

# The new HydroSHEDS v2.0 database derived from the TanDEM-X DEM



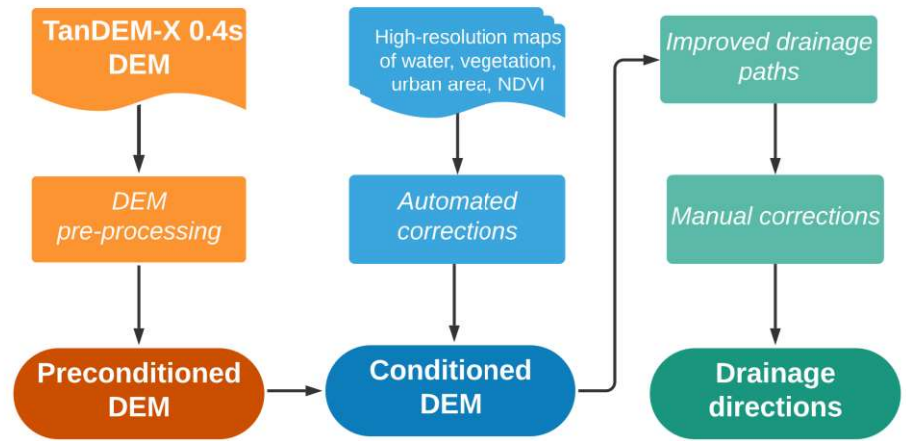
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## What is new in HydroSHEDS v2.0?

The new hydrographic database is derived from **0.4" high-resolution TanDEM-X data**, providing seamless and consistent data in **1" resolution for all land areas worldwide**.

Further improvements include

- Enhanced river tracing algorithms
- Improved 'stream-burning' incorporating recent auxiliary data products
- Correction of urban areas and vegetation

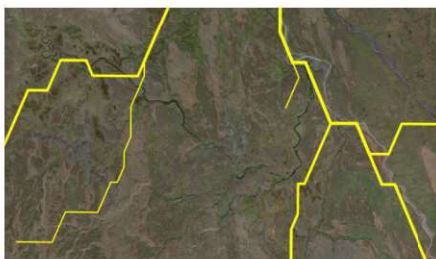


## What is HydroSHEDS?

**HydroSHEDS** offers a suite of global digital data layers in support of hydro-ecological research and applications worldwide. Its various hydrographic data products come at multiple scales and resolutions.

**The HydroSHEDS v2.0 drainage directions will be used to update the entire suite of HydroSHEDS products at global coverage.**

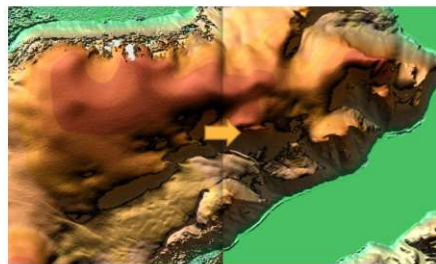
HydroSHEDS v2.0 combines a very high quality pre-conditioned DEM, customized conditioning procedures, automated processing, unique drainage algorithms, and iterative manual quality control.



Comparison of river networks based on the HYDRO1k DEM (upper image) and HydroSHEDSv2.0 based on the TanDEM-X DEM (lower image) in Iceland.

## Preconditioned DEM

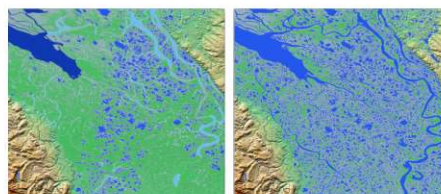
A **hydrologically pre-conditioned 1" DEM** is created from the original 12 m resolution TanDEM-X data.



The TanDEM-X DEM is locally filled with elevation data from the Copernicus DEM where shadow and layover effects during acquisition cause invalid or unreliable height information (Baffin Island, Canada).

**Urban corrections** with high-resolution settlement maps are applied to reduce distortions caused by built-up areas.

Following the derivation of a high-resolution coastline, a **water body mask** is generated by applying an automatic machine-learning based classification algorithm, detecting water even when it is frozen at the time of acquisition.



The Copernicus water body mask is displayed on the left and the classification result is shown on the right (Mackenzie River entering the Beaufort Sea).

## Conditioned DEM

Refined hydrological optimization and correction algorithms are used to derive the **drainage pathways** from the resulting conditioned DEM.

**Improved 'stream-burning' techniques** incorporate recent data products such as high-resolution terrestrial open water masks and improved tracing of drainage pathways as centerlines in global lake and river maps in order to solve depressions.

**Vegetation correction** combines the best available remotely-sensed forest height maps and NDVI data to restore continuous flow.



The river network before (left) and after (right) the vegetation correction, showing the success of restoring the continuous flow following the river bed.

## Drainage directions

**Manual inspection** using imagery and existing digitized rivers to burn streams is performed in an **iterative correction process** until all flow paths are corrected. Potential sinks are automatically detected and manually verified.

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