EGU General Assembly 2023

Vienna, Austria & Online | 23–28 April 2023

What is going on within Google Earth Engine? A Systematic Review and Meta-Analysis

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Foreword

Google Earth Engine

Cloud computing platforms for geospatial big data analytics

! Probably the most widely-spread cloud processing tool nowadays !

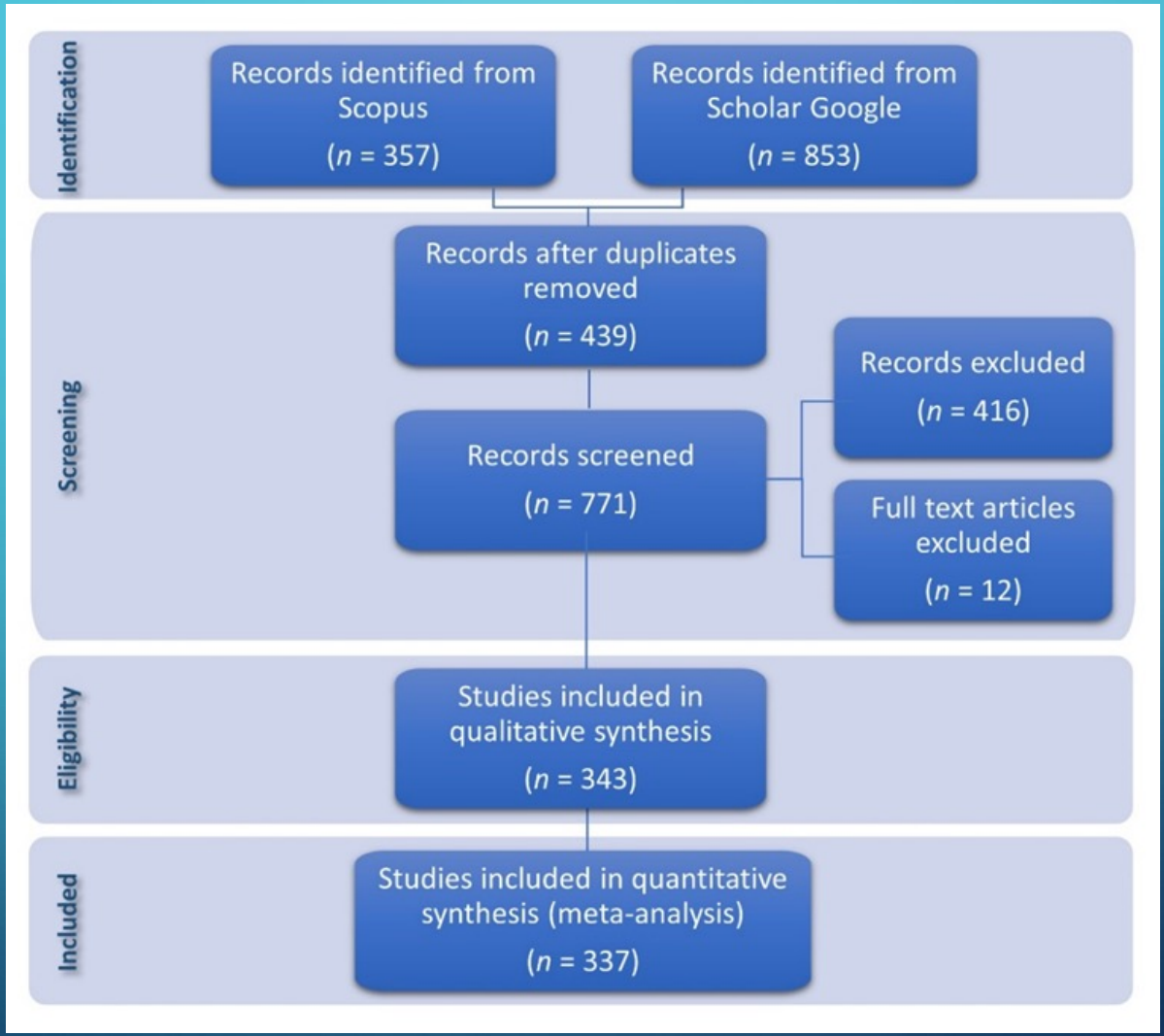
Aims of the study

Updated and systematic review related to the use and application of the GEE platform

✓ articles published from 2020 to present

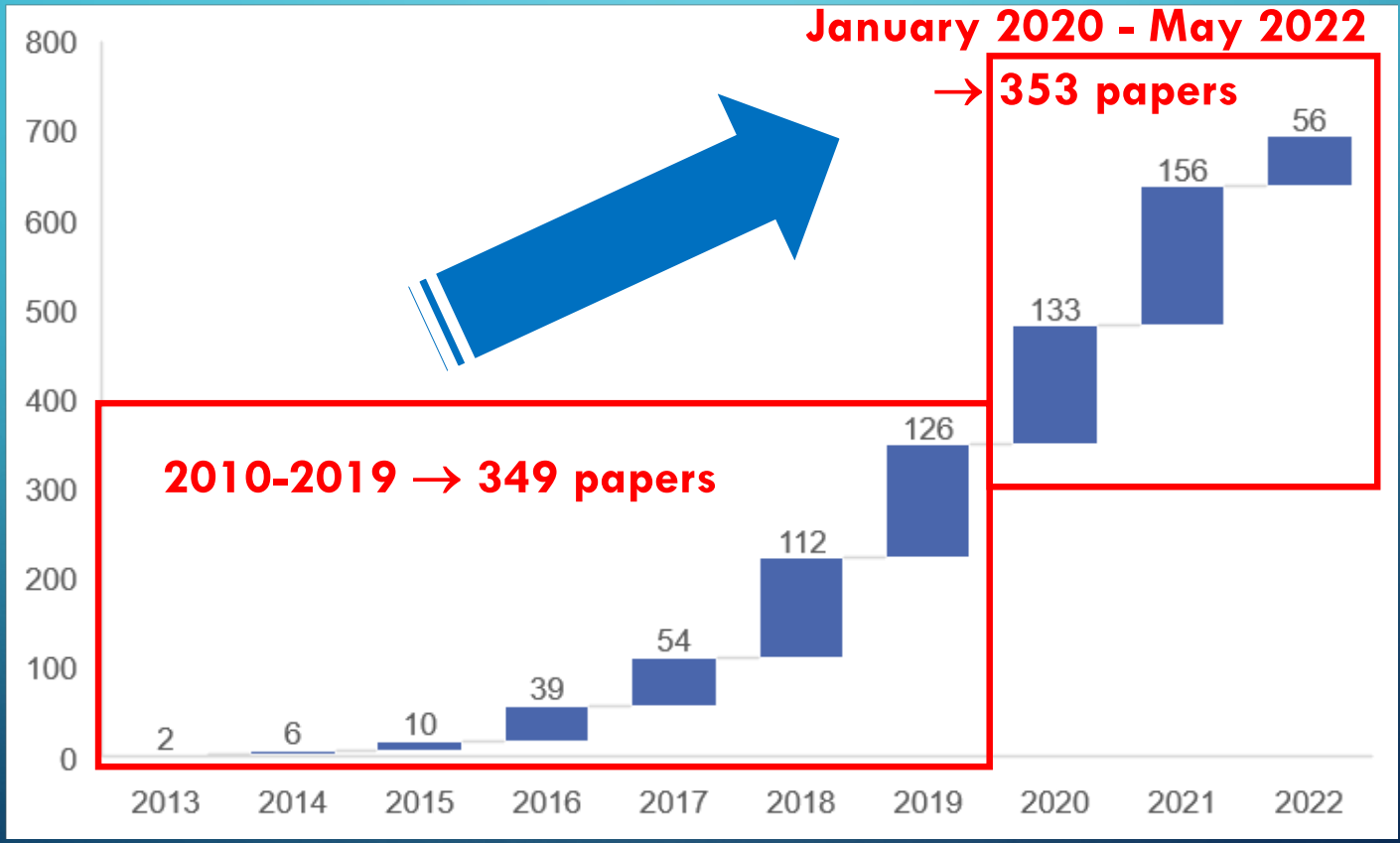
✓ criteria of the PRISMA 2020 statement (Page et al., 2021-BMJ)

Methods



PRISMA 2020-based flow-chart about the article selection

Cumulative value of GEE articles publications per year



Values from 2013-2019 extracted from Tamiminia et al. (2020)-ISPRS-JoPaRS;
values from 2022 extracted until 1 May

Number of published articles on GEE per journal

Journals	2013-2019	2020-2022	Total	% on the total
Remote Sensing	96	109	205	29.6
Remote Sensing of Environment	43	11	54	7.8
ISPRS-J. Photogramm. Remote Sensing	8	14	22	3.2
IEEE J. Sel. Top. Appl. Earth Observ. Remote Sensing	5	16	21	3.0
Int. J. Appl. Earth Obs. Geoinf.	13	6	19	2.7
International Journal of Remote Sensing	8	7	15	2.2
PLoS ONE	9	4	13	1.9
Science of the Total Environment	5	3	8	1.2
Other journals	162	173	335	48.4
TOTAL	**349**	**343**	**692**	**100**

Notes: Values from 2013-2019 extracted from Tamiminia et al. (2020)-ISPRS-JoPaRS.

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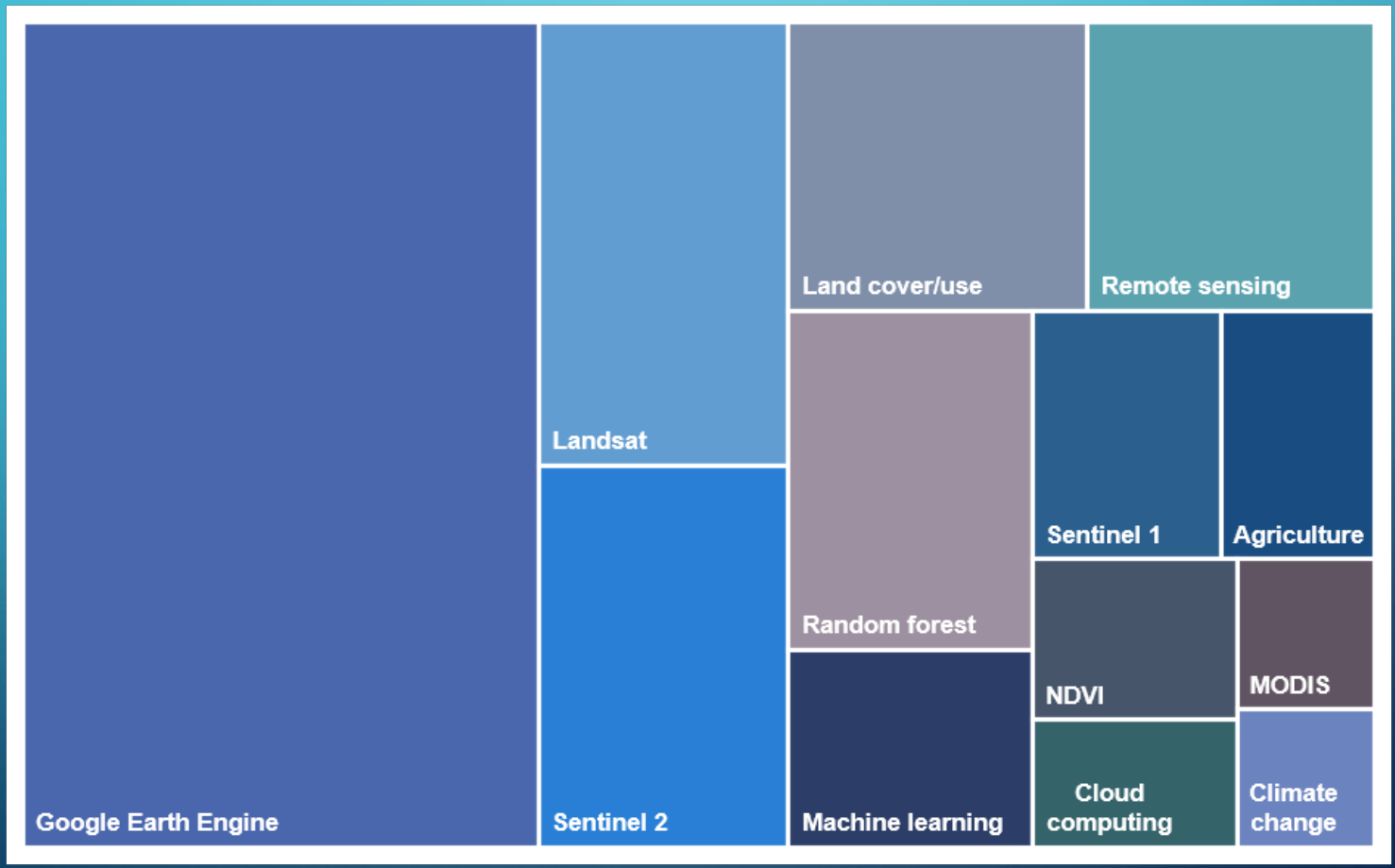
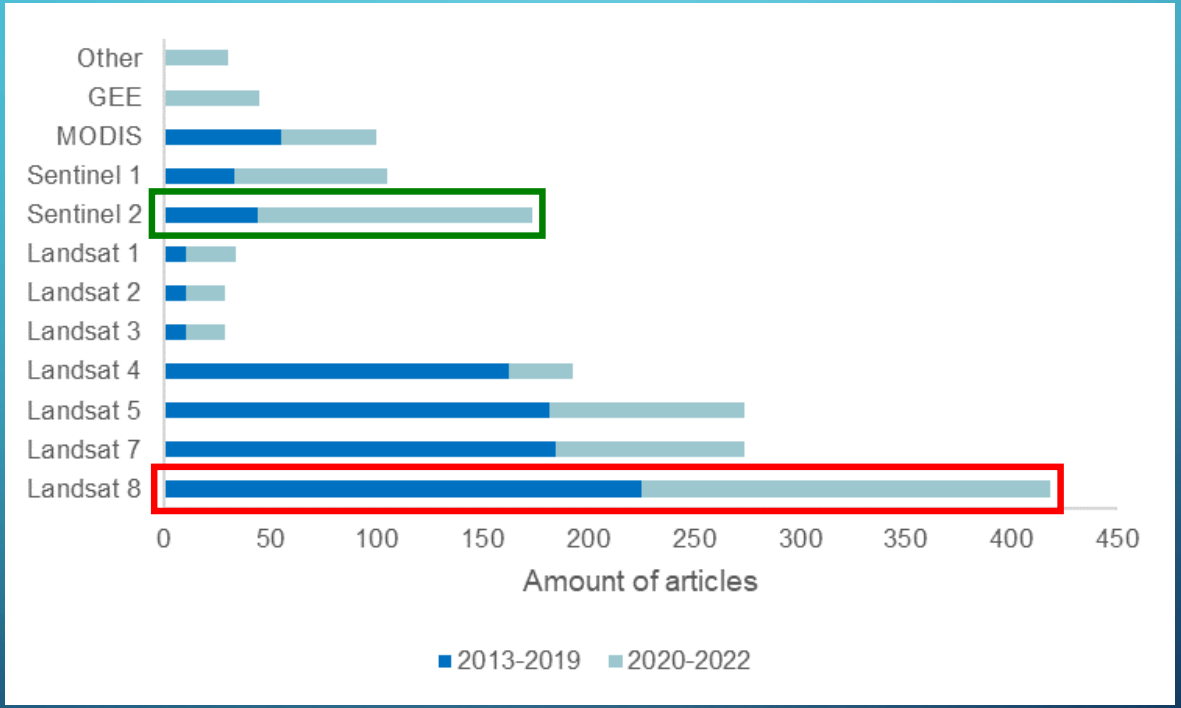
Keyword frequency from articles on GEE



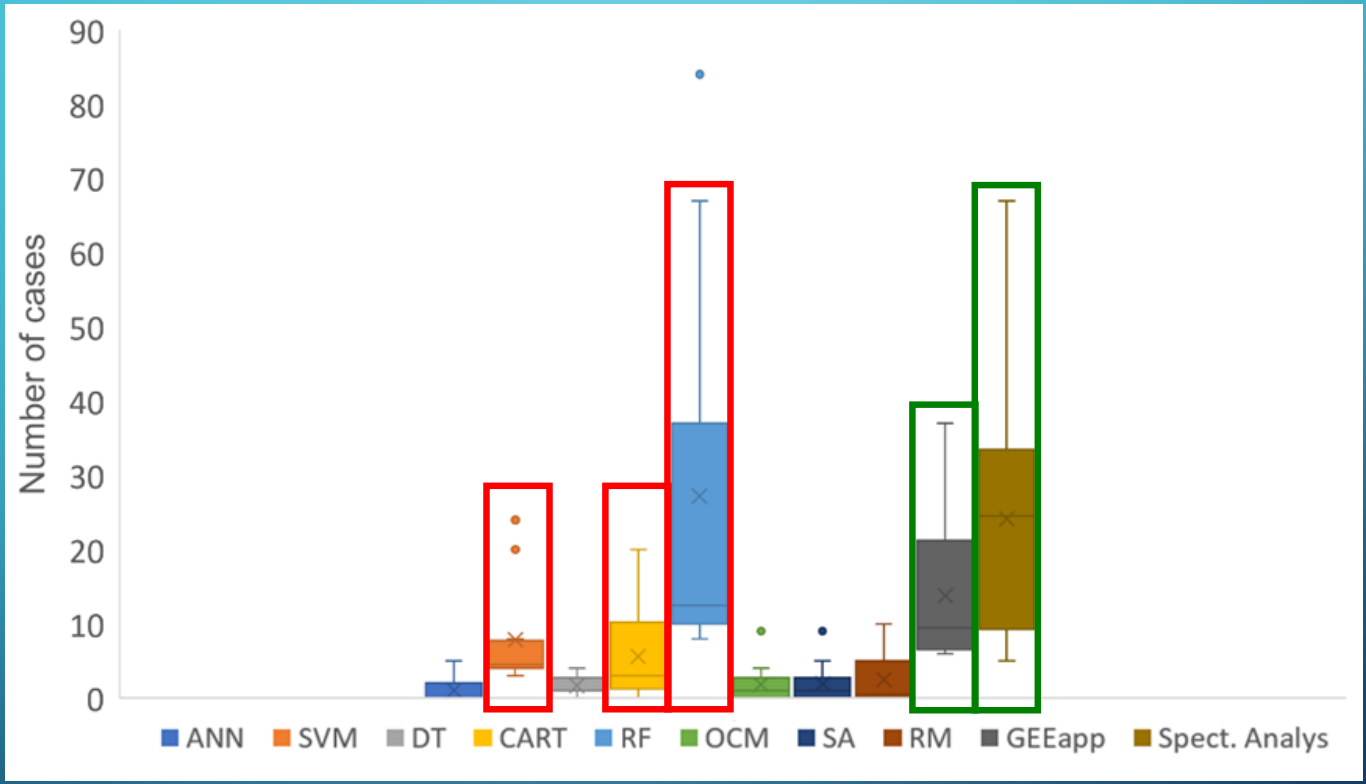
Rectangle size displays the frequency rate of the cited keyword.

Satellites used in articles on GEE



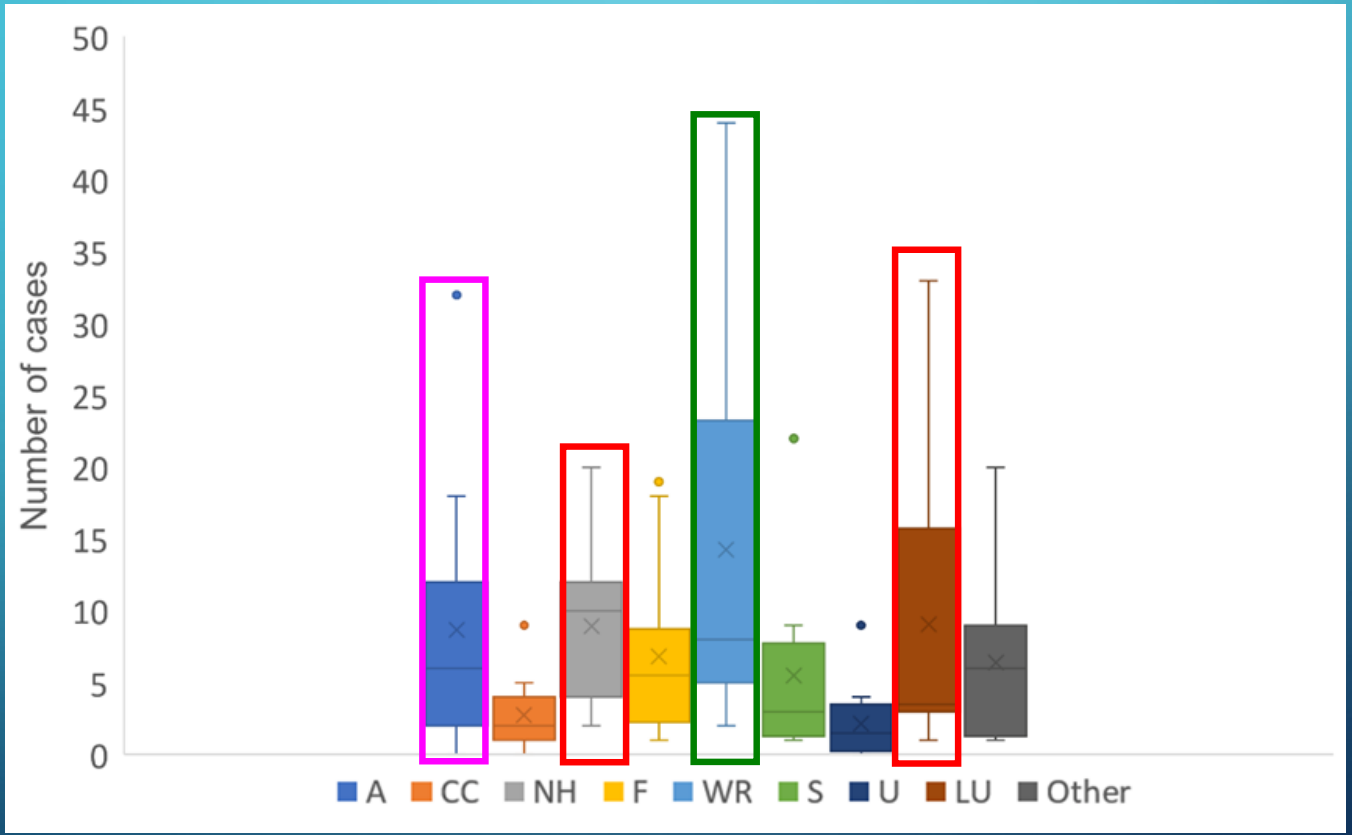
'Other' stands for images from other satellites. GEE: GEE data catalog at user's access.
Values from 2013-2019 extracted from Tamiminia et al., 2020-ISPRS-JoPaRS.

Distribution of processing methods used in the articles on GEE



Several methods can be used in a single article. Methods: Artificial Neural Networks (ANN); Support Vector Machine (SVM); Decision Tree (DT); Classification and Regression Trees (CART); Random Forest (RF); Other Classification Methods (OCM); Segmentation Algorithms (SA); Regression models (RM); GEEapp: Algorithms implemented within GEE; Spect. Analysis: Spectral Analysis used by acquisition of surface reflectance from spectral data.

Distribution of applications used in the articles on GEE



Several applications can be used in a single article. Applications: Agriculture (A); Climate change (CC); Natural hazards (NH); Forestry (F); Water resources (WR); Soils (S); Urban (U); Land use (LU).

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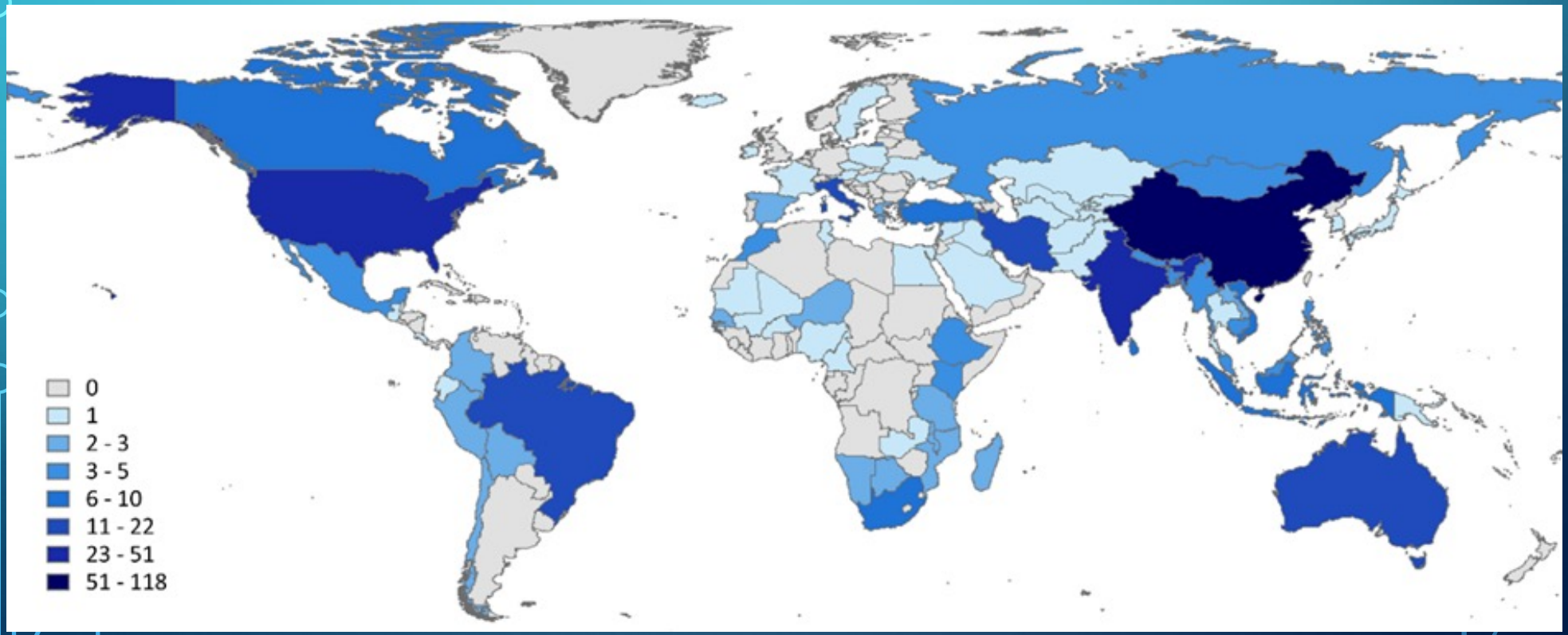
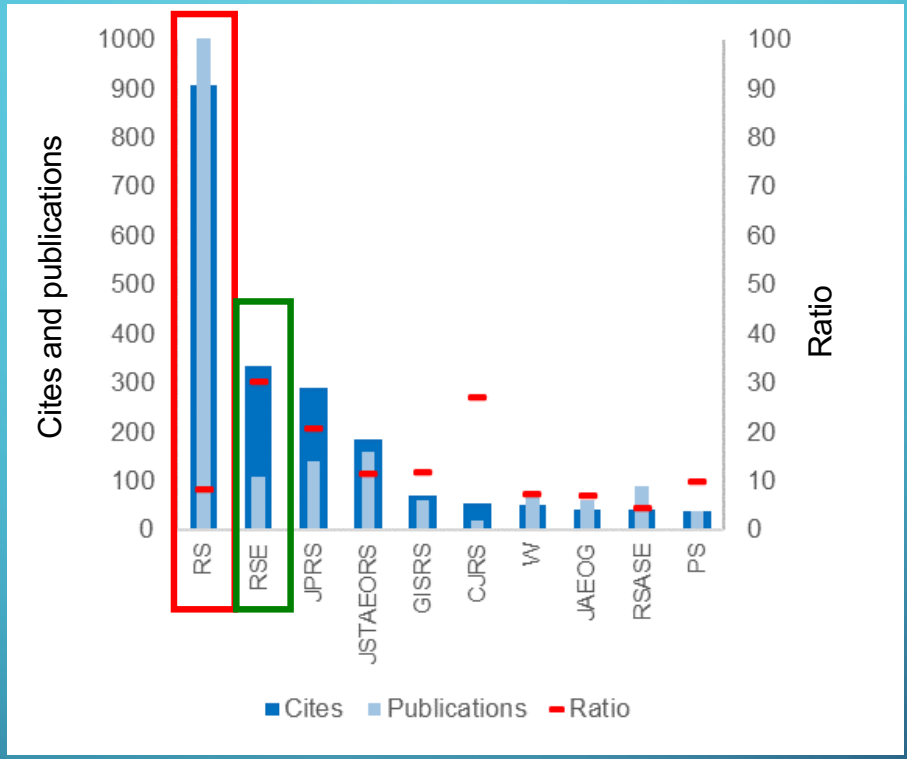
Geographical distribution of the number of articles on GEE in the different countries



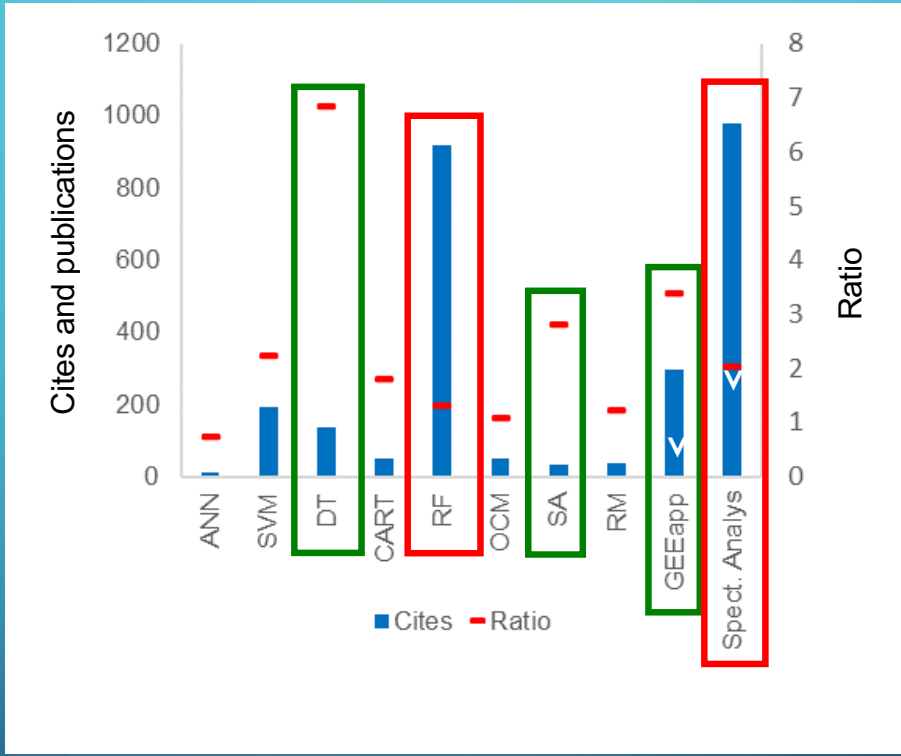
Grouping by category has been done in ArcGIS v.10.5 applying the geometric interval classification method.

Analysis of citation impact metrics for journals of articles on GEE



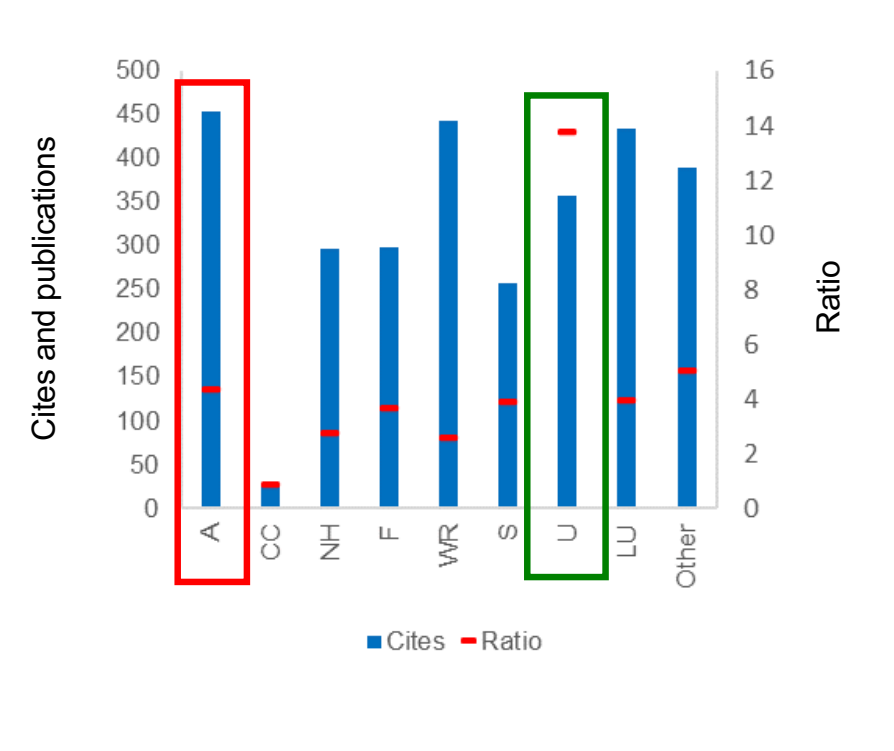
Acronyms: Remote Sensing (RS); Remote Sensing of Environment (RSE); ISPRS Journal of Photogrammetry and Remote Sensing (JPRS); IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTAEORS); GIScience and Remote Sensing (GISRS); Canadian Journal of Remote Sensing (CJRS); Water (W); International Journal of Applied Earth Observation and Geoinformation (JAEOG); Remote Sensing Applications: Society and Environment (RSASE); PloS one (PS).

Analysis of citation impact metrics for methods in articles on GEE



Acronyms: Artificial Neural Networks (ANN); Support Vector Machine (SVM); Decision Tree (DT); Classification and Regression Trees (CART); Random Forest (RF); Other Classification Methods (OCM); Segmentation Algorithms (SA); Regression models (RM); GEEapp Algorithms implemented within GEE; Spect. Analysis: Spectral Analysis used by acquisition of surface reflectance from spectral data.

Analysis of citation impact metrics for applications in articles on GEE



Acronyms: Spect. Analysis: Spectral Analysis used by acquisition of surface reflectance from spectral data. Right graph: Applications metrics. Agriculture (A); Climate change (CC); Natural hazards (NH); Forestry (F); Water resources (WR); Soils (S); Urban (U); Land use (LU).

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Conclusions

➢ *Bibliometric review*

✓ 90 journals publishing articles on GEE → interest of scientific community, but non-homogenous distribution of studies

➢ *Meta-analysis*

✓ Landsat 8 + non-parametric classification methods + water resources → most frequent sensor, processing tool, and application

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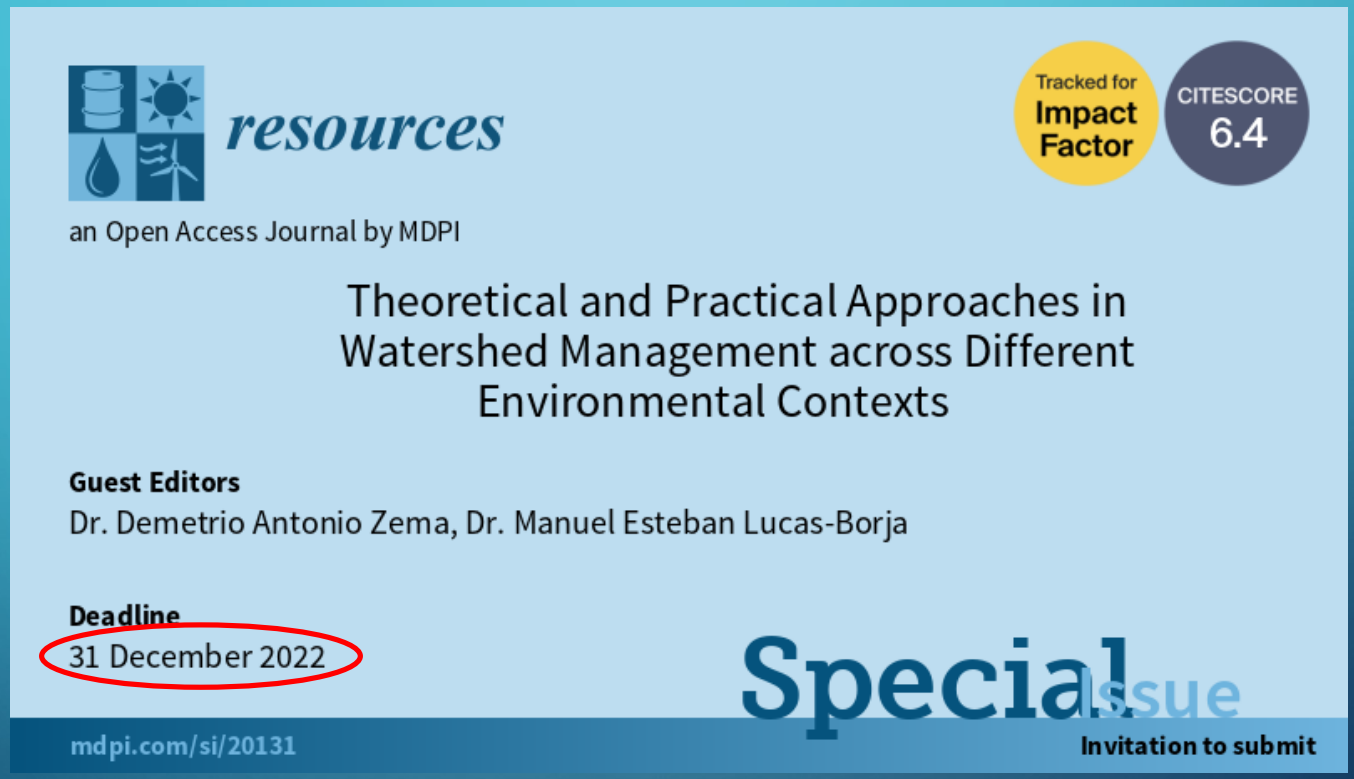
A short advertisement!



Extended to: 31 December 2023!

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Thanks a lot for your kind attention!

Demetrio Antonio Zema, dzema@unirc.it