Global Gridded Land-use Forcing Datasets

George C. Hurtt

Professor & Research Director
Department of Geographical Sciences
University of Maryland
gchurtt@umd.edu

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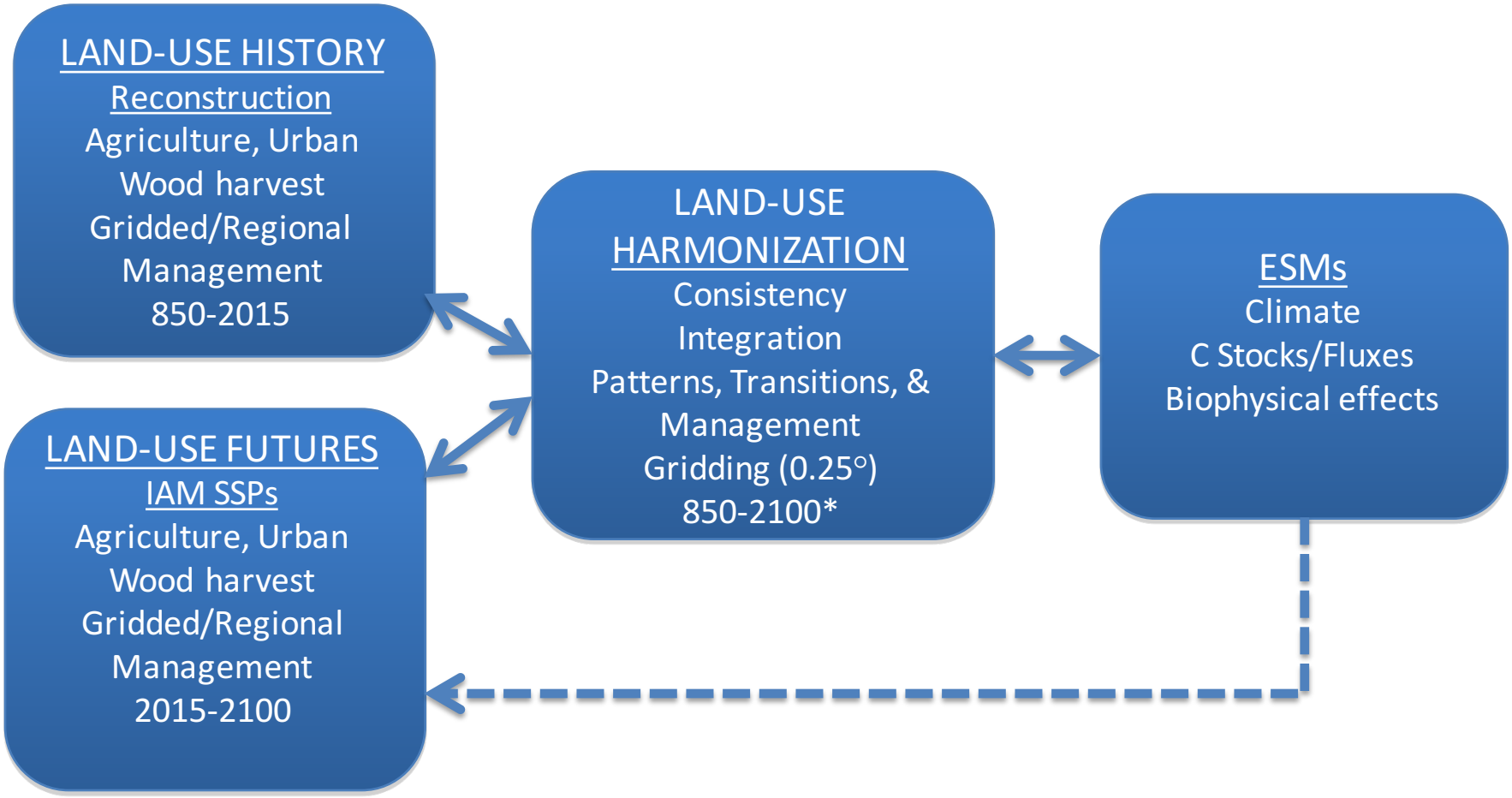
Land-Use Scheme (CMIP6)



* Upto 2300 for extensions

After Hurtt et al (2009, 2011)

Land-Use Datasets (CMIP6)

New History

Hyde 3.2 based
Landsat F/NF
Multiple crop typs (5)
Multiple pasture types (2)
Updated Forest Cover/B
Updated Wood harvest
Updated Shifting Cultivation
Extended time domain (850-2015)

New Mgt. Layers

Agriculture

Fraction of cropland irrigated
Fraction of cropland flooded
Fraction of cropland fertilized
Fertilizer application rates
Fraction of cropland tilled
Fraction of cropland for biofuels

Crop rotations

Wood Harvest

Fraction used for industrial products
Fraction used for commercial biofuels
Fraction used for fuelwood

New Future Scenarios

Six futures, SSP-based

New Resolution

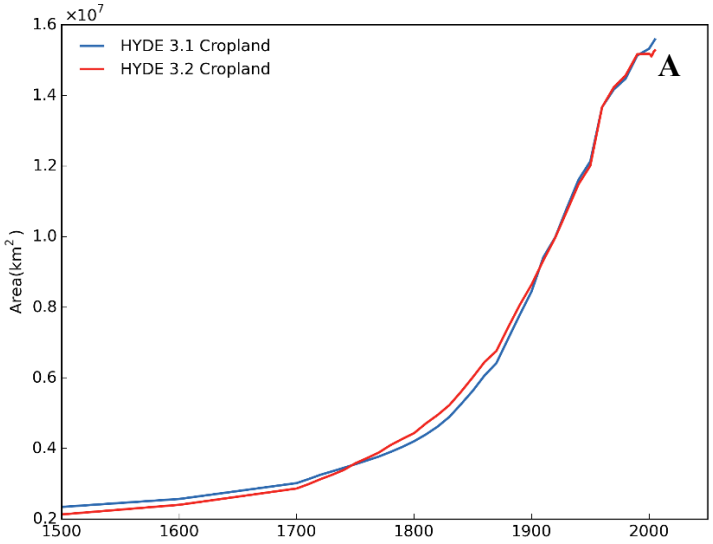
0.25°

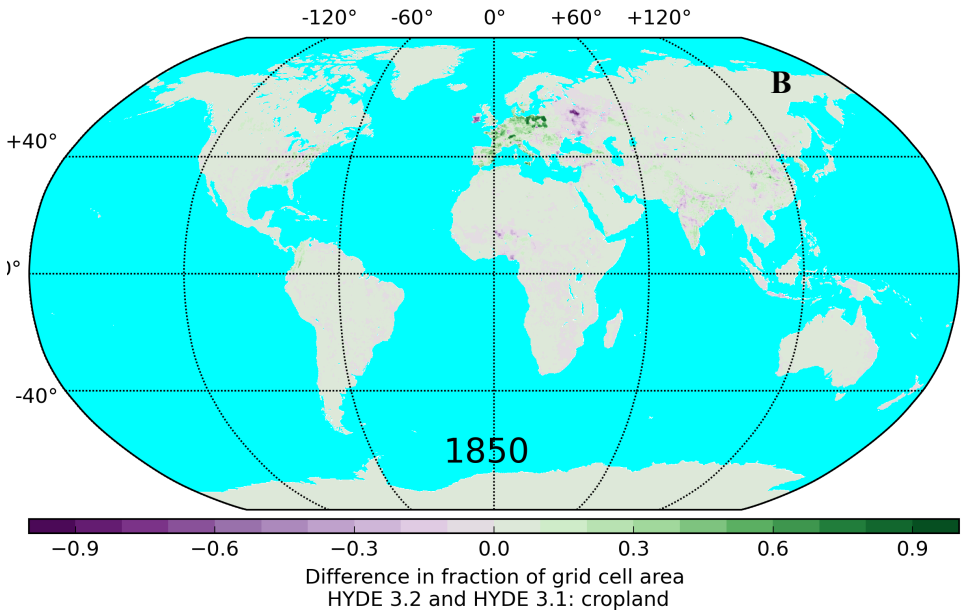
New Transition Matrix

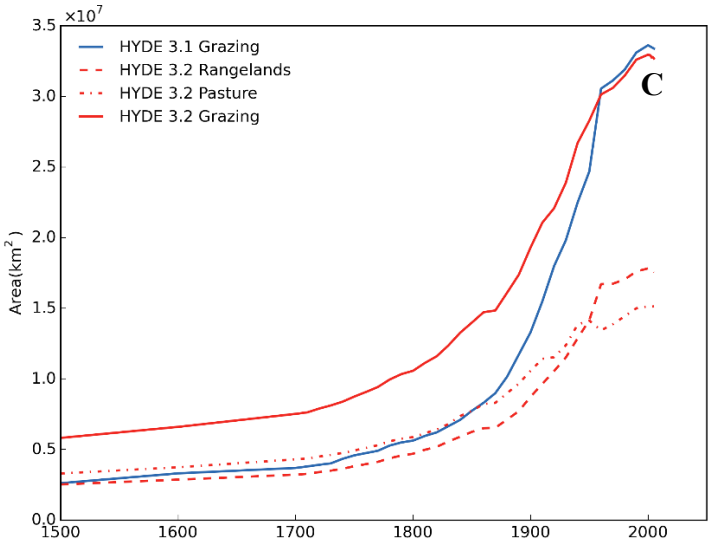
	Pri F	Pri NF	Sec F	Sec NF	C3 Ann	C4 Ann	C3 per	C4 per	C3 N-Fix	Pasture	Rangeland	Urban
Pri F	■	■		■								
Pri NF	■	■	■									
Sec F	■	■	■	■								
Sec NF	■	■	■	■								
C3 Ann	■	■			■							
C4 Ann	■	■				■						
C3 Per	■	■					■					
C4 Per	■	■						■				
C3 N-Fix	■	■							■			
Pasture	■	■								■	■	
Rangeland	■	■								■	■	
Urban	■	■										■

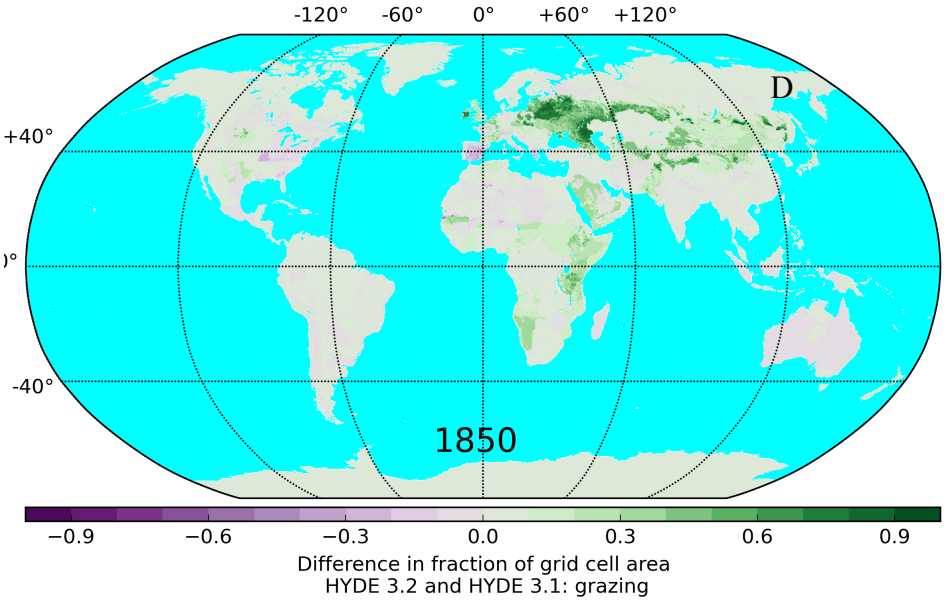
~ 50x information content of CMIP5!

Global Agricultural Area: HYDE 3.2* and HYDE 3.1

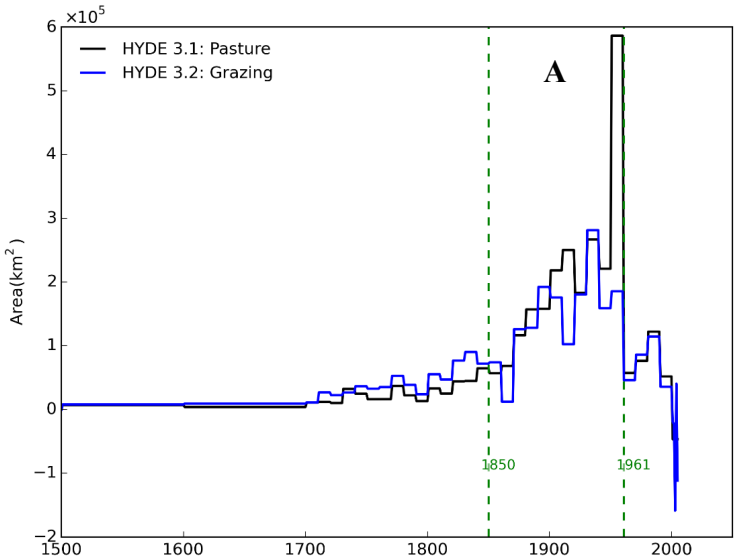


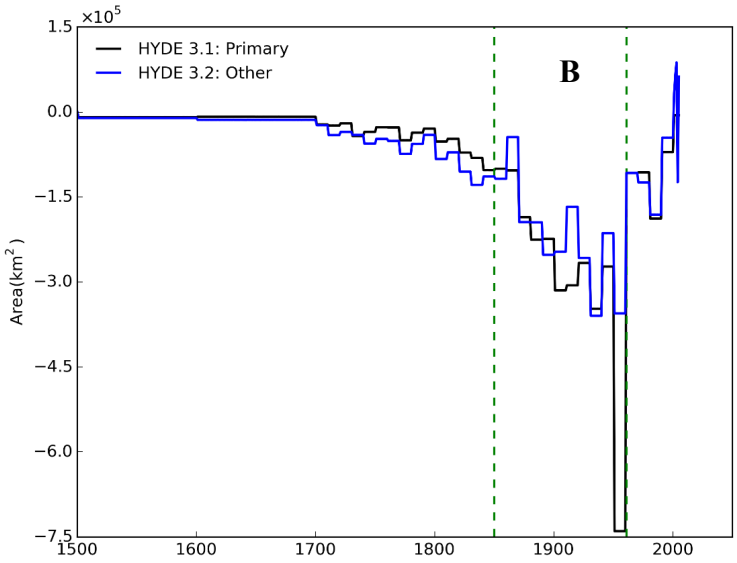






Annual Changes in Global Agricultural Area: HYDE 3.2* and HYDE 3.1





Forcing category	Type of Scenario	Forcing in 2100[1] (W/m2)	SSP	Short name	Use by other MIPs[2]
Tier 1[3]					
High	SSP-based RCP	8.5	5	SSP5-8.5	C[4]MIP, GeoMIP, ISMIP6, RFMIP
Medium-high	Gap: Baseline	7.0	3	SSP3-7	AerChemMIP, LUMIP
Medium	SSP-based RCP	4.5	2	SSP2-4.5	VIAAB, CORDEX, GeoMIP, DAMIP, DCPP
Low	SSP-based RCP	2.6	1	SSP1-2.6	LUMIP
Tier 2					
Additional 21st century scenarios					
Medium[4]	SSP-based RCP	6.0	1	SSP1-6.0	GeoMIP
Low	Gap: Mitigation	3.7	4	SSP4-3.7	
Overshoot scenario					
Overshoot[5]	Gap: Mitigation	2.6	X	SSPx-2.6 over	
Ensembles[6]					
SSP3-7.0, 9-member ensemble	Gap: Baseline	7.0	3	SSP3-7.0	AerChemMIP, LUMIP
Extensions					
SSP5-8.5, long-term extension	SSP-based RCP	8.5	5	SSP5-8.5 ext	C[4]MIP, ISMIP6, GeoMIP
SSP5-8.5, long-term – overshoot	SSP-based RCP	8.5	5	SSP5-8.5 ext-over	C[4]MIP, ISMIP6, GeoMIP
SSP1-2.6, long-term extension	SSP-based RCP	2.6	1	SSP1-2.6 ext	
Tier 3					
Additional 21st century scenarios					
Low[7]	Gap: Mitigation	<2.6	X	SSPX-Y	

Notes

1 Forcing levels are nominal identifiers. Actual forcing levels of the SSPs depend, for non-climate policy scenarios, on socio-economic developments while for scenarios that include climate policy, the objective was to replicate forcing in the RCPs run as part of CMIP5. These values differed somewhat from the nominal levels.

2 Current plans by other MIPs to use ScenarioMIP scenarios either directly or as a basis for a variant to be run as part of their own design are indicated here.

IAM Marker

ReMIND-MAgPIE (PIK, Germany)*

AIM (NIES, Japan)

MESSAGE-GLOBIOM (IIASA, Austria)*

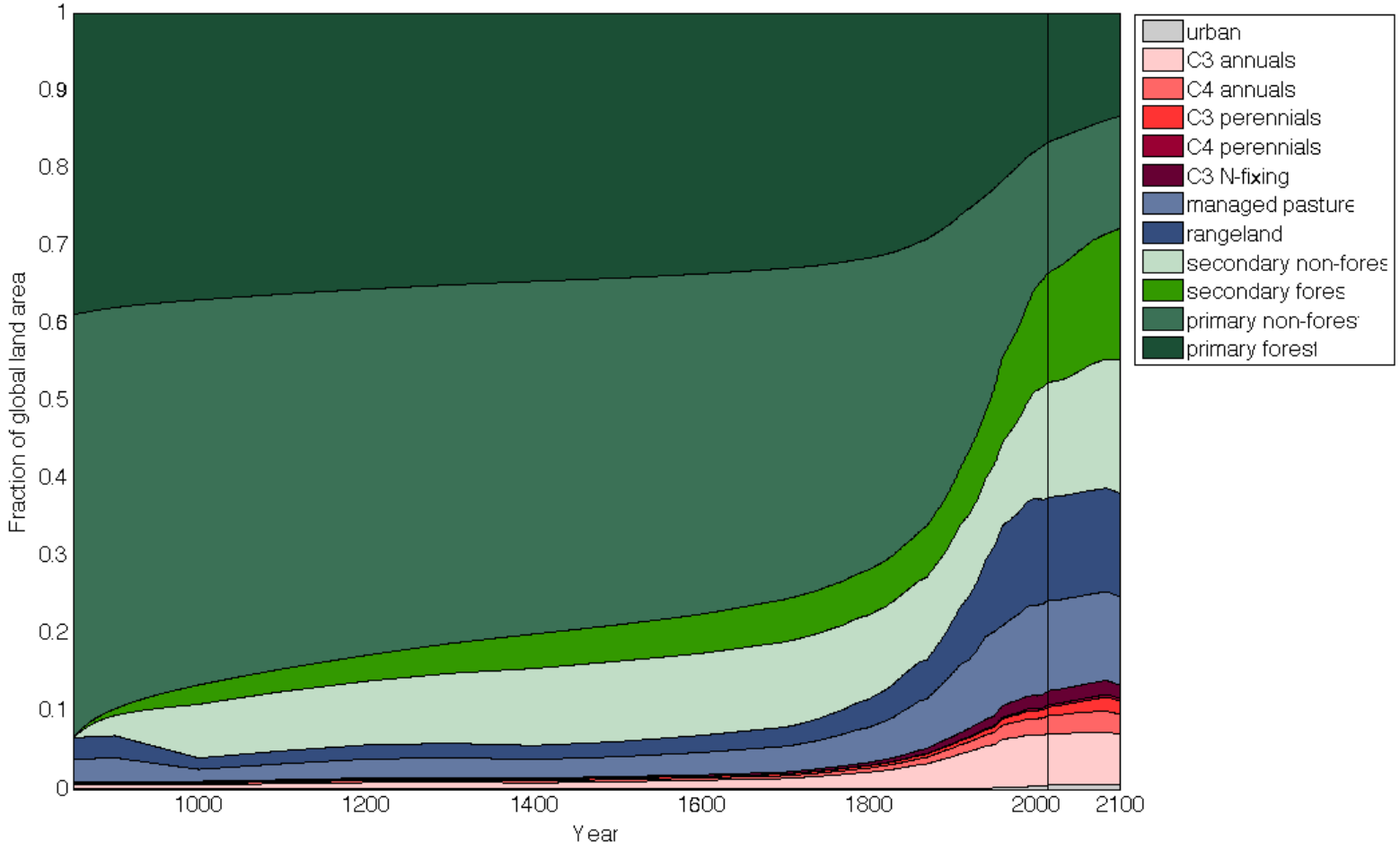
IMAGE (PBL, Netherlands)

IMAGE (PBL, Netherlands)
GCAM (PNNL, USA)*

*Received draft data

DRAFT DRAFT

Fraction of global land area for all land-use classes
(LUH2-v0.3, partial harmonization only)



DRAFT DRAFT

LUMIP/LU Forcing Timeline

- 2013 Summer: Concept
- 2013 Fall: CMIP Proposal, WGCM Briefing
- 2014 Spring: GLP Meeting, Workshop 1
- 2014 July 18-19: GEWEX – Biogeophysics
- 2014 July 22-23: Hamburg – Biogeochemistry
- 2014 August 5-9: AGCI Aspen Joint-MIP Workshop
- 2014 September 15: LUMIP proposal due
- 2015 January: Prototype Land-use dataset released (v0.1)
- 2015 July: CMIP6 Endorsement
- 2015 September: Prototype Land-use dataset released (v0.2)
- 2015 October: Prototype Land-use dataset released (v0.3)
- *2015 October: WGCM/CMIP6/LandMIP workshops*
- *2015 … <additional prototype release(s)>*
- *2016 January: Final Land-use dataset released (v1.0)*
- *2016 March: GMD papers due*
- *2016-2019: Model experiments, results and synthesis*
- *2020: WG1 AR6 Report published*

https://cmip.ucar.edu/lumip

Challenges

- Scientific advances: Extended history, increased data density, new quantities, additional future scenarios… More work = more science (Fun!)
- Data usage: Make greatest use of features in dataset, and standardize use of data across models
- Timeline: Tight, and has models freezing code prior to final datasets

RECC: Recommend models use of data prototypes now for I/O and testing, contribute to ongoing development of data use protocols, have potential workshop this spring on std data/usage/project integration, participation in LUMIP