Eco-systems of agricultural landscapes
and sustainable land use: Livestock systems

02 - Eco-geography of domestic livestock - 1

General aspects: The ecological gradient from pole to equator

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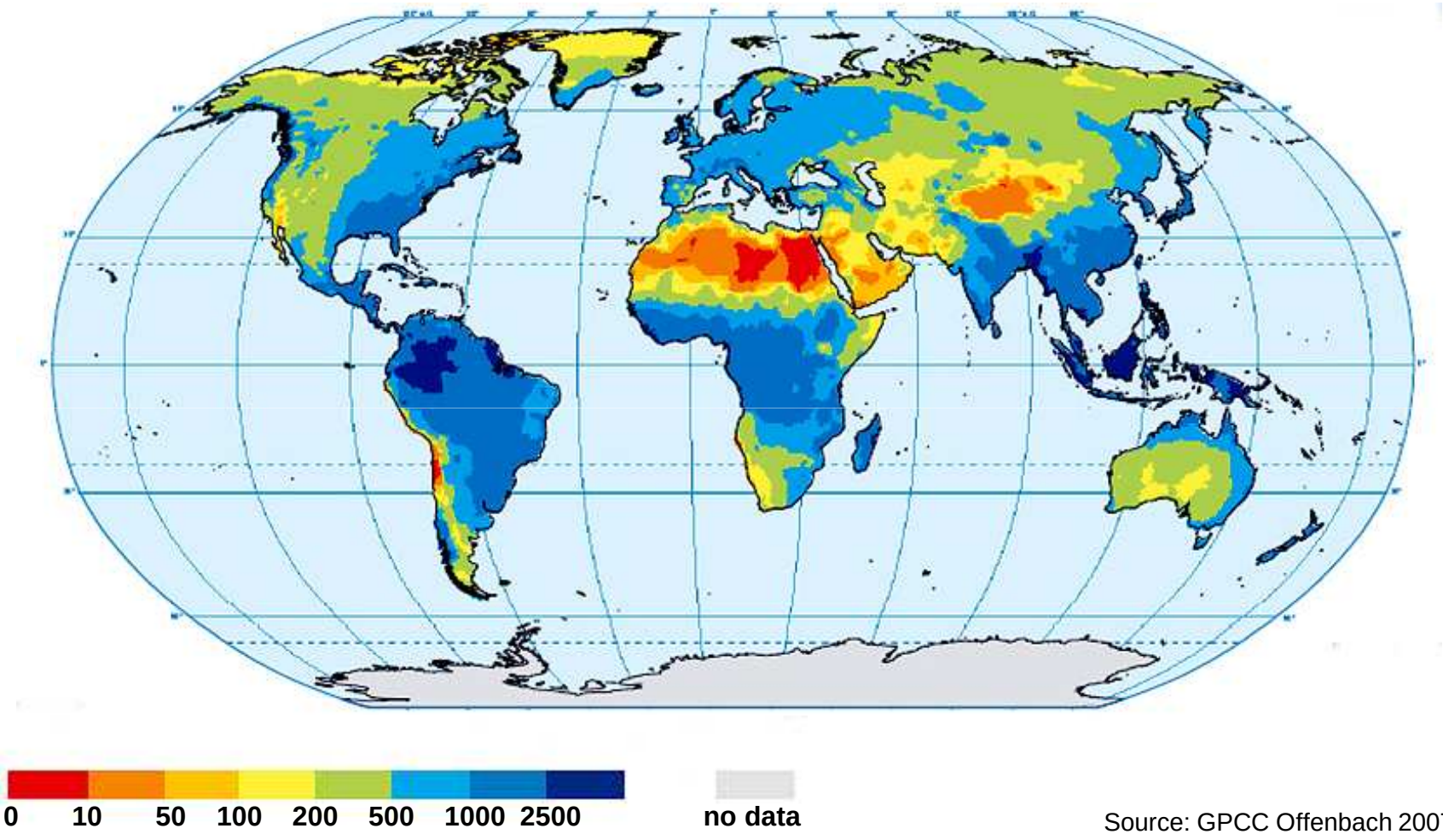
Mean annual precipitation [mm]



Source: GPCC Offenbach 2007

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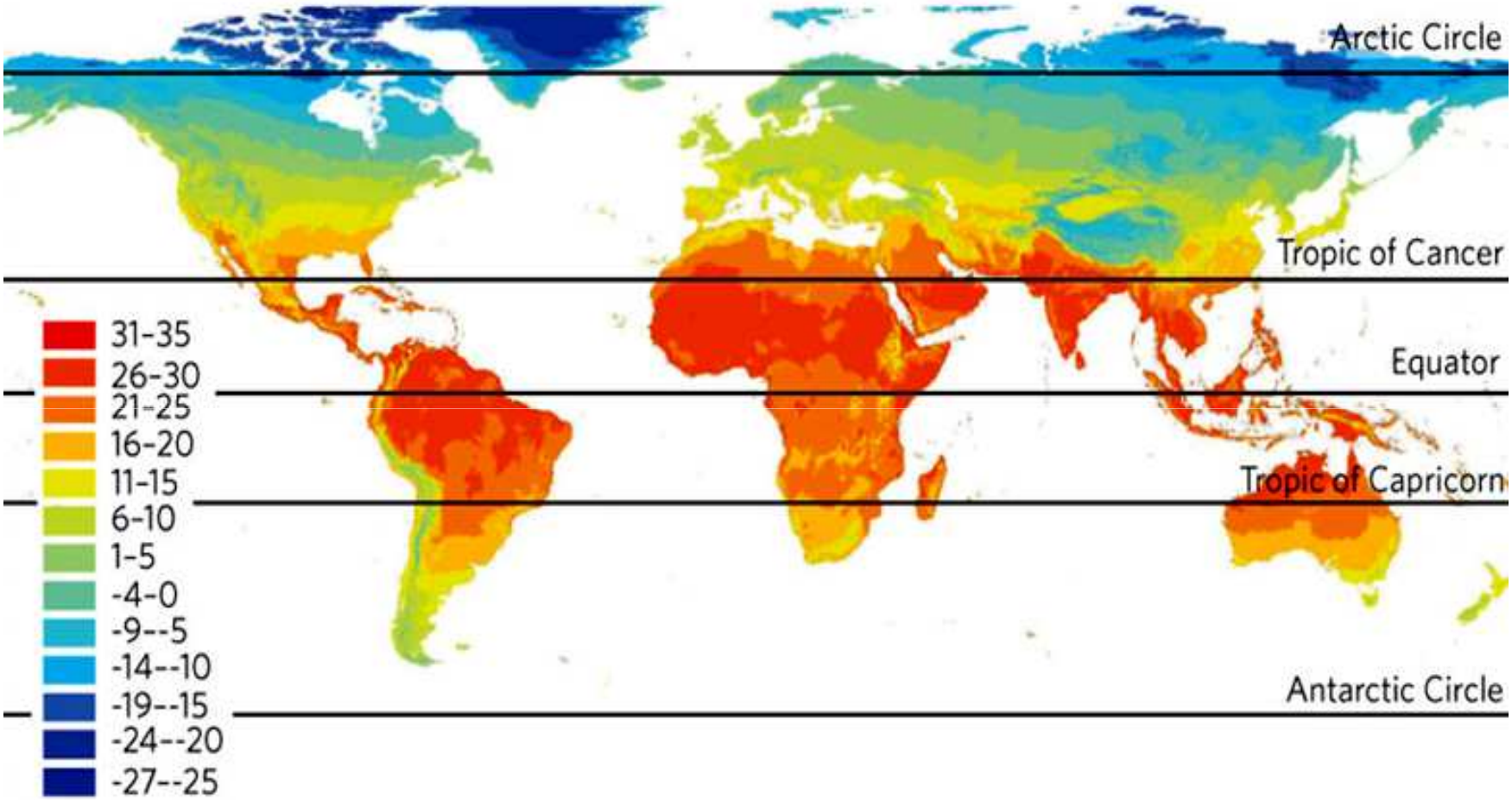
Global mean annual temperatures [ºC]



Source: Nature Climate Change 2, 239–242 (2012) doi:10.1038/nclimate1430 Published online 28 March 2012

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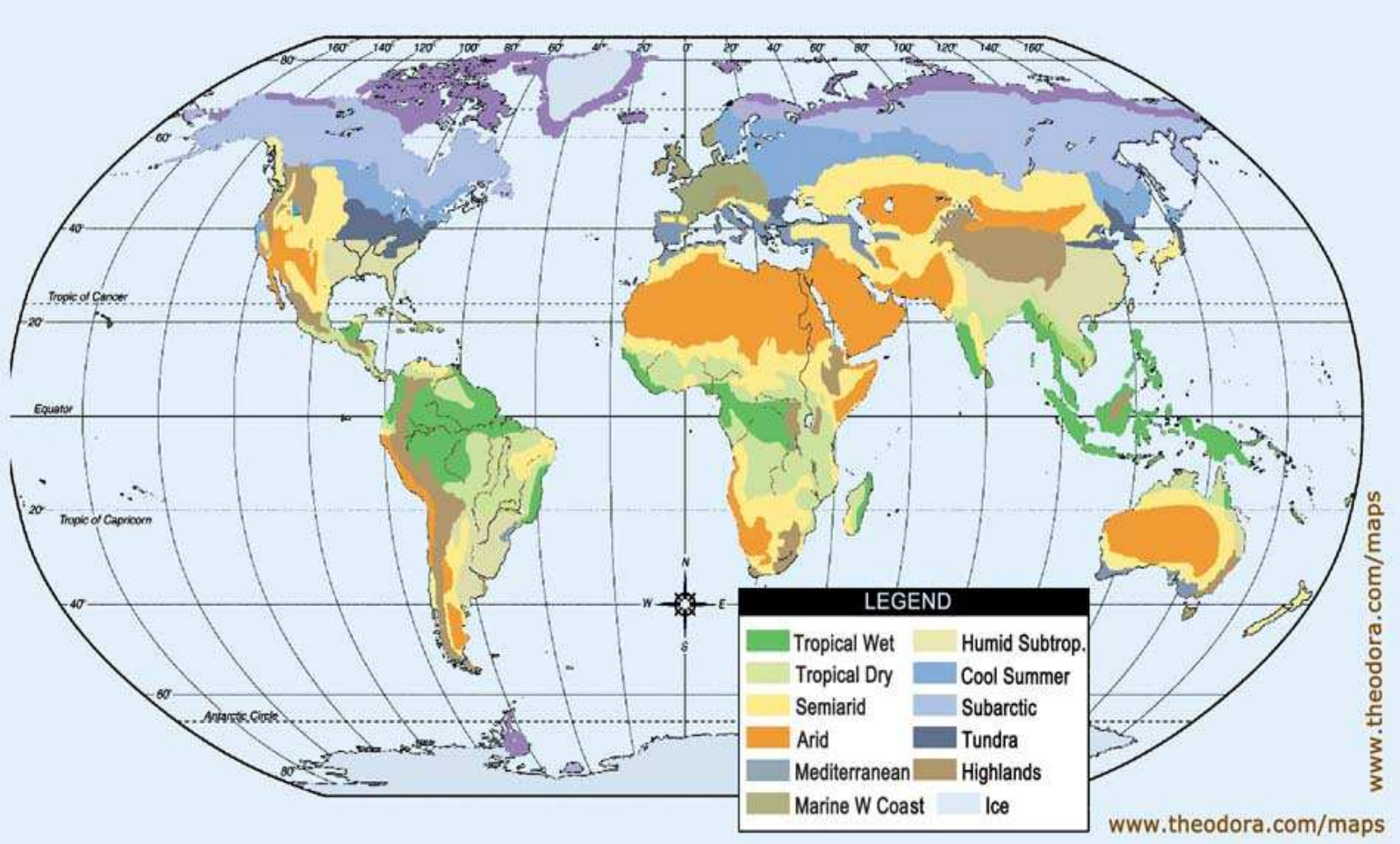
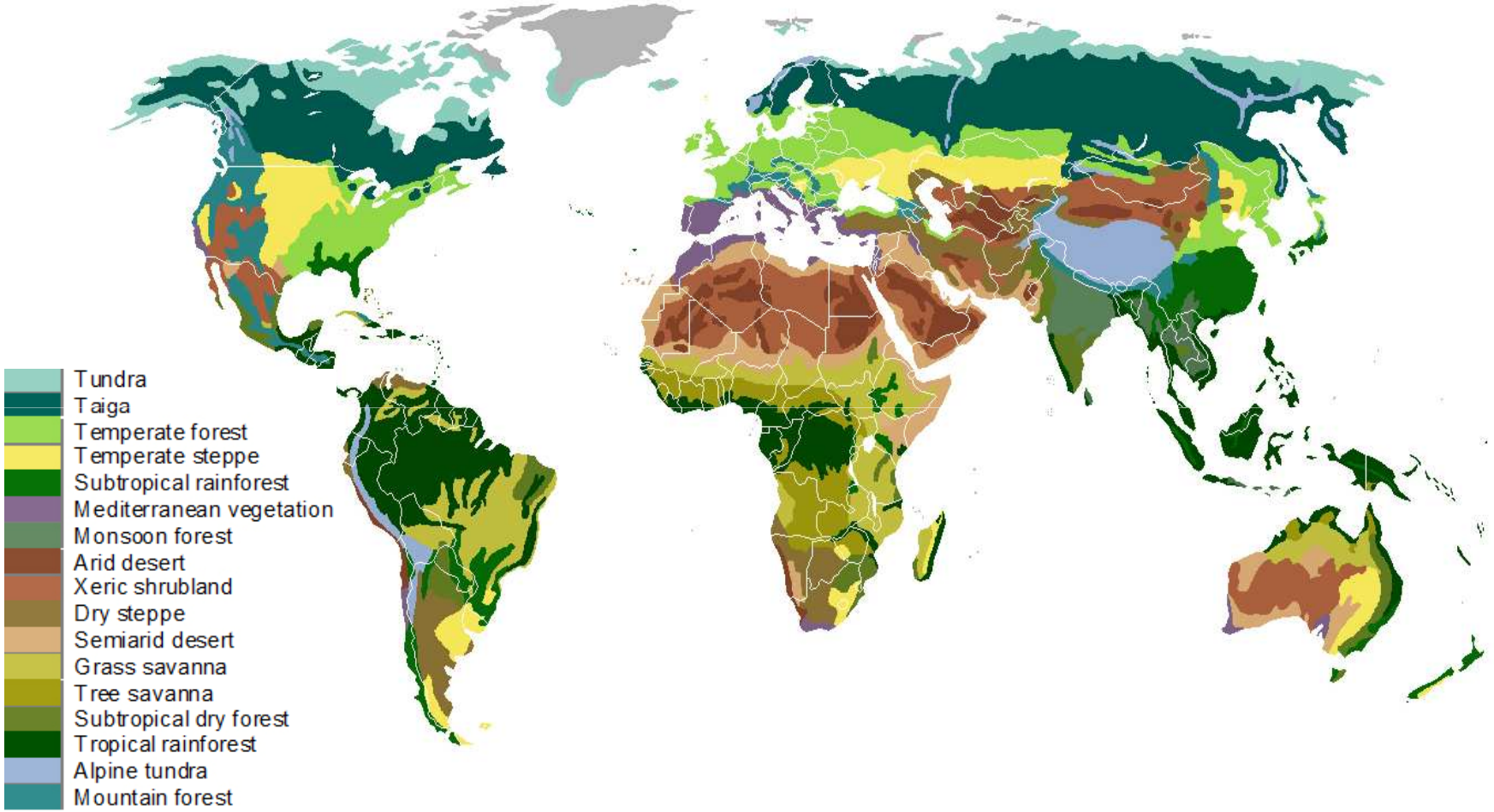
World Climate Types



World Vegetation Types



Source: modified from Wikimedia Commons; downloaded July 2012

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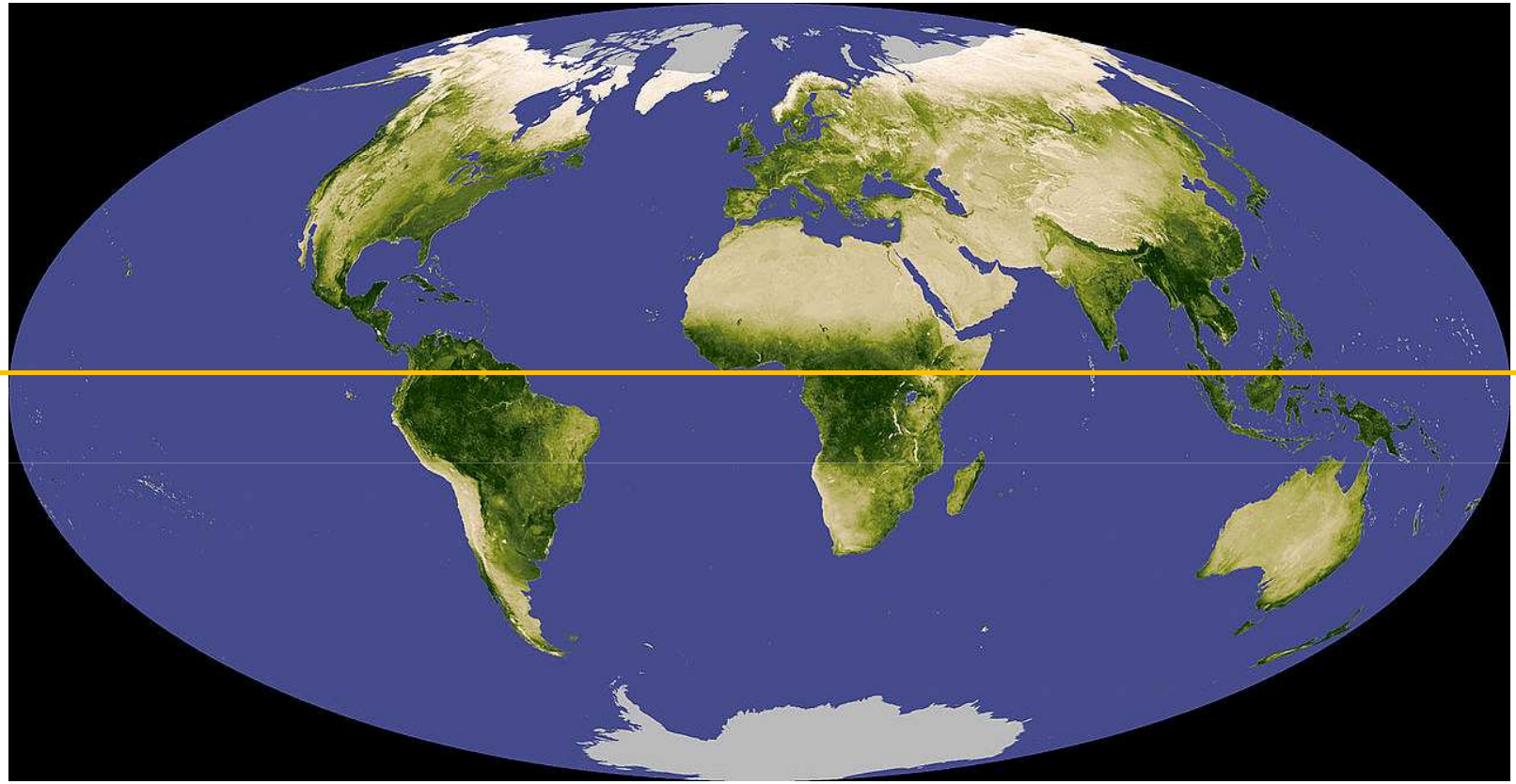
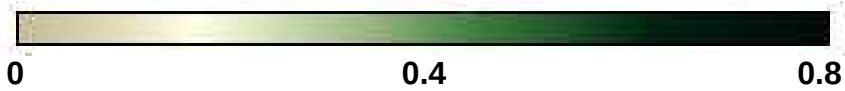
Accumulated Annual Standing Green Biomass I



Normalised Difference Vegetation Index NDVI



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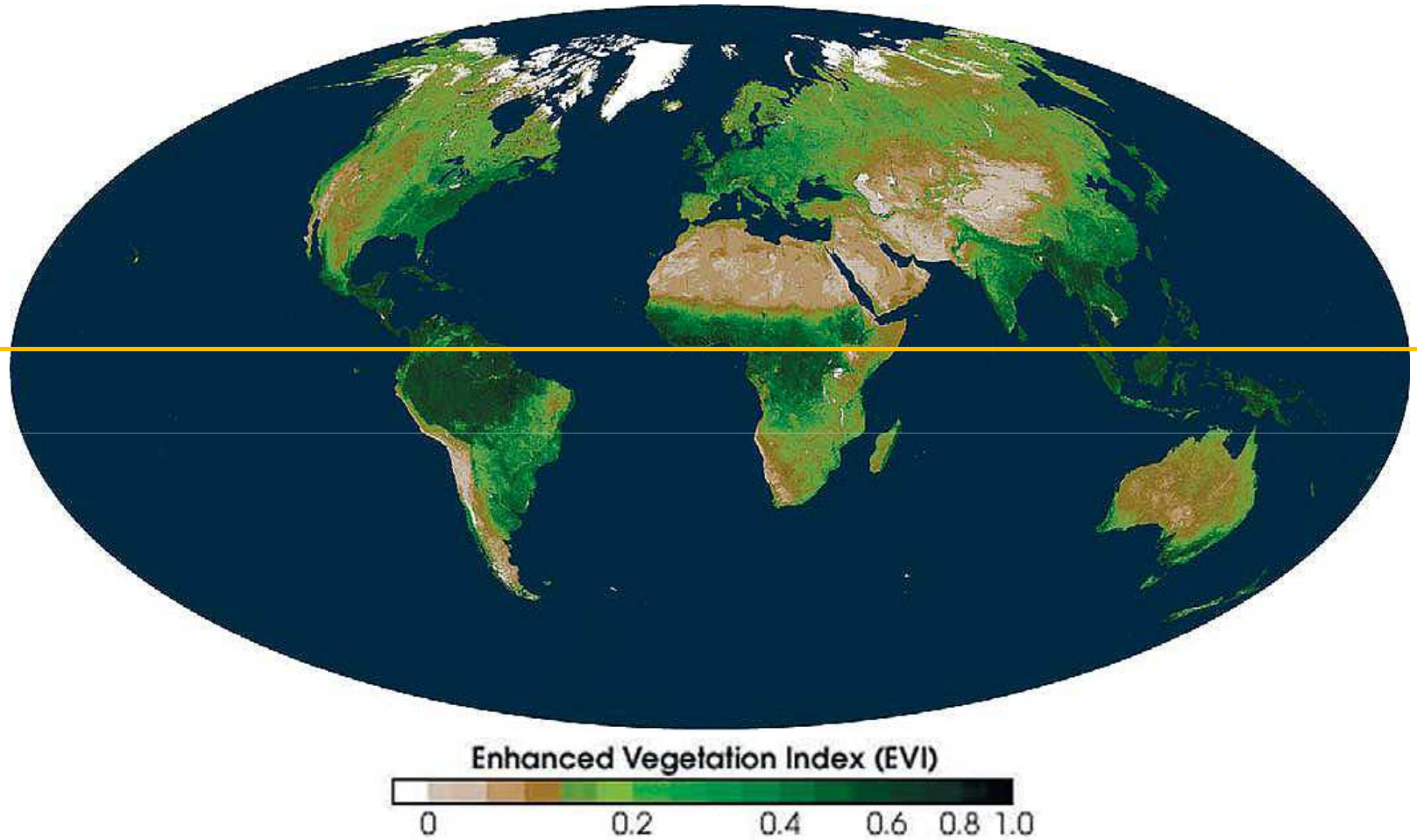
The **Normalized Difference Vegetation Index (NDVI)** is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not. Negative values of NDVI (values approaching -1) correspond to water. Values close to zero (-0.1 to 0.1) generally correspond to barren areas of rock, sand, or snow. Lastly, low, positive values represent shrub and grassland (approximately 0.2 to 0.4), while high values indicate temperate and tropical rainforests (values approaching 1).

The **Enhanced Vegetation Index (EVI)** is an 'optimized' index designed to enhance the vegetation signal with improved sensitivity in high biomass regions and improved vegetation monitoring through a de-coupling of the canopy background signal and a reduction in atmosphere influences.

Whereas the NDVI is chlorophyll sensitive, the EVI is more responsive to canopy structural variations, including leaf area index (LAI), canopy type, plant physiognomy, and canopy architecture. The two VIs complement each other in global vegetation studies and improve upon the detection of vegetation changes and extraction of canopy biophysical parameters.

Accumulated Annual Standing Green Biomass II



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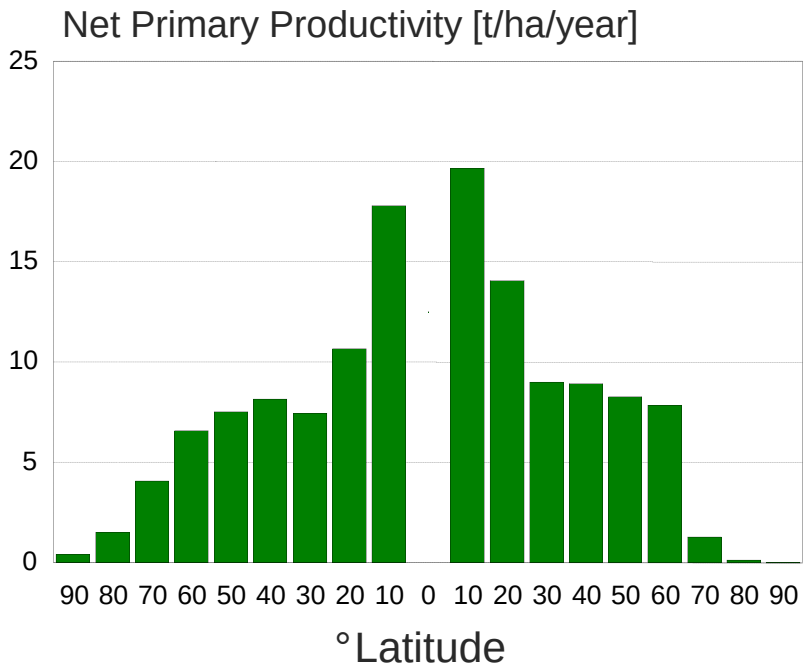
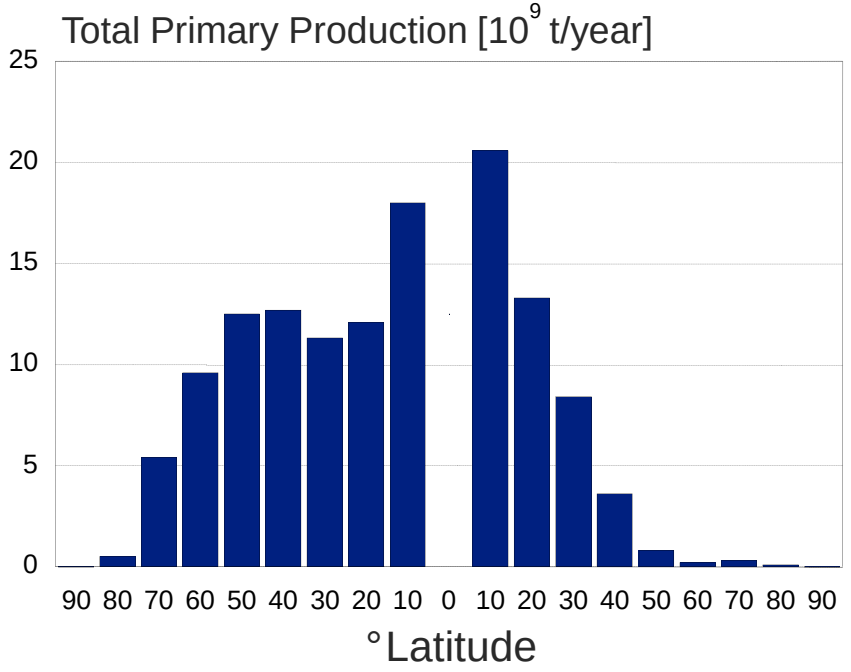
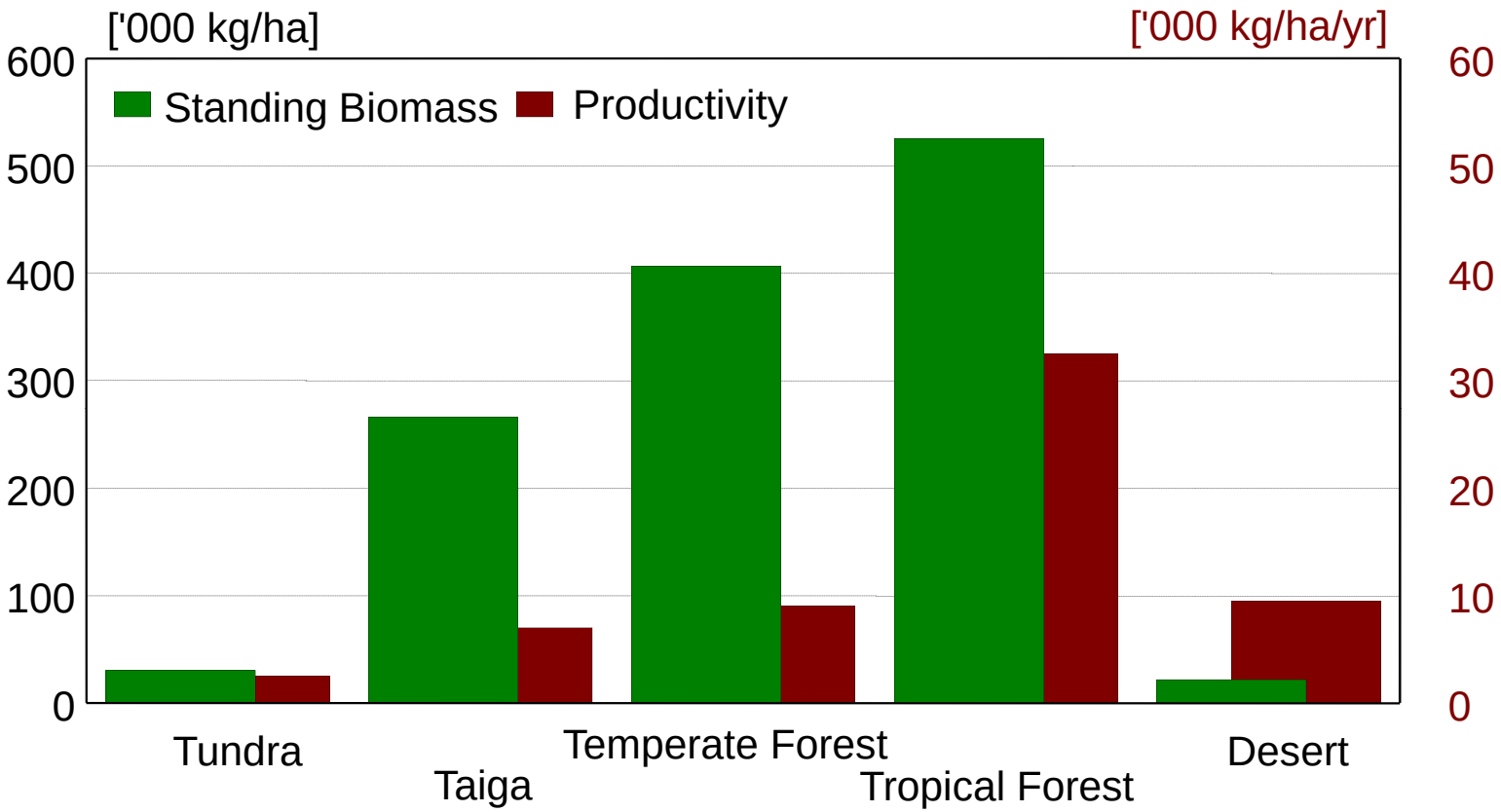
Estimates of net primary productivity (NPP) and total net production (NP) of all vegetation on all land areas in 10º latitudinal belts





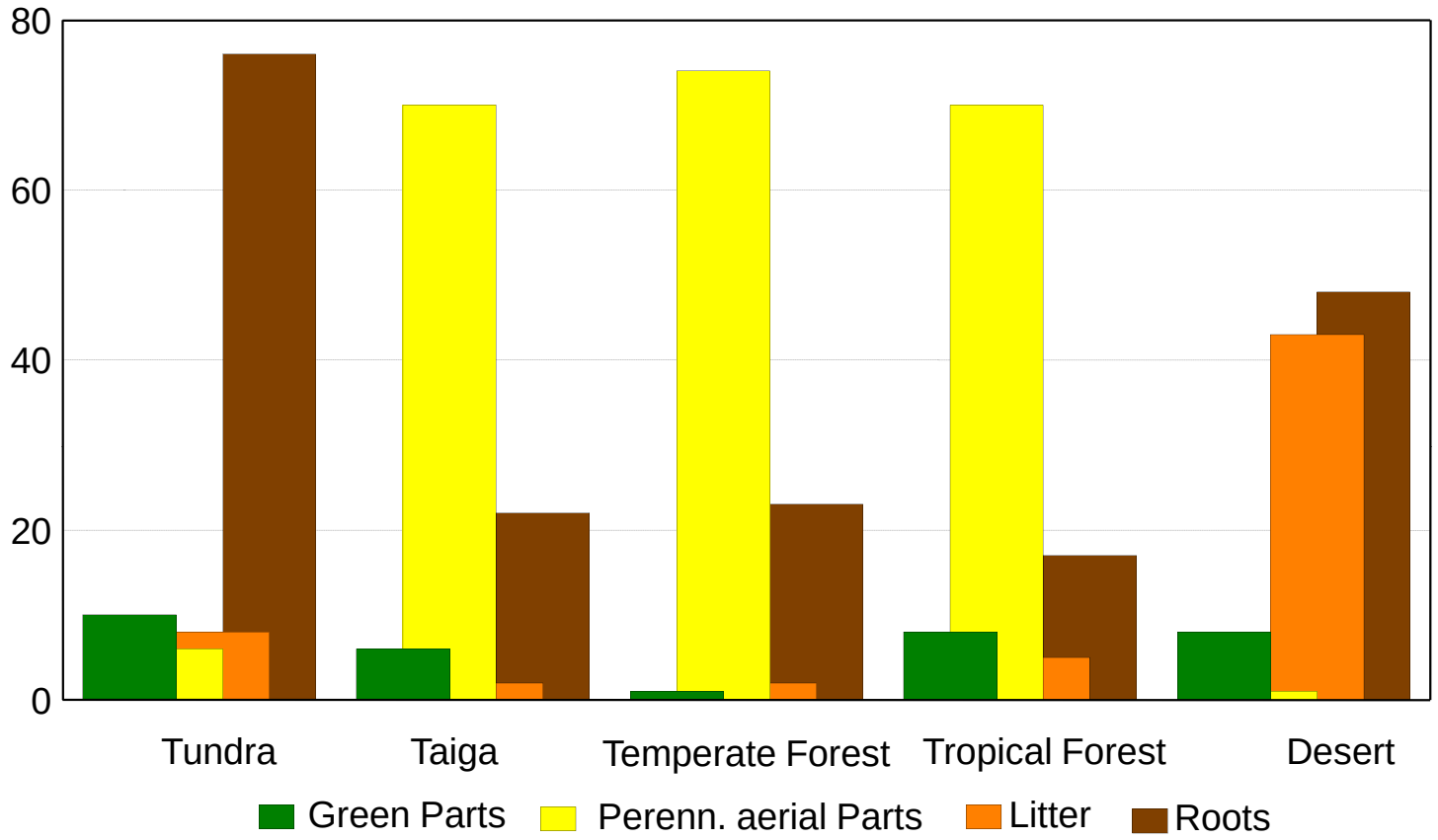
Source: Pearson, C.J. & Ison, R.L. 1987

Standing Biomass and Annual Primary Productivity in Selected Biomes



Source: E. J. Kormondy, 1987

Vertical Distribution of Biomass in Selected Major Biomes [%]



Source: E. J. Kormondy, 1987

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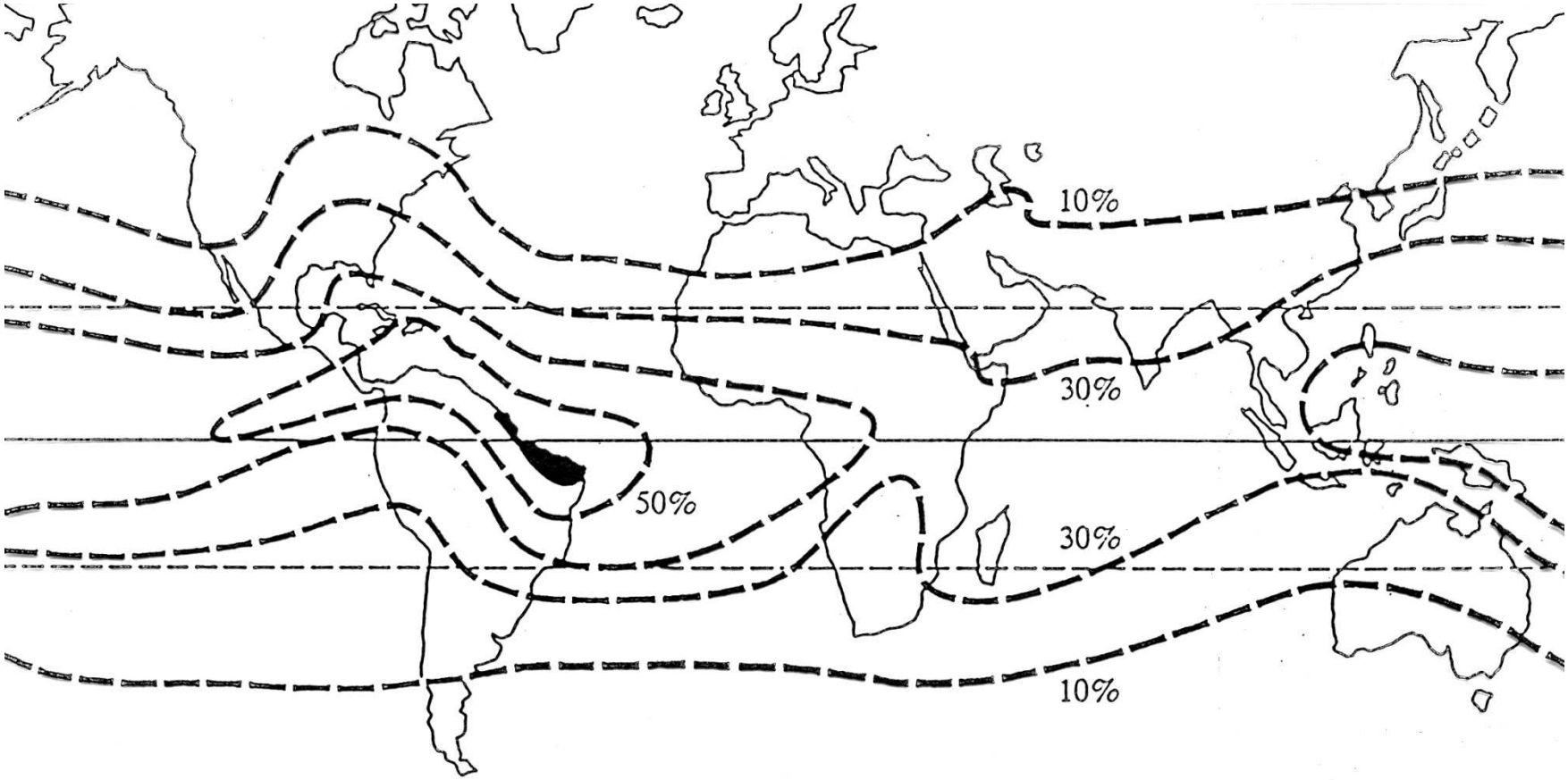
Worldwide distribution and abundance of *Panicaceae* [% of all grass species present]



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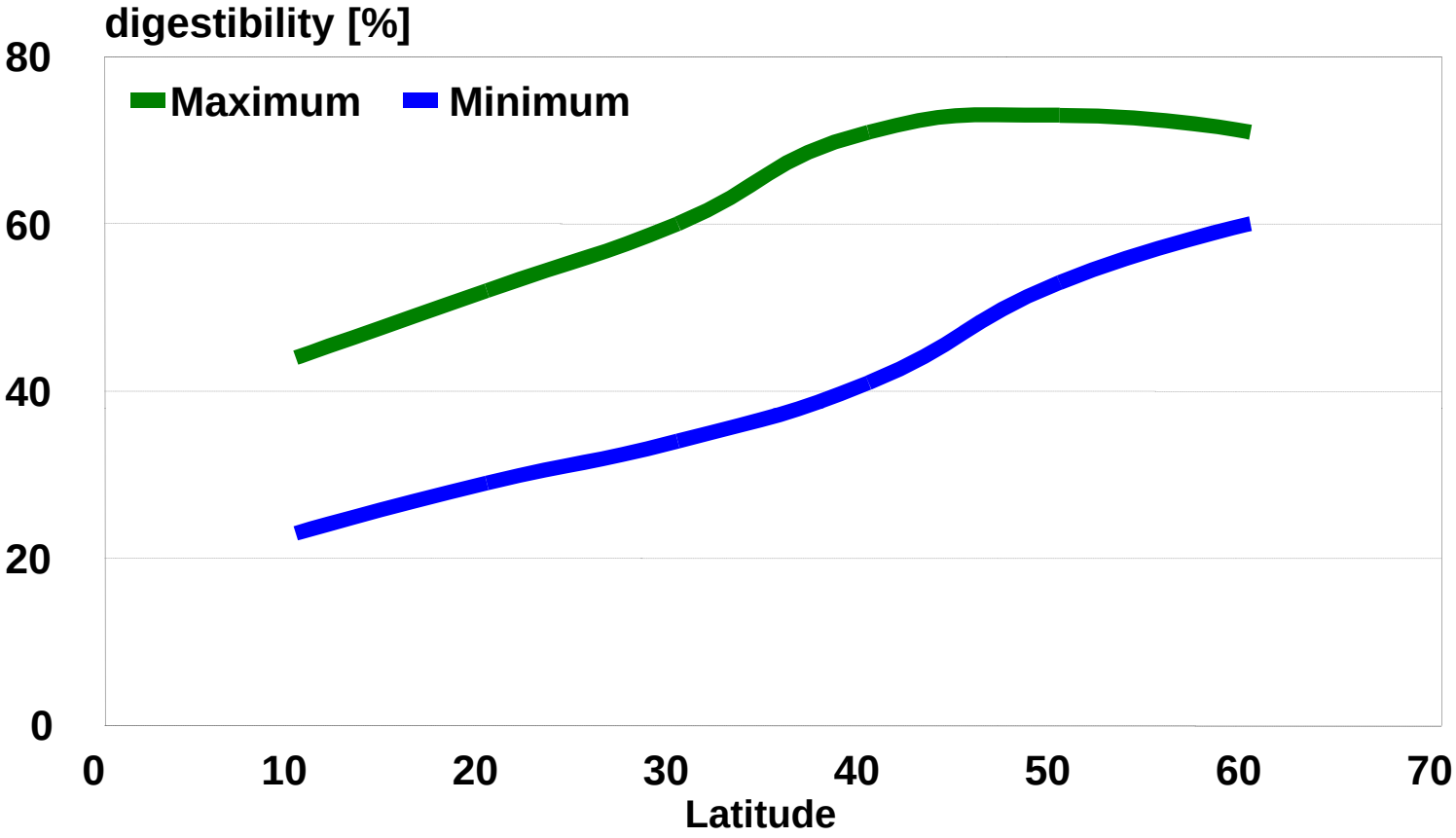
Dry matter digestibility of grasses at the first cut of the growing season in relation to geographic latitude



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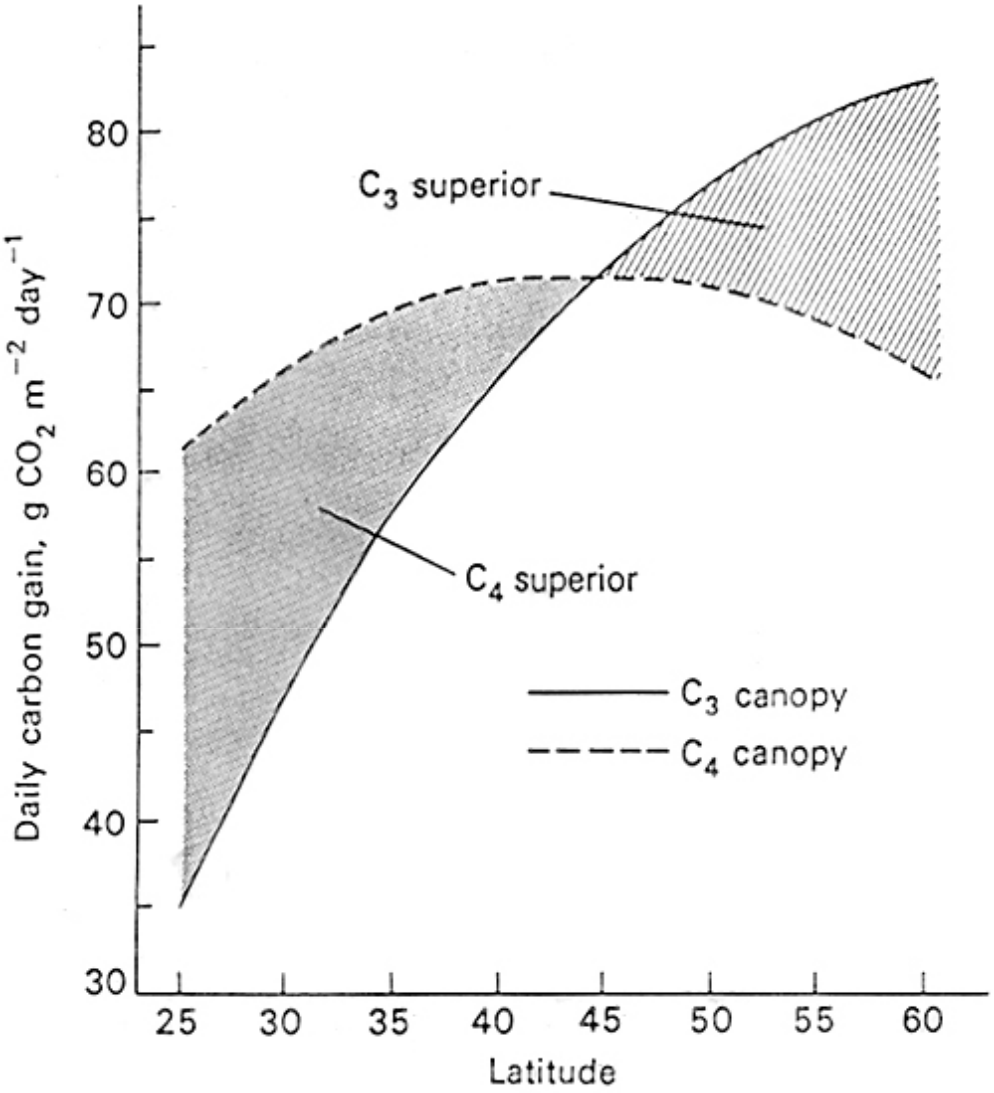
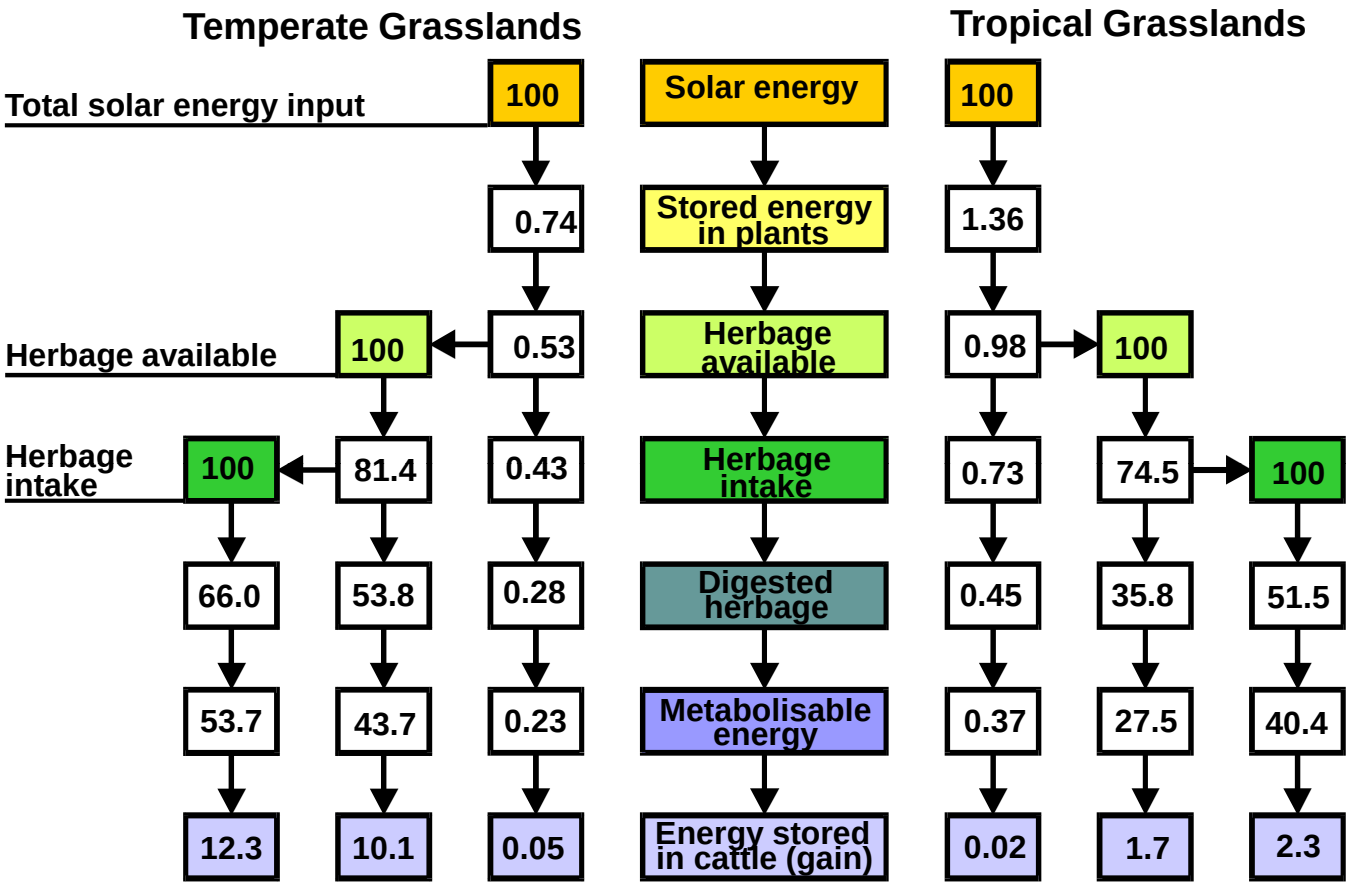
Predicted levels of photosynthesis for C_3 and C_4 species over a range of latitudes



Source: Biogeography, Cox & Moore, 1993

Efficiency of utilisation of solar energy (%) in cattle grazing systems



Modified after Pearson & Ison 1987

Temperate grasslands

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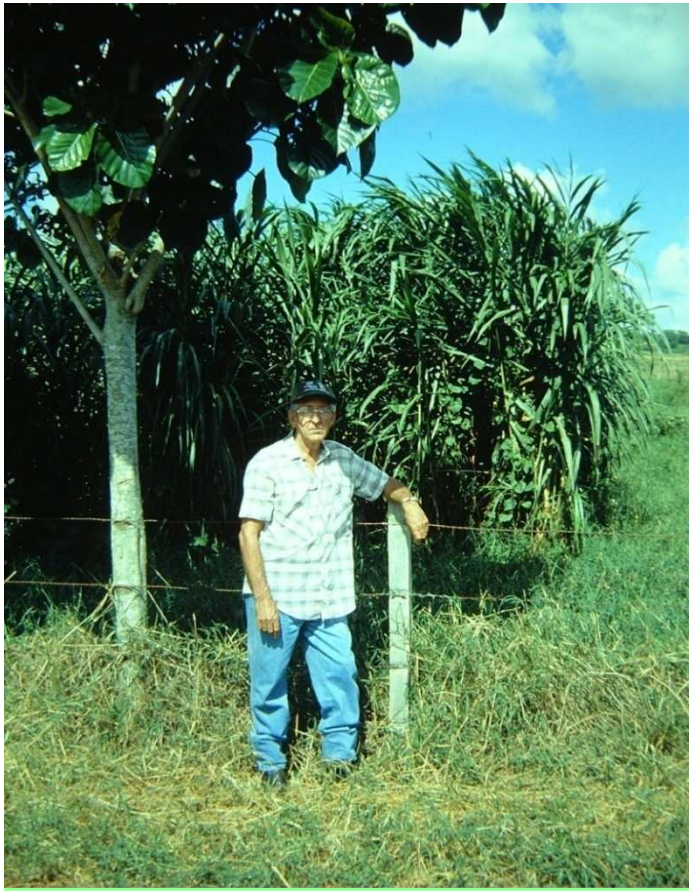
Tropical grasses

Sacharum officinalis



Penisetum purpureum

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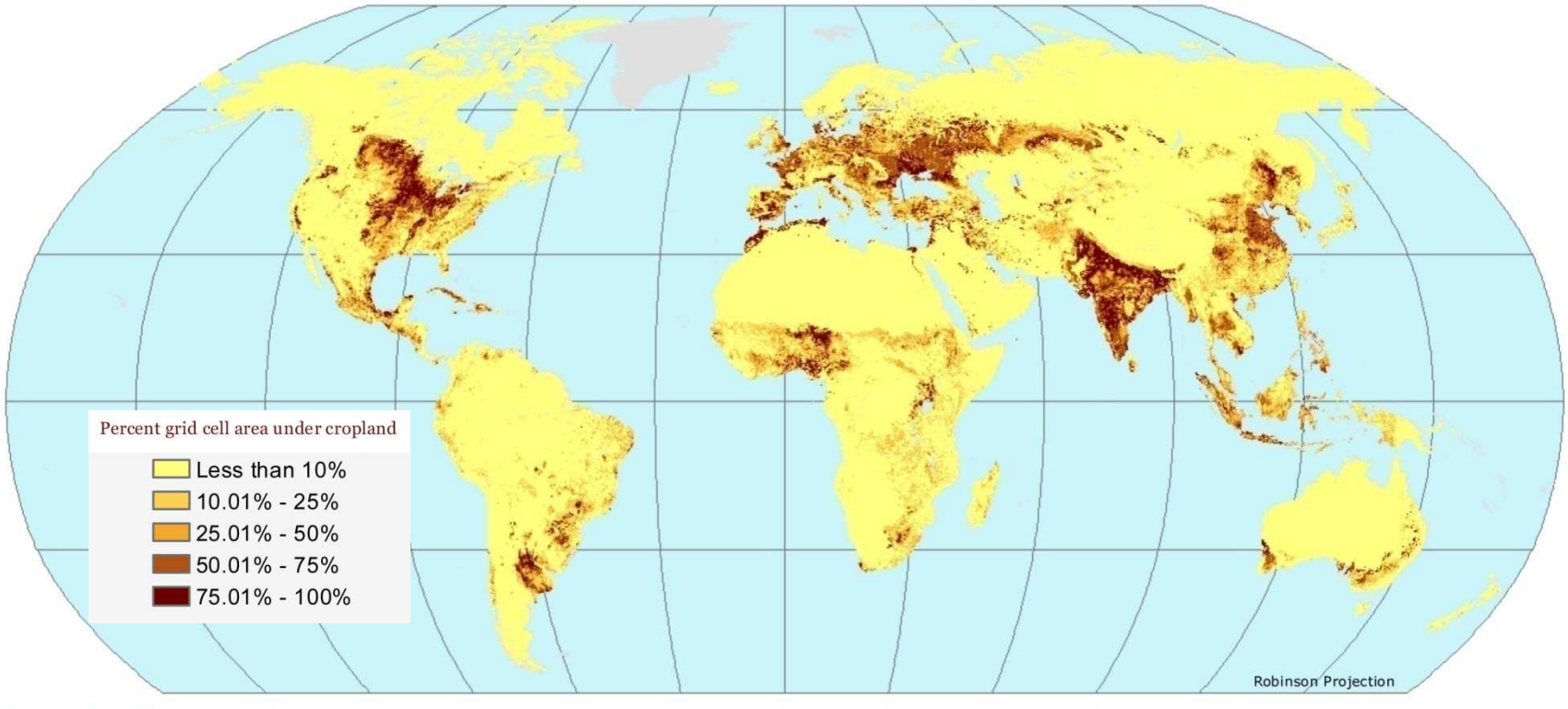
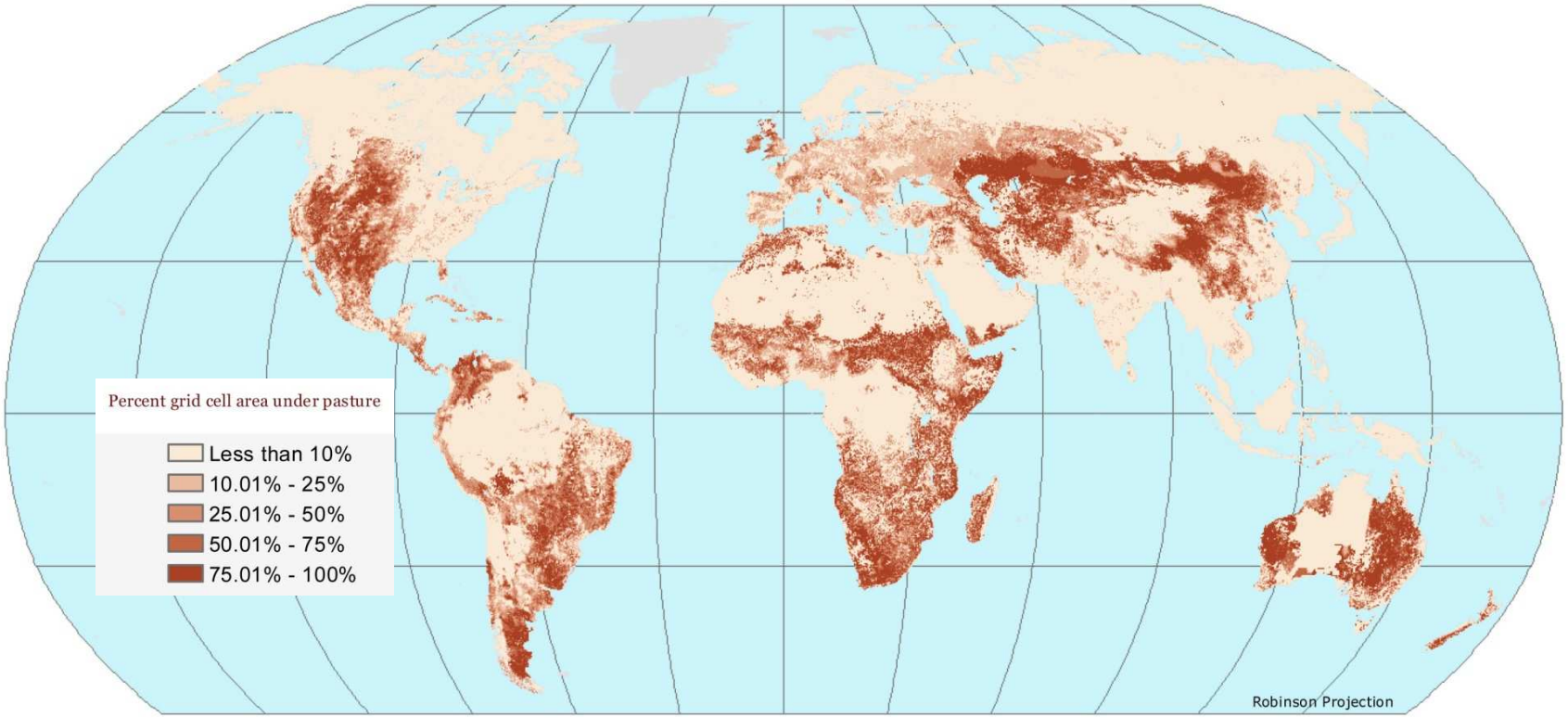
Approximate distribution of world croplands



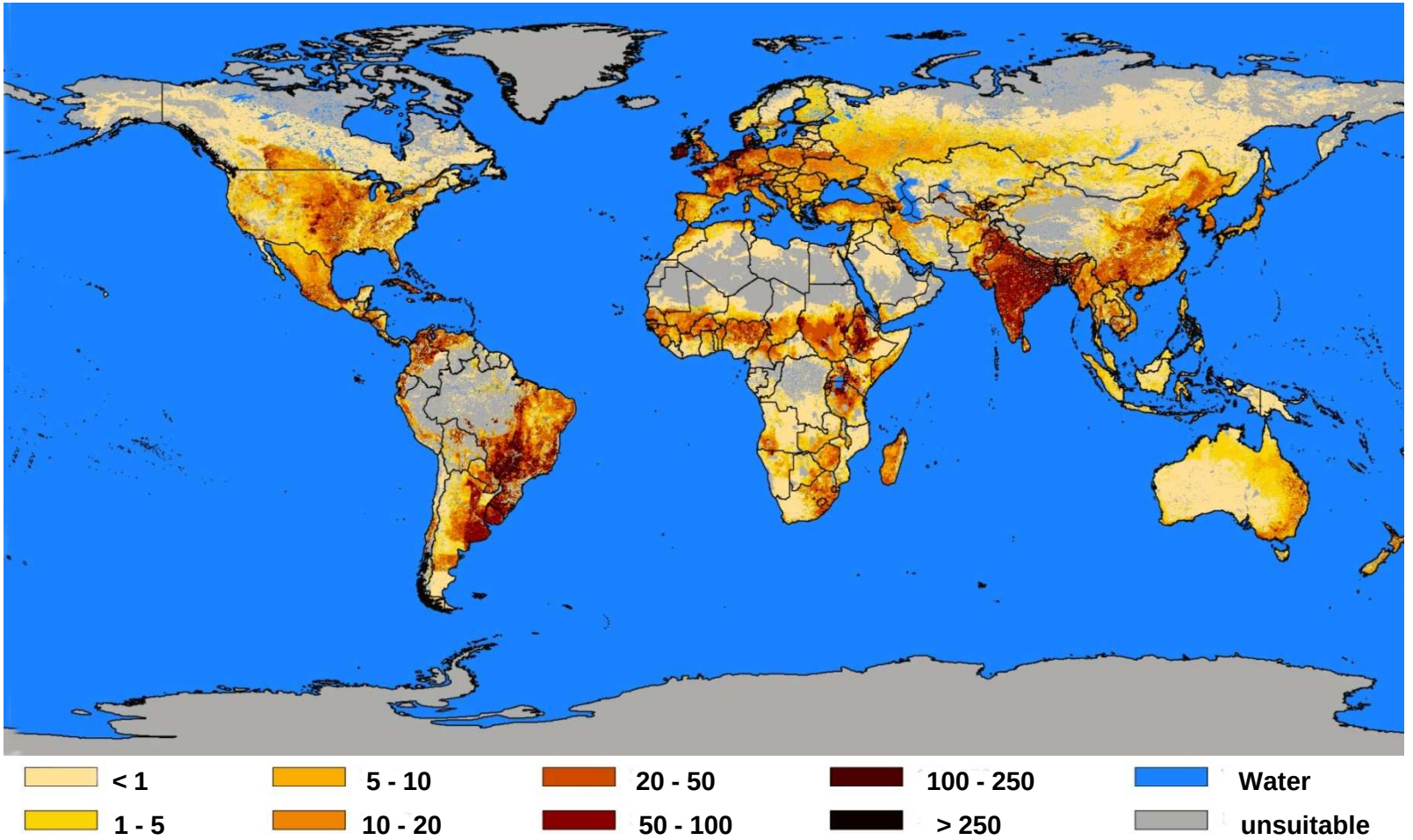
Source: Ramankutty, N., A.T. Evan, C. Monfreda, and J.A. Foley. (2010)
Downloaded from: http://sedac.ciesin.columbia.edu/es/aglands.html

Approximate distribution of world pastures



Source: Ramankutty, N., A.T. Evan, C. Monfreda, and J.A. Foley. (2010)
Downloaded from: http://sedac.ciesin.columbia.edu/es/aglands.html

Densities of bovine livestock [number/km²]



Source: FAO Gridded Livestock of The World

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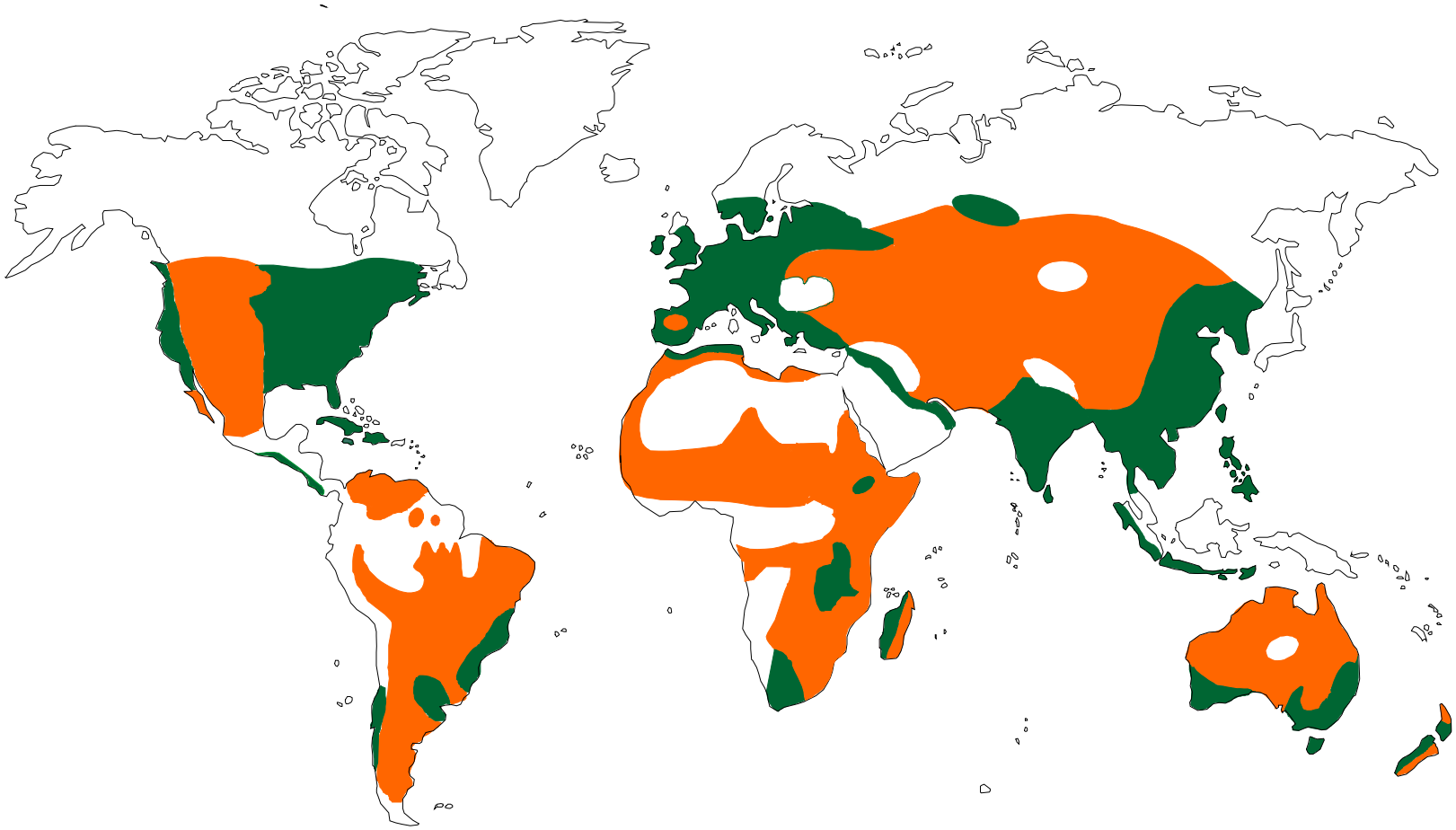
Worldwide distribution of crops and pastures as the base for livestock production systems



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