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Merge Overlapping Rasters Using R and Terra

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When utilizing tiled spatial data, it's common to come across overlapping tiles. For instance, when we chose four tiles from the global 30-meter land-cover dataset GLC_FCS30-2020 to encompass the entire North Island in New Zealand, they had overlapping pixels (Figure 1 and Figure 2).

Figure 1: Extracted four tiles for North Island in New Zealand with overlaps.

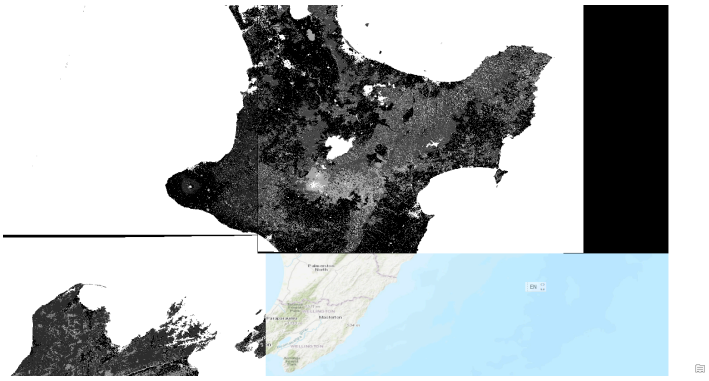

Figure 2: the right-bottom tile is dropped to show the overlap areas.

In the preceding tutorial, we utilized **GDAL VRT Pixel functions** or the Python package of **rioxarray** to merge overlapping tiles or rasters. This tutorial addresses the problem using an ***R*** spatial analysis package called ***Terra***, which has functions for creating, reading, manipulating, and writing raster data. The package provides, among other things, general raster data manipulation functions that can easily be used to develop more specific functions.

The critical function of ***mosaic*** from the Terra package is applied, combining adjacent and (partly) overlapping spatial rasters to form a new raster. Values in overlapping cells are averaged (by default) or can be computed with another function such as "median," "min," "max," "modal," "sum," "first," and "last." These functions are much richer than the python's rioxarray package.

```
library(terra)

tif_files <- list.files(path = r"(data\)",
```

```
                          pattern = ".tif$",
                          full.names = TRUE,
                          ignore.case = TRUE
                          )
tif_rasts <- list()
for (i in 1:length(tif_files)){
  print(tif_file_name[i])
  tif_rasts <- c(tif_rasts,  rast(tif_files[i]))
}


tif_mosaic <- do.call(mosaic, c(tif_rasts,
fun="max"))
plot(tif_mosaic)

rf <- writeRaster(tif_mosaic,
                  filename = r"
(GLC_FCS30_2020_merged.tif)",
                  overwrite = TRUE
                  )
```

The merged tiles are presented in Figure 3. It is pretty tidy.

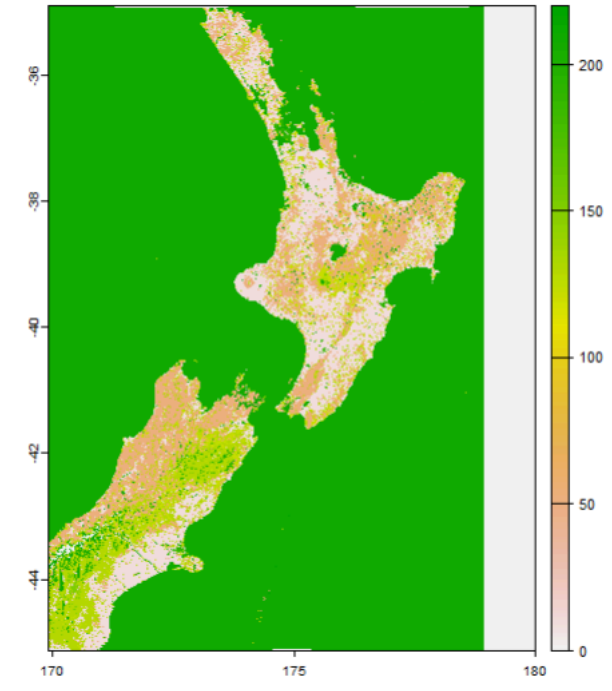

Figure 3: Merged Raster. Dark green means water.

>> A Short Introduction to global 30-m land-cover data of GLC_FCS30-2020

> The global 30-m land-cover data of GLC_FCS30-2020 are grouped by 948 5X5 degrees regional tiles in the GeoTIFF format, which are named “GLCFCS30_E/W**N/S**.tif”,

> where “E/W**N/S**” explains the longitude and latitude information of the upper left corner of each regional land-cover map. Further, each tile contains a land-cover label band ranging from 0–255, and the invalid fill value is labeled as 0 and 250.

Summary and Discussions

In spatial analysis, using tiled data is crucial for handling large datasets efficiently. However, dealing with overlapping tiles can be tricky. It's vital to assess available options and pick the best solution. Whether using pixel functions, specialized libraries like rioxarray/rasterio, terra, or other methods, selecting the right approach ensures accurate spatial analysis. The saying "All roads lead to Rome."

References

https://rdrr.io/github/rspatial/terra/man/terra-package.html

https://www.linkedin.com/pulse/merge-overlapping-rasters-using-python-gdal-vrt-pixel-chonghua-yin-8ri1c?trackingId=HnZjg5Ifl%2FT3%2FpYmRdKvCA%3D%3D&lipi=urn%3Ali%3Apage%3Ad_flagship3_profile_view_base_recent_activity_content_view%3Bh%2FtDk02tSymsZDksThNNgw%3D%3D

https://www.linkedin.com/pulse/merge-overlapping-rasters-using-rioxarray-chonghua-yin-dck6c/?trackingId=OPv8bLcCTTeo34drS9XvMQ%3D%3D

Liangyun, L., Xiao, Z., Xidong, C., Yuan, G., & Jun, M. (2020). GLC_FCS30-2020: Global Land Cover with Fine Classification System at 30m in 2020 (v1.2) [Data set]. Zenodo. **https://doi.org/10.5281/zenodo.4280923**

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