Raster processing with R

Reading, writing, manipulating, analysing and modelling of gridded spatial data

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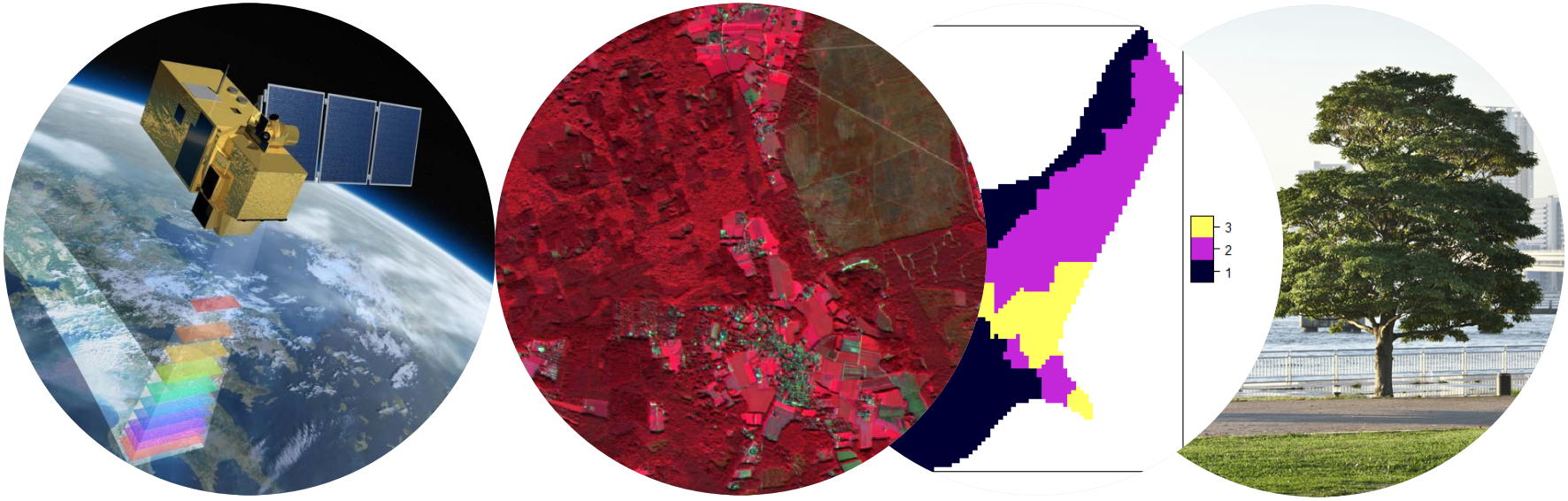

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Overview

- Raster data: Elements of a spatial raster dataset
- IO
- data manipulation
- resources

1. Intro

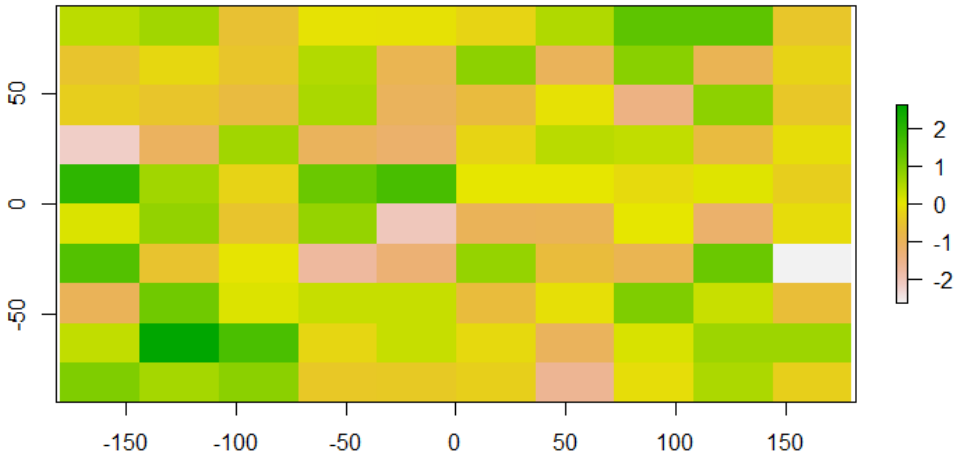
- What is spatial raster data for?
  - variables with continuous spatial coverage
- Sources:
  - imaging remote sensing sensors (e.g. Landsat)
  - spatial modelling (e.g. interpolation from point sources)

2. Raster Data Concept

- Minimum required for a (spatial) raster dataset
  - values: vector/matrix of values
  - spatial dimensions
  - datum + coordinate system/projection

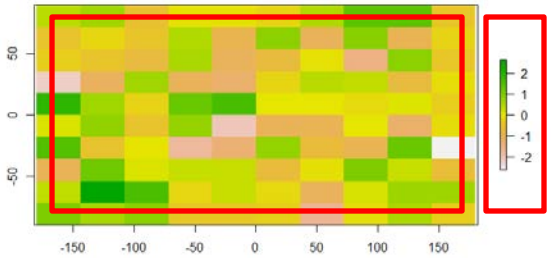
Data

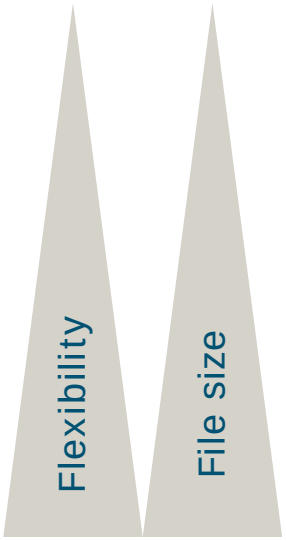
Meta-Data



3. Implementation

- Values: Datatype
  e.g. raster-package datatypes

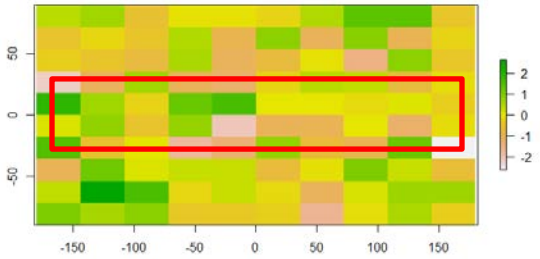




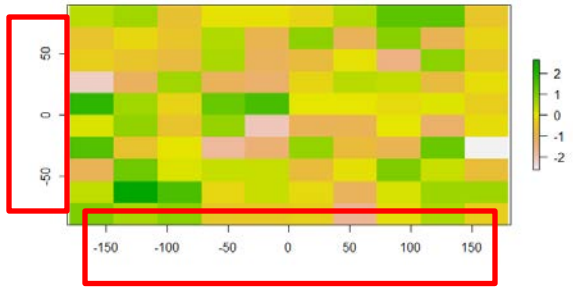
Datatype definition	minimum possible value	maximum possible value
LOG1S	FALSE (0)	TRUE (1)
INT1S	-127	127
INT1U	0	255
INT2S	-32,767	32,767
INT2U	0	65,534
INT4S	-2,147,483,647	2,147,483,647
INT4U	0	4,294,967,296
FLT4S	-3.4e+38	3.4e+38
FLT8S	-1.7e+308	1.7e+308

3. Implementation

- NA values
  - set in header/meta-data



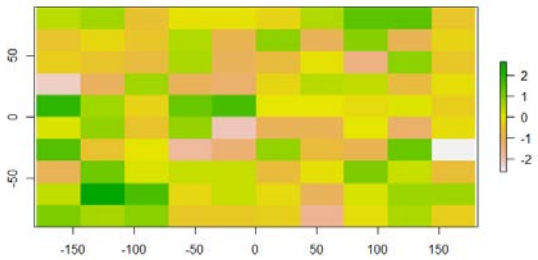
3. Implementation



- spatial dimension:
  alternatives to define
  the extent/cell size
  - raster package:
    extent (xmin, xmax, ymin, ymax) + nrow/ncol
  - GeoTIFF:
    upper left (UL) lower right (LR) x/y +
    nrow/ncol + resolution

3. Implementation

WGS84



- (Geodetic) Datum =
  What is your Earth definition?

- coordinate systems = How do you measure your Earth?
  - geographic: spherical coordinates
  - projected: coordinates in the plane

- Why different datums/coordinate systems?

GI-Software

Scripting	**General Purpose GIS**
R (raster, sp, gdalUtils)	QGIS
Python	ArcGIS
IDL	GRASS
	SAGA GIS
Libraries	**Remote Sensing**
GDAL	Erdas Imagine
	ENVI

Resources

- WUR Geoscripting https://geoscripting-wur.github.io/
- Spatial Cheatsheet http://www.maths.lancs.ac.uk/~rowlings/Teaching/UseR2012/cheatsheet.html
- rasta package http://rasta.r-forge.r-project.org/
- hsdar (hyperspectral remote sensing) http://cran.r-project.org/web/packages/hsdar/index.html