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Thank you.



Locating and analysing river boundaries



Martin Pratt

bordermap consulting

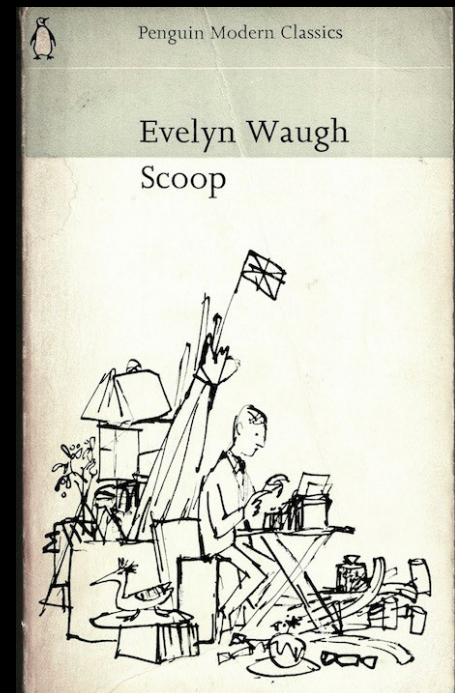
Geographical intelligence for international
boundary-making and dispute resolution

What's in a name?

They talked about Ishmaelia. “No-one knows if it's got any minerals because no-one's been to see. The map's a complete joke,” Bannister explained. “The country has never been surveyed at all; half of it's unexplored. Why, look here,” he took down a map from his shelves and opened it. “See this place, Laku. It's marked as a town of some five thousand inhabitants, fifty miles north of Jacksonburg.

Well, there has never been such a place. Laku is the Ishmaelite for ‘I don't know’. When the boundary commission were trying to get through to the Sudan in 1898 they made a camp there and asked one of their boys the name of the hill, so as to record it in their log. He said ‘Laku’, and they've copied it from map to map ever since.

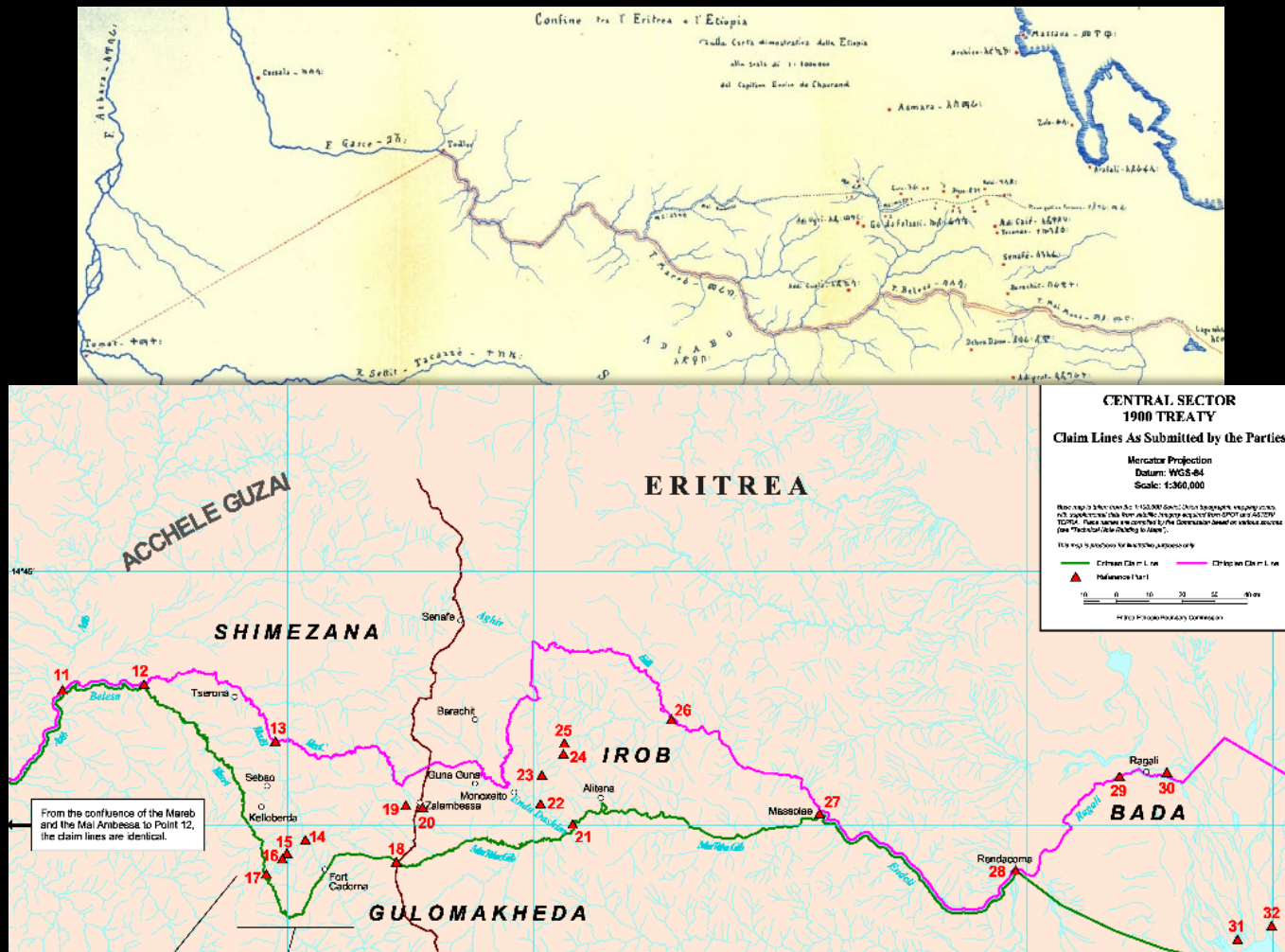
Evelyn Waugh: *Scoop*



Disagreement on boundary river names

Eritrea-Ethiopia (central section)

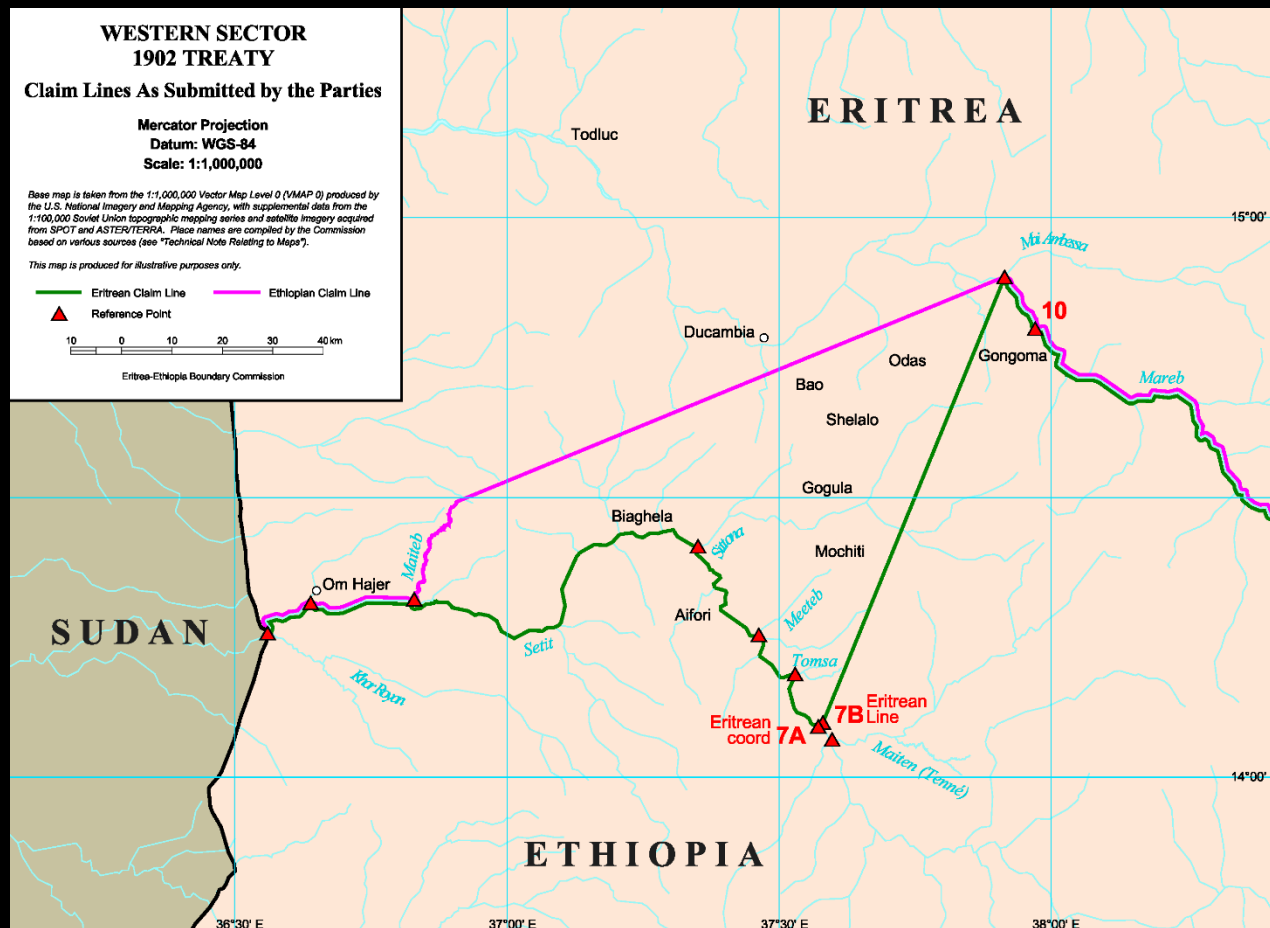
“The line Tomat-Todluc-Mareb- Belesa-Muna, traced on the map annexed, is recognized by the two Contracting Parties as the boundary between Eritrea and Ethiopia.”



Disagreement on boundary river names

Eritrea-Ethiopia (western section)

“Commencing from the junction of the Khor Um Hagar with the Setit, the new frontier follows this river to its junction with the Maieteb, following the latter’s course so as to leave Mount Ala Tacura to Eritrea, and joins the Mareb at its junction with the Mai Ambessa.”



Imprecise boundary delimitations

“the new boundary ... follows the Can-le-Cham as far as the point where it leaves the northerly direction to swing in a wide arc to the east”

Decree Governing the Boundary between Vietnam and Cambodia, July 1914

“thence along the thalweg of the river Kaia (Kaya), downstream to its confluence with the unnamed river which runs immediately south of Chei and Lodwa rocks, and then runs in a northerly direction”

Section of the Sudan-Uganda boundary described in the Constitution of Uganda

“Thence crosses this marsh where it reaches a river passing quite close to the village of Limanti to a confluence at about 2 kms to the north-west of this village”

Cameroon-Nigeria, Franco-British Declaration, July 1919

Archives for boundary research

- Government archives
 - National
 - Local
 - Imperial / colonial
 - Survey authority
- International organisation archives, e.g. United Nations
- National and academic libraries
- Learned society collections, e.g. Royal Geographical Society
- University collections, e.g. Durham Sudan Archive
- Business archives, e.g. oil & gas companies
- Personal archives

UK National Archives



XXXXXX Survey Department archive



Archival evidence over the location of a confluence

Mozambique-Tanzania



BOUNDARY BRIEF

The Mozambique-Tanzania boundary is demarcated throughout by streams or by pillars. With a total length of 470 miles, streams comprise 445 miles of the distance, of which the Ruvuma (Rio Rovuma) and its tributaries account for all but about one mile. Islands in the Ruvuma situated downstream of its confluence with the Domoni at approximately 38° 8' East are part of Mozambique, and those situated upstream of the confluence are part of Tanzania.

MOZAMBIQUE-TANZANIA BOUNDARY

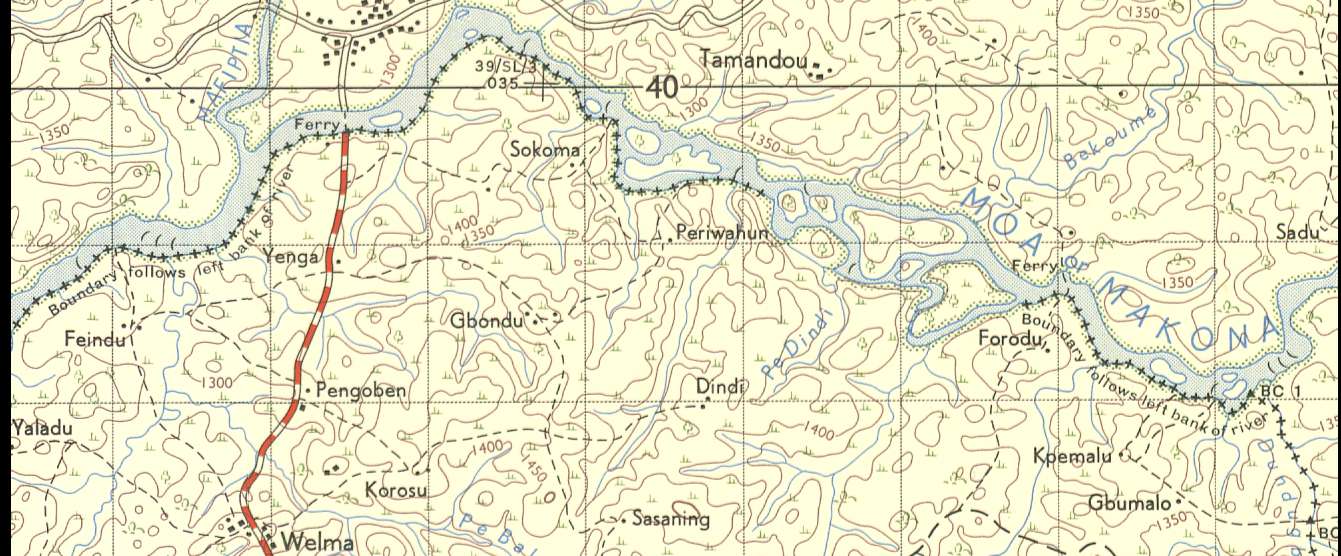
— — — — — Mozambique-Tanzania boundary
 — — — — — Other international boundary

0 25 50 75 100 Miles
 0 25 50 75 100 Kilometers

Source of Data: Office of the Geographer, Dept. of State

Disagreement over the location of the bank

Guinea-Sierra Leone



Map research is about more than just the map

- What was the purpose the map?
- Who produced it for whom?
- What source material was used to compile the map?
- How widely was it distributed?
- Did anyone comment on the map?
- What are the strengths and weaknesses of the map in the context of the dispute?
- Remember metadata and marginalia
Title, series, sheet no., publisher, publication date, edition, dates of revisions, scale, other marginal information, archive reference no. etc.

Historical aerial photography



Wadi Hasi, Gaza-Israel, early 1940s



Big Bend, Swaziland (1947, 1961, 1971)

- UK National Centre for Aerial Photography holds 1.5 million aerial photographs acquired by the Directorate of Overseas surveys between 1946 and 1984 (<https://ncap.org.uk/DOS>)

US declassified Corona imagery, 1960-72

<https://data.nasa.gov/dataset/CORONA-Satellite-Photography/4rni-qjx7>



East of Tblisi, Georgia, 1971

US declassified Corona imagery, 1960-72

<https://data.nasa.gov/dataset/CORONA-Satellite-Photography/4rni-qjx7>



US declassified Corona imagery, 1960-72

<https://earthexplorer.usgs.gov>

EarthExplorer System Notification (1) Help Feedback Login

Search Criteria Data Sets Additional Criteria **Results** Clear Search Criteria

4. Search Results

If you selected more than one data set to search, use the dropdown to see the search results for each specific data set.

Note: You must be logged in to download and order scenes

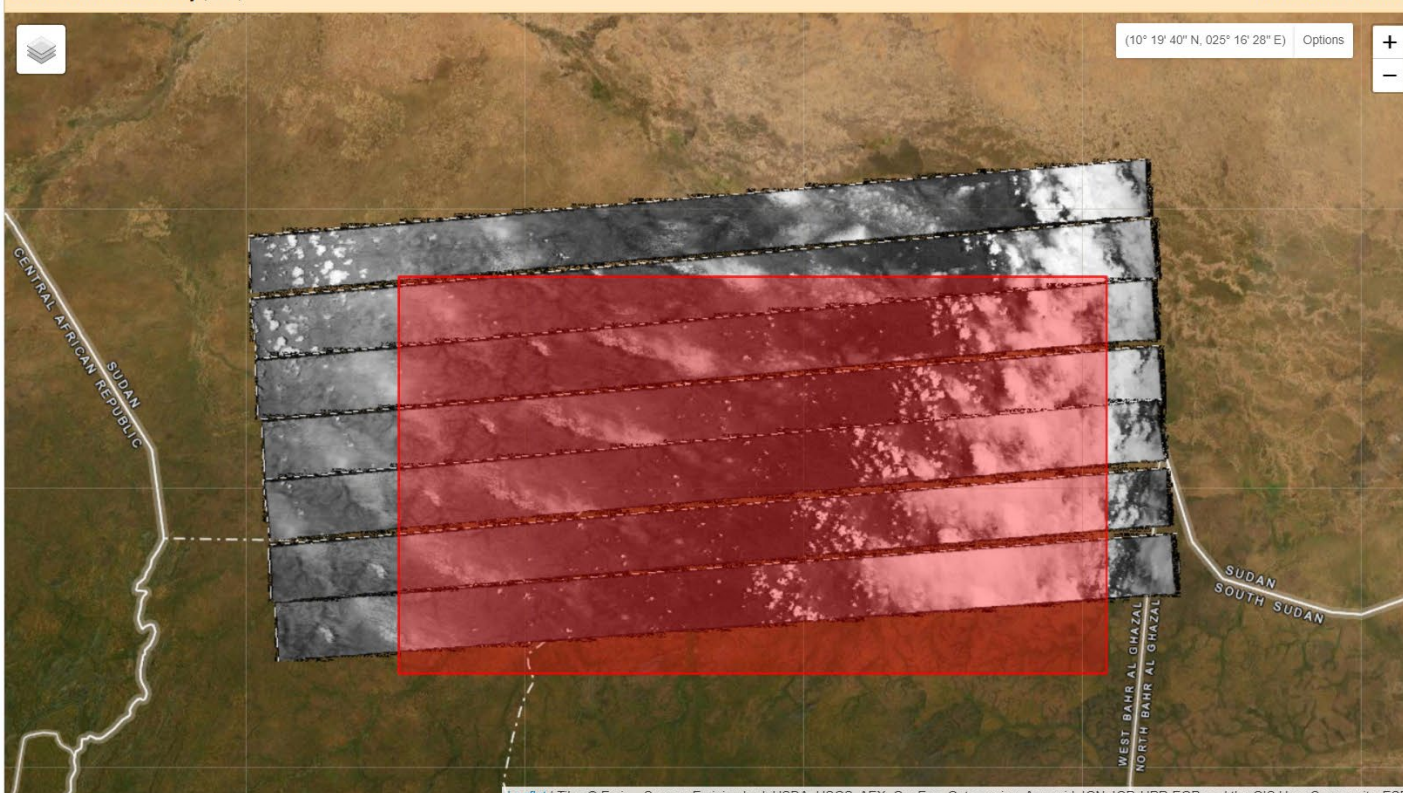
Show Result Controls

Data Set [Click here to export your results »](#)

Declass 1 (1996)

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Entity ID: DS1050-2042DA151 Coordinates: 9.68 , 25.104 Camera Resolution: Stereo Medium Acquisition Date: 1969-03-22
Entity ID: DS1050-2042DA152 Coordinates: 9.53 , 25.12 Camera Resolution: Stereo Medium Acquisition Date: 1969-03-22
Entity ID: DS1050-2042DA153 Coordinates: 9.38 , 25.124

Search Criteria Summary (Show)

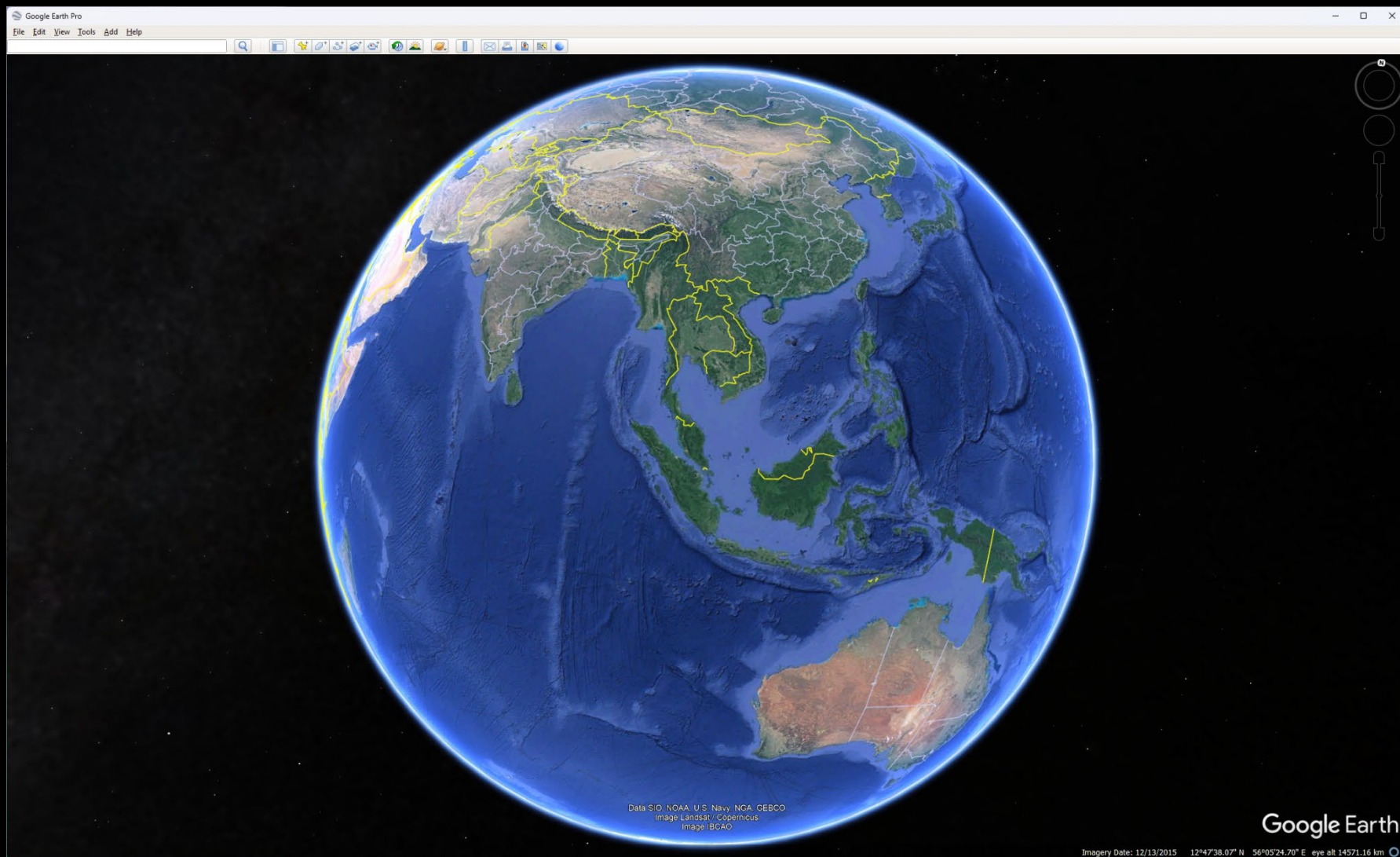


(10° 19' 40" N, 025° 16' 28" E) Options + -

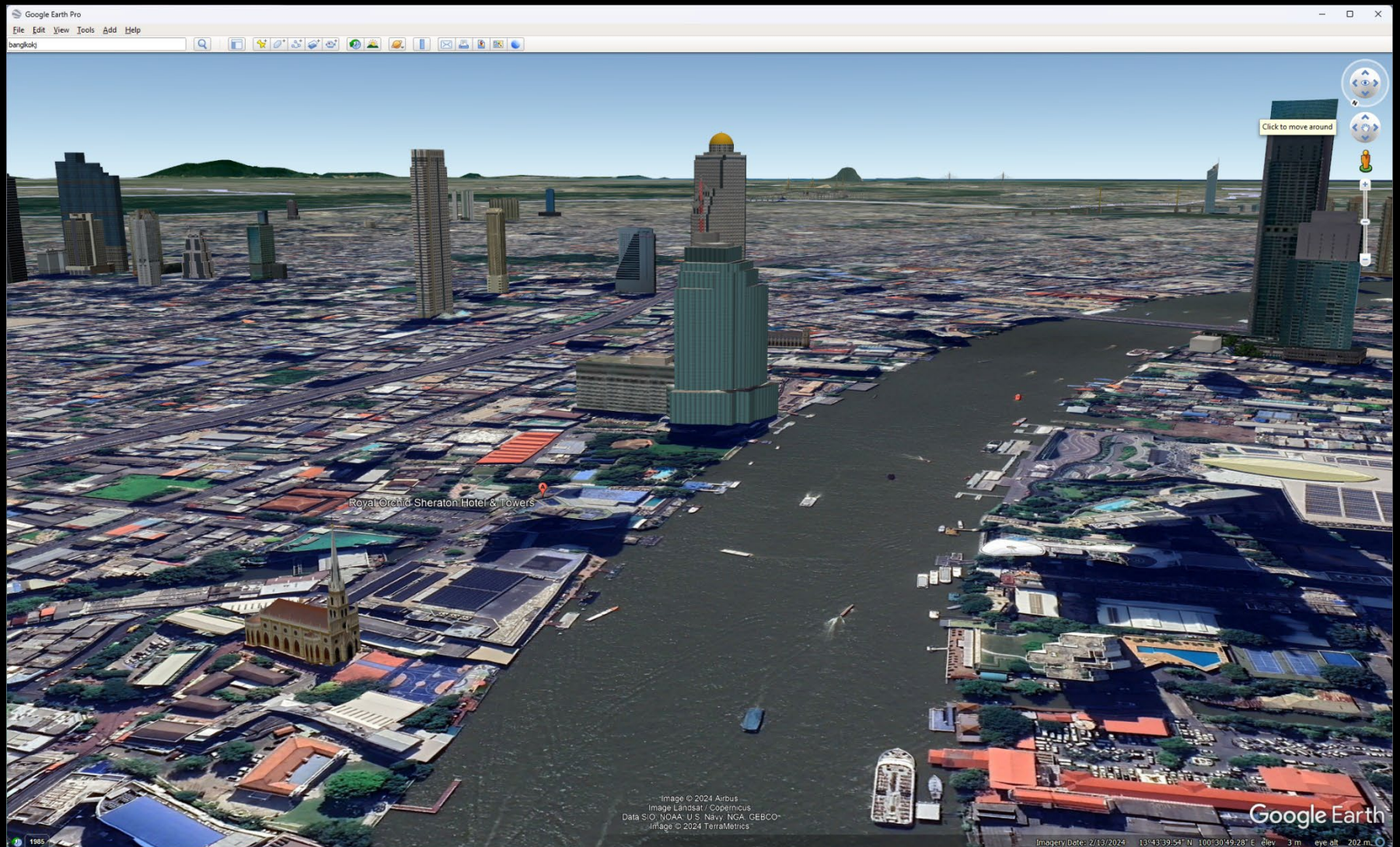
Leaflet | Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community, ESRI

The provided maps are not for purchase or for download; they are to be used as a guide for reference and search purposes only; they are not owned or managed by the USGS.

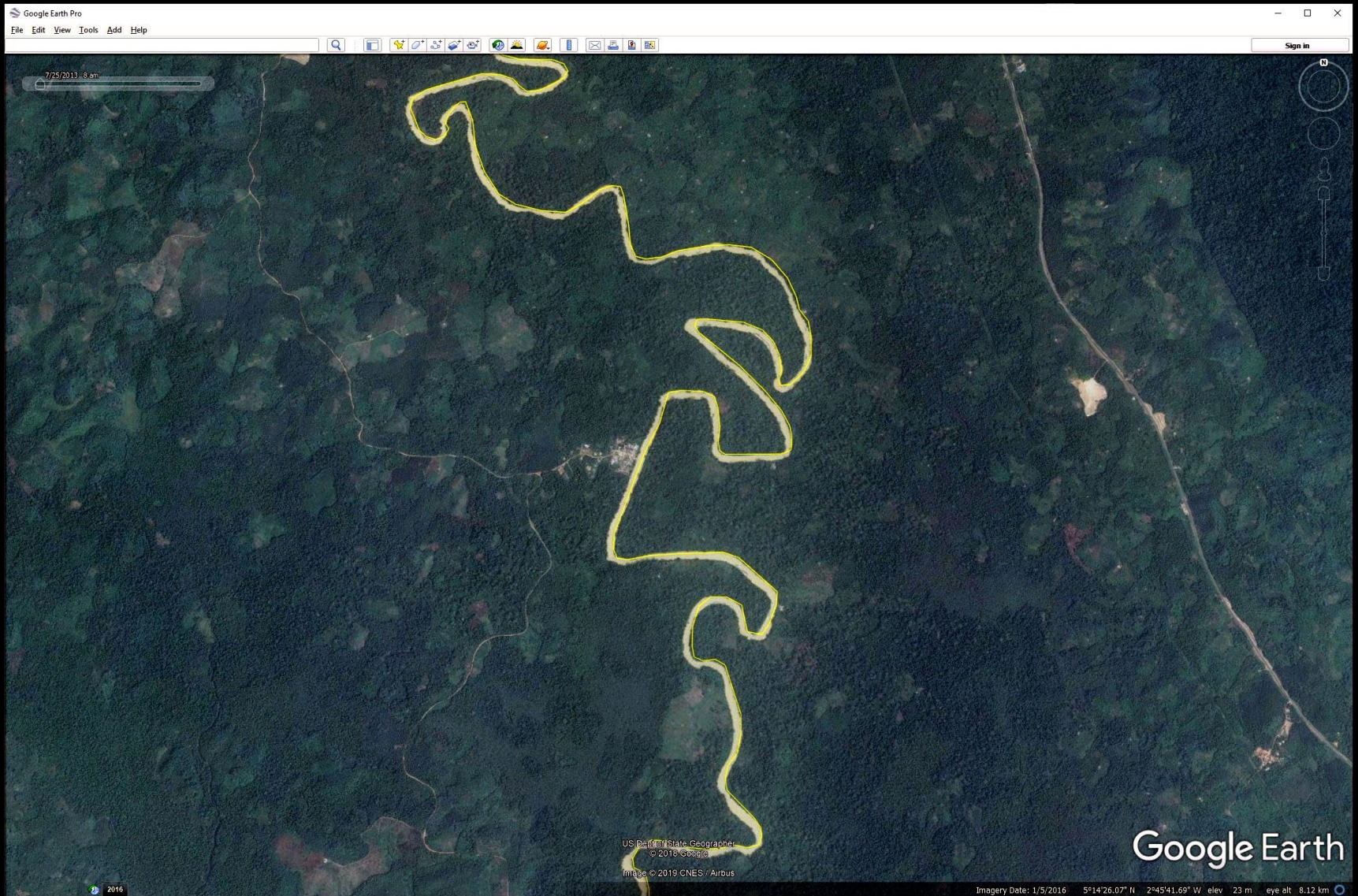
The imagery revolution: Google Earth etc



The imagery revolution: Google Earth etc



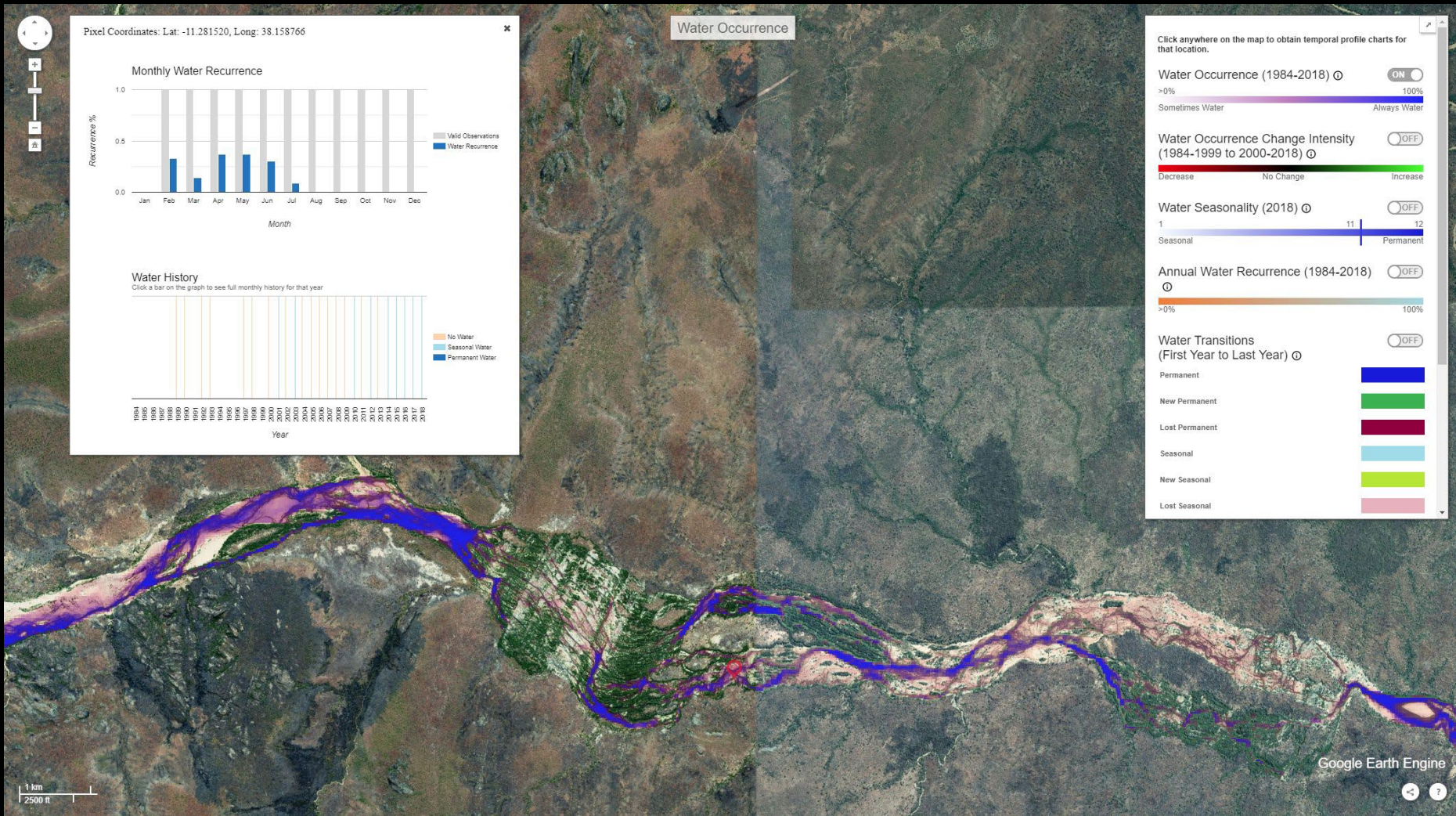
The imagery revolution: Google Earth etc



The imagery revolution: Google Earth etc



The Global Surface Water Explorer



Other research resources

United Nations Treaty Series <https://treaties.un.org>

UK Treaties Online: <https://treaties.fcdo.gov.uk/responsive/app/consolidatedSearch/>

US State Department International Boundary Studies series

<https://fall.fsulawrc.com/collection/LimitsinSeas/numericalibs.html>

Sovereign Limits database (\$) <https://sovereignlimits.com>

African Boundaries: A Legal & Diplomatic Encyclopedia (I. Brownlie, 1979)

<https://archive.org/details/africanboundarie0000brow>

The Map of Africa by Treaty (E. Hertslett, 1909)

Full PDFs: <https://library.si.edu/digital-library/book/map-africa-treaty>

Hi-res images: <https://www.loc.gov/item/99446110/>

Map of Mainland Asia by Treaty (J.R.V. Prescott, 1975)

<https://archive.org/details/mapofmainlandasi0000pres>

Sovereign Limits database

SOVEREIGN LIMITS

Zoom to feature Close

Myanmar--Thailand Land Boundary

Type: Land Boundary
Effective Start: 1868-02-08
Effective Through: Present

Status

- Myanmar Directly Involved Accept
- Thailand Directly Involved Accept

Formal Arrangements

(1868-02-08) Convention between the Governor-General of India and the King of Siam, defining the Boundary on the Mainland between the Kingdom of Siam and the British Province of Tenasserim
[Bilateral Agreement](#) [Download](#) [View](#)
notes

(1868-07-03) Exchange of Notes between Great Britain and Siam
[Bilateral Agreement](#) [Download](#) [View](#)
notes

(1894-10-17) Boundary Demarcation Agreement in Three Maps between Siam and Great Britain
[Bilateral Agreement](#)
notes

(1932-03-14) Agreement and Exchange of Notes between His Majesty's Government in the United Kingdom and the Government of India and the Government of Siam regarding the Boundary between Burma (Kengtung) and Siam
[Bilateral Agreement](#) [Download](#) [View](#)
notes

(1934-06-01) Exchange of Notes between His Majesty's Government in the United Kingdom and the Government of India and the Government of Siam regarding the Boundary between Burma (Tenasserim) and Siam
[Bilateral Agreement](#) [Download](#) [View](#)
notes

(1940-12-10) Exchanges of Notes between His Majesty's Government in the United Kingdom and the Government of Thailand regarding the Boundary between Burma and Thailand
[Bilateral Agreement](#) [Download](#) [View](#)
notes

Legend

- Disputed/Contentious Sovereignty
- Land**
 - Land Boundary
 - Shared Sovereignty Area
 - Undetermined Sovereignty Area
- Maritime**
 - Maritime Boundary
 - Provisional Equidistance
 - Straight Baseline Claim
 - Archipelagic Baseline Claim
 - Territorial Sea Limit
 - Exclusive Economic Zone
 - Shared Sovereignty Zone
 - Special Maritime Zones
 - Extended- Continental Shelf Submissions

All States

IBRU river boundaries database

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Boundary

Boundary Details

Boundary	Region	Estimated total land boundary length
Argentina - Brazil	South America	1261km

River Details

Number of Sections	Total River Boundary Length	Estimated % of total land boundary length	Reference	Notes
4	1236km	98%	Government source	This river boundary total and overall length was provided by Mr. Dauberson Montero da Silva at 2006 Symposium on Land and River Demarcation. Both IBS and Biger estimate the total river boundary length to be 1200 (the percentage with CIA land boundary total is almost identical). Biger gives a total length of river sections as 1200 km and 24 km overland. SRBD gives a total river boundary length of 8

Section Details

Click on section names to expand

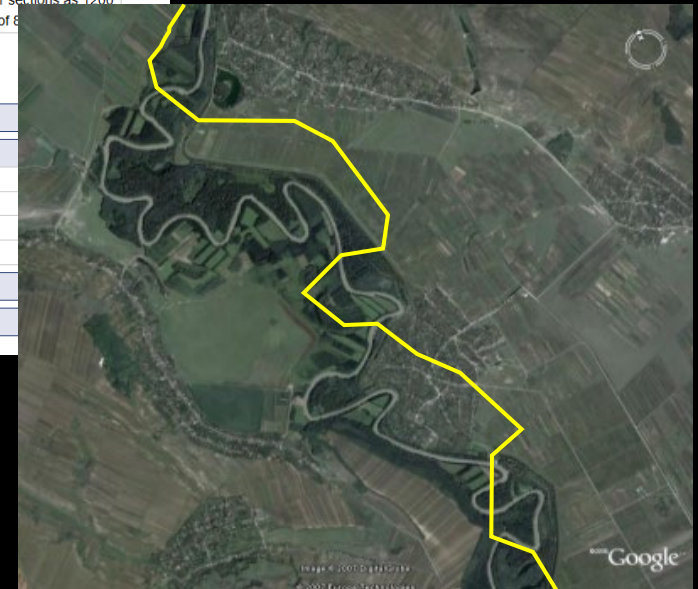
+ Iguacu

+ Pepiri-Guacu

Section Length	225km
Latest Delimitation	1910
Principal Terminology	Thalweg
Reference	IBS/Biger

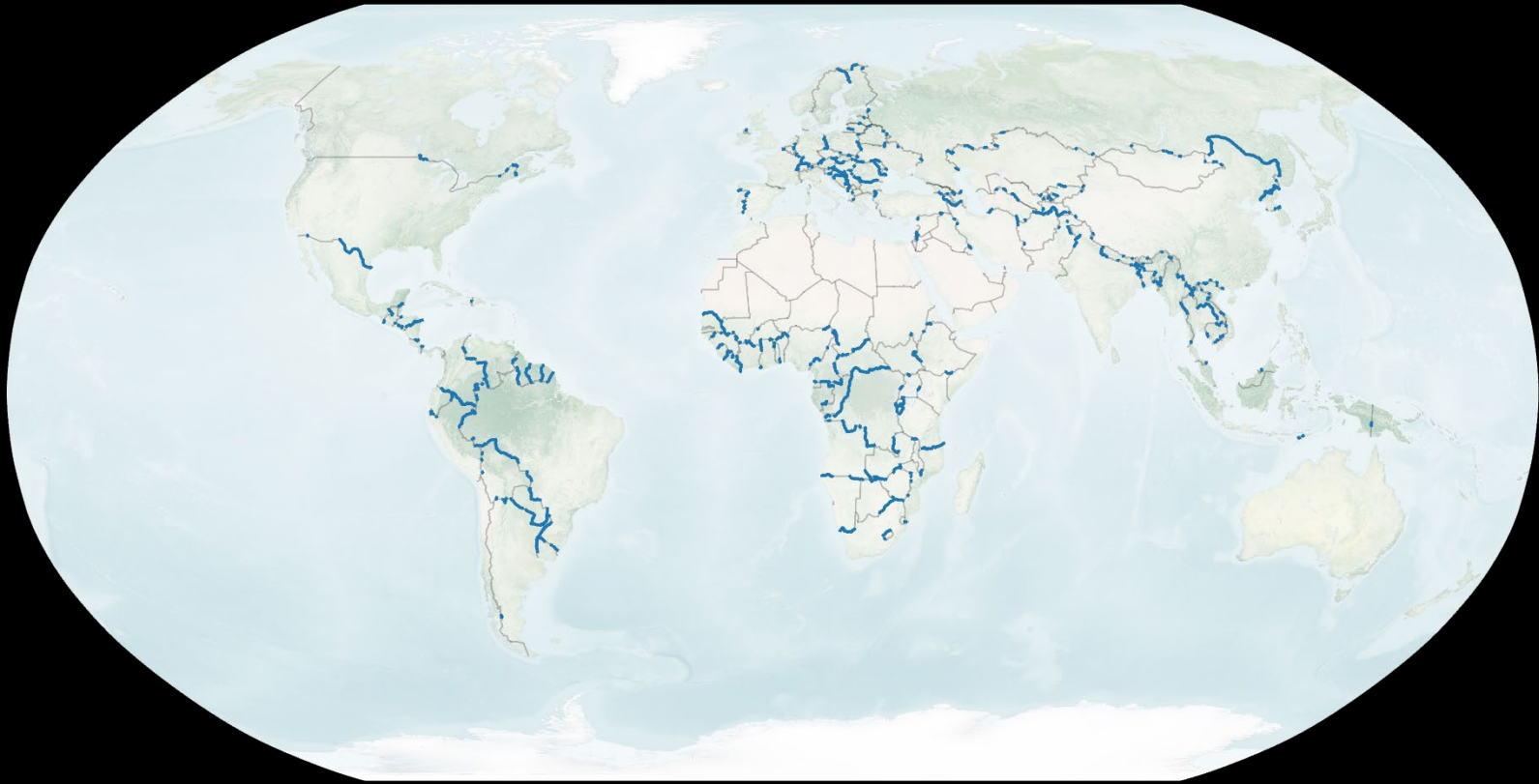
+ San Antonio

+ Uruguay



Moldova-Romania boundary, Prut river (original Google Earth depiction highlighted in yellow)

Global Subnational River Borders dataset



iwaponline.com/wp/article/22/3/293/74045/Rivers-as-political-borders-a-new-subnational

GIS tools for river channel analysis

River Bathymetry Toolkit (ArcMap)

<https://essa.com/explore-essa/tools/river-bathymetry-toolkit-rbt>

FluvialGeomorph ArcGIS toolbox (ArcGIS Pro)

<https://github.com/FluvialGeomorph/FluvialGeomorph-toolbox>

Median line calculations:

- CARIS LOTS Limits & Boundaries
- Geocap Maritime Limits and Boundaries for ArcGIS
- ET Geowizards Create Centerline Tool
- ArcGIS / QGIS Polygon to Centerline tools
- GIZ algorithm (Yannick Le Gléau)

Thank you!



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Geographical intelligence for international
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