

# Global Channel Belt (GCB) Dataset

Technical Documentation Version 1.0

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## Background

The Global Channel Belt (GCB) maps and datasets show the global distribution of channel belts and the single- or multi-threaded river morphology. In Version 1.0 a two-tier single-threaded (e.g., meandering) versus multi-threaded (e.g., braided) classification is created providing the first planetary scale classification of channel belt extent and associated river channel morphology. Accompanying the GCB prediction model are the riverine and lacustrine environment classifications that are associated with the channel belt definition.

The aim of the datasets and map is to provide the research community and planners the necessary resources needed to relate the morphology of channel belts with river behavior, ecosystem health, freshwater resources, and improved flood mitigation strategies.

## Methods

The GCB prediction was created by implementing machine learning for pattern recognition of meandering and braided channel belt characteristics based on 370 river system examples. The modified VGG-19 convolutional neural network contains 21,353,943 parameters based on a 3-band (6,5 and 4) Landsat-8 imagery. A total of 151,723 Landsat 8 TM scenes were used to create a cloud and snow-free composite image for 2020 for the machine learning algorithm to classify. The model achieved a 94% accuracy to the validation dataset.

Based on the predicted extent of the channel belt, we are further able to produce a classification of riverine and lacustrine environments. Here we define permanent waterbodies of 2020 within the

channel belt as the river channel and waterbodies outside the channel belt as lacustrine or wetland. Furthermore, we classify the active channel belt as the extent of migration of the channel belt of the 36-years of Landsat observations. In addition, a separate class is given for smaller river / channel belt lakes (e.g. oxbow/billabong lakes) that are disconnected from the larger river channel.

### **Data Format and Descriptions**

Two folders are included with this readme file that include the two datasets named GRM and GRM\_env. Each dataset is provided in 10-degree cloud-optimized GeoTIFF files in a WG84 projection.

#### GCB Prediction

The GRM folder shows the predicted channel belt extent and morphology. It contains two raster bands, 'meandering' and 'braided' at a 30m resolution showing the confidence in the machine learning algorithm in predicting either a single-threaded (e.g., meandering) or multi-threaded (e.g., braided) classification. Each band will range from 0 to 100% with the remaining percentage referring to the background value confidence.

The files are provided in 8 different ZIP compressed folder starting with the name GRM\_x.zip.

#### GRM Environments

The GRM\_env show the predicted riverine and wetland/lacustrine environments. The dataset contains one raster band with values ranging from 1 to 6 at a 30m resolution. Refer to Table 1 for a description of the different values.

*Table 1 – GRM environments dataset values*

<b>Value</b>	<b>Description</b>
1	Background Value
2	Channel Belt
3	Active Channel Belt
4	River Channel
5	Wetland/Lacustrine
6	Smaller Rivers / Channel Belt Lakes

### **Interactive Maps**

The online interactive map accompanying the datasets is available at

<https://bjornburnnyberg.users.earthengine.app/view/gcbm>

A 3D perspective is available through Google Earth at

<https://earth.google.com/web/data=MicKJQojCiExQUFCWDUtNjFzMHRsZWVkdDJtTlJqaVpnMTdib3JEbGs>

#### Visualization

To recreate the visualization used in the interactive maps for the GRM prediction, use a RGB band rendering applying the Braided band for both the 'R' and 'G' bands and the Meandering band for the 'B' band with a 2.0 gamma color setting.

**License and Citation**

The datasets are publicly available under a CC0 license.

We kindly ask that if you use the data in your research, reports, or documentation to include a citation to the original GCB dataset and publication.