

Bewertung der potenziellen Wassererosion mit R und SAGA-GIS

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Box 2 | The FAIR Guiding Principles

To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data it describes
- F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
 - A1.1 the protocol is open, free, and universally implementable
 - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

To be Interoperable:

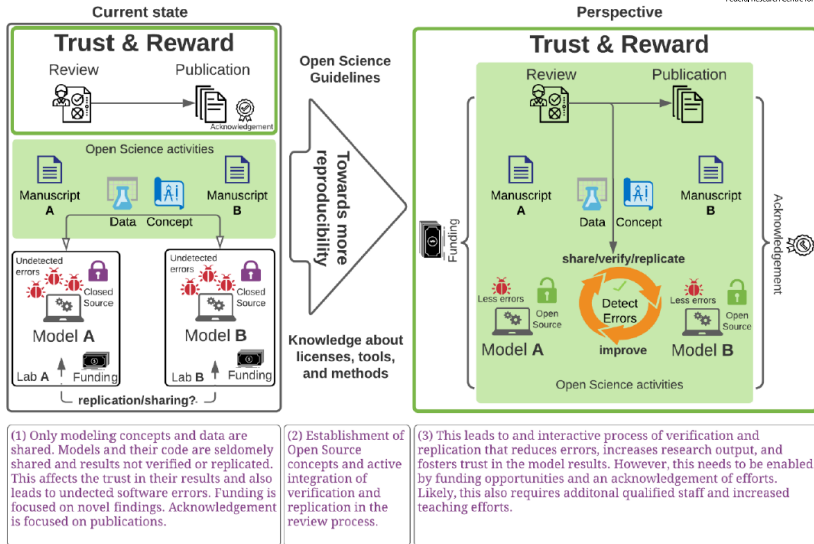
- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
 - R1.1. (meta)data are released with a clear and accessible data usage license
 - R1.2. (meta)data are associated with detailed provenance
 - R1.3. (meta)data meet domain-relevant community standards

Wilkinson, M.D. et al., 2016. The FAIR Guiding Principles for scientific data management and stewardship. Scientific Data 3

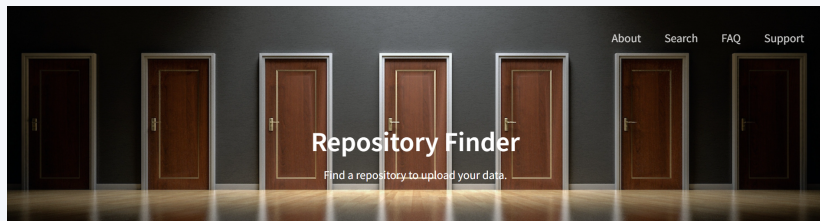
Reproducibility/Provenance



Reinecke, R., Trautmann, T., Wagener, T., Schüler, K., 2022. The critical need to foster computational reproducibility. Environ. Res. Lett. 17, 041005

Digitale Forschungsdatenrepositorien sind Informationsinfrastrukturen, die digitale Forschungsdaten möglichst dauerhaft – anhand der Anforderungen der jeweiligen Nutzergruppe – speichern und organisieren um die Auffindbarkeit und Zugänglichkeit der Daten zu sichern (<https://www.forschungsdaten.org/>).

Repository finder



<https://repositoryfinder.datacite.org>

Repositorien: Daten

Pangaea



PANGAEA.

Data Publisher for Earth & Environmental Science

Not logged in

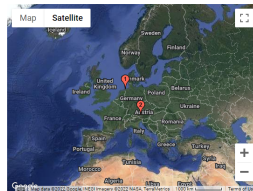
SEARCH SUBMIT HELP ABOUT CONTACT

Citation:

Preidl, Sebastian; Lange, Maximilian; Doktor, Daniel (2020): Land cover classification map of Germany's agricultural area based on Sentinel-2A data from 2016. *PANGAEA*, <https://doi.org/10.1594/PANGAEA.910837>

Always quote citation above when using data! You can download the citation in several formats below.

[RIS Citation](#) [BibTeX Citation](#) [Copy Citation](#) [Facebook](#) [Twitter](#) [Share Map](#) [Google Earth](#) [590](#) [170](#)



Abstract:

Overcoming the obstacle of frequent cloud coverage in optical remote sensing data is essential for monitoring dynamic land surface processes from space. APIC, a novel adaptable pixel-based compositing and classification approach, is especially designed to use high resolution spatio-temporal space-borne data.

Here, pixel-based compositing is used separately for training data and prediction data. First, cloud-free pixels covered by reference data are used within adapted composite periods to compile a training dataset. The compiled training dataset contains samples of spectral reflectances for respective land cover classes at each composite period. For land cover prediction, pixel-based compositing is then applied region-wide. Multiple prediction models are used based on temporal subsets of the compiled training dataset to dynamically account for cloud coverage at pixel level. Thus we present a data-driven classification approach which is applicable in regions with different weather conditions, species composition and phenology.

The capability of our method is demonstrated by mapping 19 land cover classes across Germany for the year 2016 based on Sentinel-2A data. Since climatic conditions and thus plant phenology change on a large scale, the classification was carried out separately in six landscape regions of different biogeographical characteristics. The study drew on extensive ground validation data provided by the federal states of Germany.

For each landscape region, composite periods of different lengths have been established, which differ regionally in their temporal arrangement as well as in their total number, emphasising the advantage of a flexible regionalised classification procedure. Using a random forest classifier and evaluating outcomes with independent reference data, an overall accuracy of 88% was achieved, with particularly high classification accuracy of around 90% for the major land cover types. We found that class imbalances have significant influence on classification accuracy. Based on multiple temporal subsets of the compiled training dataset, over 10,000 random forest models were calculated and their performance varied considerably across and within landscape regions. The calculated importance of composite periods show that a high temporal resolution of the compiled training dataset is necessary to better capture the different phenology of land cover types.

Preidl, S.; Lange, M.; Doktor, D., 2020, Land cover classification map of Germany's agricultural area based on Sentinel-2A data from 2016. PANGAEA

Code

A software repository is a storage location for software packages and is typically managed by source control or repository managers.

https://en.wikipedia.org/wiki/Software_repository.

Versionskontrolle

Edit Conflict: Favourite Animal

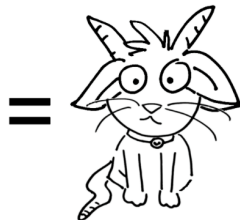
Your version

Cat Lover's version



Your version
● ○

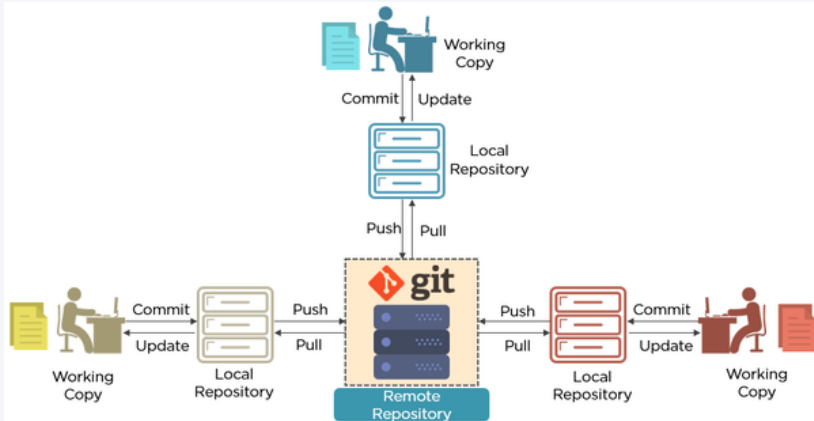
Other version
○ ●



<https://www.gbnews.ch/version-control-system-a-non-technical-introduction/>

Repositorien: Code

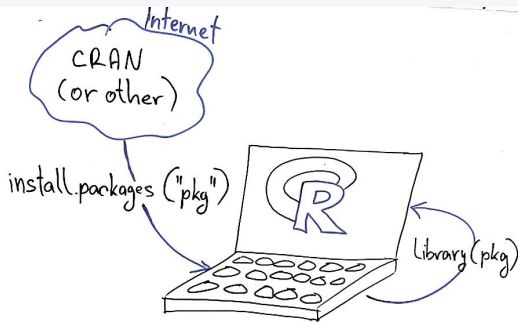
Git



<https://www.gbnews.ch/version-control-system-a-non-technical-introduction/>

... I name all my projects after myself. First Linux, now Git. Linus Torwald

Repository manager



https://davidzeleny.net/wiki/doku.php/recol:r_packages

Zentrale Repositorien

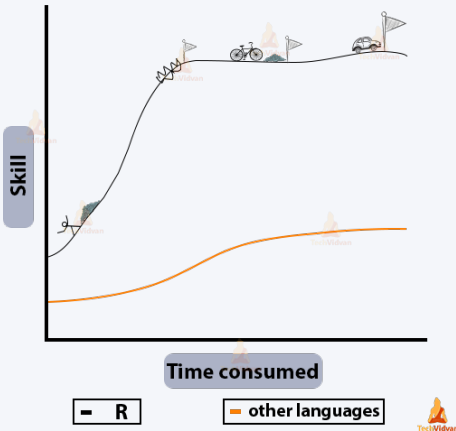
- CRAN
- Bioconductor

Entwicklerrepositorien

- R-Forge
- GitHub

Lingua franca for data science

Learning Curve of R Programming



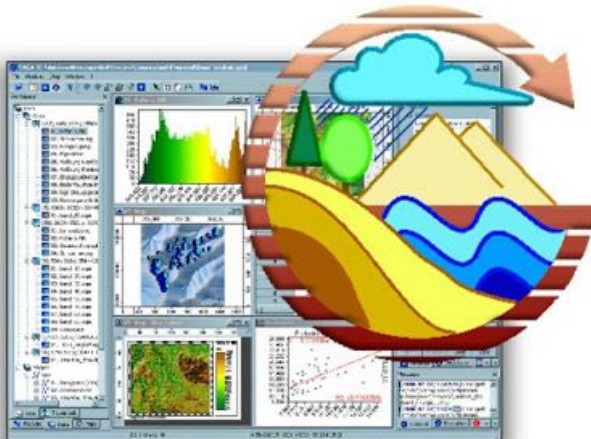
<https://techvidvan.com/tutorials/r-tutorial/>



Why R?

Open-source · Aktive Community · Umfassende und standardisierte Package-Bibliotheken ([CRAN](#), [Bioconductor](#)) · plattform-übergreifende Kompatibilität · Machine Learning · Raster- und Vektordatenanalyse · Big Data · GIS-Operationen ...

System for Automated Geoscientific Analyses

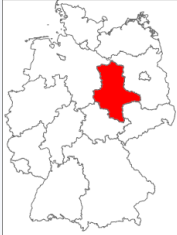


Conrad, O., Bechtel, B.,
Bock, M., Dietrich, H.,
Fischer, E., Gerlitz, L.,
Wehberg, J., Wichmann,
V., Böhner, J., 2015.
System for Automated
Geoscientific Analyses
(SAGA) v. 2.1.4. Geosci.
Model Dev. 8, 1991–2007

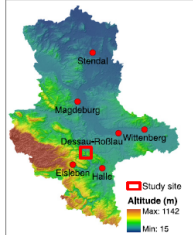
<https://sourceforge.net/projects/saga-gis/>

Messtischblatt Könnern

Germany



Saxony-Anhalt

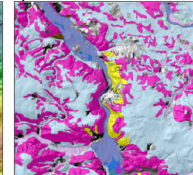


Study site 'Könnern'

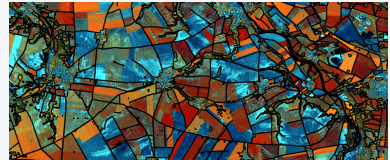
Relief



Systematic soil units



Feldblöcke



Möller, M., Koschitzki, T., Hartmann, K.-J., Jahn, R., 2012. Plausibility test of conceptual soil maps using relief parameters. CATENA 88, 57–67

Bewertung der potenziellen Wassererosion

$$A = R \times K \times LS$$

mit **A** = langjähriger mittlerer Bodenabtrag bezogen auf eine Fruchtfolge,
R = Niederschlagserosivitätsfaktor, **K** = Bodenerodierbarkeitsfaktor,
LS = Hangneigungs- und Hanglängenfaktor

1. Berechnen Sie verschiedene Fließakkumulationsvarianten für verschiedene DGM-Varianten (10, 40 und 90 m)!

SAGA-Modul *Flow Accumulation (Top-Down)*

- Deterministic 8
- Deterministic infinity
- Multiple flow direction

Bircher, P., Liniger, H.P., Prasuhn, V., 2019. Comparing different multiple flow algorithms to calculate RUSLE factors of slope length (L) and slope steepness (S) in Switzerland. *Geomorphology* 346, 106850

Bewertung der potenziellen Wassererosion

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LS = Hangneigungs- und Hanglängenfaktor

2. Verwenden Sie die drei Akkumulationsvarianten für die Berechnung des LS-Faktors (zwei Methoden) für verschiedene DGM-Varianten (10, 40 und 90 m)!

SAGA-Modul *LS Factor*

- Desmet / Govers 1996
- Moore et al. 1991

⇒ **18 LS-Faktorvarianten**

Bewertung der potenziellen Wassererosion

$$A = R \times K \times LS$$

mit **A** = langjähriger mittlerer Bodenabtrag bezogen auf eine Fruchtfolge,
R = Niederschlagserosivitätsfaktor, **K** = Bodenerodierbarkeitsfaktor,
LS = Hangneigungs- und Hanglängenfaktor

3. Berechnen Sie zwei LS-Faktorenvarianten mit Berücksichtigung von Feldblockgrenzen für verschiedene DGM-Varianten (10, 40 und 90 m)!

SAGA-Modul *LS Factor (Field-based)*

- Desmet / Govers 1996
- Moore et al. 1991

⇒ **sechs LS-Faktorvarianten**

Bewertung der potenziellen Wassererosion

$$A = R \times K \times LS$$

mit **A** = langjähriger mittlerer Bodenabtrag bezogen auf eine Fruchtfolge,
R = Niederschlagserosivitätsfaktor, **K** = Bodenerodierbarkeitsfaktor,
LS = Hangneigungs- und Hanglängenfaktor

4. Führen Sie eine Zonal Statistics-Operation mit den Faktoren(varianten) durch und berechnen Sie 16 Varianten der potentielle Feldblock-bezogene Bodenerosionsgefährdung!

- 18 + 6 LS-Faktorenvarianten
- zwei K-Faktorenvarianten (VBK und Bodenschätzung)
- R-Faktor ([Auerswald et al. 2019](#))

Bewertung der potenziellen Wassererosion

$$A = R \times K \times LS$$

mit **A** = langjähriger mittlerer Bodenabtrag bezogen auf eine Fruchtfolge,
R = Niederschlagserosivitätsfaktor, *K* = Bodenerodierbarkeitsfaktor,
LS = Hangneigungs- und Hanglängenfaktor

5. Vergleichen Sie die Ergebnisse!

- Scatterplots
- R^2 / *RMSE*

Code

<https://github.com/FLFgit/ABAG>