

Impact of Deforestation and ENSO on Precipitation Patterns and Cereal Production in Congo River Basin

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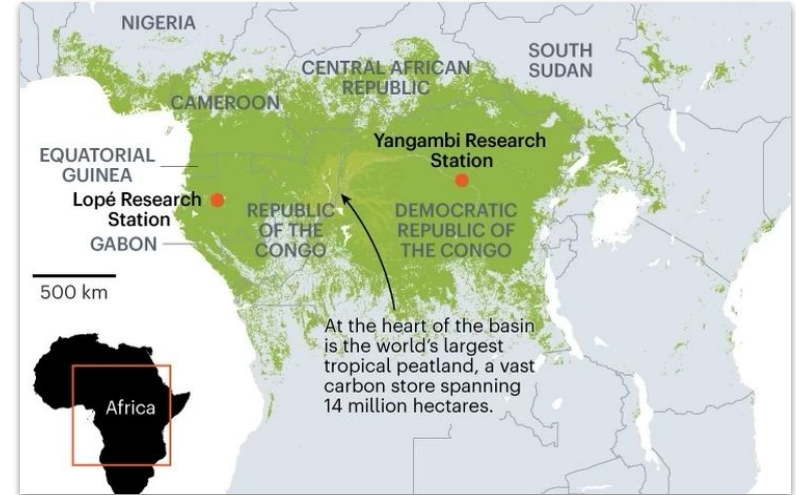
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Climatematch
Academy

Congo River Basin

[Speaker
Zoom
video]



<https://carpe.umd.edu/>



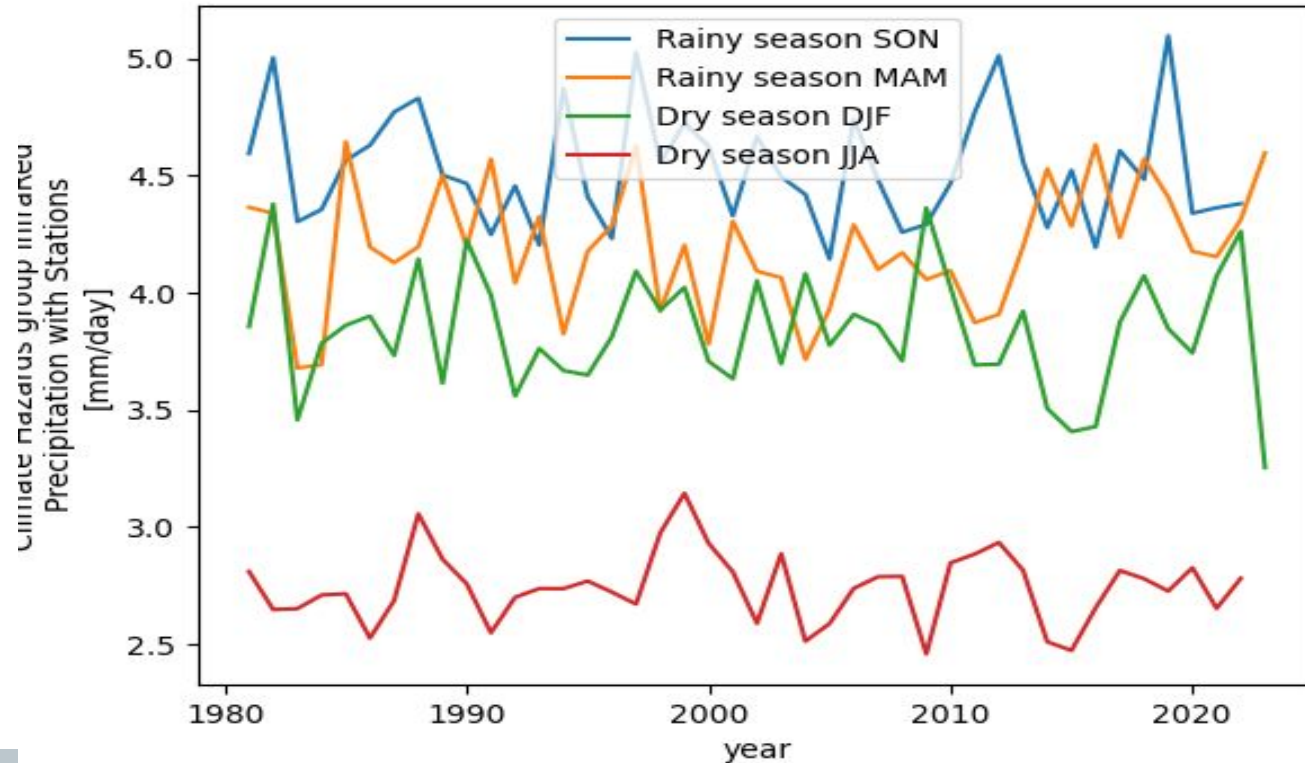
Changes in vegetation and precipitation from 1982 to 2022 during the rainy season – September to November (SON)

Smith, C., Baker, J. C. A., & Spracklen, D. V. (2023). Tropical deforestation causes large reductions in observed precipitation. *Nature*, 615(7951), 270-275.



CHIRPS, Seasonal Rainfall Patterns (1982-2022)

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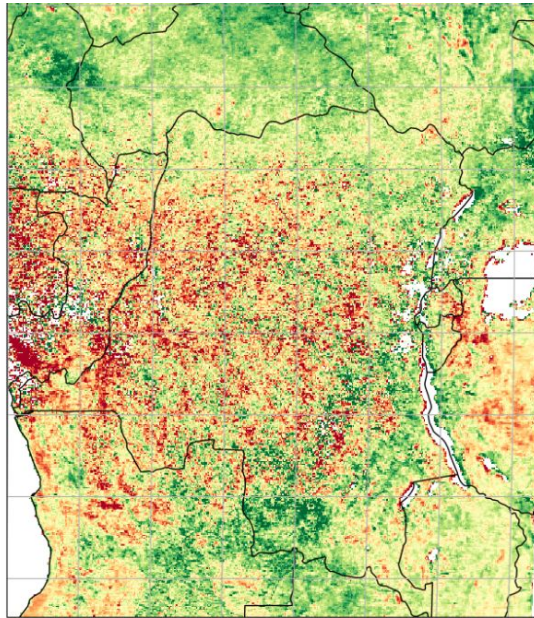


Changes in vegetation and precipitation

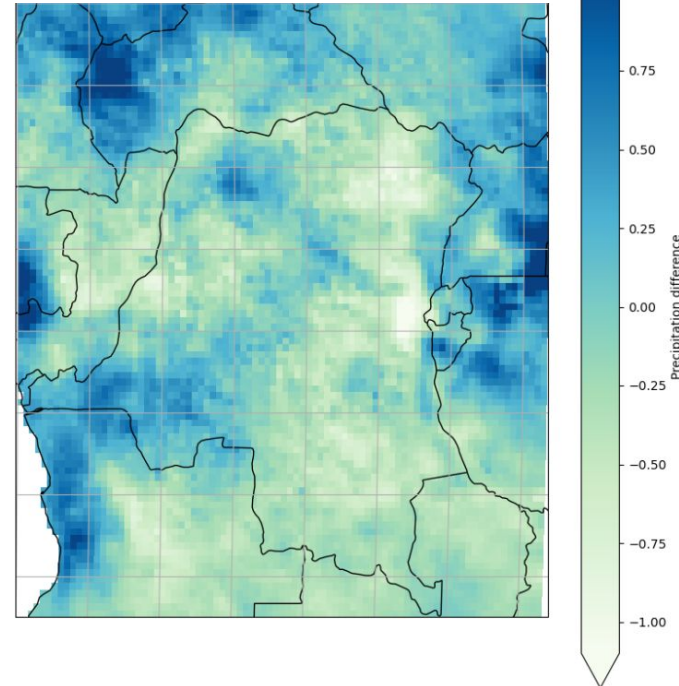
From years 1982-1992 to 2012-2022

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Vegetation change (NDVI)



Precipitation change



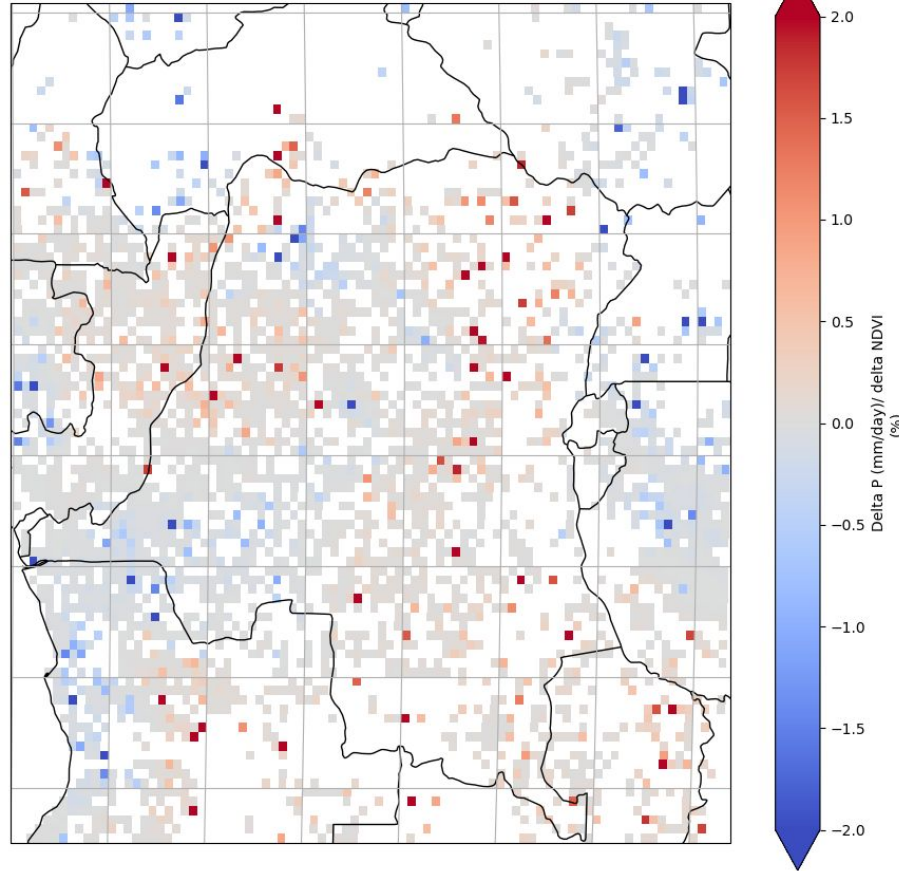
Changes in precipitation / vegetation

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$$x = \Delta P \text{ (mm/day)} / \delta \text{ veg (\%)}$$

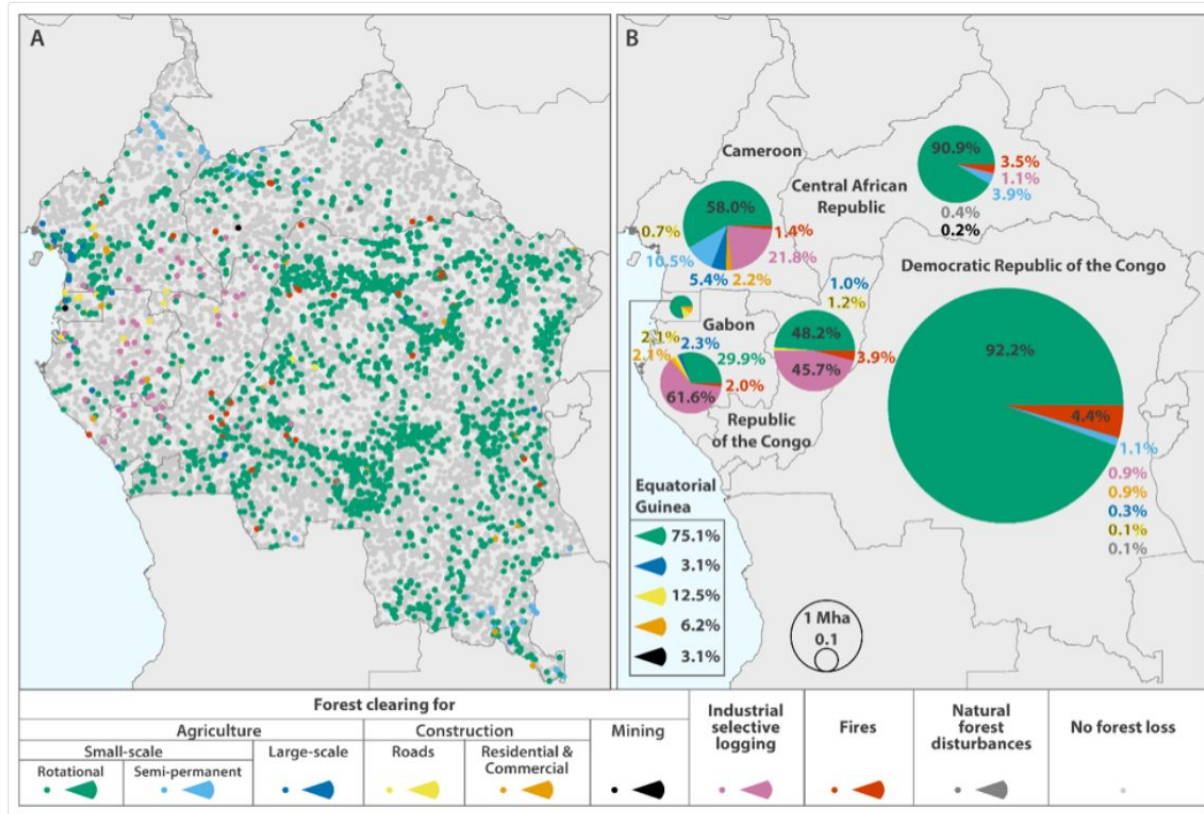
$x > 0 \Rightarrow$ decrease in
precipitation

The larger x , the greater is
the change in precipitation
for each percentage of forest
loss



Forest loss (2000-2014): farming & logging

[Speaker
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video]



<https://www.science.org/doi/10.1126/sciadv.aat2993>



Land use: Increased cereal production (World Bank Data)

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MT = metric tons cereal production					
HA = hectares under agric. production					
increases: mean (2011-2021) - mean (1981-1991)					
	Rwanda	Uganda	Burundi	Congo Rep	DRC
MT_increase	450532	2380125	112406	14119	2380125
HA_increase	201845	732112	72286	14961	2554803



Final Remarks

- Deforestation directly affects precipitation!
- Possible impacts on local population, economy and ecosystem resilience

Thank you for your attention!



References

Smith, C., Baker, J. C. A., & Spracklen, D. V. (2023). Tropical deforestation causes large reductions in observed precipitation. *Nature*, 615(7951), 270-275.

Tyukavina, A., Hansen, M. C., Potapov, P., Parker, D., Okpa, C., Stehman, S. V., ... & Turubanova, S. (2018). Congo Basin forest loss dominated by increasing smallholder clearing. *Science advances*, 4(11), eaat2993.



2015/2016 ENSO Type: Very Strong El Niño Event

+/- 0.5 degree C for the Oceanic Niño Index (ONI)
[3 month running mean (5oN-5oS, 120o-170oW)],
30-year base periods updated every 5 years.

[Speaker
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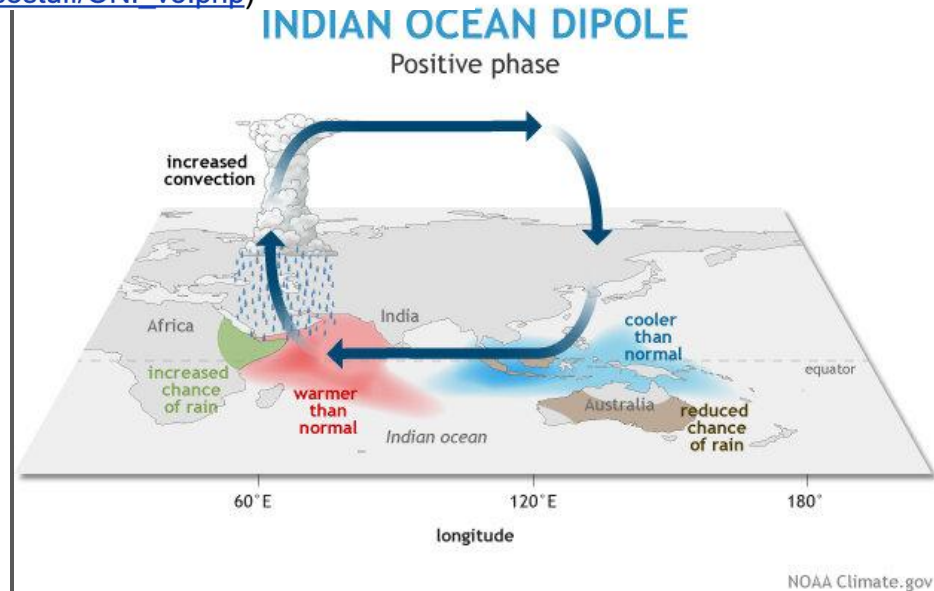
2014	-0.4	-0.5	-0.3	0.0	0.2	0.2	0.0	0.1	0.2	0.5	0.6	0.7
2015	0.5	0.5	0.5	0.7	0.9	1.2	1.5	1.9	2.2	2.4	2.6	2.6
2016	2.5	2.1	1.6	0.9	0.4	-0.1	-0.4	-0.5	-0.6	-0.7	-0.7	-0.6

(https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php)

Non-ENSO variables

“Beyond El Niño: Unsung climate modes drive African floods”
(Ficchi A, et al, Weather and Climate Extremes, Vol 33, Sept 2021)

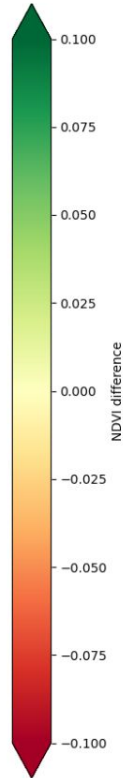
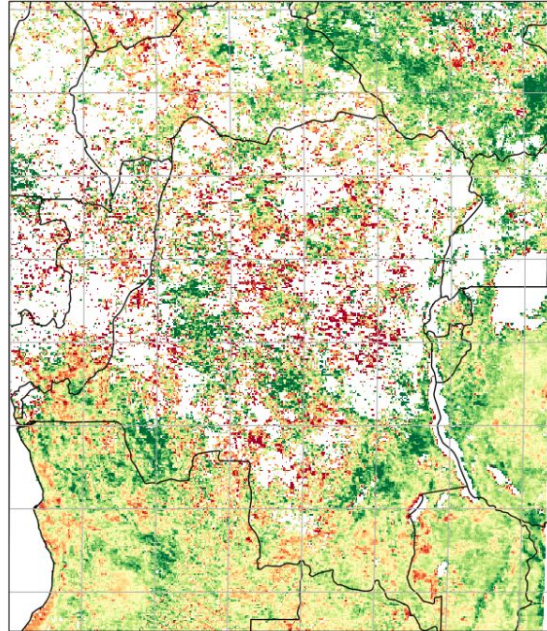
**Indian and Atlantic Ocean modes of climate
variability as important as ENSO**
**Driving changes in frequency of major floods
across Africa.**



Vegetation decrease in dry and rainy seasons

[Speaker
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Change in average seasonal *(JJA)* vegetation from 1982-1992 to 2012-2022



Change in average seasonal *(SON)* vegetation from 1982-1992 to 2012-2022

