

Objective

The task objective was to prepare five types of datasets in an S3 bucket, based on a document received from EUROSTAT.

Bucket

Each dataset has its own reference line on S3 Bucket, named “ESTAT”.

```
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/  
DIR s3://ESTAT/Census_GRID/  
DIR s3://ESTAT/Field_boundaries/  
DIR s3://ESTAT/GHSL/  
DIR s3://ESTAT/GISCO_Reference_Grid/  
DIR s3://ESTAT/NUTS/
```

Datasets

Datasets are:

- NUTS regions (geopackage)

We have downloaded the NUTS 2021 dataset in Polygon geometry type, shapefile format, at a 01M scale, and in all available coordinate reference systems. All these shapefiles are stored in a compressed (ZIP) format to facilitate the downloading of complete files (as a shapefile consists of several files, and the count may vary). Example files for 2024 on the S3 bucket are shown on the screen below:

```
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/NUTS/  
DIR s3://ESTAT/NUTS/2021/  
DIR s3://ESTAT/NUTS/2024/  
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/NUTS/2024/  
2025-01-23 09:14 17551656 s3://ESTAT/NUTS/2024/NUTS_RG_01M_2024_3035.shp.zip  
2025-01-23 09:14 17989422 s3://ESTAT/NUTS/2024/NUTS_RG_01M_2024_3857.shp.zip  
2025-01-23 09:14 19858622 s3://ESTAT/NUTS/2024/NUTS_RG_01M_2024_4326.shp.zip
```

- Population grid (geopackage and raster, 1km resolution)

We have downloaded the Version 2021 (dated 16 June 2024) dataset. The dataset was packaged in a single ZIP file. To facilitate access to each file in the dataset, they were extracted and uploaded individually to the S3 bucket:

```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/Census_GRID/2021/
DIR s3://ESTAT/Census_GRID/2021/ESTAT_Census_2021_V2_SDMX_Metadata/
2025-01-23 10:24 8972349664 s3://ESTAT/Census_GRID/2021/ESTAT_Census_2021_V2.csv
2025-01-23 10:24 1724784640 s3://ESTAT/Census_GRID/2021/ESTAT_Census_2021_V2.gpkg
2025-01-23 10:24 194294074 s3://ESTAT/Census_GRID/2021/ESTAT_Census_2021_V2.parquet
2025-01-23 10:24 9745597 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-CHG_IN_2021_V2.tiff
2025-01-23 10:24 7114977 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-CHG_OUT_2021_V2.tiff
2025-01-23 10:24 1818902 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-CONFIDENTIAL_2021_V2.tiff
2025-01-23 10:24 9071037 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-EMP_2021_V2.tiff
2025-01-23 10:24 8808149 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-EU_OTH_2021_V2.tiff
2025-01-23 10:24 11717667 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-F_2021_V2.tiff
2025-01-23 10:24 10269355 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-LANDSURFACE_2021_V2.tiff
2025-01-23 10:24 11781575 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-M_2021_V2.tiff
2025-01-23 10:24 12157806 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-NAT_2021_V2.tiff
2025-01-23 10:24 9094506 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-OTH_2021_V2.tiff
2025-01-23 10:24 8633535 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-POPULATED_2021_V2.tiff
2025-01-23 10:24 12175835 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-SAME_2021_V2.tiff
2025-01-23 10:24 12377763 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-T_2021_V2.tiff
2025-01-23 10:24 11898833 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-Y_1564_2021_V2.tiff
2025-01-23 10:24 11019519 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-Y_GE65_2021_V2.tiff
2025-01-23 10:24 10474349 s3://ESTAT/Census_GRID/2021/ESTAT_OBS-VALUE-Y_LT15_2021_V2.tiff
2025-01-23 10:23 3507 s3://ESTAT/Census_GRID/2021/read.me

```

- GISCO Reference Grid

We downloaded all the GISCO reference grids available from the documentation source and consolidated them into a single reference.

```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GISCO_Reference_Grid/
2025-01-22 19:13 218996 s3://ESTAT/GISCO_Reference_Grid/grid_100km.csv
2025-01-22 19:13 61002 s3://ESTAT/GISCO_Reference_Grid/grid_100km.parquet
2025-01-22 19:12 368640 s3://ESTAT/GISCO_Reference_Grid/grid_100km_point.gpkg
2025-01-22 19:13 446464 s3://ESTAT/GISCO_Reference_Grid/grid_100km_surf.gpkg
2025-01-22 19:12 10735800 s3://ESTAT/GISCO_Reference_Grid/grid_10km.csv
2025-01-22 19:13 1791163 s3://ESTAT/GISCO_Reference_Grid/grid_10km.parquet
2025-01-22 19:12 14426112 s3://ESTAT/GISCO_Reference_Grid/grid_10km_point.gpkg
2025-01-22 19:12 20131840 s3://ESTAT/GISCO_Reference_Grid/grid_10km_surf.gpkg
2025-01-22 19:13 821137604 s3://ESTAT/GISCO_Reference_Grid/grid_1km.csv
2025-01-22 19:13 107065082 s3://ESTAT/GISCO_Reference_Grid/grid_1km.parquet
2025-01-22 19:12 1258541056 s3://ESTAT/GISCO_Reference_Grid/grid_1km_point.gpkg
2025-01-22 19:12 1785110528 s3://ESTAT/GISCO_Reference_Grid/grid_1km_surf.gpkg
2025-01-22 19:12 3036411 s3://ESTAT/GISCO_Reference_Grid/grid_20km.csv
2025-01-22 19:12 582111 s3://ESTAT/GISCO_Reference_Grid/grid_20km.parquet
2025-01-22 19:12 4030464 s3://ESTAT/GISCO_Reference_Grid/grid_20km_point.gpkg
2025-01-22 19:12 5541888 s3://ESTAT/GISCO_Reference_Grid/grid_20km_surf.gpkg
2025-01-22 19:13 228584571 s3://ESTAT/GISCO_Reference_Grid/grid_2km.csv
2025-01-22 19:12 30170885 s3://ESTAT/GISCO_Reference_Grid/grid_2km.parquet
2025-01-22 19:12 319987712 s3://ESTAT/GISCO_Reference_Grid/grid_2km_point.gpkg
2025-01-22 19:13 452874240 s3://ESTAT/GISCO_Reference_Grid/grid_2km_surf.gpkg
2025-01-22 19:12 628263 s3://ESTAT/GISCO_Reference_Grid/grid_50km.csv
2025-01-22 19:12 146237 s3://ESTAT/GISCO_Reference_Grid/grid_50km.parquet
2025-01-22 19:12 884736 s3://ESTAT/GISCO_Reference_Grid/grid_50km_point.gpkg
2025-01-22 19:12 1155072 s3://ESTAT/GISCO_Reference_Grid/grid_50km_surf.gpkg
2025-01-22 19:13 39215770 s3://ESTAT/GISCO_Reference_Grid/grid_5km.csv
2025-01-22 19:13 5917056 s3://ESTAT/GISCO_Reference_Grid/grid_5km.parquet
2025-01-22 19:13 53755904 s3://ESTAT/GISCO_Reference_Grid/grid_5km_point.gpkg
2025-01-22 19:13 76046336 s3://ESTAT/GISCO_Reference_Grid/grid_5km_surf.gpkg

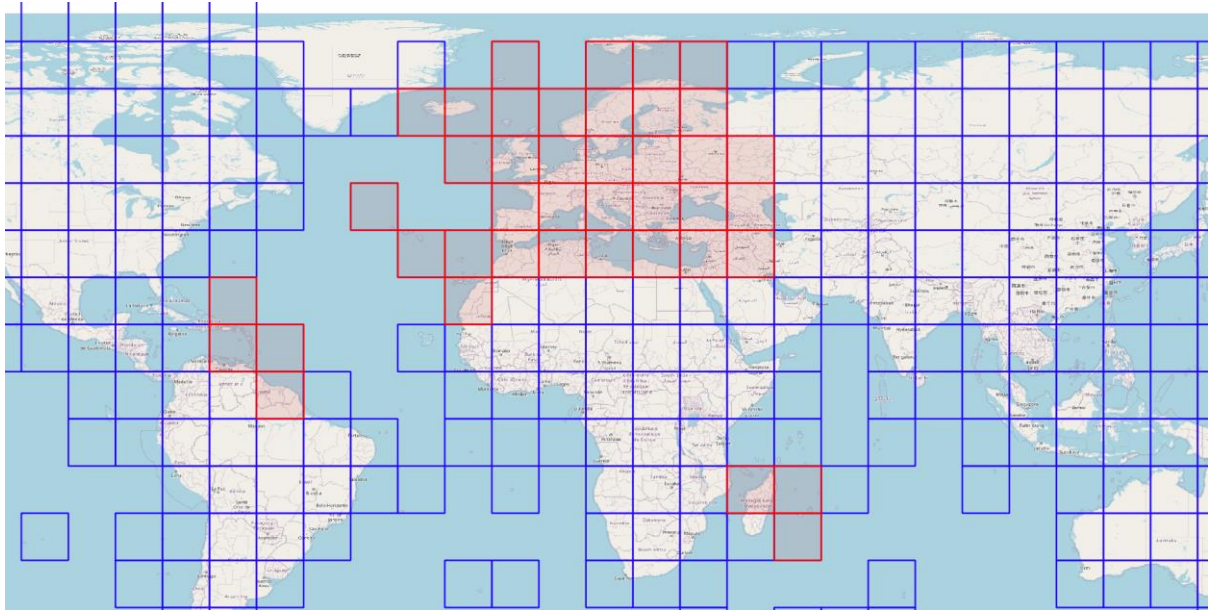
```

- Global Human Settlement layer (raster)

We downloaded six products listed in the documentation provided: GHS-BUILT-S, GHS-BUILT-H, GHS-BUILT-V, GHS-BUILT-C, GHS-POP, and GHS-SMOD.

All available years and resolutions for each product were downloaded. A summary can be found in Appendix 1.

However, not all tiles were downloaded. We filtered the tiles (for both the Mollweide and WGS84 coordinate systems) to include those that cover European countries in Europe and overseas territories. Below, we present an example of the filtered tiles (highlighted in red) in the WGS84 reference system.



All downloaded tiles ids for which data was downloaded:

CRS	Tiles ids
WGS84 (EPSG4326)	R11_C23, R12_C24, R1_C19, R1_C20, R2_C17, R2_C18, R2_C19, R2_C20, R2_C21, R3_C18, R3_C19, R3_C20, R3_C21, R4_C18, R4_C19, R4_C20, R4_C21, R4_C22, R5_C16, R5_C17, R5_C18, R5_C19, R5_C20, R5_C21, R5_C22, R5_C23, R6_C17, R7_C12, R7_C13, R8_C12, R8_C13, R9_C13
Mollweide (ESRI54009)	R11_C23, R11_C24, R12_C24, R2_C18, R2_C20, R2_C21, R2_C22, R3_C16, R3_C17, R3_C18, R3_C19, R3_C20, R3_C21, R3_C22, R4_C17, R4_C18, R4_C19, R4_C20, R4_C21, R4_C22, R4_C23, R5_C15, R5_C18, R5_C19, R5_C20, R5_C21, R5_C22, R5_C23, R6_C16, R6_C17, R6_C18, R6_C19, R6_C20, R6_C21, R6_C22, R6_C23, R7_C12, R7_C17, R8_C12, R8_C13, R9_C13

In summary, we have 32 tiles for Mollweide and 41 tiles for WGS84.

All products are published on the GHSL website in ZIP format. To facilitate access, we uploaded only the contents of the ZIP files to the S3 bucket. The files were also organized based on product, year, and resolution. An example of a single product (organized by year and resolution) is shown on the screen below:


```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GHSL/
DIR s3://ESTAT/GHSL/GHS_BUILT_C/
DIR s3://ESTAT/GHSL/GHS_BUILT_H/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/
DIR s3://ESTAT/GHSL/GHS_BUILT_V/
DIR s3://ESTAT/GHSL/GHS_POP/
DIR s3://ESTAT/GHSL/GHS_SMOD/
DIR s3://ESTAT/GHSL/TILES/
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GHSL/GHS_BUILT_S/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/1975/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/1980/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/1985/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/1990/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/1995/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2000/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2005/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2010/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2015/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2018/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2020/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2025/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2030/
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GHSL/GHS_BUILT_S/2010/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2010/30ss/
DIR s3://ESTAT/GHSL/GHS_BUILT_S/2010/3ss/
$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/
2025-01-23 12:21 2207652 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R11_C23.tif
2025-01-23 12:23 693512 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R12_C24.tif
2025-01-23 12:22 387403 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R1_C19.tif
2025-01-23 12:23 546418 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R1_C20.tif
2025-01-23 12:21 1068793 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R2_C17.tif
2025-01-23 12:22 789539 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R2_C18.tif
2025-01-23 12:25 1071462 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R2_C19.tif
2025-01-23 12:22 3128575 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R2_C20.tif
2025-01-23 12:21 1435485 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R2_C21.tif
2025-01-23 12:23 10787789 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R3_C18.tif
2025-01-23 12:22 16673395 s3://ESTAT/GHSL/GHS_BUILT_S/2010/100m/GHS_BUILT_S_E2010_GLOBE_R2023A_54009_100_V1_0_R3_C19.tif

```

To make it easier to locate specific tiles, we also uploaded vector files with both unfiltered and filtered versions of the tiles.

```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/GHSL/TILES/
2025-01-23 14:07 10941 s3://ESTAT/GHSL/TILES/GHSL_data_tiles_4326_shapefile.zip
2025-01-23 14:07 11988 s3://ESTAT/GHSL/TILES/GHSL_data_tiles_54009_shapefile.zip
2025-01-23 14:07 106496 s3://ESTAT/GHSL/TILES/GHSL_tiles_Europe_4326.gpkg
2025-01-23 14:07 106496 s3://ESTAT/GHSL/TILES/GHSL_tiles_Europe_54009.gpkg
$

```

- Field polygons for all countries over Europe for 2022

```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/Field_boundaries/
2025-01-22 15:13 15508516557 s3://ESTAT/Field_boundaries/field_boundaries.parquet
$

```

- Natura 2000 dataset

We downloaded a single dataset for 2022 year, linked in documentation.

```

$ s3cmd -c .s3cfg_eurostat ls s3://ESTAT/Natura_2000/2022/
2025-02-05 12:12 1277374464 s3://ESTAT/Natura_2000/2022/Natura2000_end2022_rev1.gpkg

```

APPENDIX LIST

Appendix1 – Summary EUROSTAT datasets on S3 Bucket

Appendix2 – GISCO_grid_metadata.pdf

Appendix3 – GHSL_Data_Package_2023_light.pdf