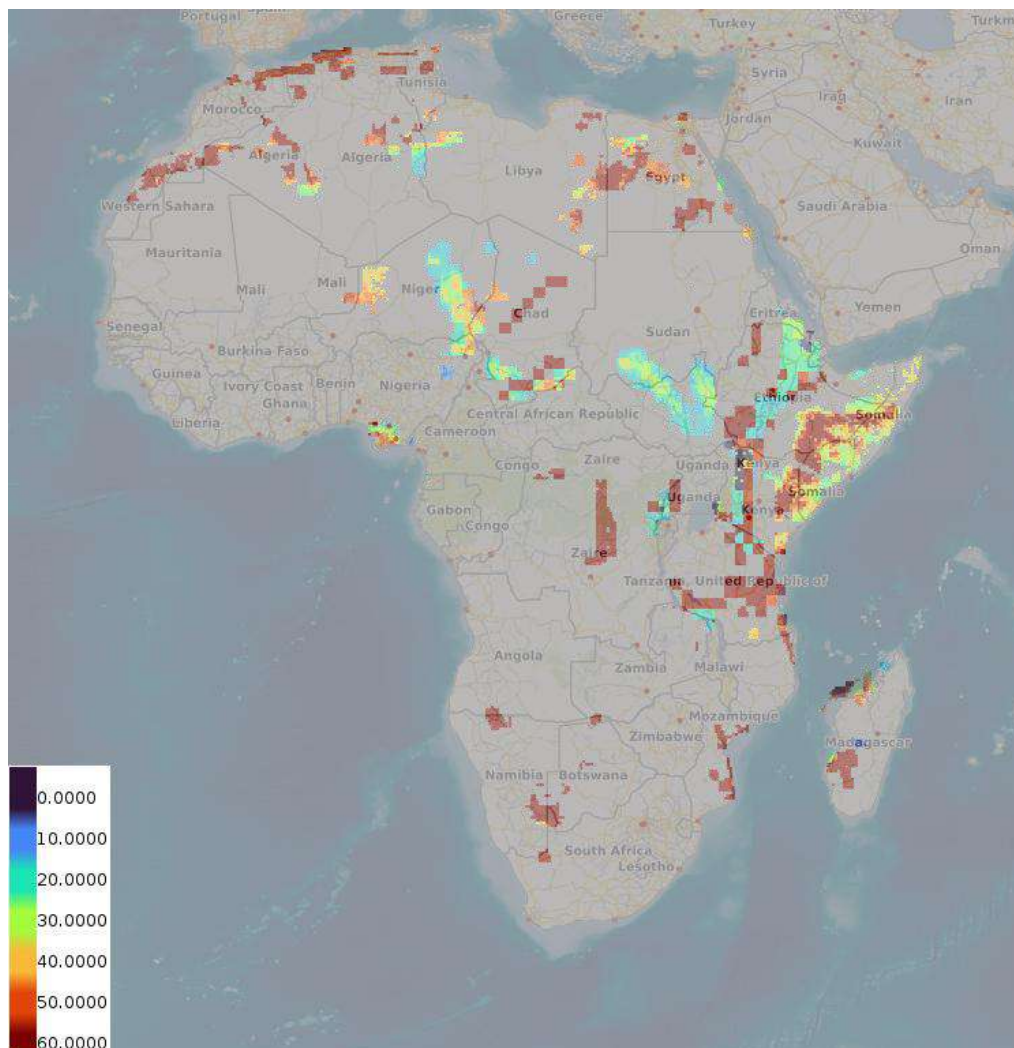
description: Organic Rankine Cycle for power: pump pressure needed to drive pumps (upupside)

keywords: Organic Rankine Cycle, pump pressure, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power production flow rate (upupside)**

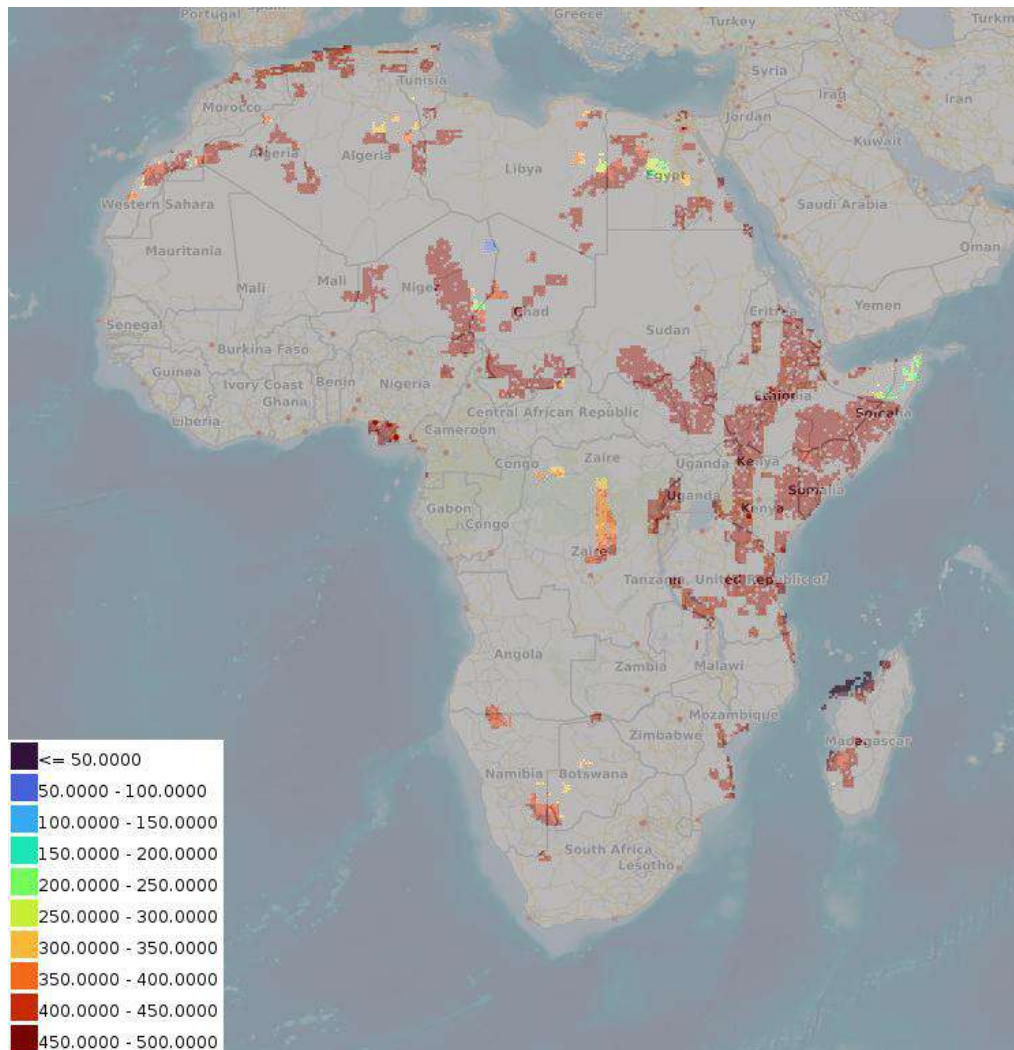
description: Organic Rankine Cycle for power production flow rate (upupside)

keywords: Organic Rankine Cycle, flow rate, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power doublet net production (upupside)**

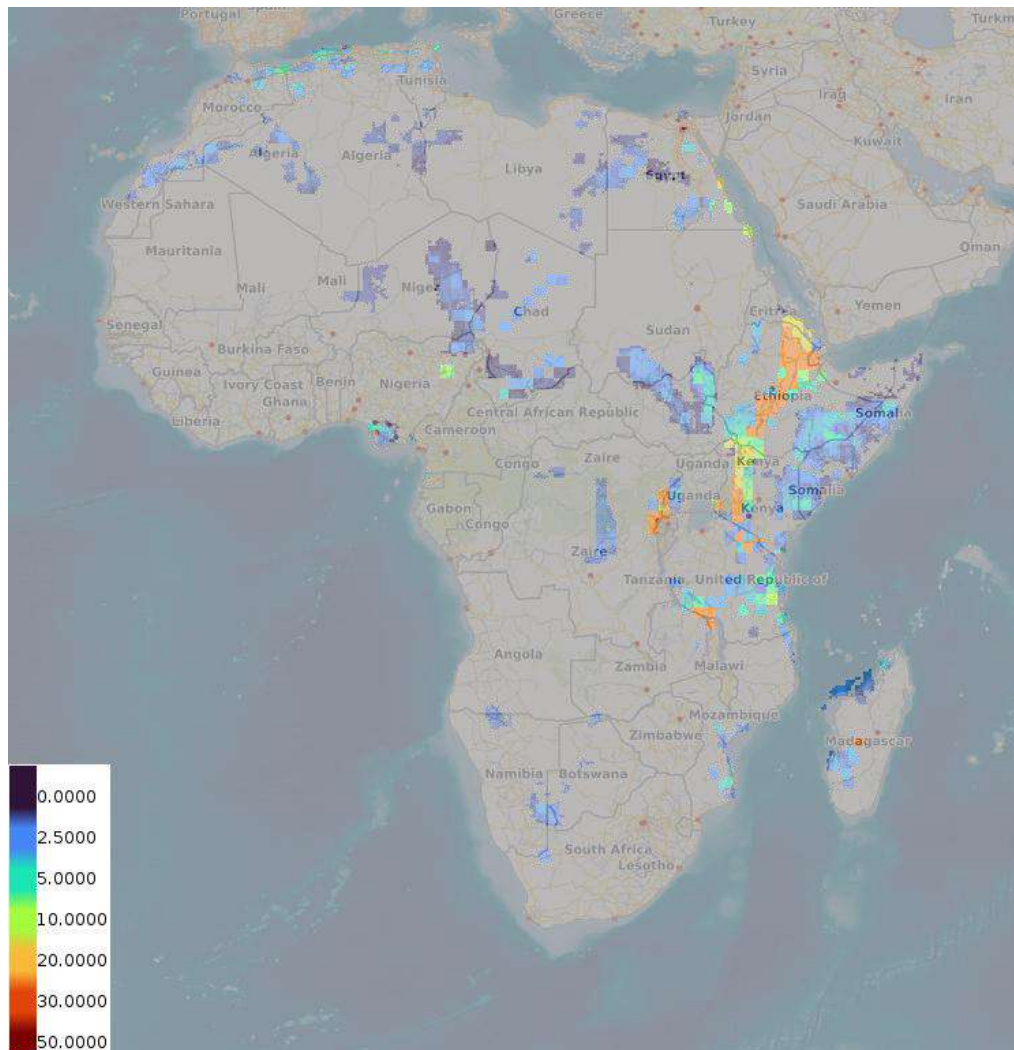
description: Organic Rankine Cycle for power doublet net production (upupside)

keywords: Organic Rankine Cycle, doublet net production, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power transmissivity (upupside)**

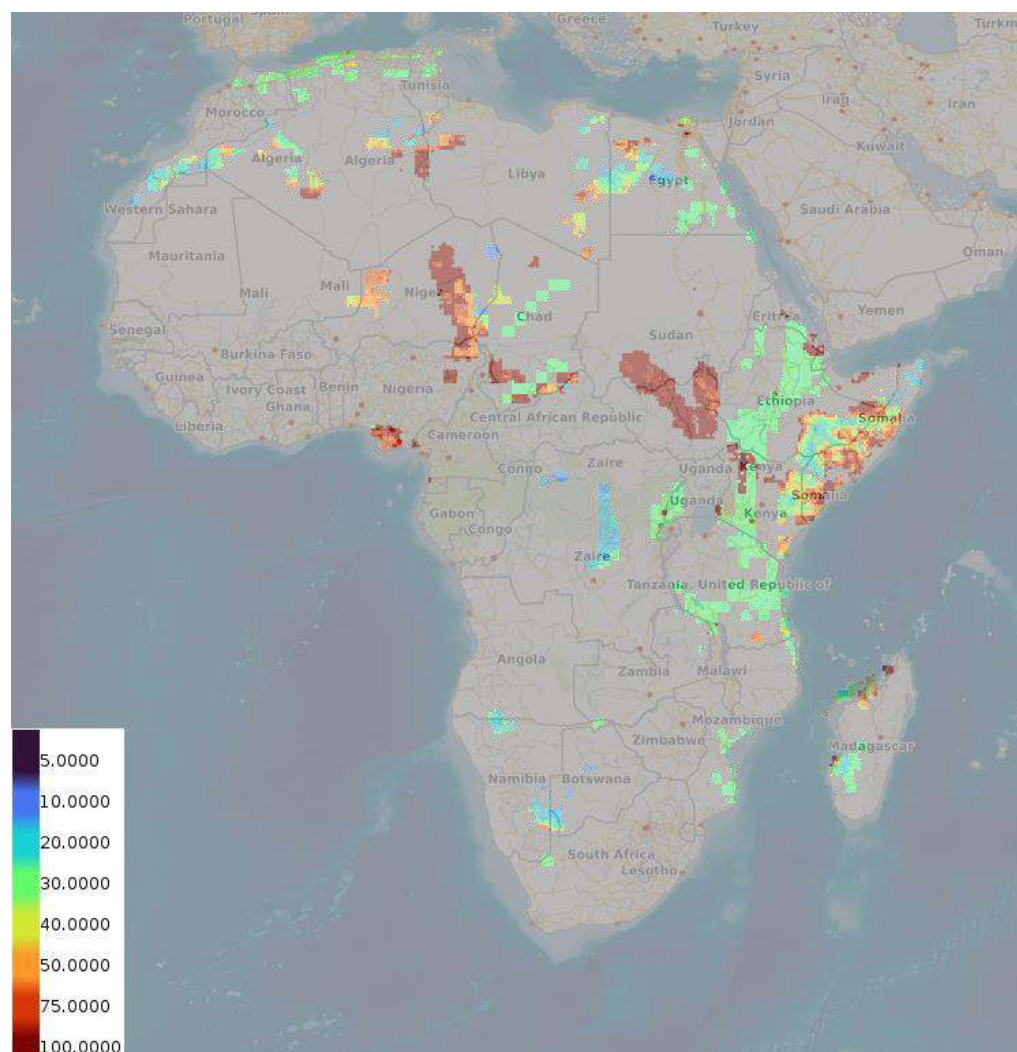
description: Organic Rankine Cycle for power transmissivity (upupside)

keywords: Organic Rankine Cycle, transmissivity, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power well distance (upupside)**

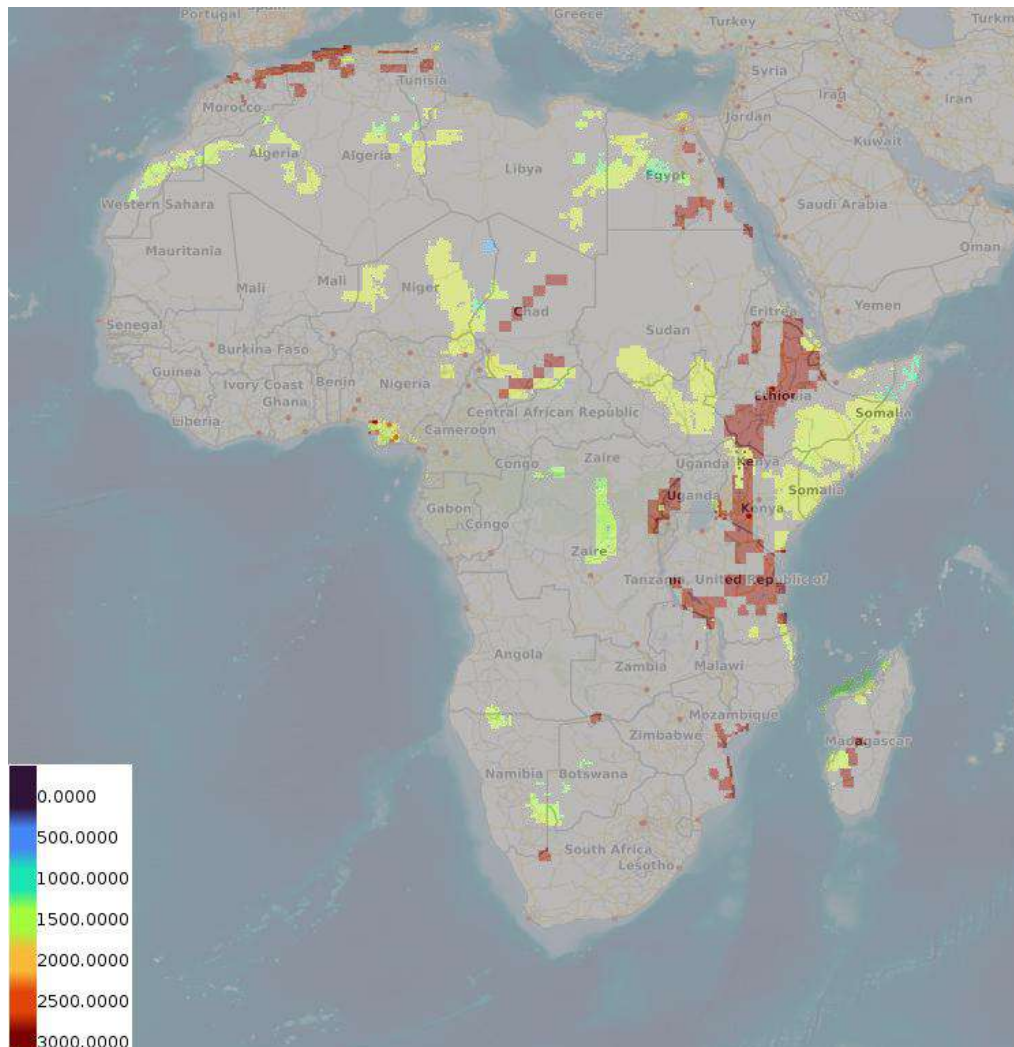
description: Organic Rankine Cycle for power well distance (upupside)

keywords: Organic Rankine Cycle, well distance, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power optimized depth of the aquifer (upupside)**

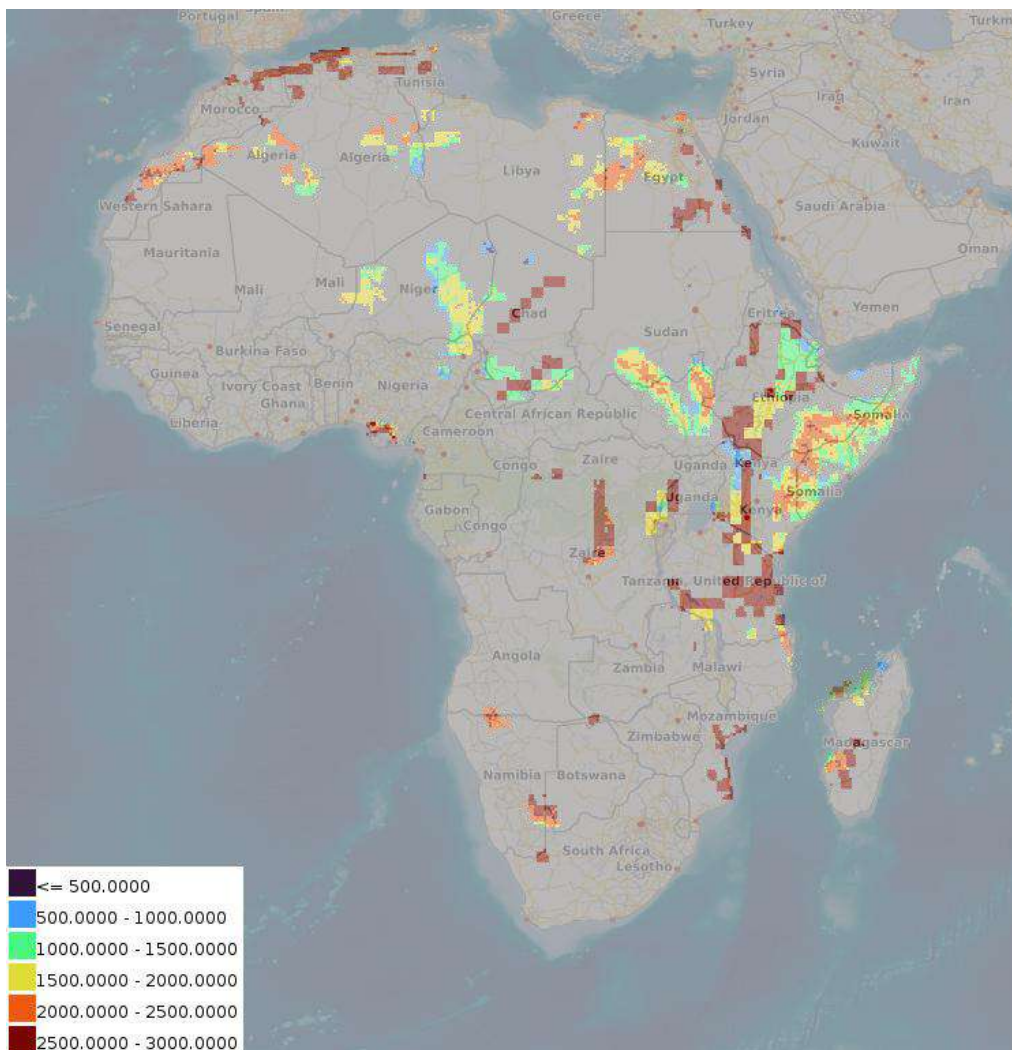
description: Organic Rankine Cycle for power optimized depth of the aquifer (upupside)

keywords: Organic Rankine Cycle, optimized depth, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power temperature at reservoir (upupside)**

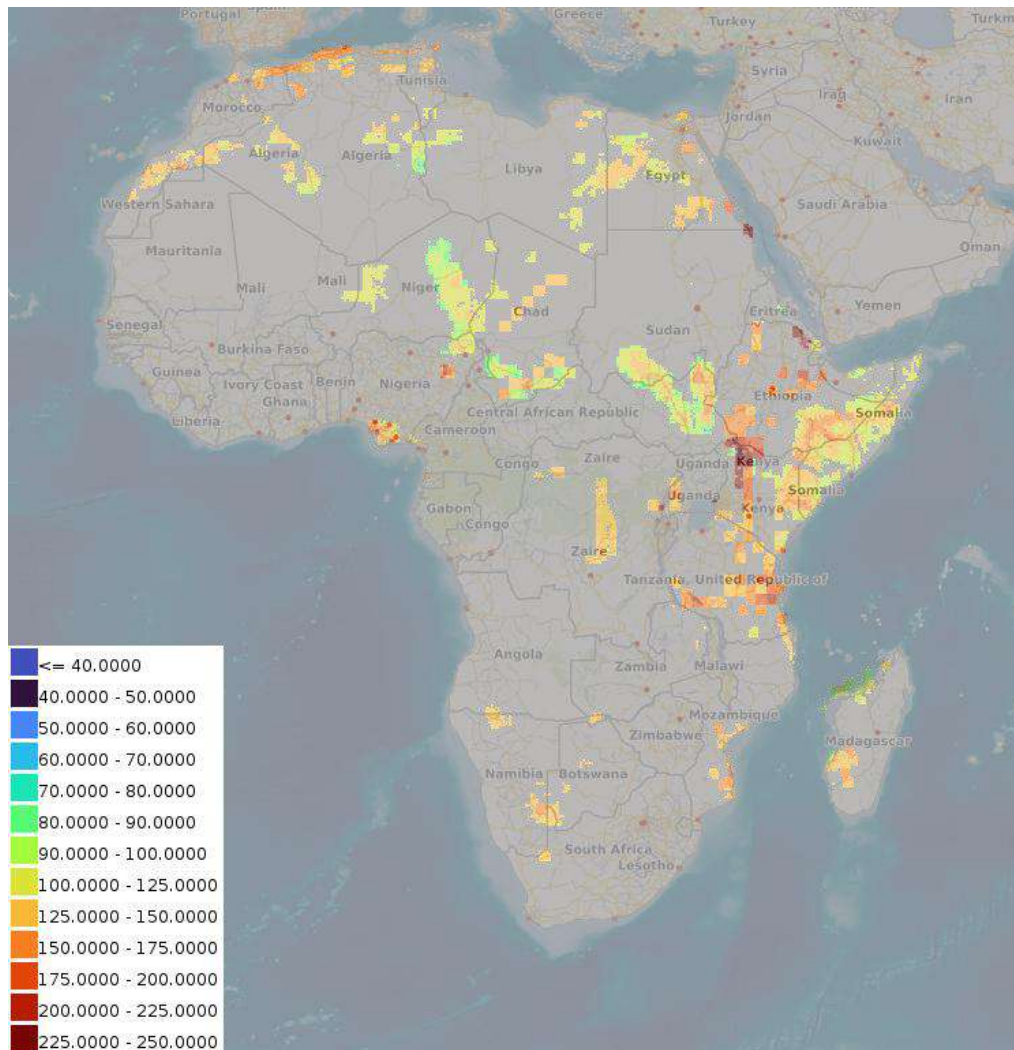
description: Organic Rankine Cycle for power temperature at reservoir (upupside)

keywords: Organic Rankine Cycle, reservoir temperature, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Organic Rankine Cycle for power Levelized Costs of Energy (upside)**

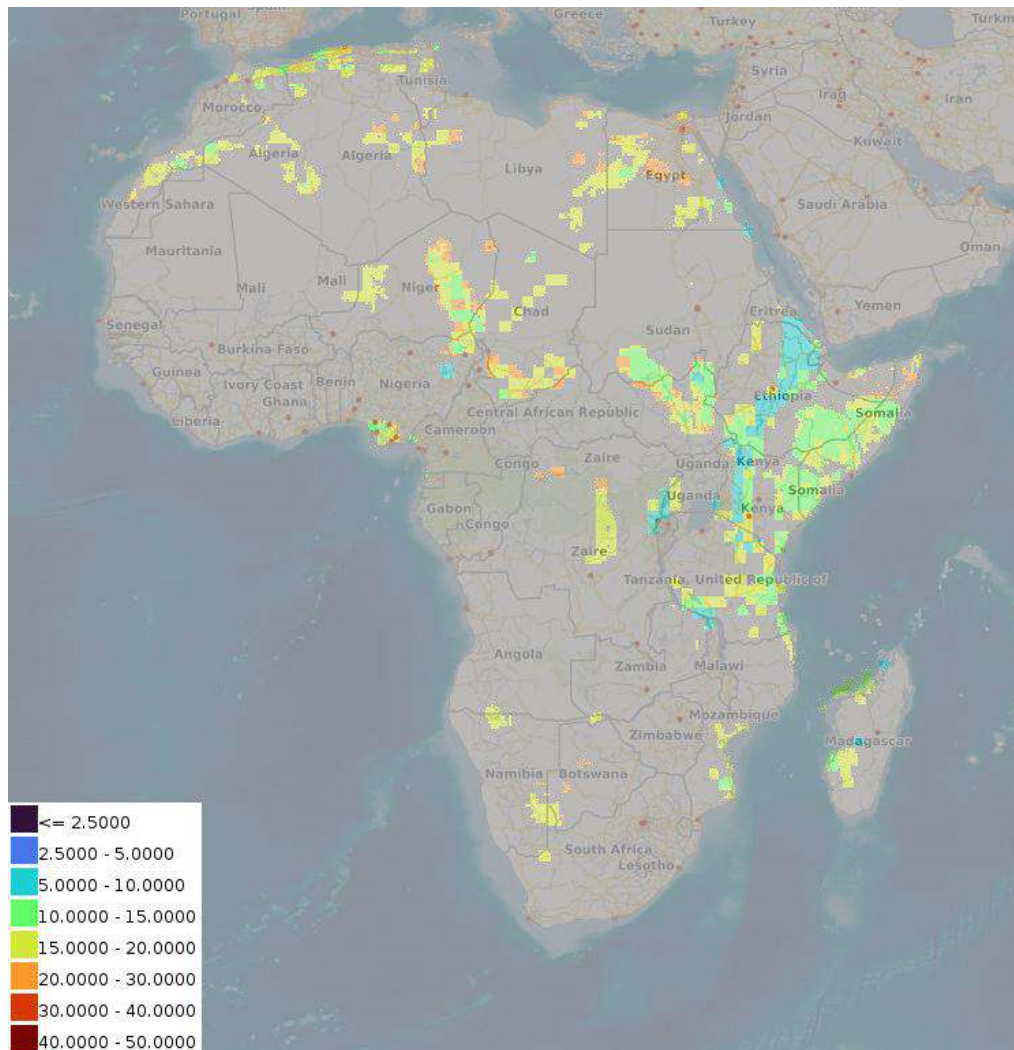
description: Organic Rankine Cycle for power Levelized Costs of Energy (upside)

keywords: Organic Rankine Cycle, Levelized costs of energy, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible power capacity for Flash Power Plant (base case)**

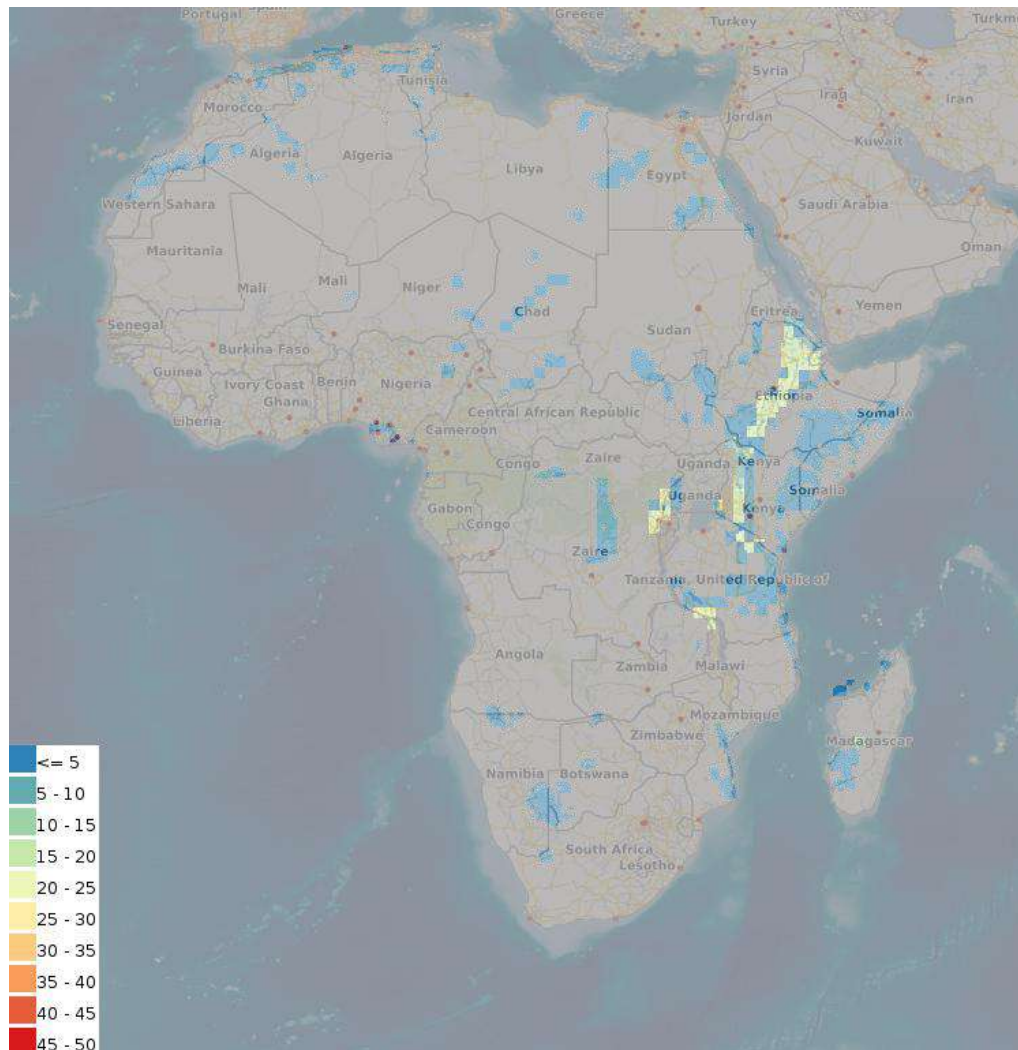
description: Possible power installed for a flash power plant in the basecase scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Flash Power Plant (base case)**

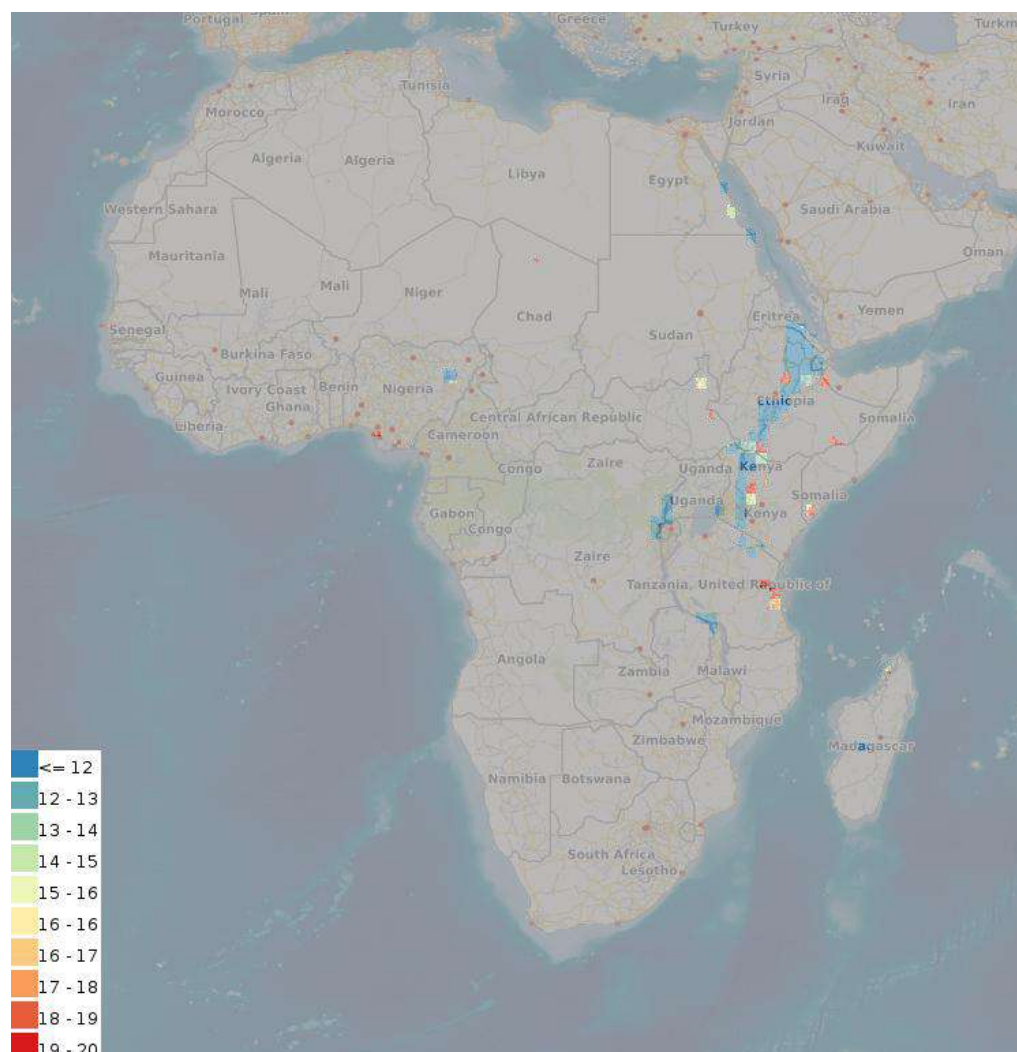
description: Possible cost of electricity for a flash power plant in the basecase scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Flash Power Plant (base case)**

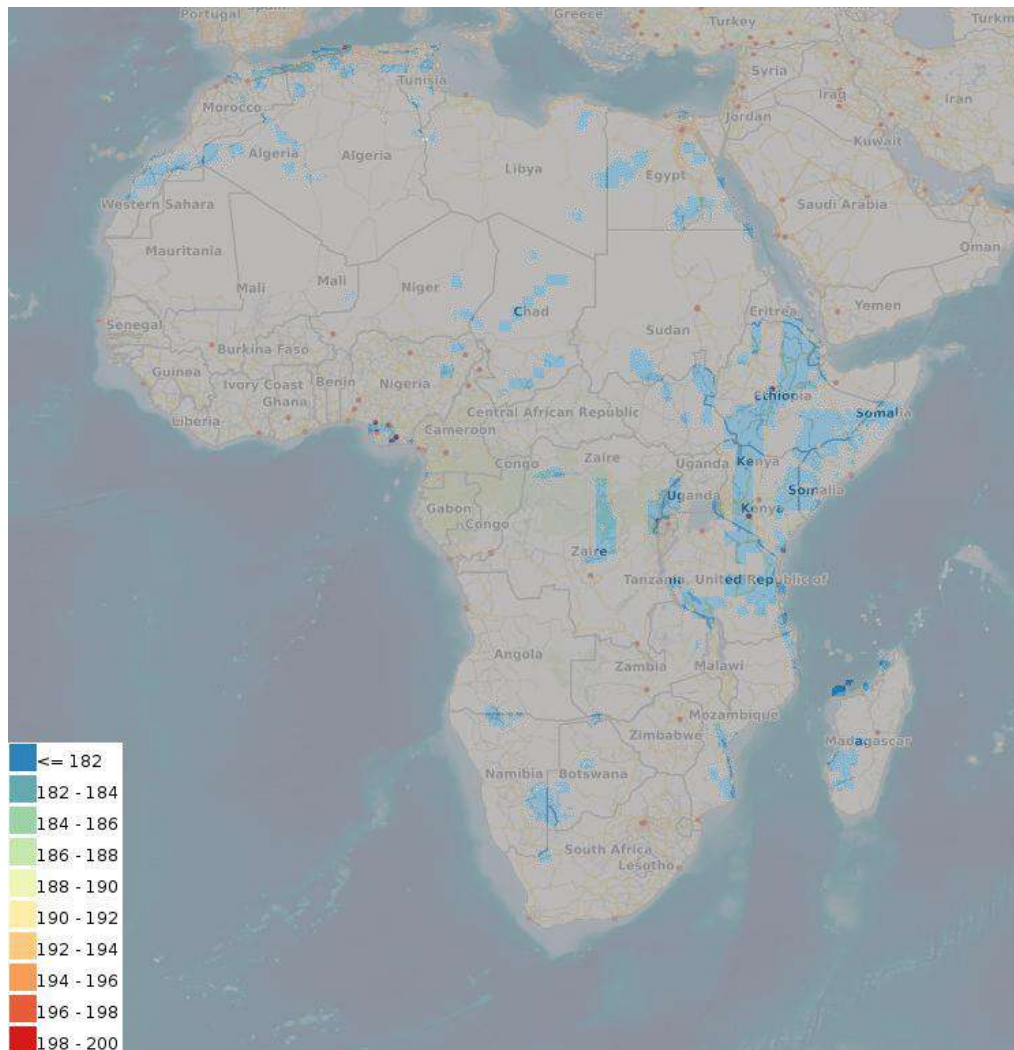
description: Possible environmental impact of climate change for a flash power plant in the basecase scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible power capacity for Flash Power Plant (upside)**

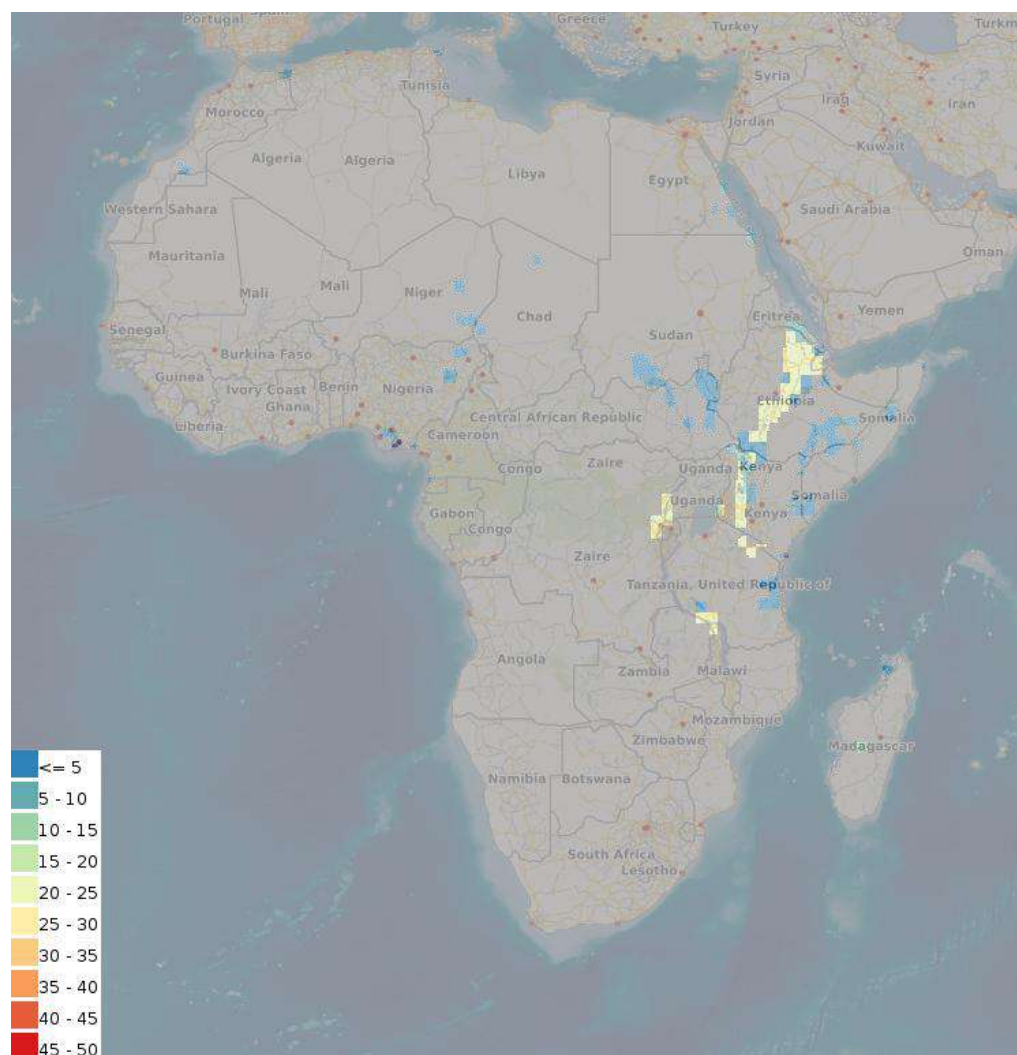
description: Possible power installed for a flash power plant in the upside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Flash Power Plant (upside)**

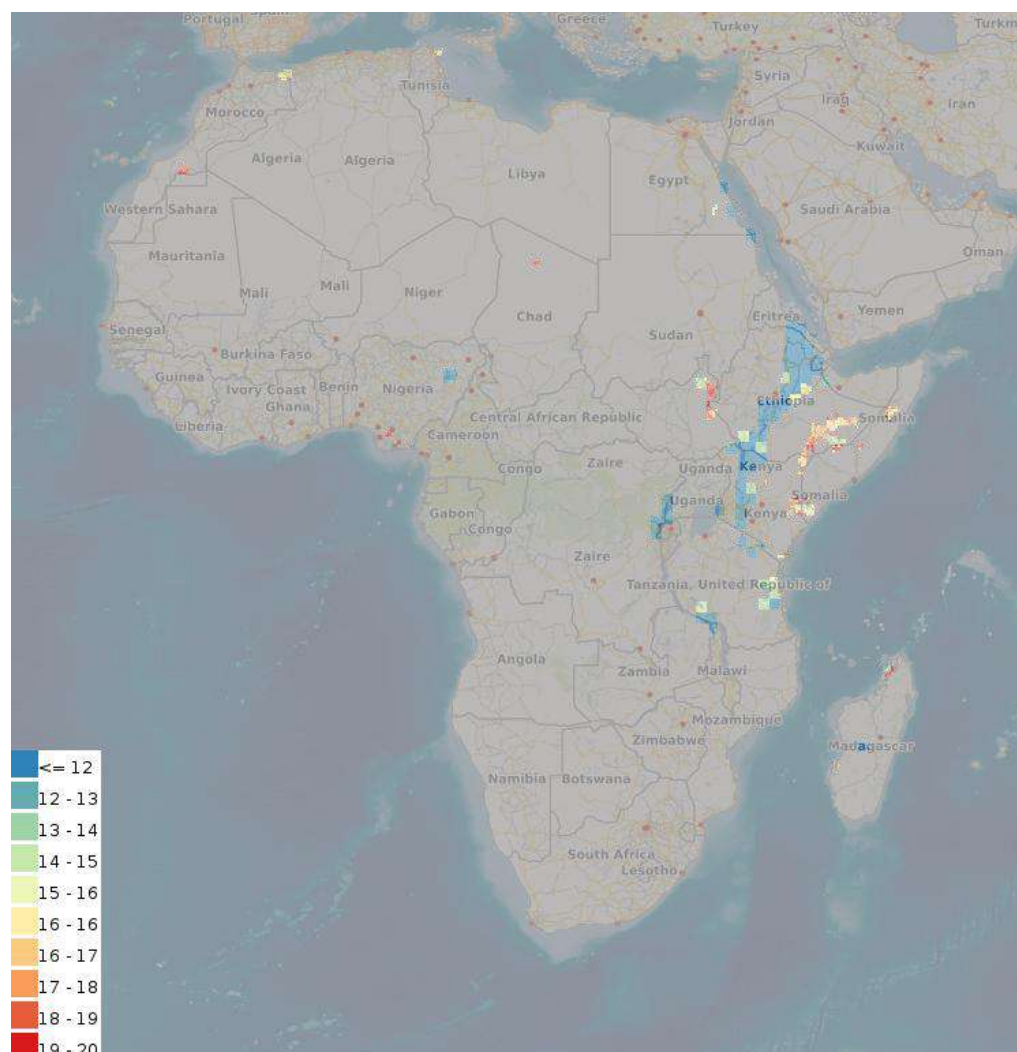
description: Possible cost of electricity for a flash power plant in the upside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Flash Power Plant (upside)**

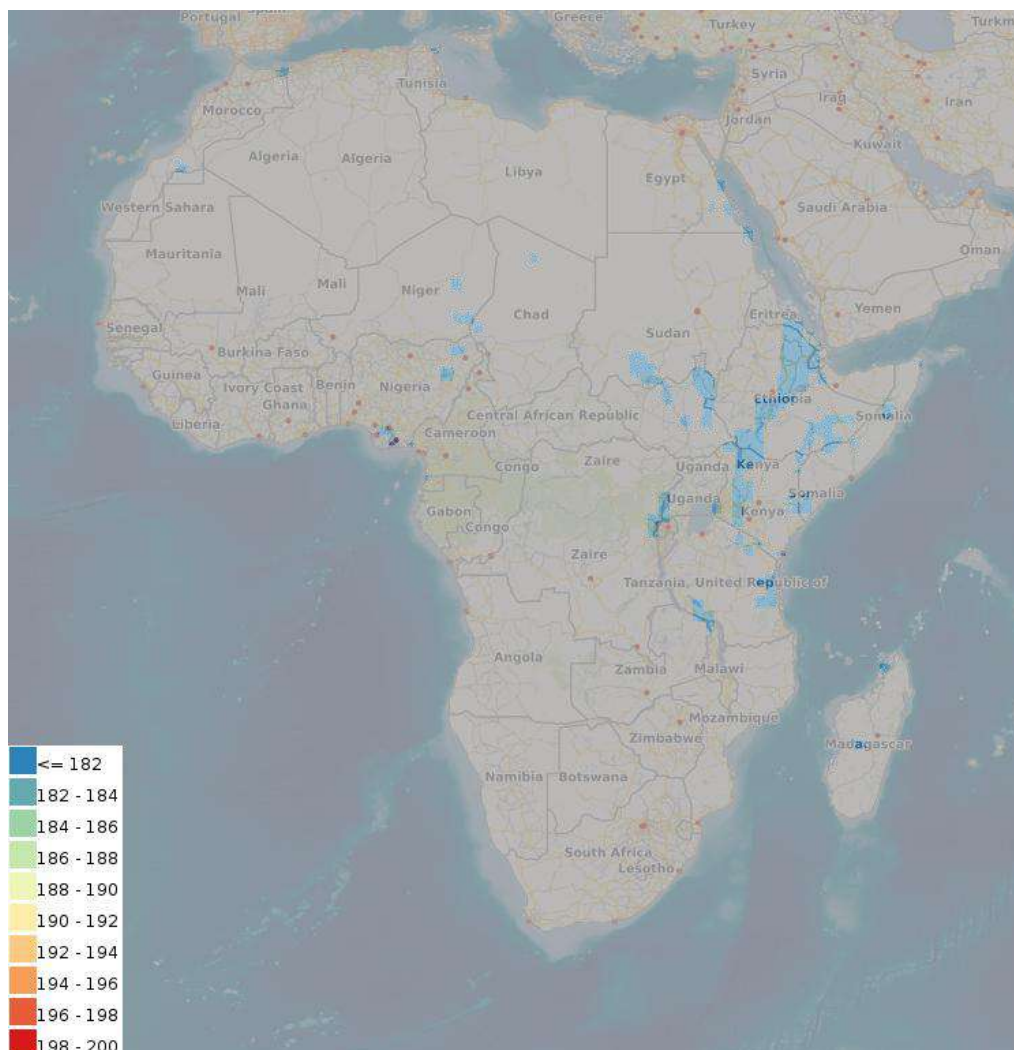
description: Possible environmental impact of climate change for a flash power plant in the upside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible power capacity for Flash Power Plant (upupside)**

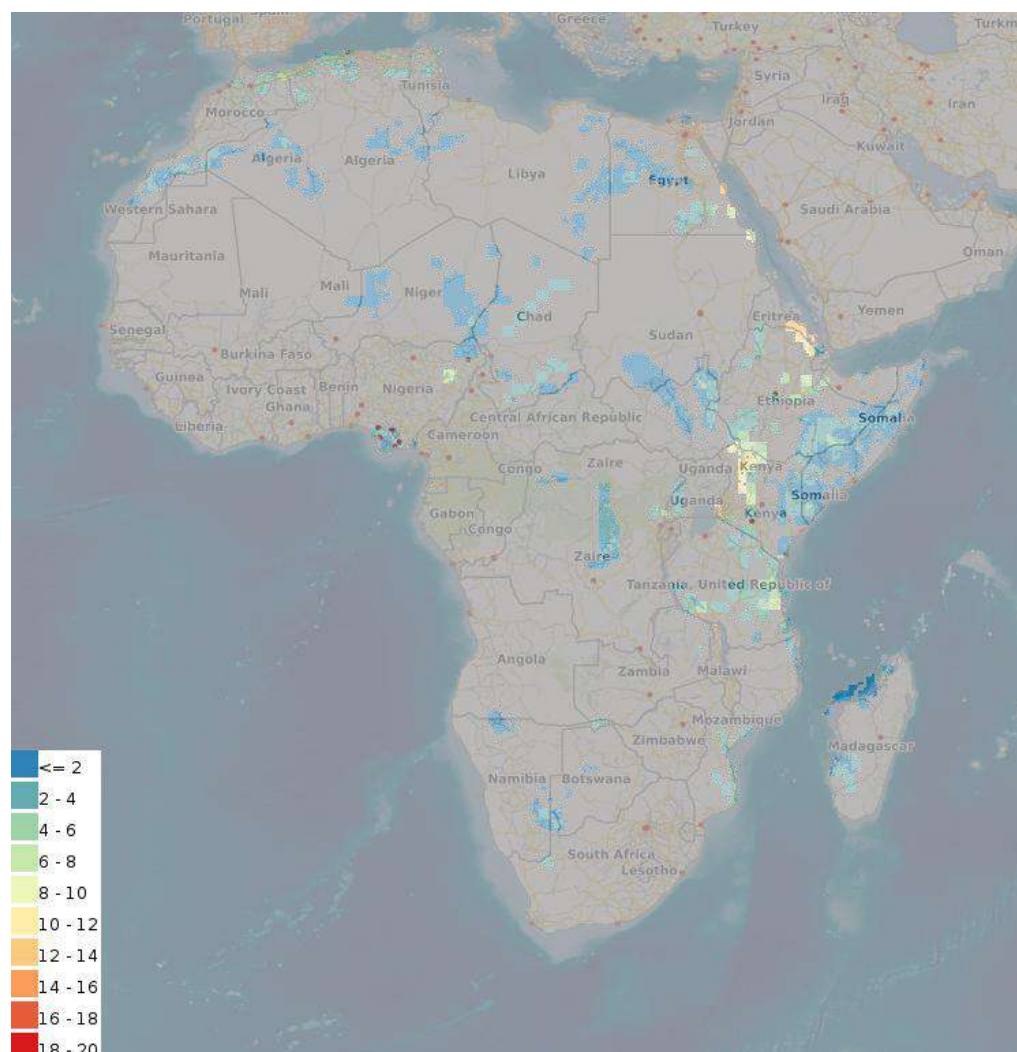
description: Possible power installed for a flash power plant in the upupside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Flash Power Plant (upupside)**

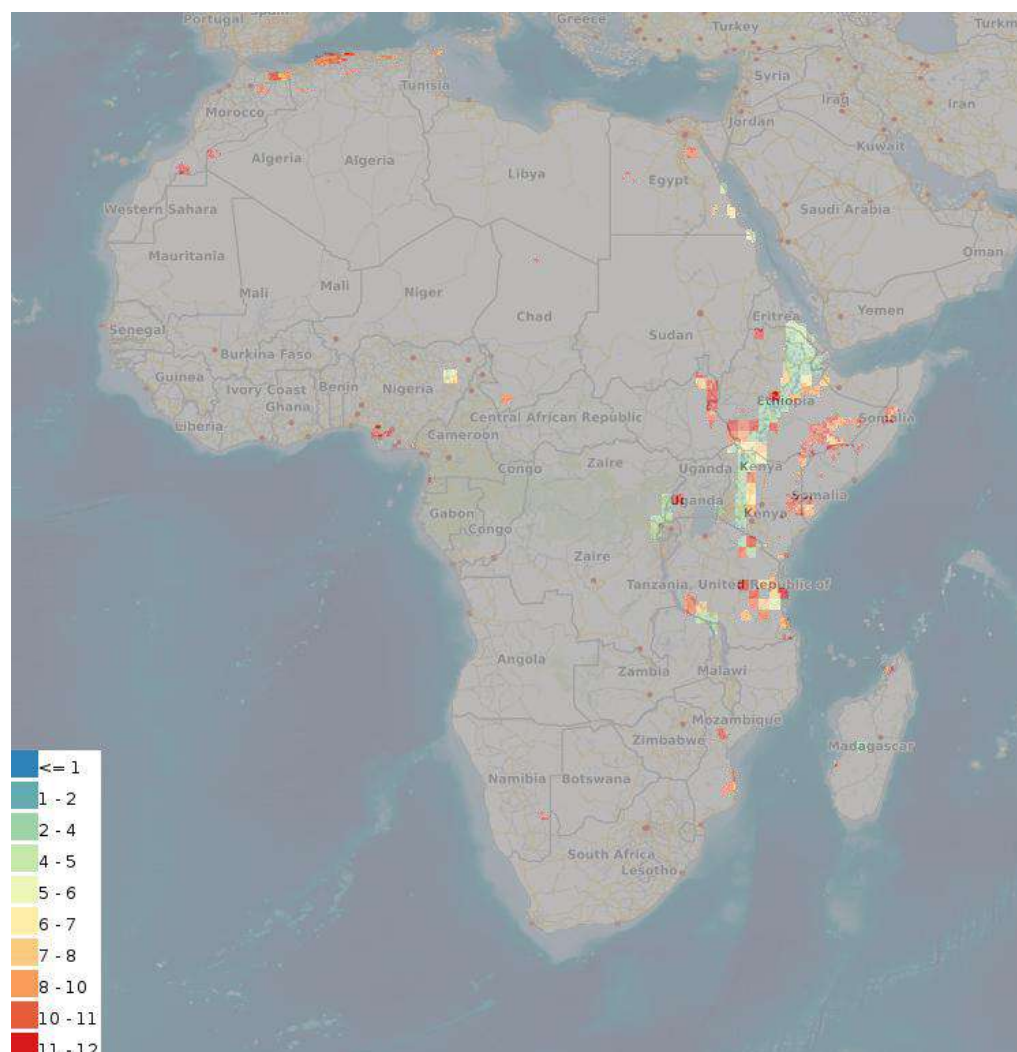
description: Possible cost of electricity for a flash power plant in the upupside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Flash Power Plant (upupside)**

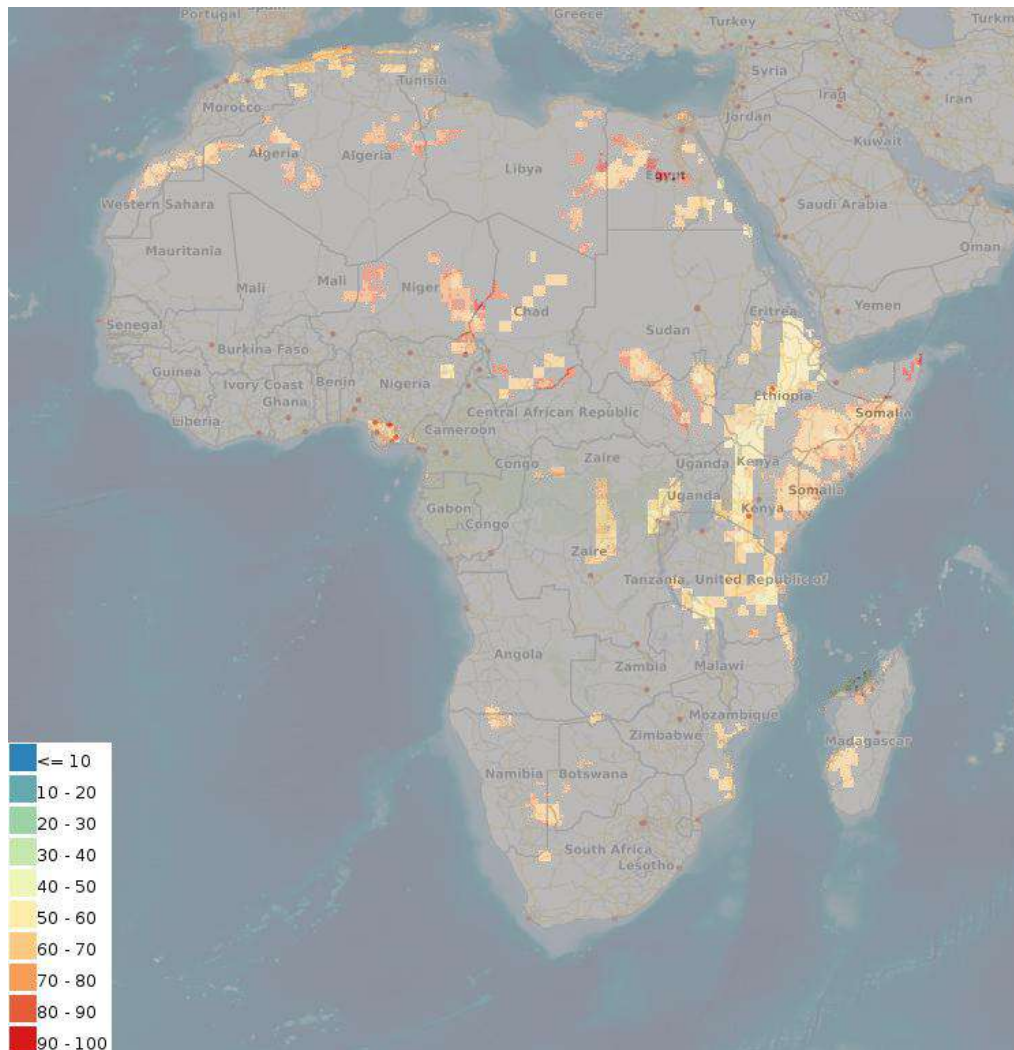
description: Possible environmental impact of climate change for a flash power plant in the upupside scenario

keywords: Flash, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Maps of possible power capacity for Binary ORC Power Plant (base case)**

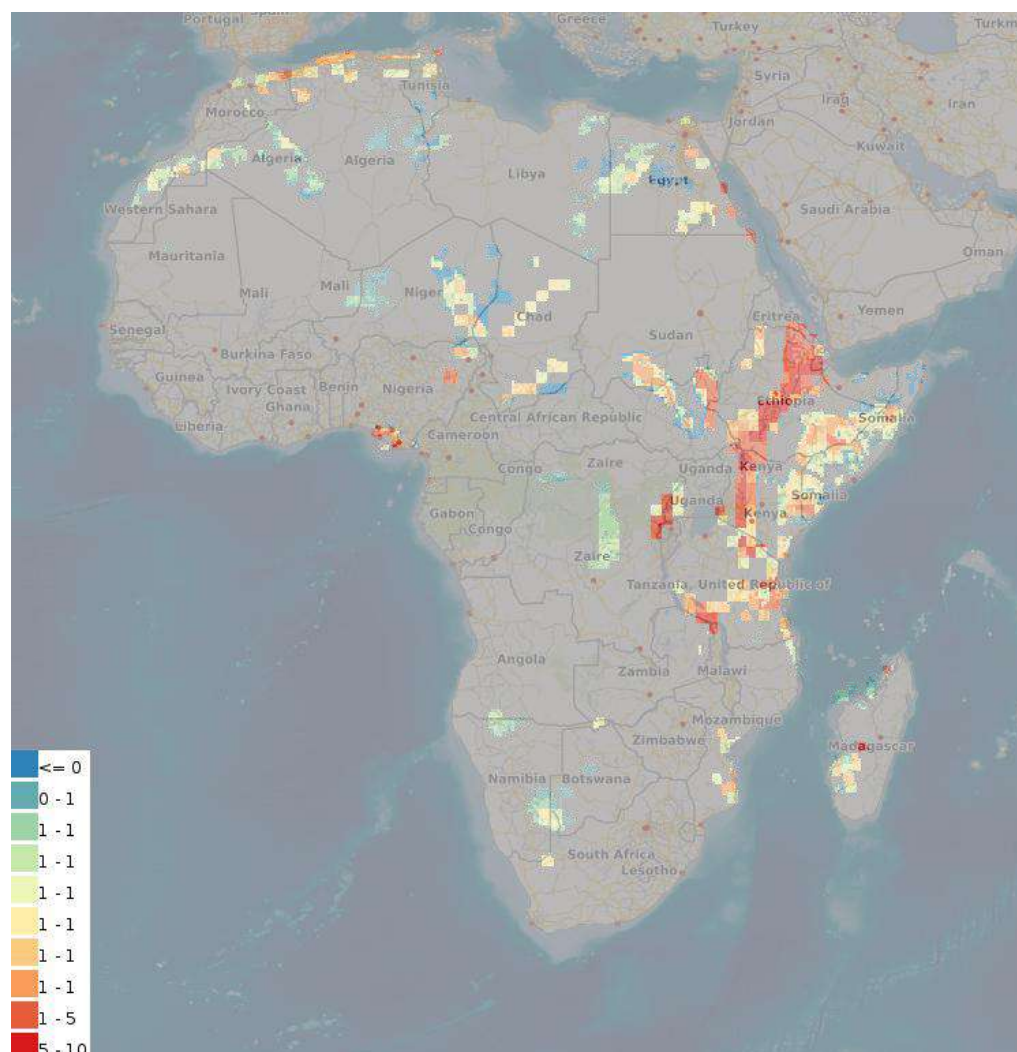
description: Possible power installed for a binary orc power plant in the basecase scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Binary ORC Power Plant (base case)**

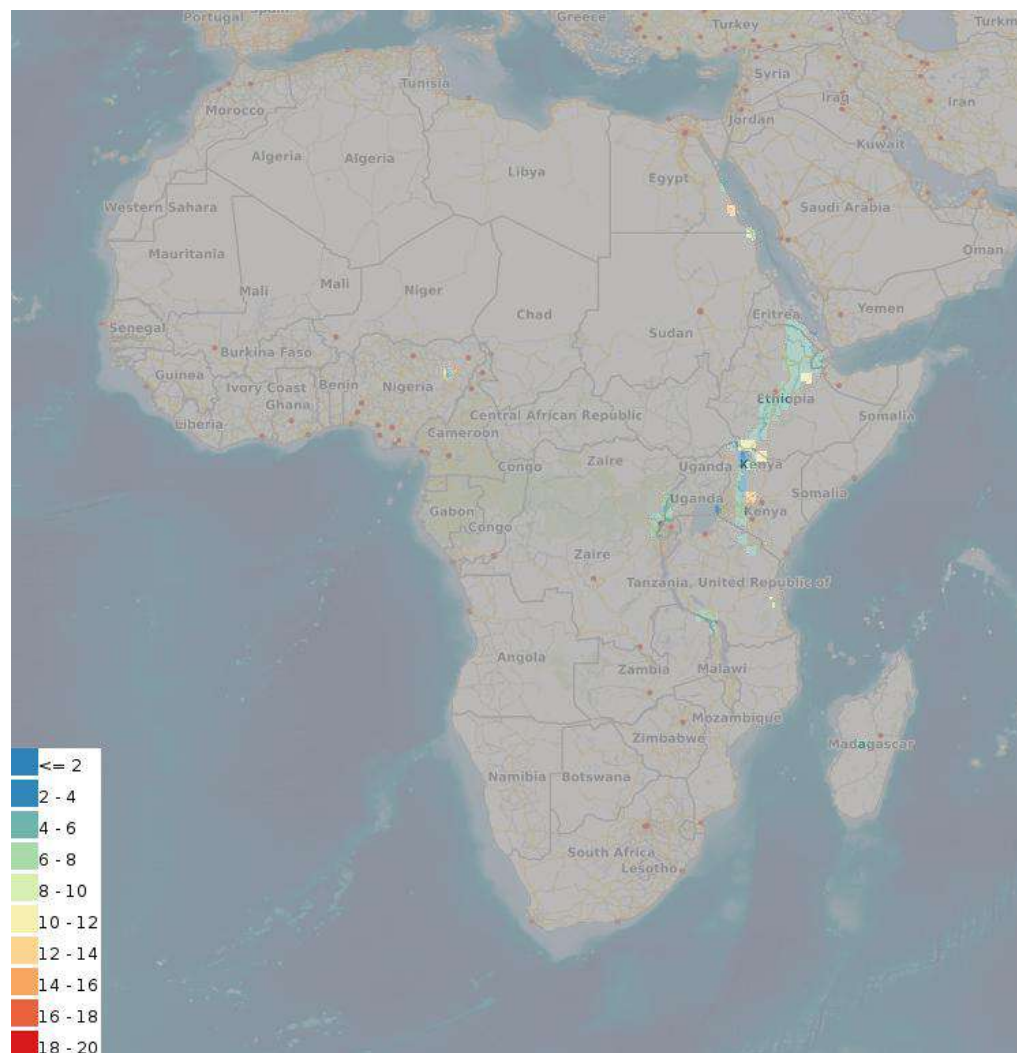
description: Possible cost of electricity for a binary orc power plant in the basecase scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Binary ORC Power Plant (base case)**

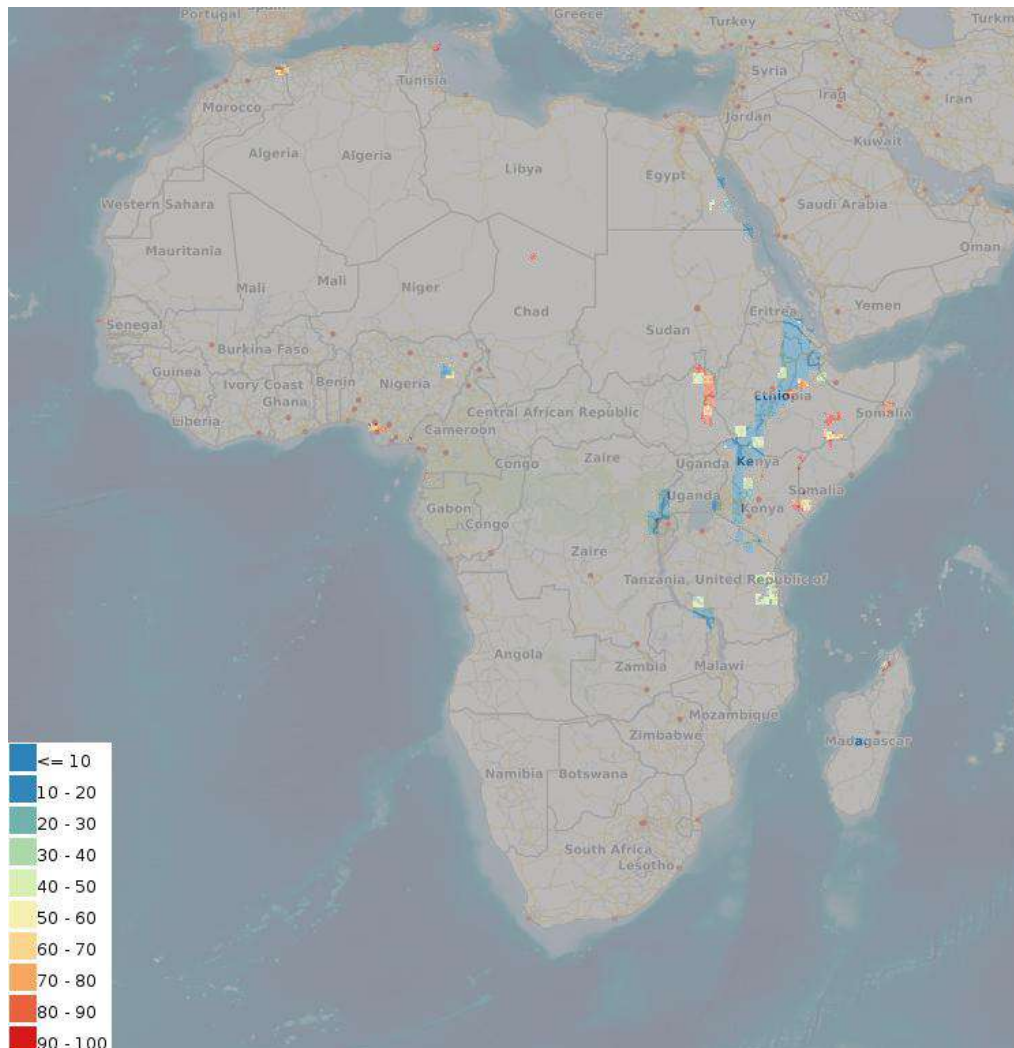
description: Possible environmental impact of climate change for a binary orc power plant in the basecase scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible power capacity for Binary ORC Power Plant (upside)**

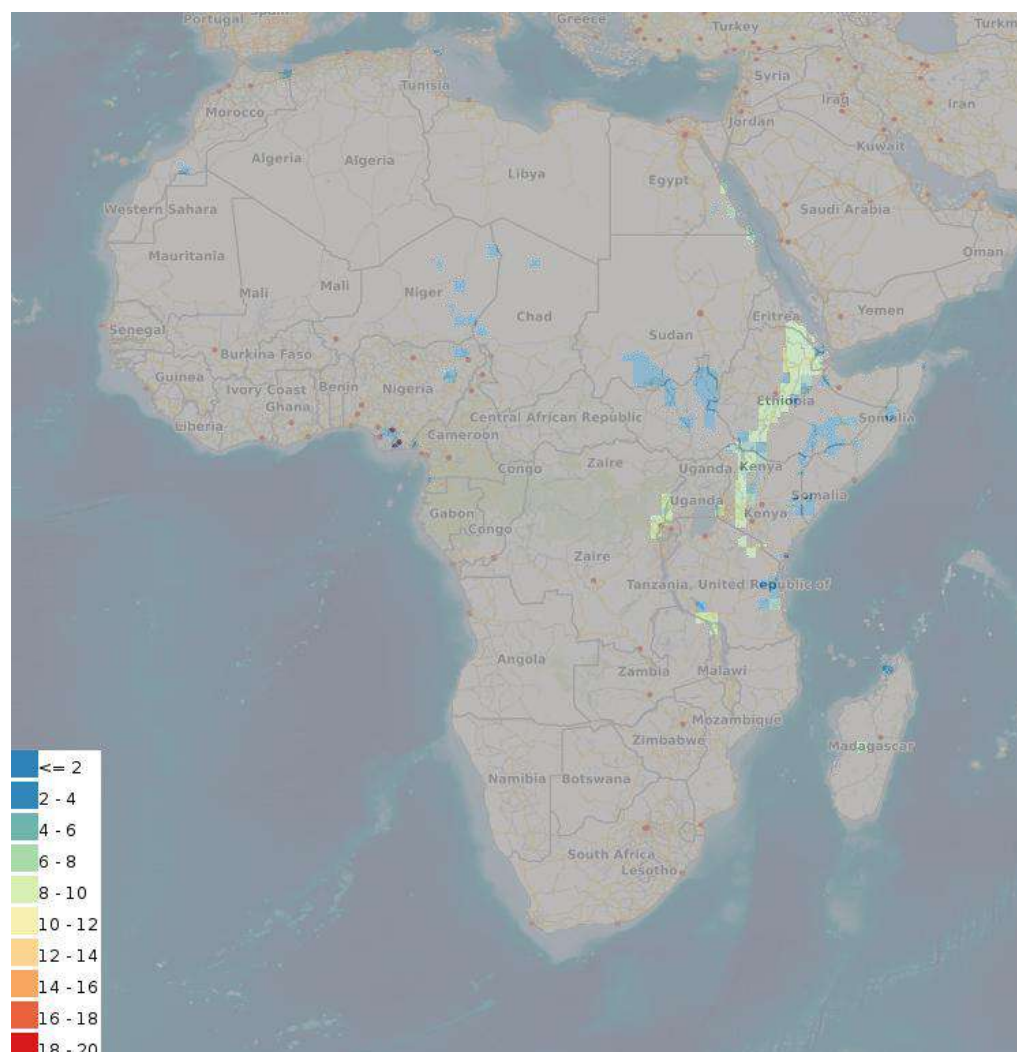
description: Possible power installed for a binary orc power plant in the upside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Binary ORC Power Plant (upside)**

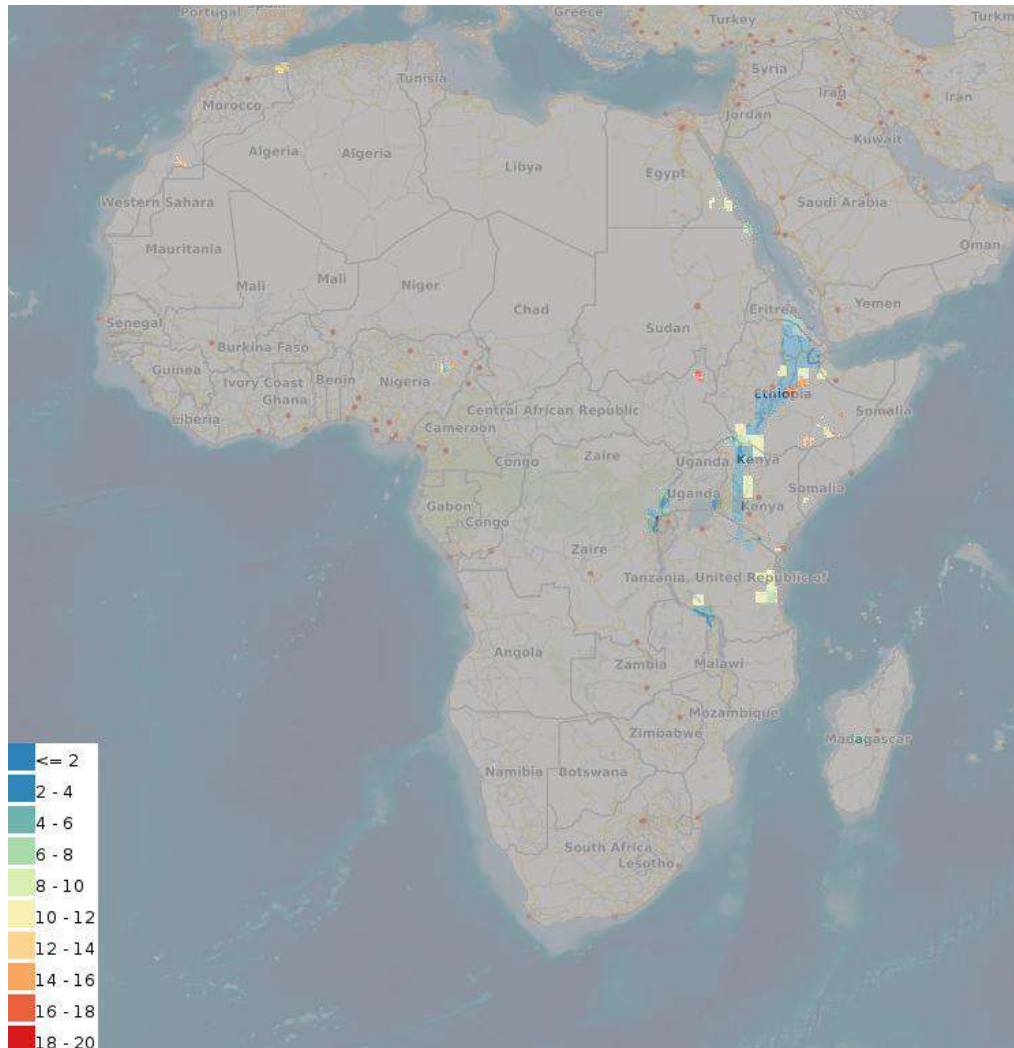
description: Possible cost of electricity for a binary orc power plant in the upside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Binary ORC Power Plant (upside)**

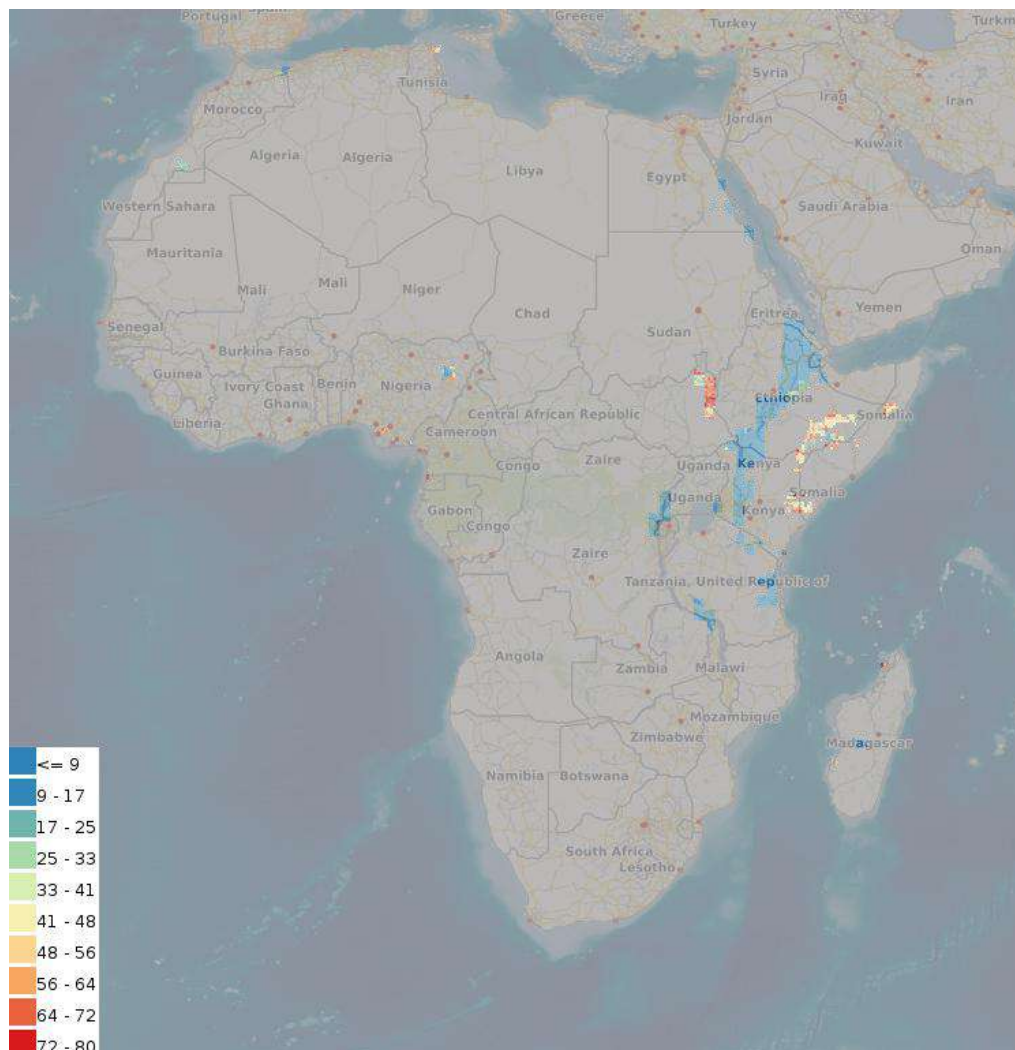
description: Possible environmental impact of climate change for a binary orc power plant in the upside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Possible power capacity for Binary ORC Power Plant (upupside)**

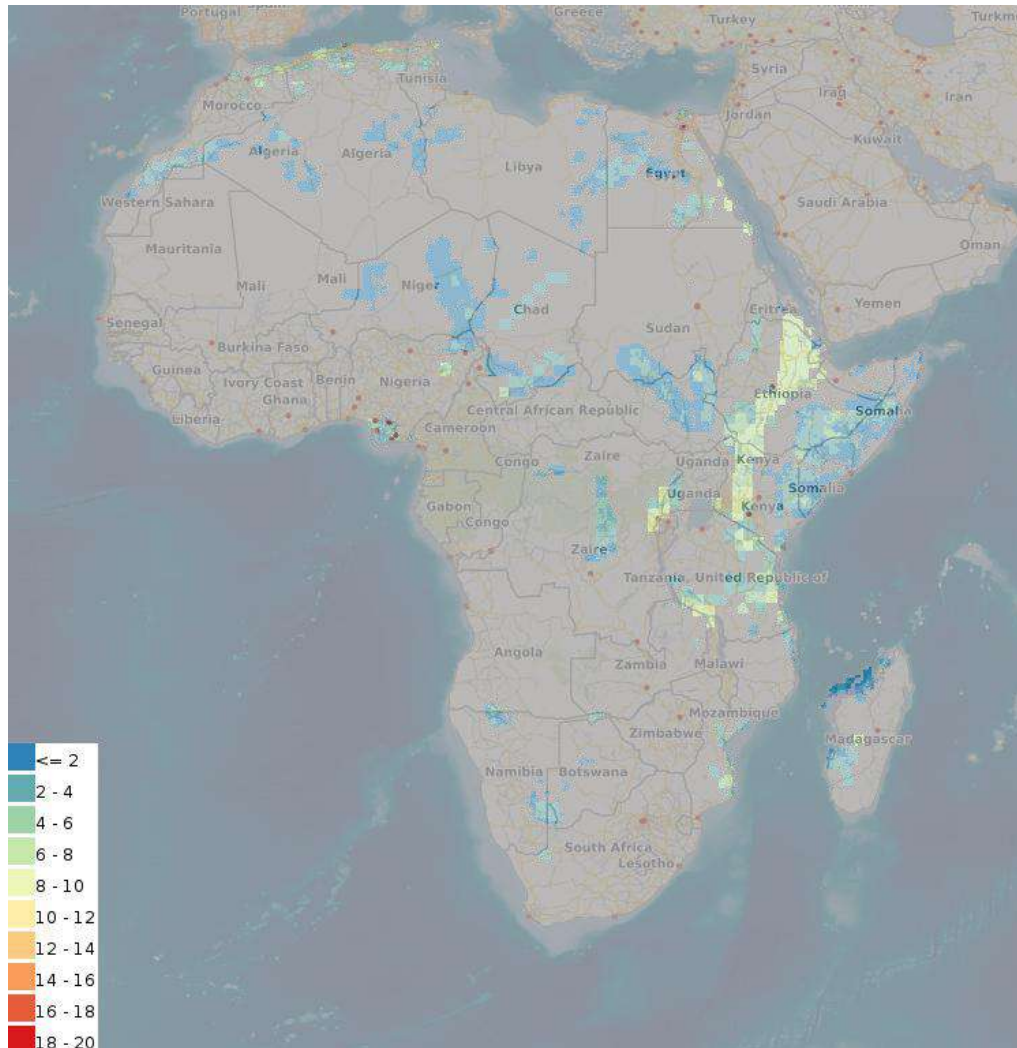
description: Possible power installed for a binary orc power plant in the upupside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Levelized Cost of Electricity for Binary ORC Power Plant (upupside)**

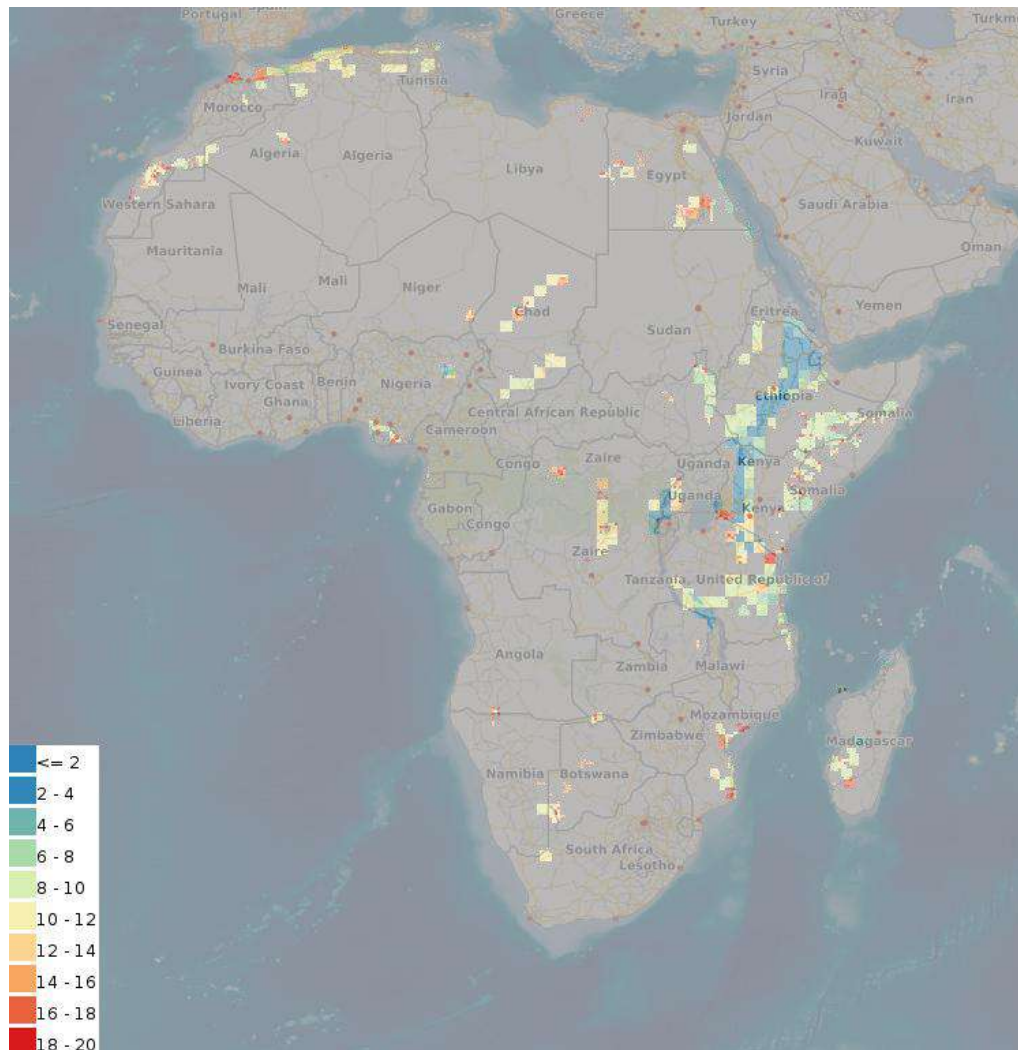
description: Possible cost of electricity for a binary orc power plant in the upupside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa



- **Climate Change potential impact for Binary ORC Power Plant (upupside)**

description: Possible environmental impact of climate change for a binary orc power plant in the upupside scenario

keywords: ORC, Power Plant, Africa

source: [link](#)

date: 2024

coverage: Africa

