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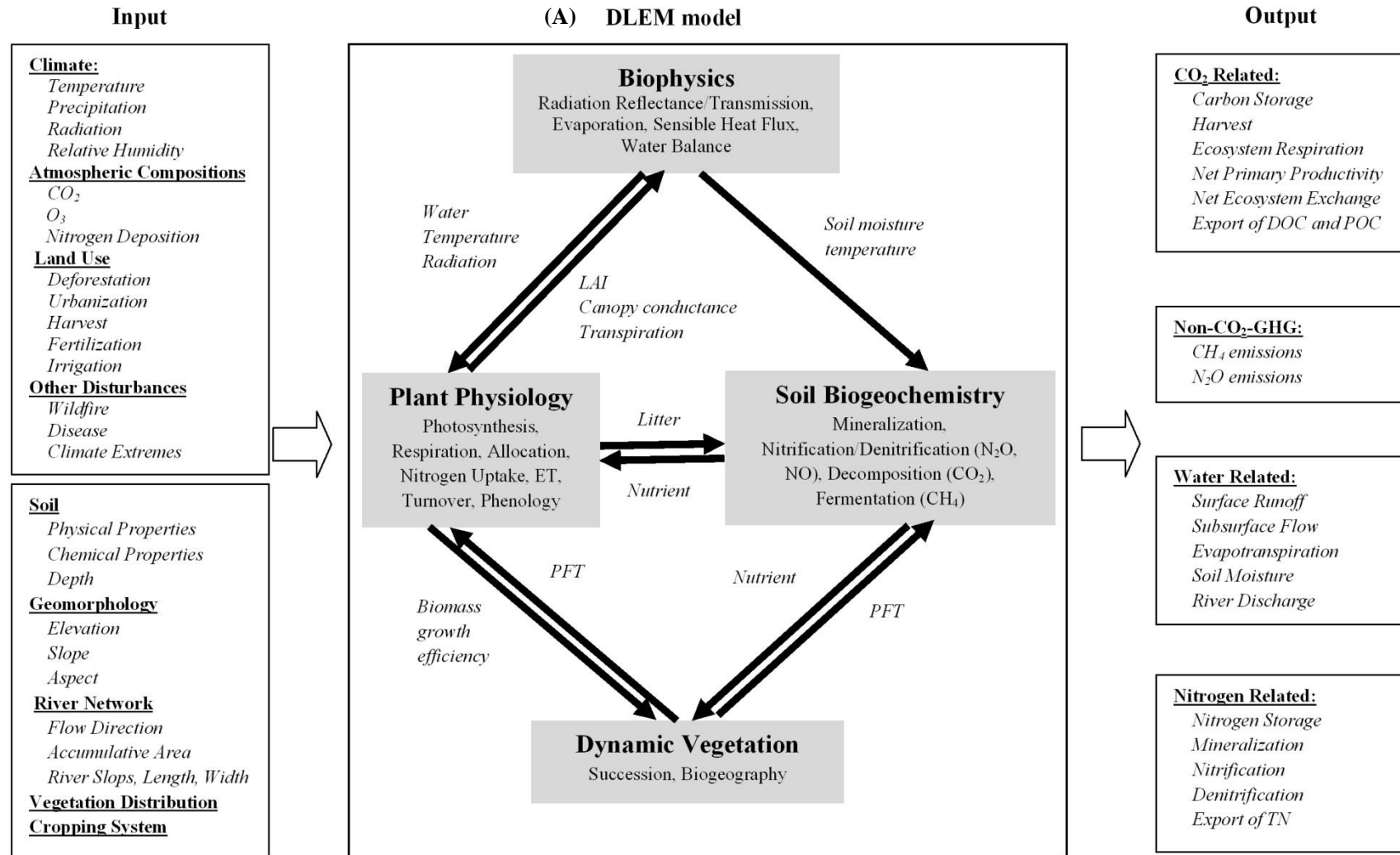


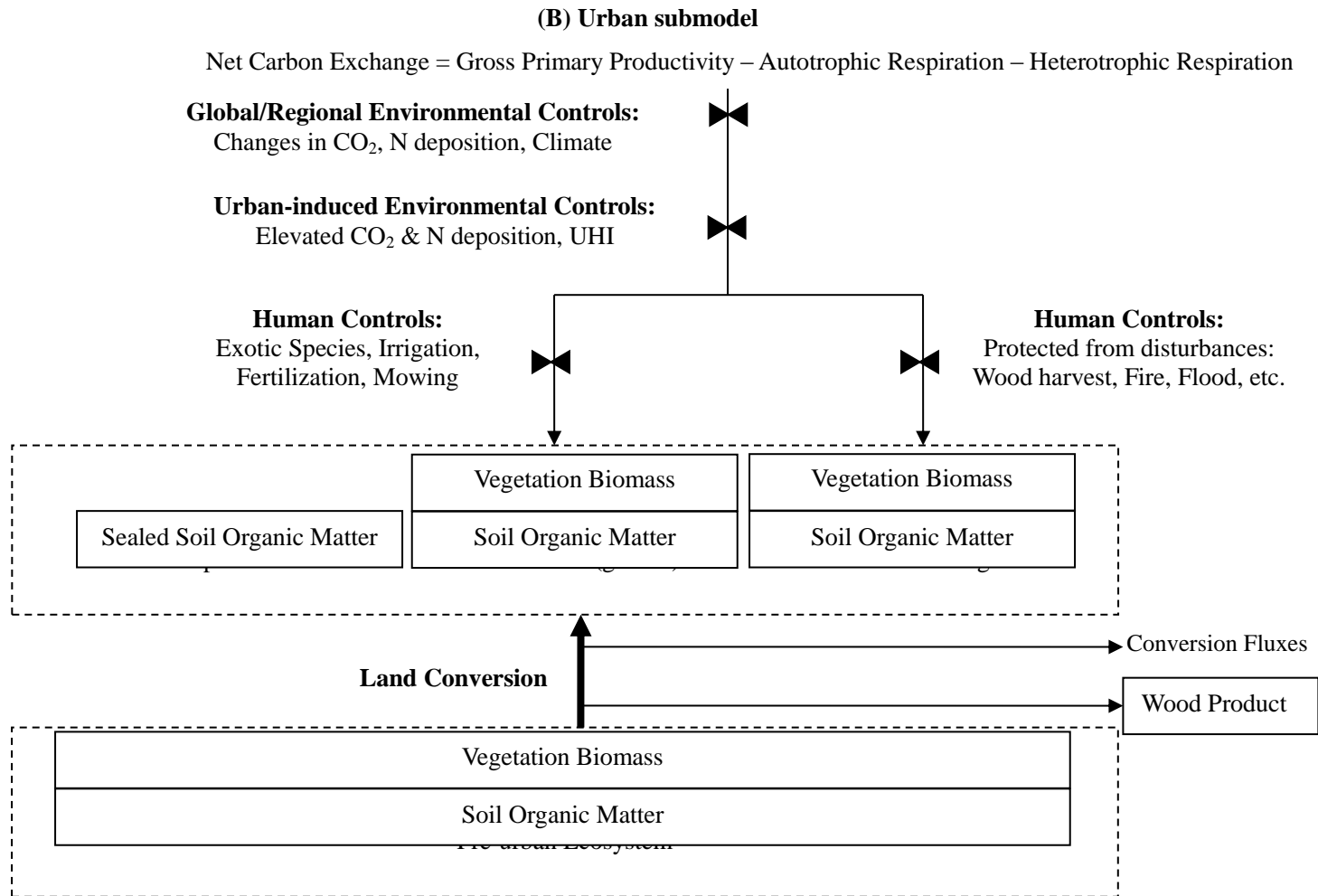
Supplement of

Multi-factor controls on terrestrial carbon dynamics in urbanized areas

C. Zhang et al.

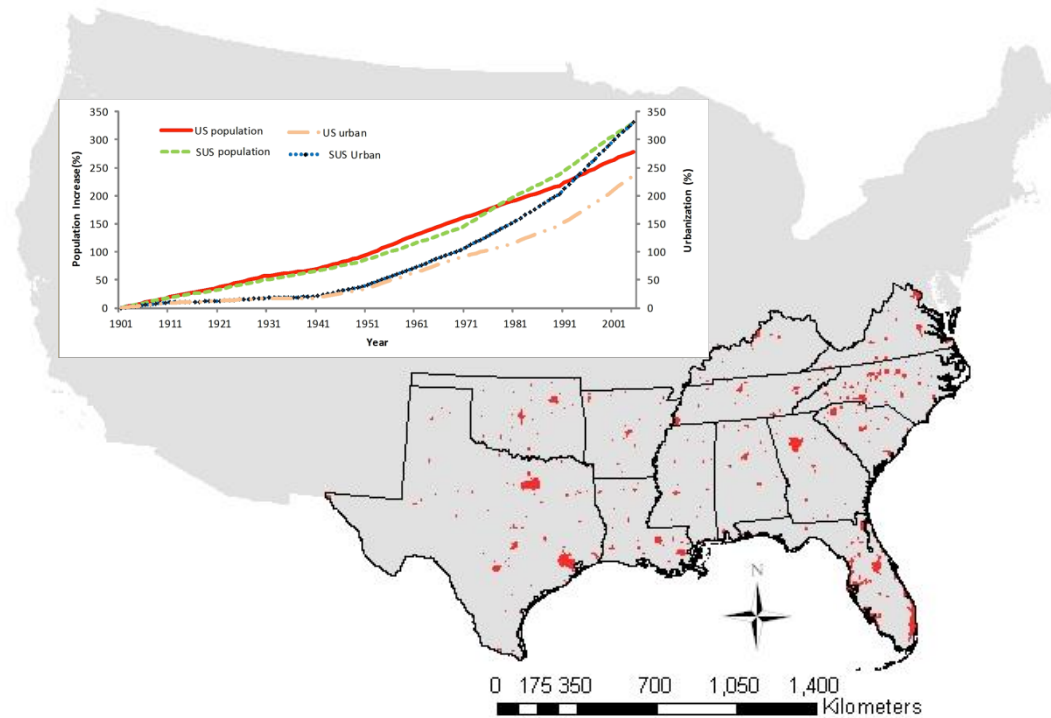
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Figure S1, Illustration of the Dynamic Land Ecosystem Model (DLEM). (a) the overall structure of DLEM; (b) the structure and controls of urban submodel in DLEM (Zhang et al., 2012).



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 2 Figure S2, The boundary of the SUS and the location of urban/developed lands (in red) (Zhang et al., 2012). The urban and developed
 3 lands were derived based on the study of Homer et al. (2007).
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Table S1, Model inputs for the Southern US case study — the background environmental drivers

Inputs	Unit	Temporal Resolution	Methods and Data Sources
Potential/native vegetation	8 [#] categories		Aggregated from the NLCD 2001 land cover dataset (Homer et al., 2007).
Soil clay content	%		
Soil sand content	%		
Soil silt content	%	Non-transient maps	Based on the 1 km resolution digital general soil association map (STATSGO) developed by USDA Natural Resources Conservation (NRC) (Miller and White, 1998).
Soil acidity	pH		
Soil bulk density	g/cm ³		
Elevation map	m		Generated from the 7.5 minute USGS National Elevation Dataset (NED). Data available online: edcnts12.cr.usgs.gov/ned/ned.html
Aspect map	Degree		
Slope map	Degree		
Irrigation map	1/0		From an Irrigated Area Map of the World developed by Thenkabail et al. (2006)
Precipitation	mm		
Maximum, minimum, and average temperature	°C	Daily	By integrating the daily climate pattern of the North American Regional Reanalysis (NARR; 32 km resolution) dataset (Mesinger et al., 2006) into the monthly PRISM (Parameter-elevation Regressions on Independent Slopes Model; 4 km resolution; 1895-present) climate data (Daly et al., 2008). See page 92-95 in Zhang (2008) for detailed description of the methodology.
Ozone index AOT40 [@]	ppb-hr		Dataset developed by Felzer et al. (2004)
CO ₂	ppmv		National Oceanic and Atmospheric Administration (NOAA) (www.esrl.noaa.gov)
Nitrogen deposition [§]	g N/m ² /yr		Retrieved from a global data set that was extrapolated from a three-year dataset (Dentener, 2006).
Cropland fertilization ^{&}	g N/ m ² /yr	Annual	Based on the county-level fertilizer consumption records (Alexander and Smith, 1990; Ruddy et al., 2006)
Cropland conversion	0/1		1: urban or cropland; 0: natural vegetation types. Developed by combining the contemporary land-use map that was derived from NLCD2001 (Homer et al., 2007) with historical census dataset for cropland, urban, and population (Waisanen and Bliss, 2002)
Urbanization	0/1		

[#] The 8 potential plant functional types: deciduous broadleaf forest, coniferous broadleaf forest, mixture forest, shrubland, C3 grassland, C4 grassland, grass wetland, and forest wetland.

[@] AOT40 (ppb-hr) is the accumulated exposure over a threshold of 40 ppb during daylight hours. Before 1940 the ozone index was 0. After 1994 the ozone concentration was assumed to be stable.

[§] Nitrogen deposition includes NH_x (NH₃ and NH₄⁺), and NO_y (oxidized nitrogen except N₂O).

& Available fertilization data extends from 1945 to 2002. We assumed no changes before 1945 and after