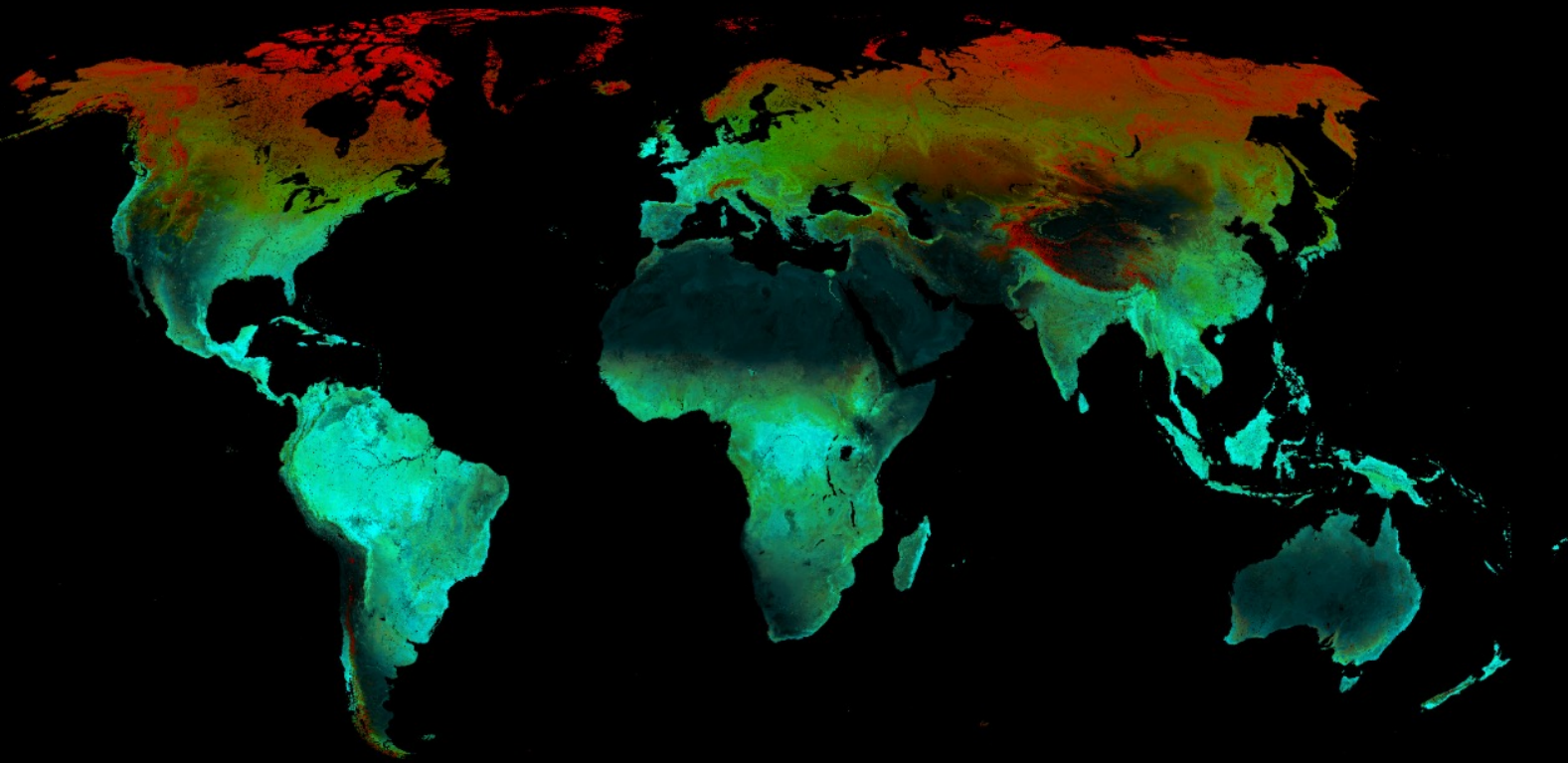


The Dynamic Habitat Indices from Terra, Aqua, Suomi NPP and JPSS data for biodiversity science and conservation



Volker C. Radeloff, Duanyang Liu, University of Wisconsin-Madison
E. Silveira, E. Razenkova, A. M. Pidgeon, N. Coops, D. Gudex-Cross, M. Hobi, and A. Ives



Introduction



Introduction

Ecology

DHIs

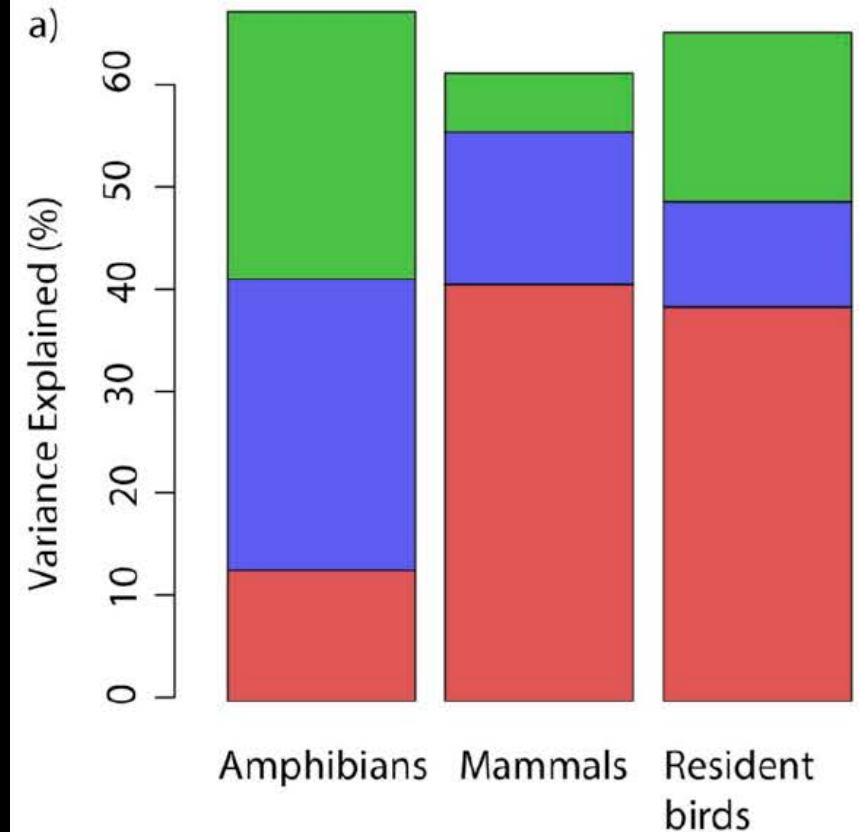
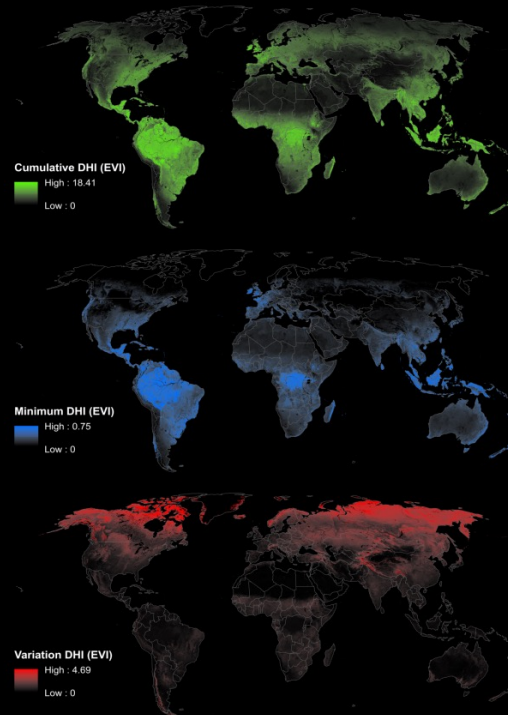
Available energy hypothesis



Environmental stress hypothesis



Environmental variability hypothesis

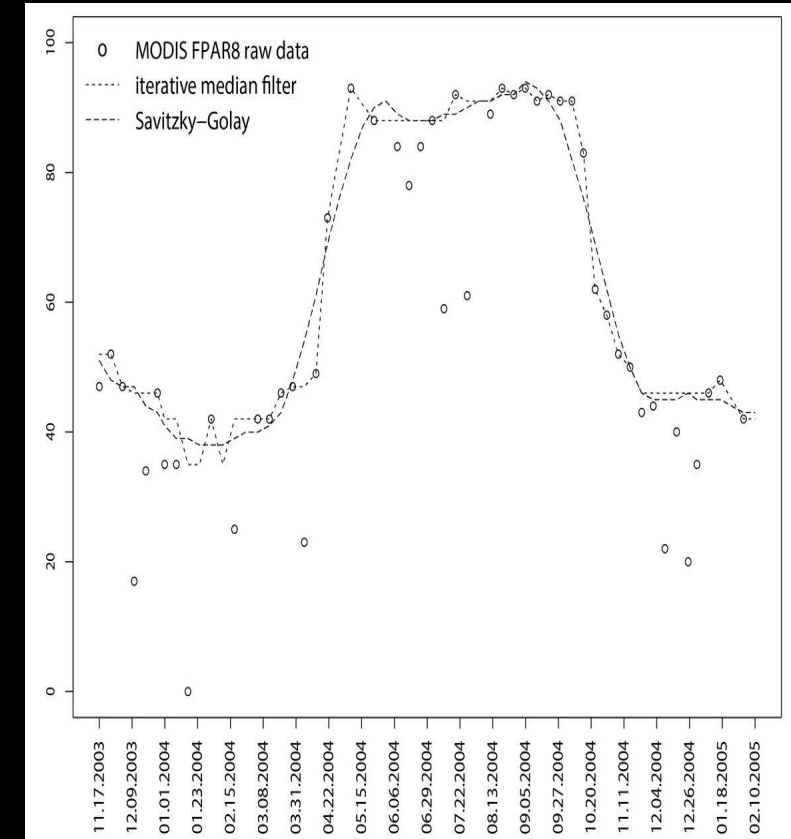
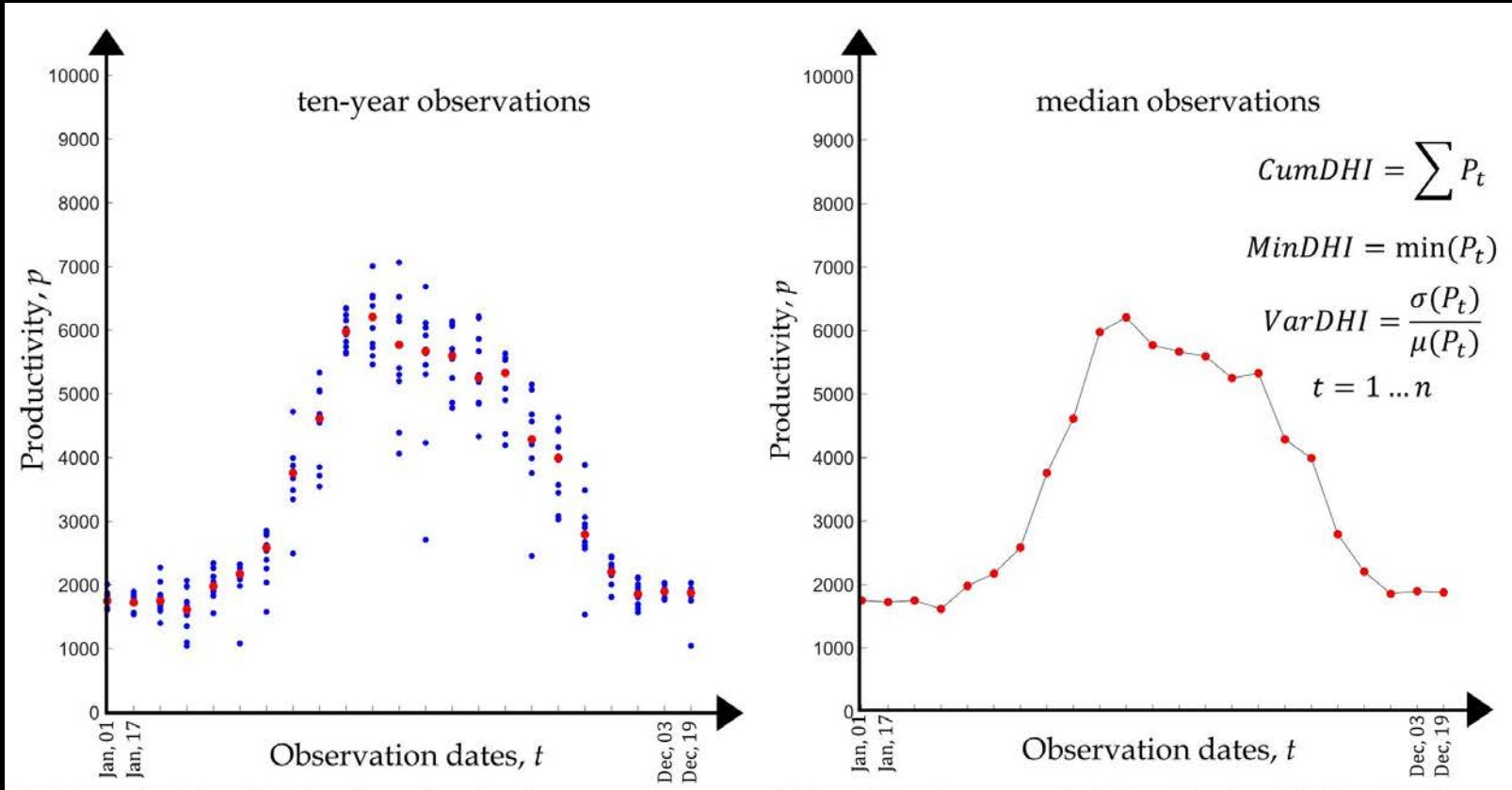


Radeloff, et al., 2019, RSE



Introduction

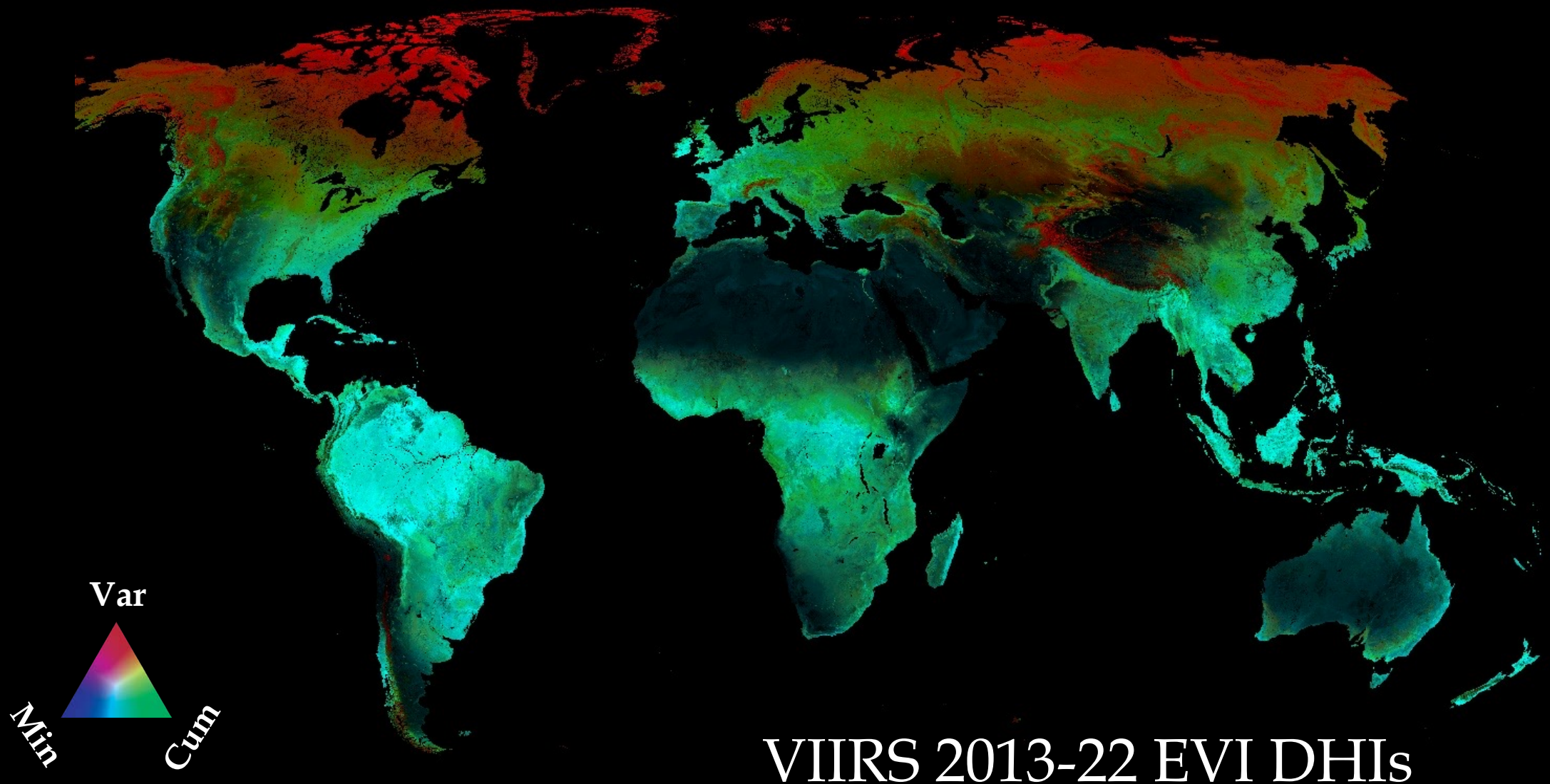
Composite & annual DHIs from MODIS and VIIRS



Radeloff, et al., 2019, RSE



Introduction



VIIRS 2013-22 EVI DHI_s



Product status

	Task	Year 1				Year 2				Year 3			
		F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
Part 1: Produce DHIs	Calculate composite DHIs	█	█	█	█	█	█	█	█	█	█	█	█
	Calculate annual DHIs				█	█	█	█	█	█	█	█	█
	Share the DHIs freely				█	█	█	█	█	█	█	█	█
Part 2: Characterize DHIs	MODIS vs. VIIRS DHIs				█	█	█	█	█	█	█	█	█
	QA flags for composite DHIs			█	█	█	█	█	█	█	█	█	█
	QA flags for annual DHIs				█	█	█	█	█	█	█	█	█
	Write ATBD for the DHIs							█	█	█	█	█	█
Part 3 Ana-lyze	Significance in DHIs trends					█	█	█	█	█	█	█	█
	Global biodiversity vs. DHIs							█	█	█	█	█	█

100% Done
66% Done
75% Done
75% Done
75% Done
50% Done
10% Done
10% Done
75% Done

Product status

Composite & annual DHIs from MODIS and VIIRS

	Vegetation index	Resolutions	Time span
MODIS Collection 6.1 Aqua & MODIS Collection 6.1 Terra	NDVI	250/500/100m, 16-day	2003-2017
			2018-2022
			2013-2022
			2003-2022
	EVI	250/500/100m, 16-day	2003-2017
			2018-2022
			2013-2022
			2003-2022
	LAI	500m, 8-day	2003-2017
			2018-2022
			2013-2022
			2003-2022
	fPAR	500m, 8-day	2003-2017
			2018-2022
			2013-2022
			2003-2022
GPP	500m, 8-day	2003-2017	
		2018-2022	
		2013-2022	
		2003-2022	

	Vegetation index	Resolutions	Time span
VIIRS	NDVI	500m, 16-day	2018-2022
			2013-2022
	EVI	500m, 16-day	2018-2022
			2013-2022
	EVI2	500m, 16-day	2018-2022
			2013-2022
	LAI	500m, 16-day	2018-2022
			2013-2022
fPAR	500m, 16-day	2018-2022	
		2013-2022	

Product status

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Dynamic Habitat Indices based on MODIS collection 6.1 and VIIRS

SENSOR: MODIS 6.1 Aqua
Vegetation Index: EVI
Band: Composite RGB
LAYER OPACITY: [slider]
LEGEND: [color swatch]

Description

The DHIs are designed for biodiversity assessments and to describe habitats of different species. Three individual indices comprise the DHIs (Fig. 1):

- DHI cum – cumulative DHI, i.e., the area under the phenological curve of a year
- DHI min – minimum DHI, i.e., the minimum value of the phenological curve of a year
- DHI var – seasonality DHI, i.e., the coefficient of variation of the phenological curve of a year

Downloads

MODIS Collection 6.1 Terra (composites)

NDVI			EVI			LAI	fPAR	GPP
250m 16-day	500m 16-day	1km 16-day	250m 16-day	500m 16-day	1km 16-day	500m 8-day	500m 8-day	500m 8-day
2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022
2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022
2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022

MODIS Collection 6.1 Aqua (composites)

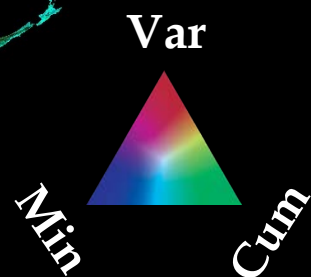
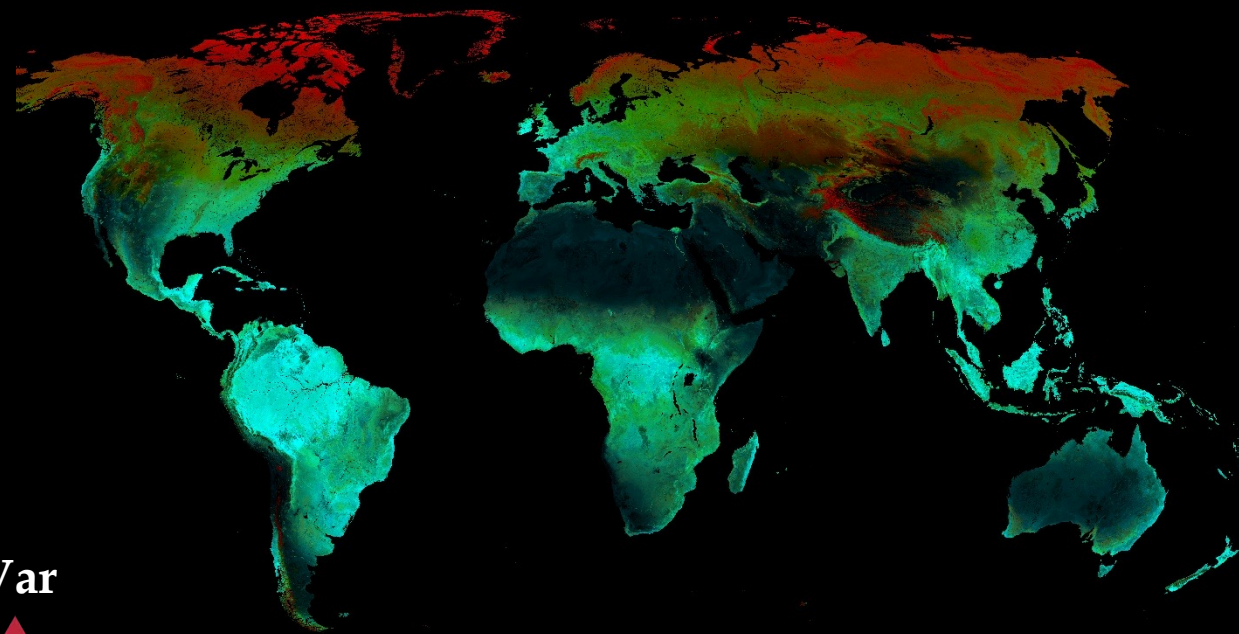
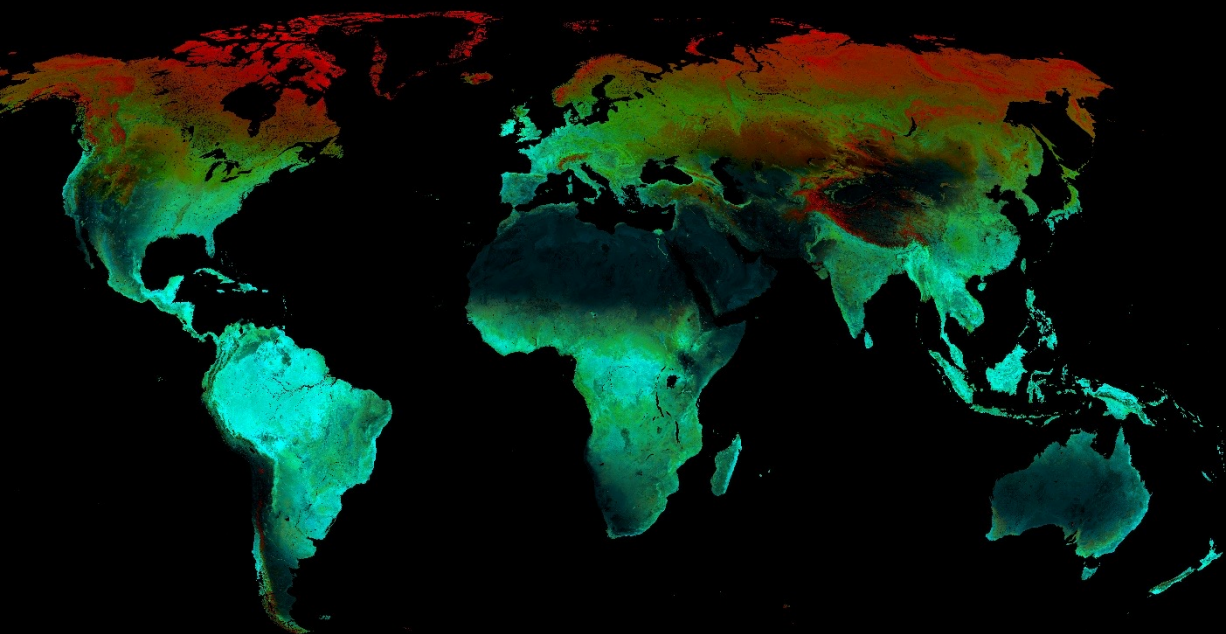
NDVI			EVI			LAI	fPAR	GPP
250m 16-day	500m 16-day	1km 16-day	250m 16-day	500m 16-day	1km 16-day	500m 8-day	500m 8-day	500m 8-day
2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022	2003-2022
2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022	2013-2022
2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022	2018-2022



MODIS - VIIRS comparison

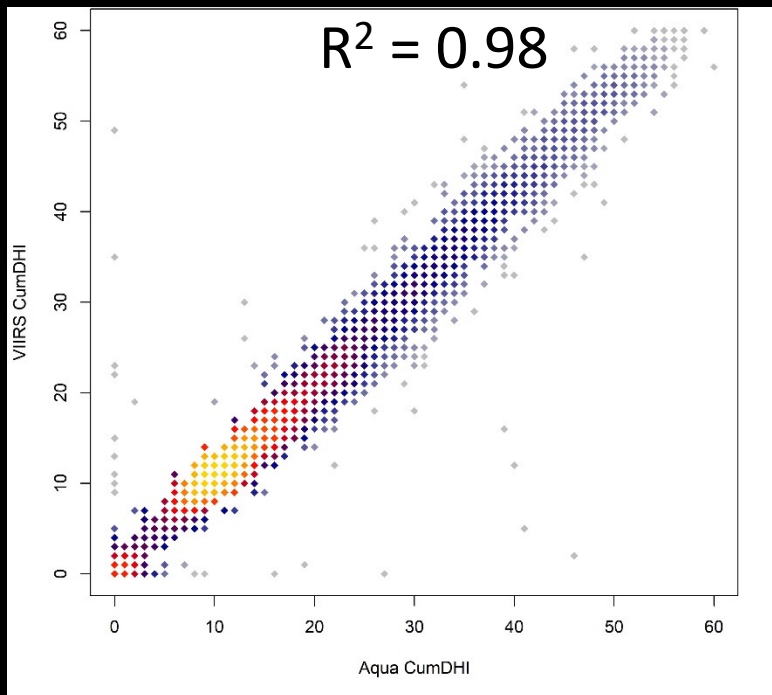
MODIS C6.1 Aqua

VIIRS

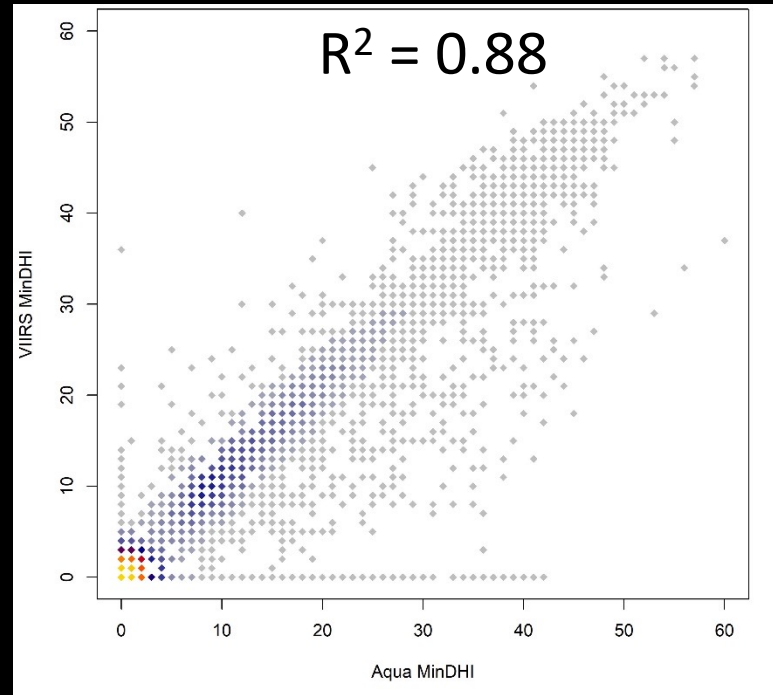


MODIS - VIIRS comparison

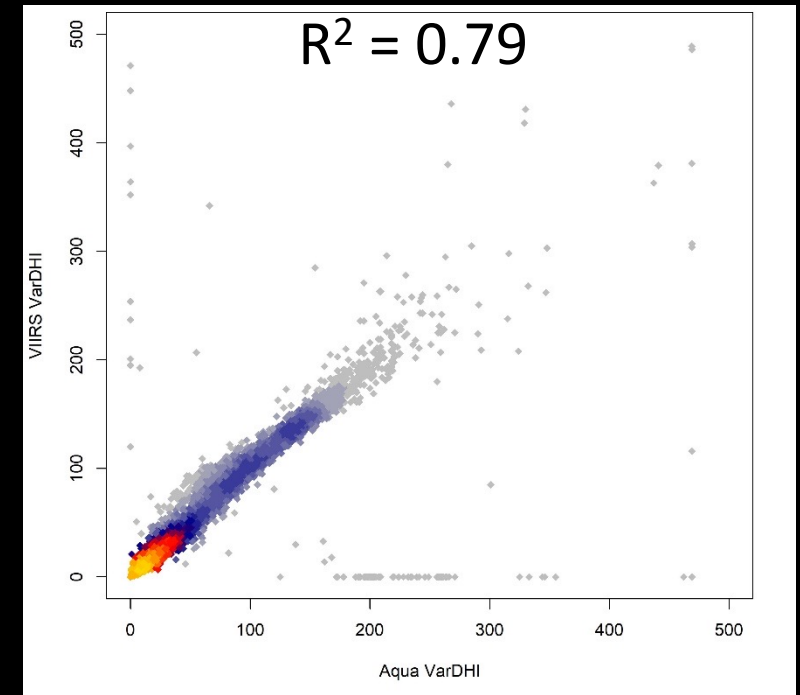
CumDHI



MinDHI

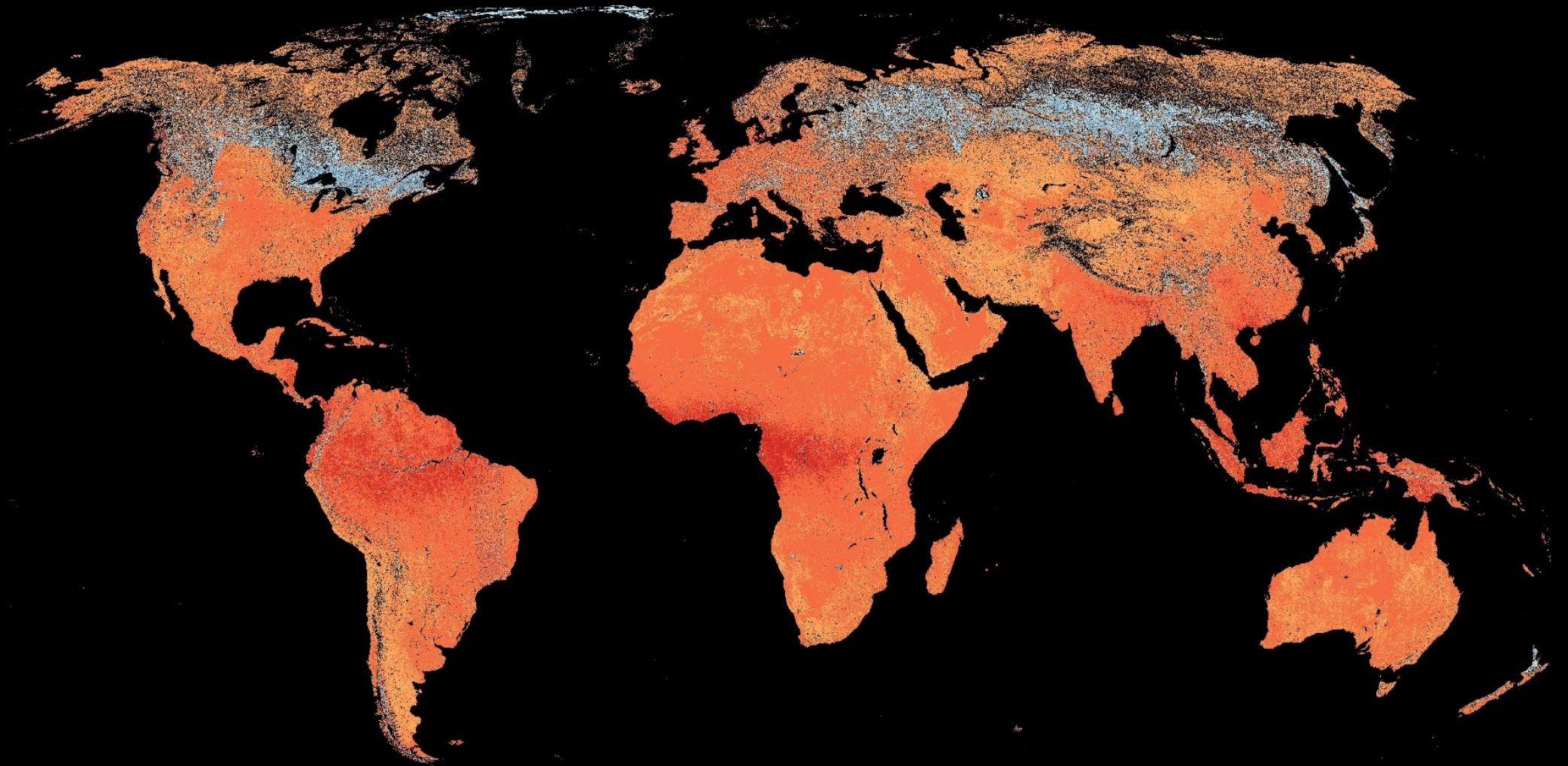
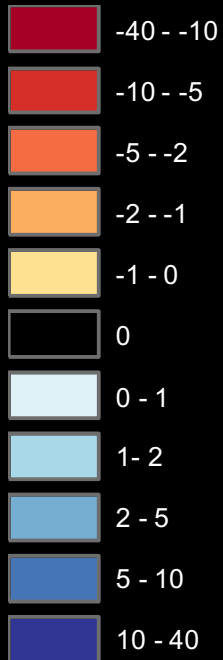


VarDHI



MODIS - VIIRS comparison

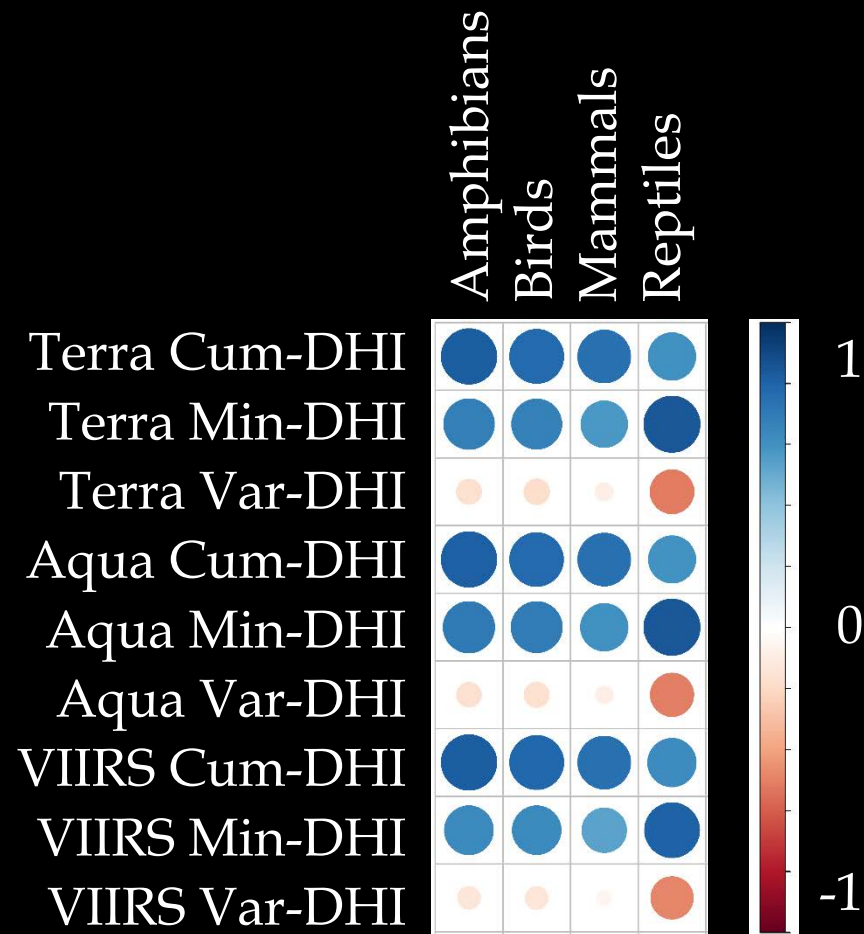
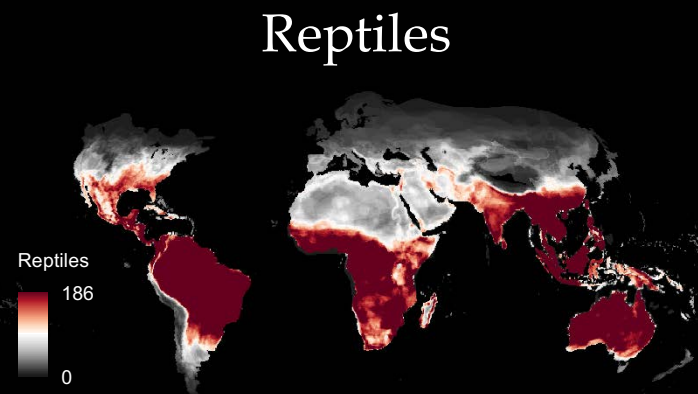
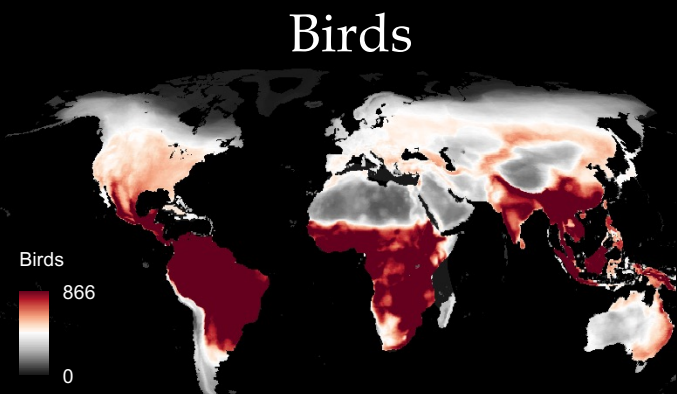
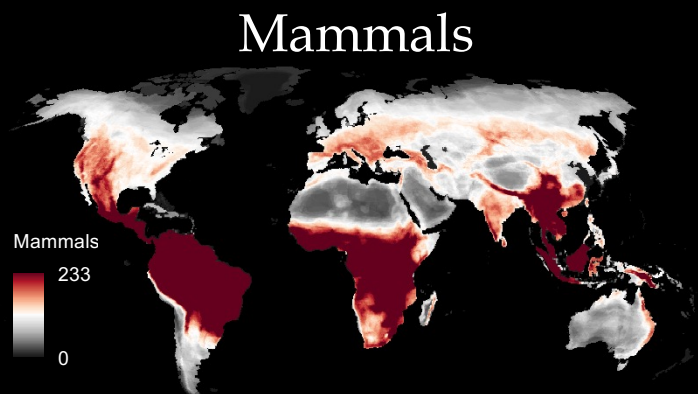
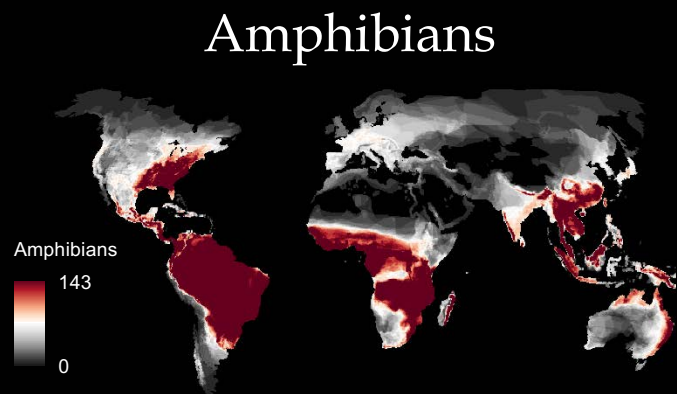
Cum-DHI



Cum-DHI EVI 2013-22: MODIS Aqua minus VIIRS

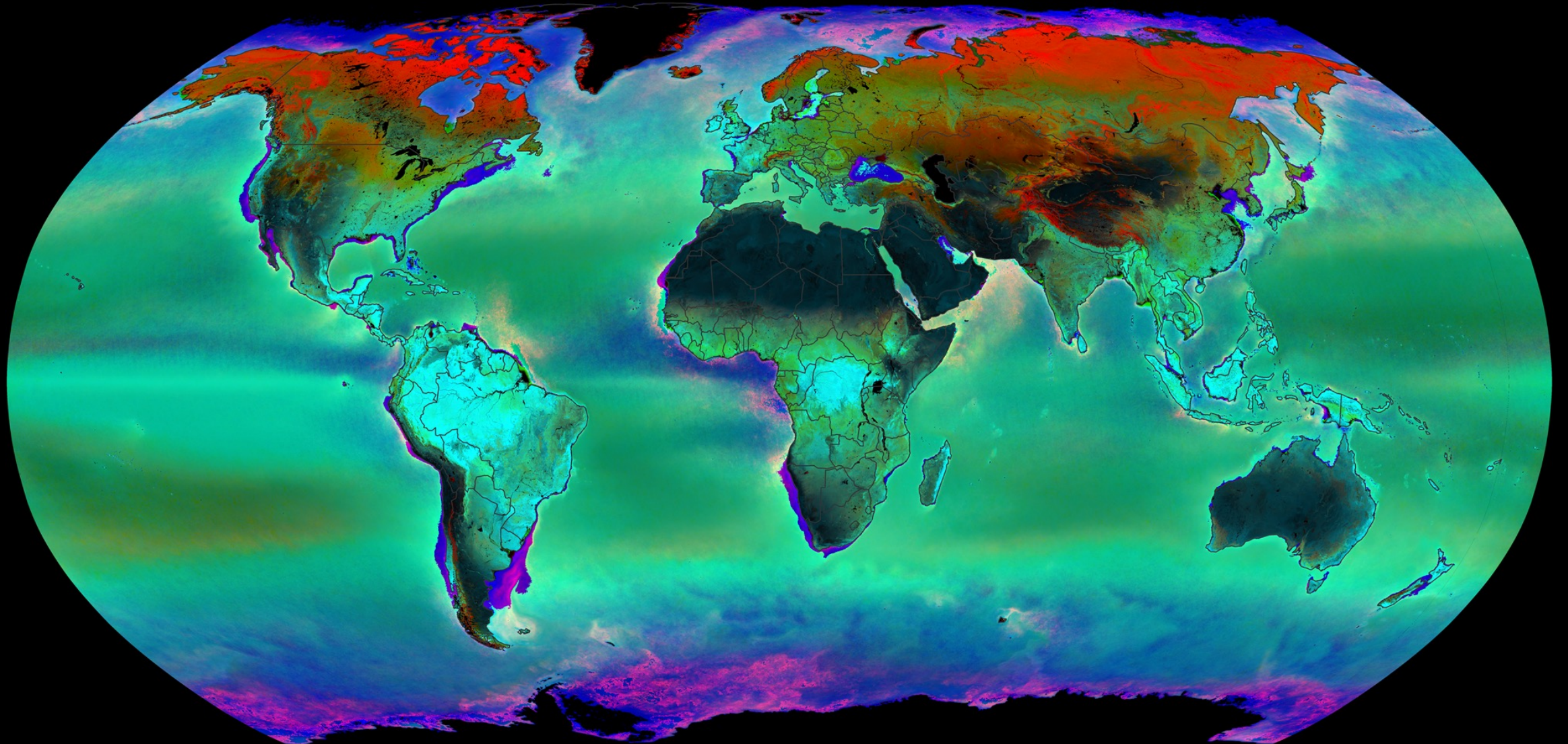


DHIs versus global species richness



Cox, Young, Bowles, et al. *Nature* (2022)

DHIs versus global species richness



DHIs versus global species richness

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- Hobi, 2017, *RSE*
- Radeloff, 2019, *RSE*
- Hobi, 2021, *Ecol Ind*
- Rapacciuolo, 2017, *GEB*
- Coops, 2018, *Sci Rep*
- Marin, 2018, *Proc R Soc B*
- Coops, 2019, *Ecol Ind*
- Rapacciuolo, 2019, *Nature E&E*
- Suttidate, 2019, *RSE*
- Razenkova, 2020, *Sci Rep*
- Silveira, 2021, *RSE*
- Silveira, 2022, *EcoApps*
- Suttidate, 2021, *GECCO*
- Carroll, 2022, *EcoApps*
- Razenkova, 2023, *J. BioG*
- Suttidate, 2023 *Bio Cons*

Other Users

Richness

- Mammal richness / Xinjiang
- Bird diversity / France
- Raptor richness / Americas
- ...

Species distributions

- Brown Bears / Cantabria
- Andean Condor / Argentina
- Grey Foxes / US
- Philippine Eagle / Philippines
- Purple-winged Ground Dove
- Mountain Tapir / Peru
- Serpent Eagle / Madagascar
- ...



Thank you!!!

