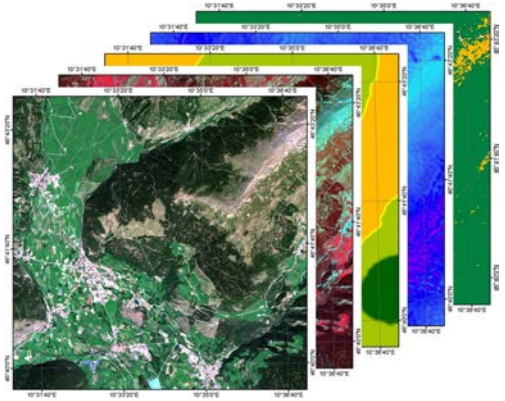

Towards a synergistic remote sensing workflow for monitoring the impact of Invasive Species

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3) Leiden University, Institute of Environmental Sciences (CML)

LifeWatch ERIC

Universiteit Leiden

Universiteit van Amsterdam

From Policy to observations

Post-2020 Global Biodiversity Framework

- New targets and goals, with greater emphasis on monitoring

Essential Biodiversity Variables (EBVs)

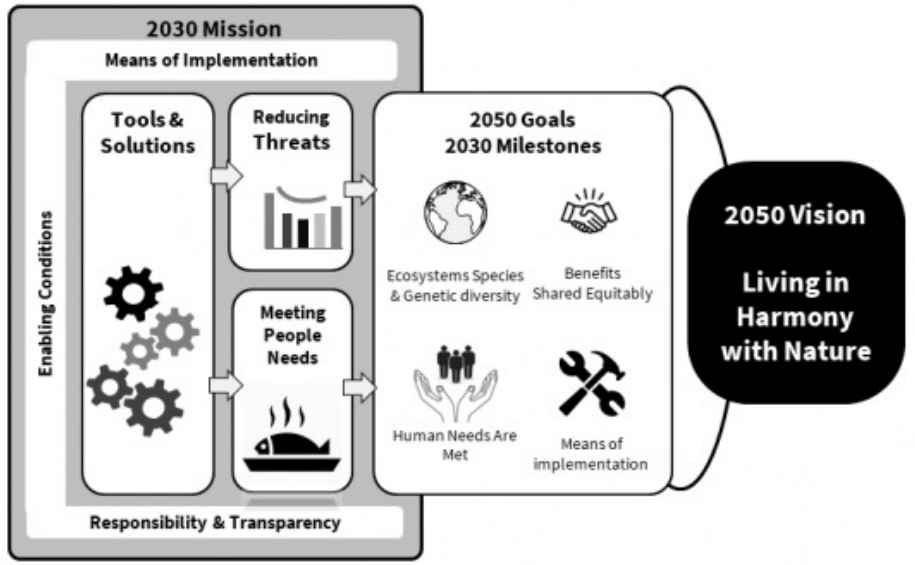
- In total 20 variables over 6 classes
- Facilitating global biodiversity monitoring
- Prioritize and minimize a set of observations

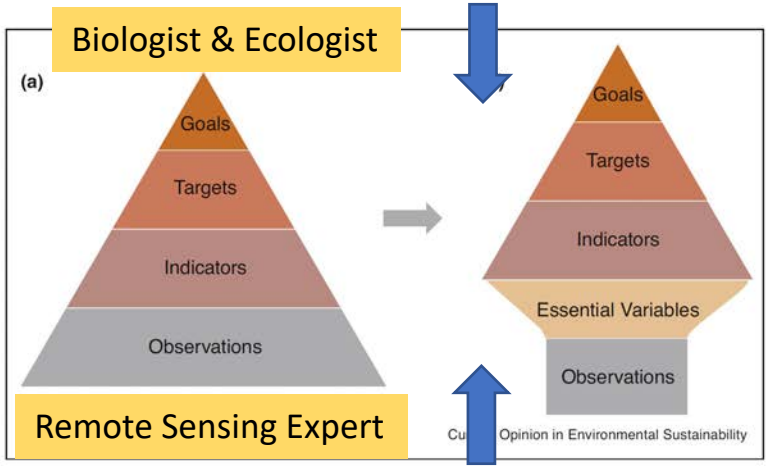
Potential of Satellite Remote Sensing (SRS)-enabled EBVs

- Integration with in situ and air-borne observations, simulations and models, and classification protocols

Developing SRS-enabled EBVs for the Post2020 framework requires

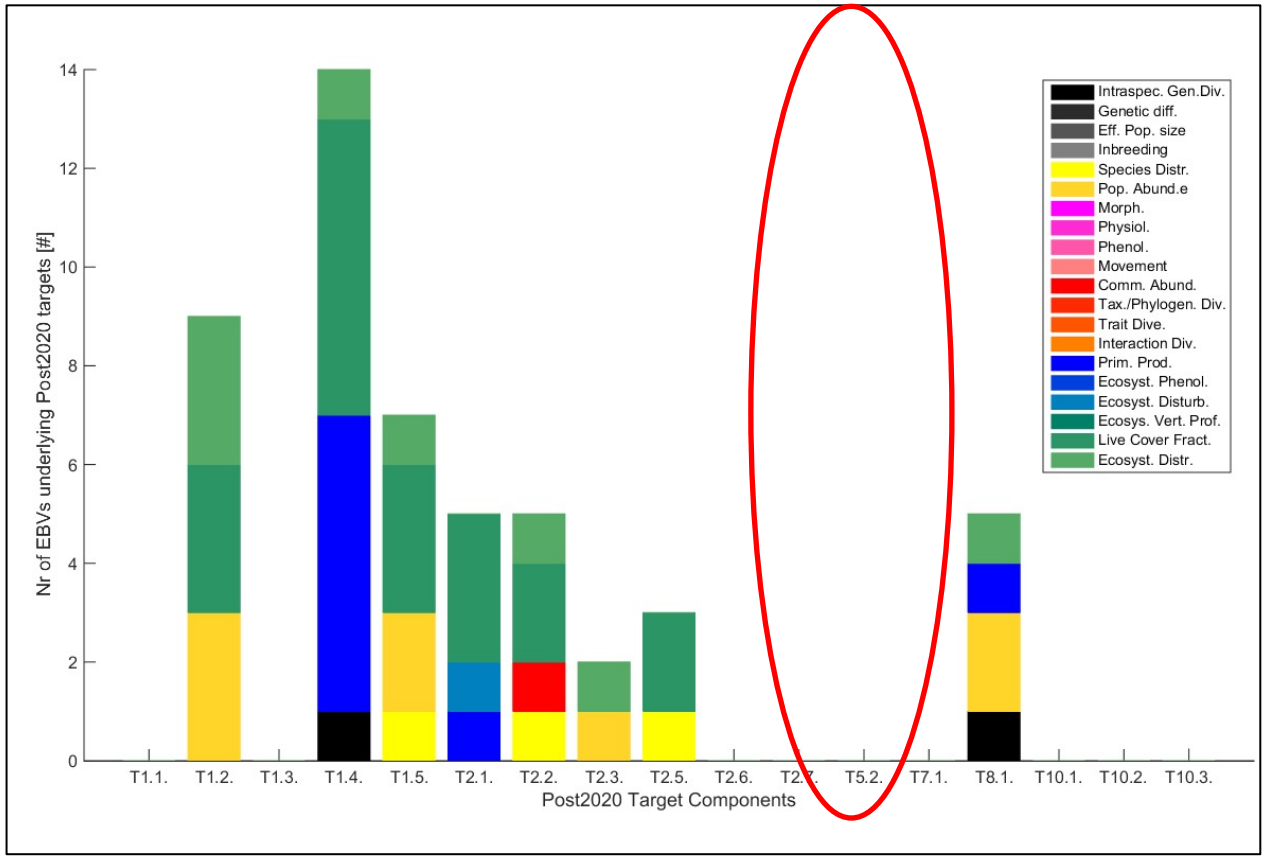
- A mapping of conservation targets to the actual observation and product requirements





Potential for SRS-enabled EBVs in respect to 2030 Targets

	ID	Description of Target components
A: Reducing threats to biodiversity	T1.1	Increase in area of terr., freshwater and marine ecosystems under spatial planning
	T1.2	Prevention of reduction and fragm. of natural habitats due to land/sea use change
	T1.3	Priority retention of intact / wilderness areas
	T1.4	Restoration of degraded ecosystems
	T1.5	Maintenance and restoration of connectivity of natural ecosystems
	T2.1	Area of terr., freshwater and marine ecosystem under protection and conservation
	T2.2	Areas of particular import. for biodiversity are protected and conserved as priority
	T2.3	Repr. system of protected areas and other eff. area-based conservation measures
	T2.5	Connectivity within the system of protected areas and other effective area-based conservation measures
	T2.6	Increased protection and conservation effectiveness
	T2.7	Integration into landscape and seascape context
	T5.2	Eff. detection, identification, prioritisation and monitoring of invasive alien species
	T7.1.	Increased biodiversity contribution to climate change mitigation, adaptation and disaster risk reduction
	T7.2	Minimised negative impacts on biodiversity from any mitigation, adaptation and disaster risk reduction measures
B: sust. use	T8.1	Sustainable management of agricultural biodiversity, including soil biodiversity, cultivated plants and farmed and domesticated animals and of wild relatives
	T10.1	Regulation of air quality
	T10.2	Regulation of hazards and extreme events
	T10.3	Regulation of freshwater quantity, quality, location and timing



Towards NIS impact monitoring

New remote sensing workflows need to map the distribution of invaders and identify which habitats are most at risk

Requirements

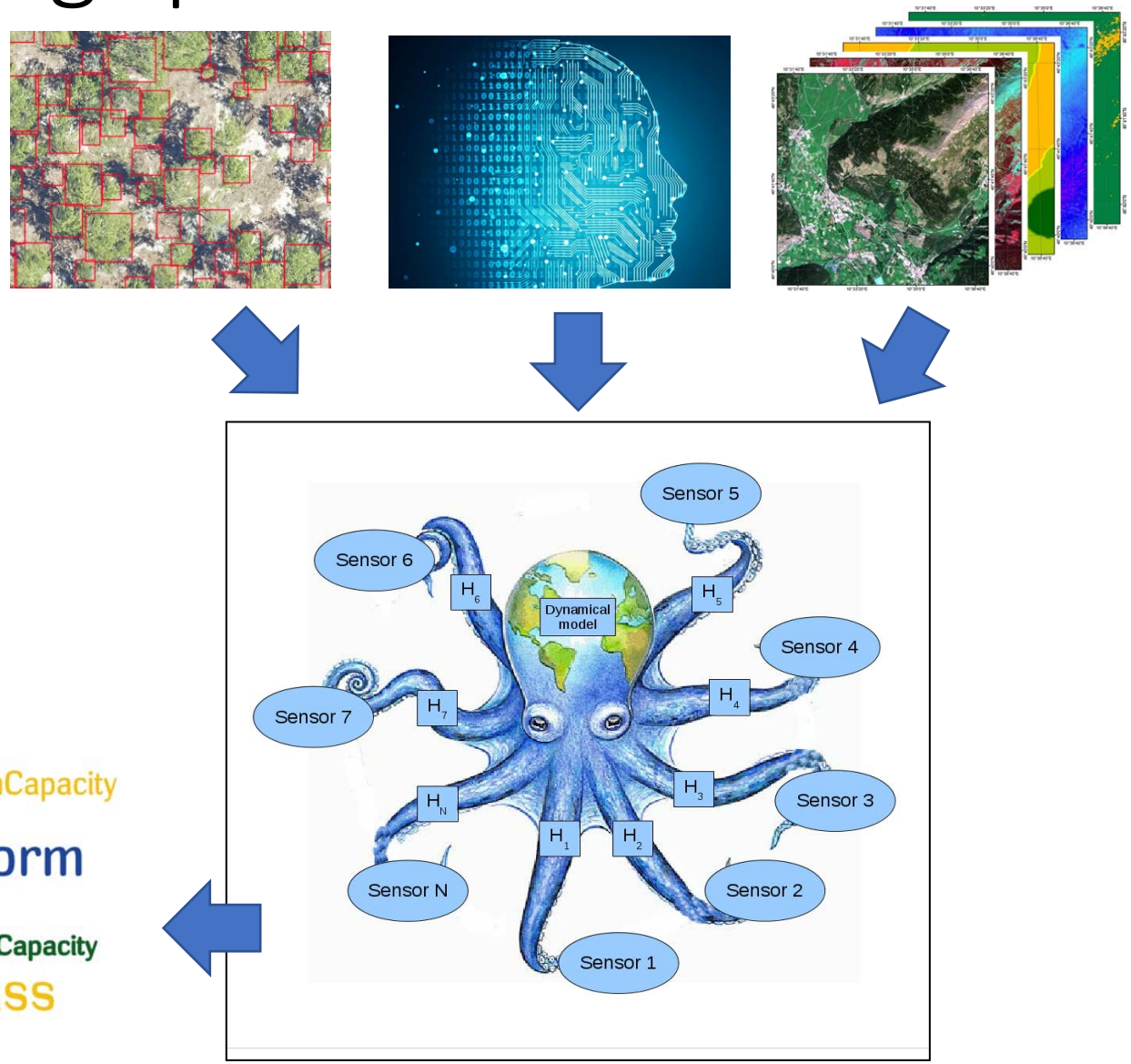
- High resolution observation, for identifying individual species
- Consistencies between RS derived functional traits, to allow for characterise ecosystem functioning
- Long term data products to model impact of NIS on stability of functioning

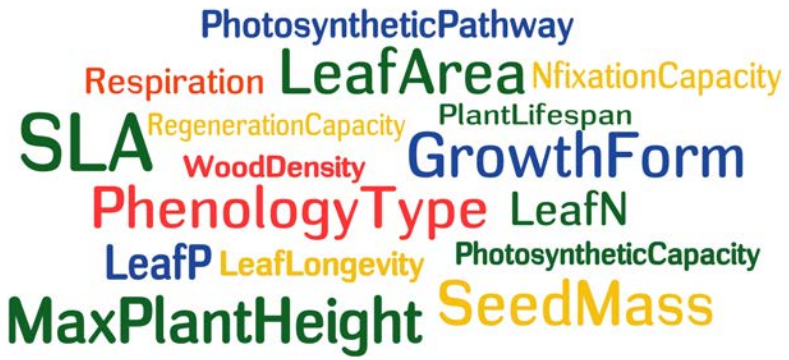
Individual remote sensing satellites do not adhere to these requirements!

Opportunities for deriving species level traits

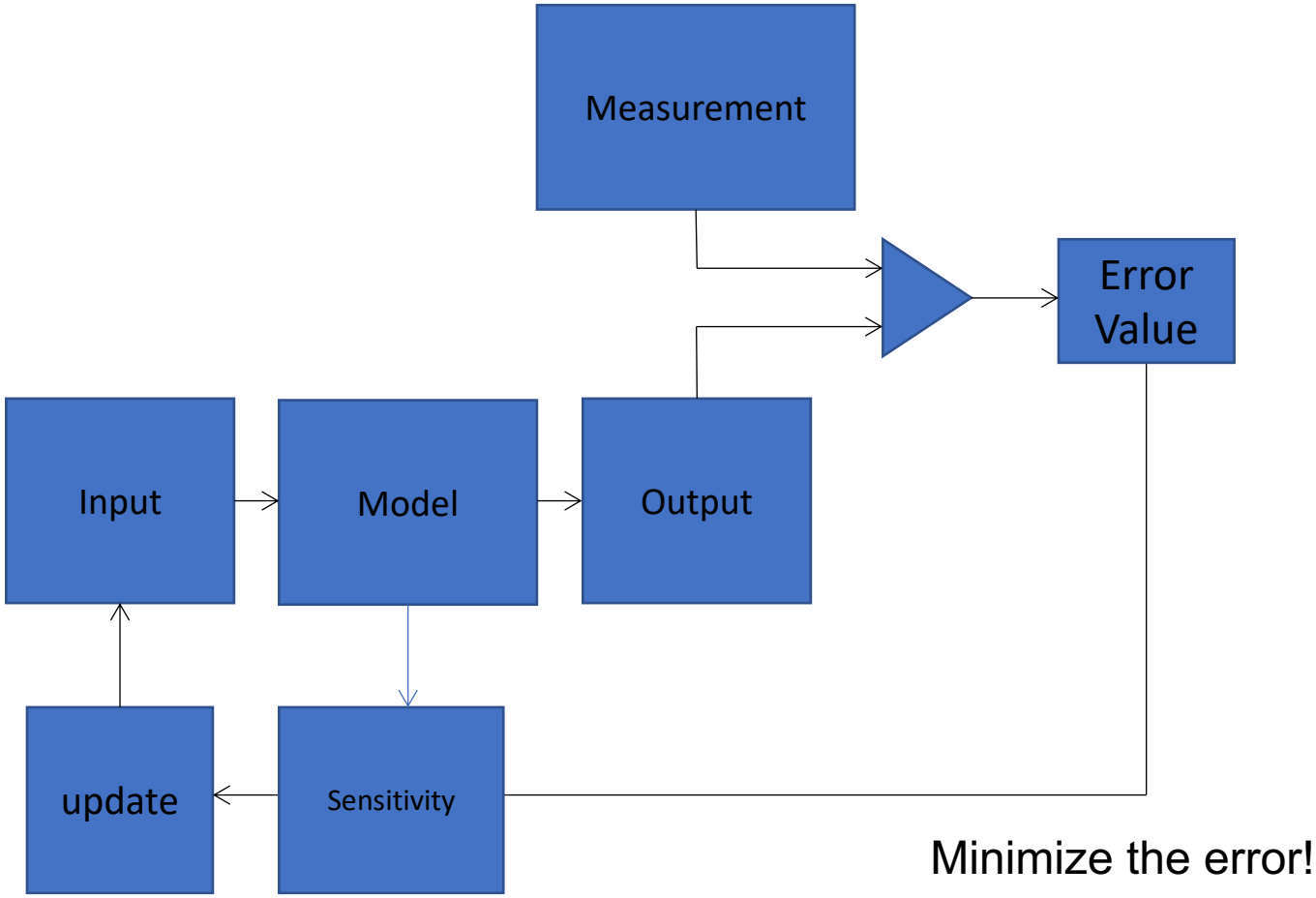
Potential of recent technological advances

- New Satellites platforms provide higher spatio-temporal resolution observations
- Multi-sensor retrieval frameworks allows for synergistic use of different satellite observations
- Computational costs can be brought down using data science techniques

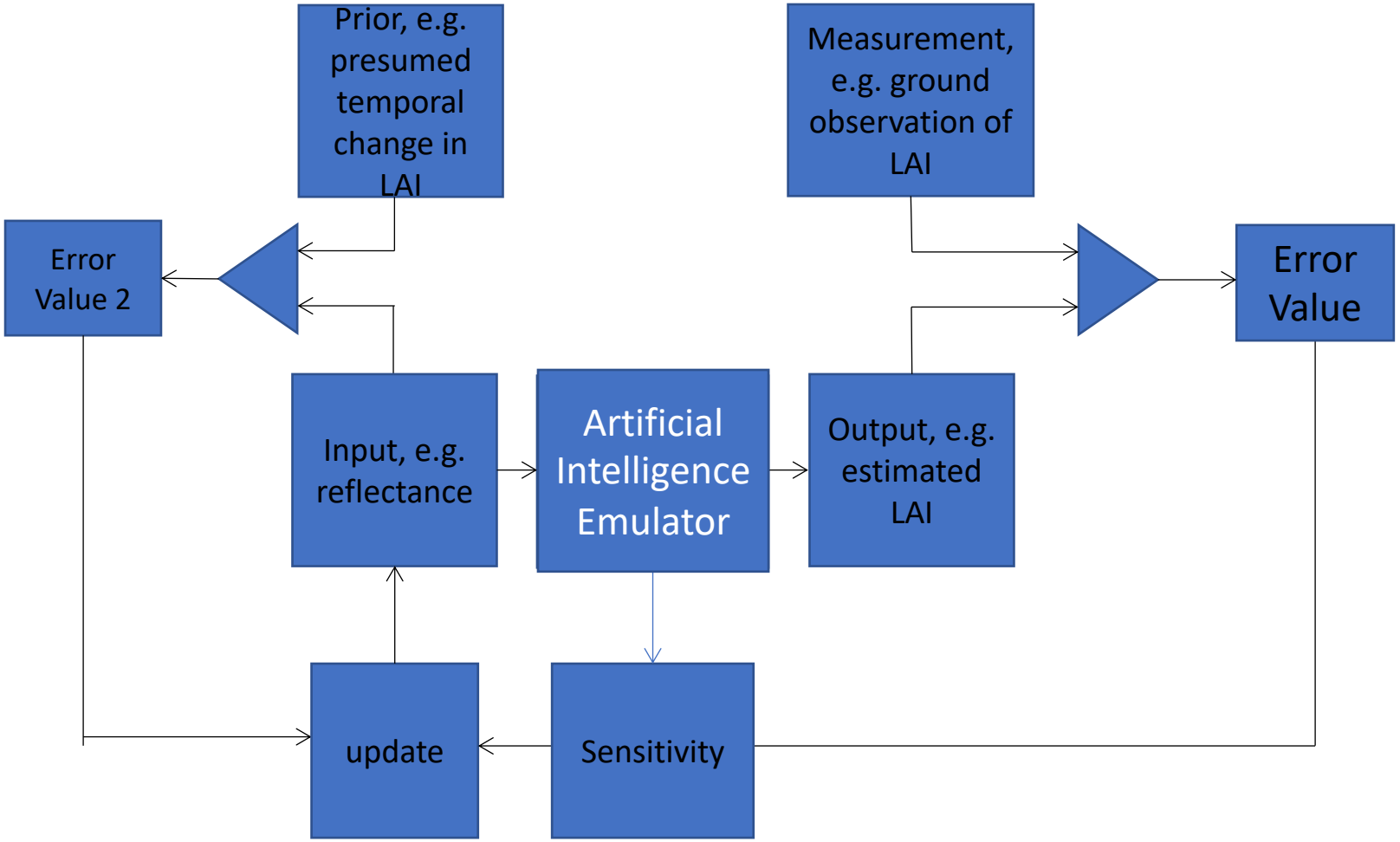




Traditional RS retrieval



The concept of data assimilation



Conclusion

- Remote sensing has huge potential for providing information to contribute to the Post2020 Global Biodiversity target
- Utilizing the framework of Essential Biodiversity Variables, allows us to minimize which (upcoming) SRS concepts should be focused on.
- Analysing current day globally available remote sensing products shows several opportunities:
  - Finer ecological grain-sizes require higher resolution products then currently available
  - Newer satellites are available to provide such higher resolution information
  - Synergistically merging different SRS data allows retrievals beyond those of single sensors
  - Cloud-computing and AI model emulation allows operational production


thank you
danke
謝謝
рахмат
ngiyabonga
شكراً جزيلاً
teşekkür ederim
Баярлалаа
спасибо
faafetai lava
kiitos
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merci

Special issue

https://www.mdpi.com/journal/remotesensing/special_issues/monitoring_biodiversity

In particular, we invite studies that apply earth observation to understand:

- Biodiversity change in terrestrial, coastal and marine ecosystems at different levels and spatial scales
- Ecosystem processes or stability to enable us to identify the risk of (among others) anthropogenic and natural threats
- Ecosystem functioning and thereby the services to humankind

We also encourage applications which demonstrate

- The potential an/or actual application of (ground based, airborne, and satellite) remote sensing
- Of rom different sensors (optical, LiDAR, thermal, microwave)
- Different methodologies (such as analytical modelling and machine learning regression, radiative transfer models)

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