DEFORESTATION EMISSIONS IN THE GLOBAL CONTEXT

A Winrock and Woods Hole Collaboration merged with the Global Carbon Project and the University of East Anglia

3 December 2012

18:30 – 20:00

WINROCK INTERNATIONAL
Putting Ideas to Work

Woods Hole Research Center
Science, Education, and Policy for A Healthy Planet

AGENDA

18:30

Welcome, Introductions, and Agenda Review

Michael Lesnick, Co-founder and Senior Partner, Meridian Institute

18:45

Winrock Internaional and Woods Hole Research Center Presentation

Introductions by: *Andreas Tveteraas, Senior Adviser, Norway's International Climate and Forest Initiative*

Presentation by: *Alessandro Baccini, Assistant Scientist, Woods Hole Research Center; Nancy Harris, Senior Carbon and Land Use Specialist, Ecosystem Services Group, Winrock International*

- Policy context and REDD+ implications
- Collaboration rationale and approach
- Research findings
- Future research advancements

AGENDA

19:00- Global Carbon Project and the University of East Anglia

***Presentation by*:** *Riccardo Valentini, University of Tuscia and Global Carbon Project, Heike Schroeder, School of International Development at the University of East Anglia*

- The latest data - 2012 Global Carbon Budget emissions and sinks (see Nature Climate Change 03 December 2012)
- Forest management carbon
- REDD+ MRV issues

19:25 -Questions, Answers and Discussion

Michael Lesnick, Co-founder and Senior Partner, Meridian Institute

19:55 -Summarizing Comments

Daniel Zarin, Director of Programs, Climate and Land Use Alliance

20:00- Adjourn

PROGRESS TOWARD A CONSENSUS ON CARBON EMISSIONS FROM TROPICAL DEFORESTATION

WINROCK INTERNATIONAL TEAM

DR. NANCY HARRIS, SENIOR CARBON AND LAND USE SPECIALIST, ECOSYSTEM SERVICES UNIT

DR. SANDRA BROWN, DIRECTOR AND CHIEF SCIENTIST, ECOSYSTEM SERVICES UNIT

DR. STEPHEN C. HAGEN, SENIOR RESEARCH SCIENTIST, APPLIED GEOSOLUTIONS, LLC

WOODS HOLE RESEARCH CENTER TEAM

DR. ALESSANDRO BACCINI, ASSISTANT SCIENTIST

DR. RICHARD HOUGHTON, SENIOR SCIENTIST

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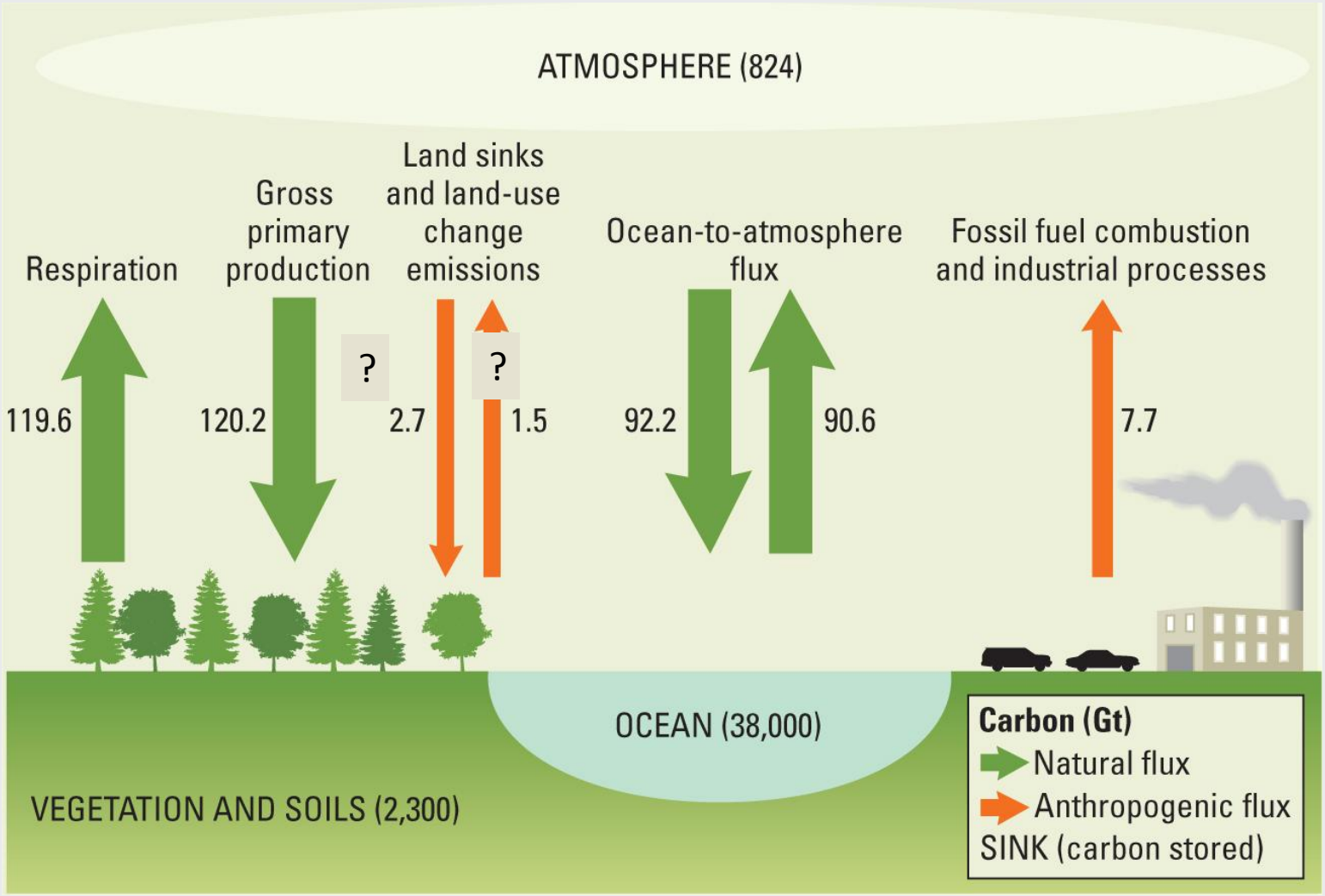
UNDERSTANDING THE ANTHROPOGENIC EFFECT ON THE CARBON CYCLE



CONFUSED?

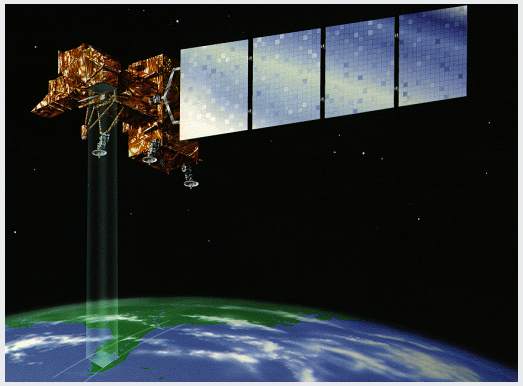
Study	Forest Area Change (Net/Gross)	Carbon Emissions (Net/Gross)	Emissions Estimate (Pg C yr^{-1})	Time Period
Houghton et al. (2003)*	Net	Net	2.2 ± 0.6	1990s
DeFries et al. (2002)*	Gross	Net	0.9 ± 0.5	1990s
Achard et al. (2004)*	Gross	Net	1.1 ± 0.3	1990s
Van der Werf et al. (2009)	Gross	Net	1.2	2000-2005
Friedlingstein et al. (2010)*	Net	Net	1.1 ± 0.7	2000-2009
Pan et al. (2011)*	Net	Net + Gross	1.3 ± 0.7 (Net) 2.8 ± 0.5 (Gross)	2000-2007
Baccini et al. (2012)	Net	Net + Gross	1.0 (Net) 2.2 (Gross)	2000-2010
This study†	Gross	Gross	0.81 (median) 0.57 – 1.22 (range)	2000–2005

* Uncertainty based on expert opinion

† Uncertainty based on statistical analysis

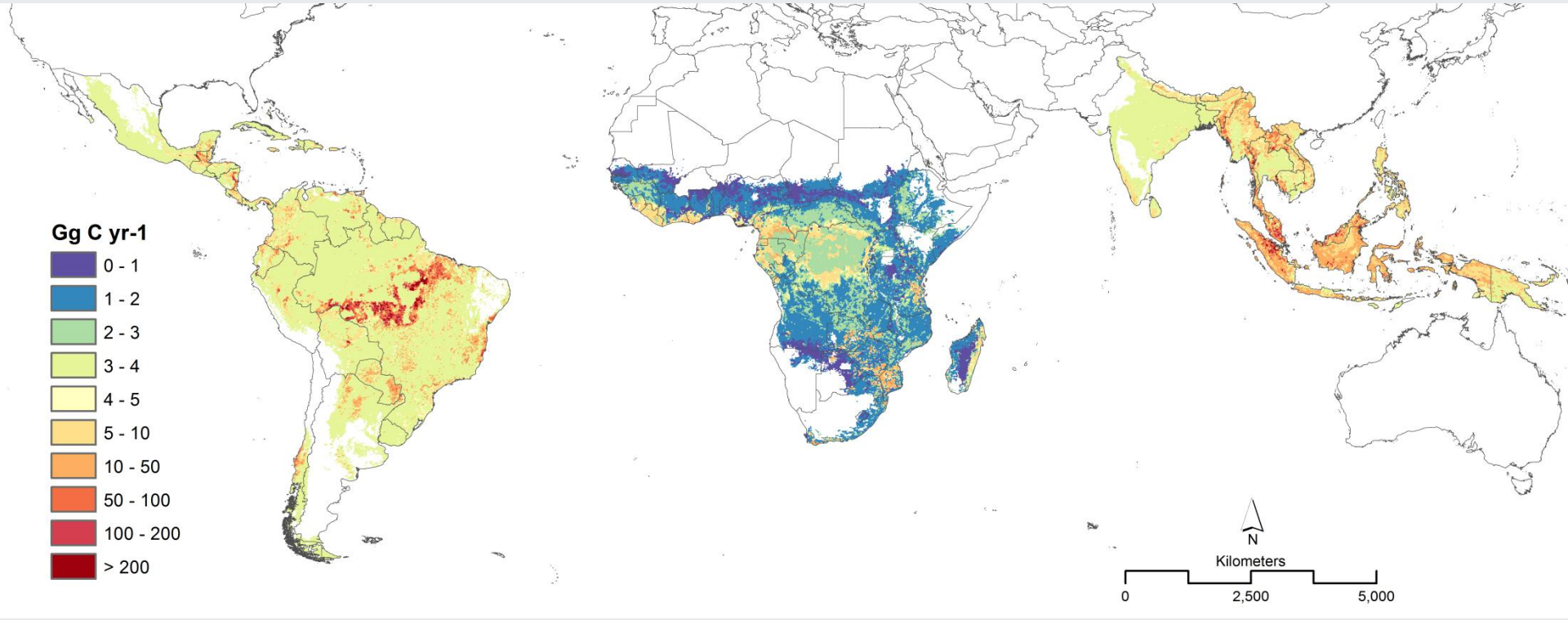
Harris et al. 2012 *Science*, Table S1

A CLEARER PICTURE OF TROPICAL DEFORESTATION EMISSIONS



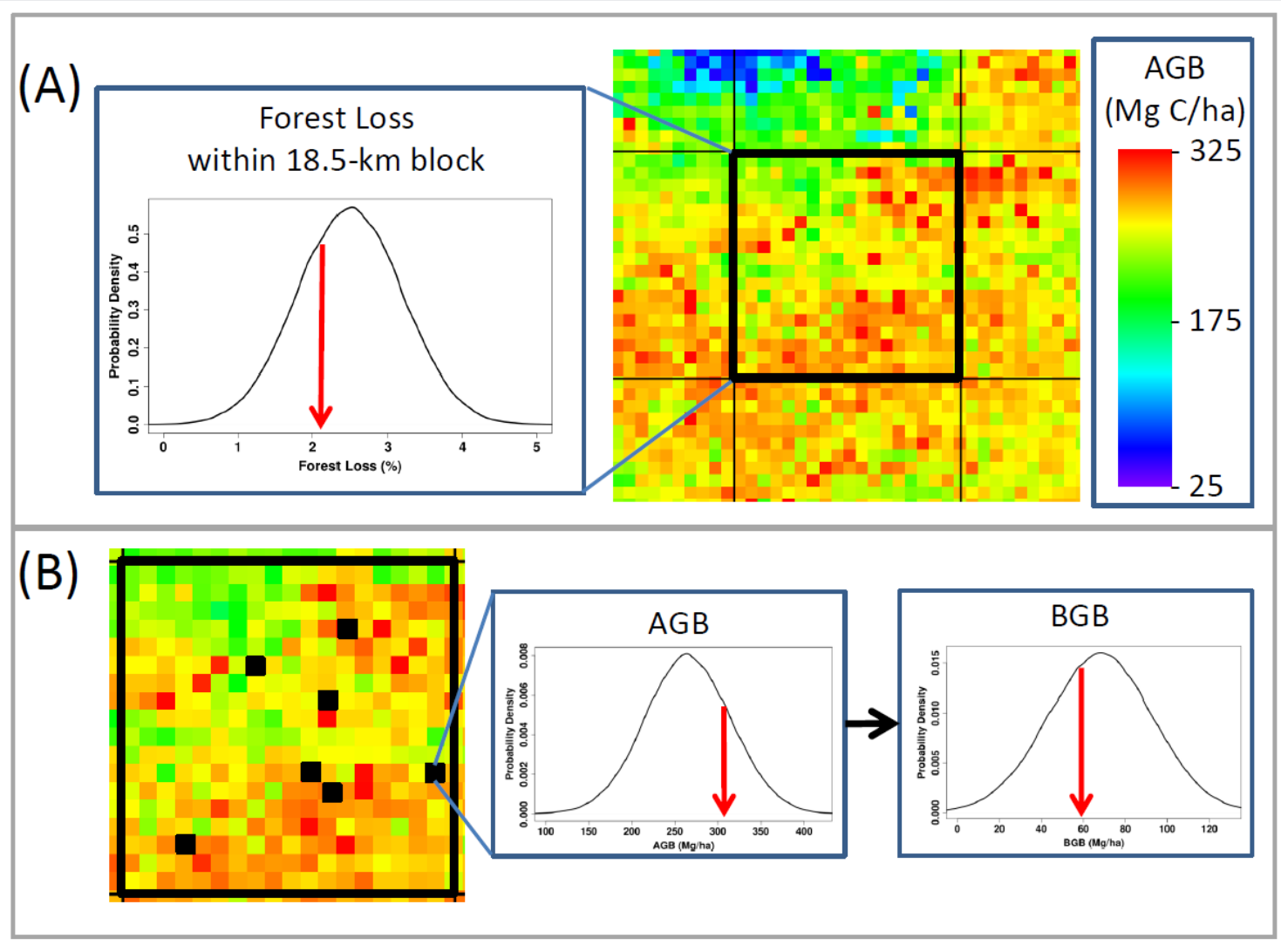
- Harris et al. used state-of-the-art data and methods to estimate
  - **gross** forest loss
  - forest carbon stocks
- …. and develop **improved**, **spatially-explicit, internally consistent, statistically bound** estimates of carbon emissions from deforestation in tropical areas for the time period 2000 to 2005

SHARPENING THE IMAGE

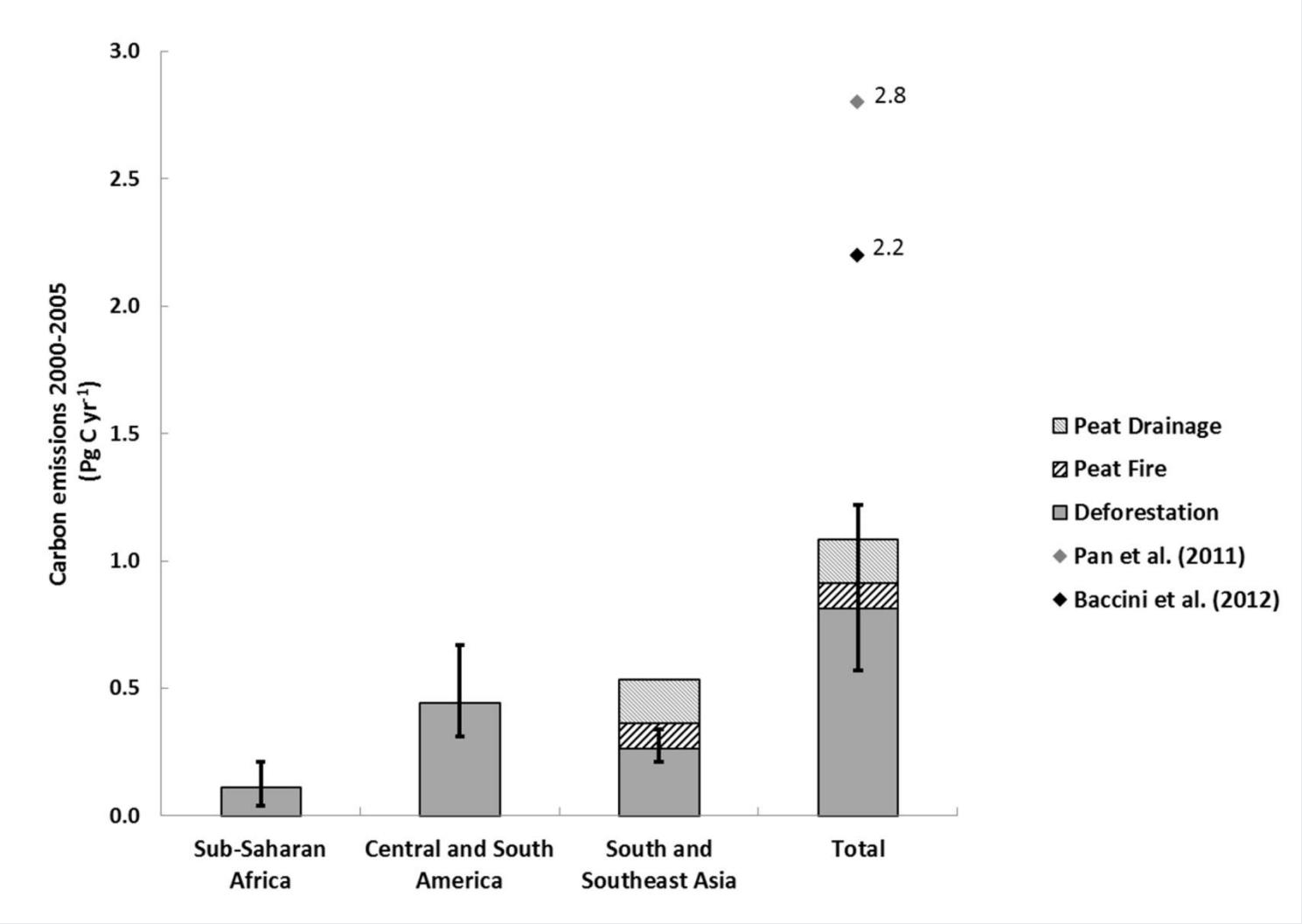


Harris et al. 2012 *Science* Fig. 2

UNCERTAINTY ESTIMATION



INITIAL COMPARISON



Harris et al. 2012. *Science* Figure 1

UNCERTAINTY IN CARBON CYCLE

- Carbon Stock and deforestation estimates are key factors in carbon fluxes calculations
- 60% of the uncertainty in carbon fluxes from deforestation in the Brazilian Amazon are due to uncertainty in carbon stock[1]
- Estimates of aboveground carbon storage in tropical African forests vary by over 100% (46.9 Pg – 104.5 Pg) [2]
- To reduce uncertainty we need to know the carbon stored in the forest that has been removed

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[1] Houghton et al. 2002, Lewis et al. 2009

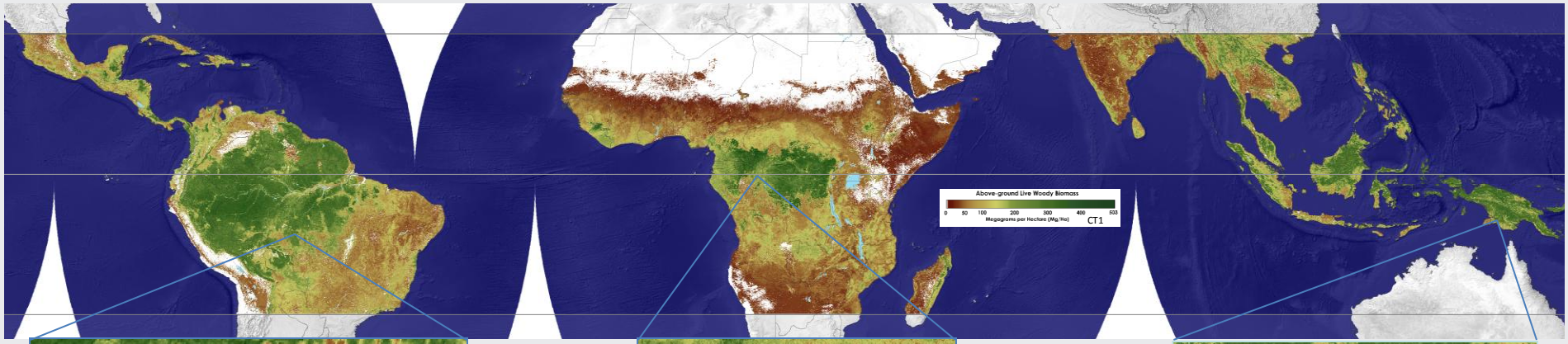
PANTROPICAL FOREST CARBON MAPPED WITH SATELLITE AND FIELD OBSERVATIONS

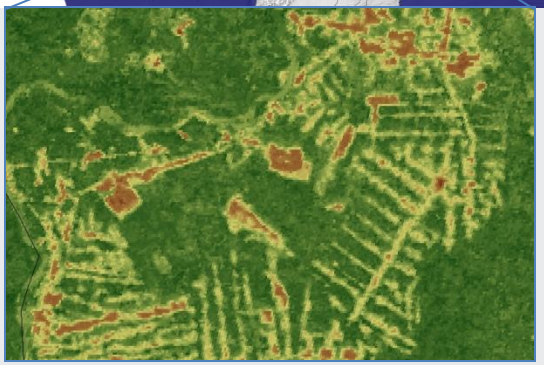
Baccini et al. 2012

Error 25 Mg C ha^{-1}

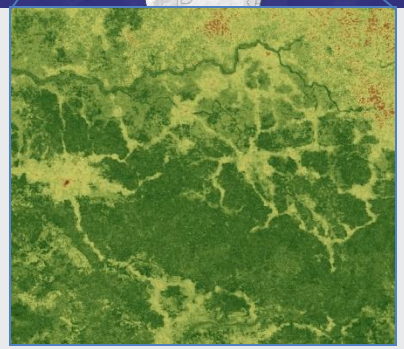
Error 19 Mg C ha^{-1}

Error 24 Mg C ha^{-1}

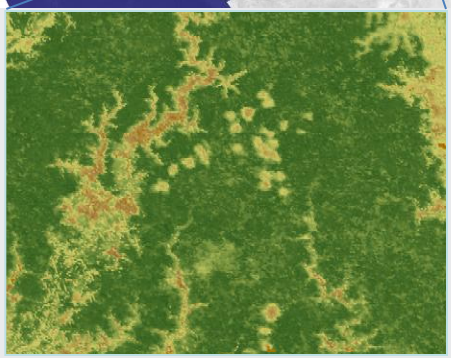




Amazon Basin detail from the map



DRC detail from the map



PNG detail from the map

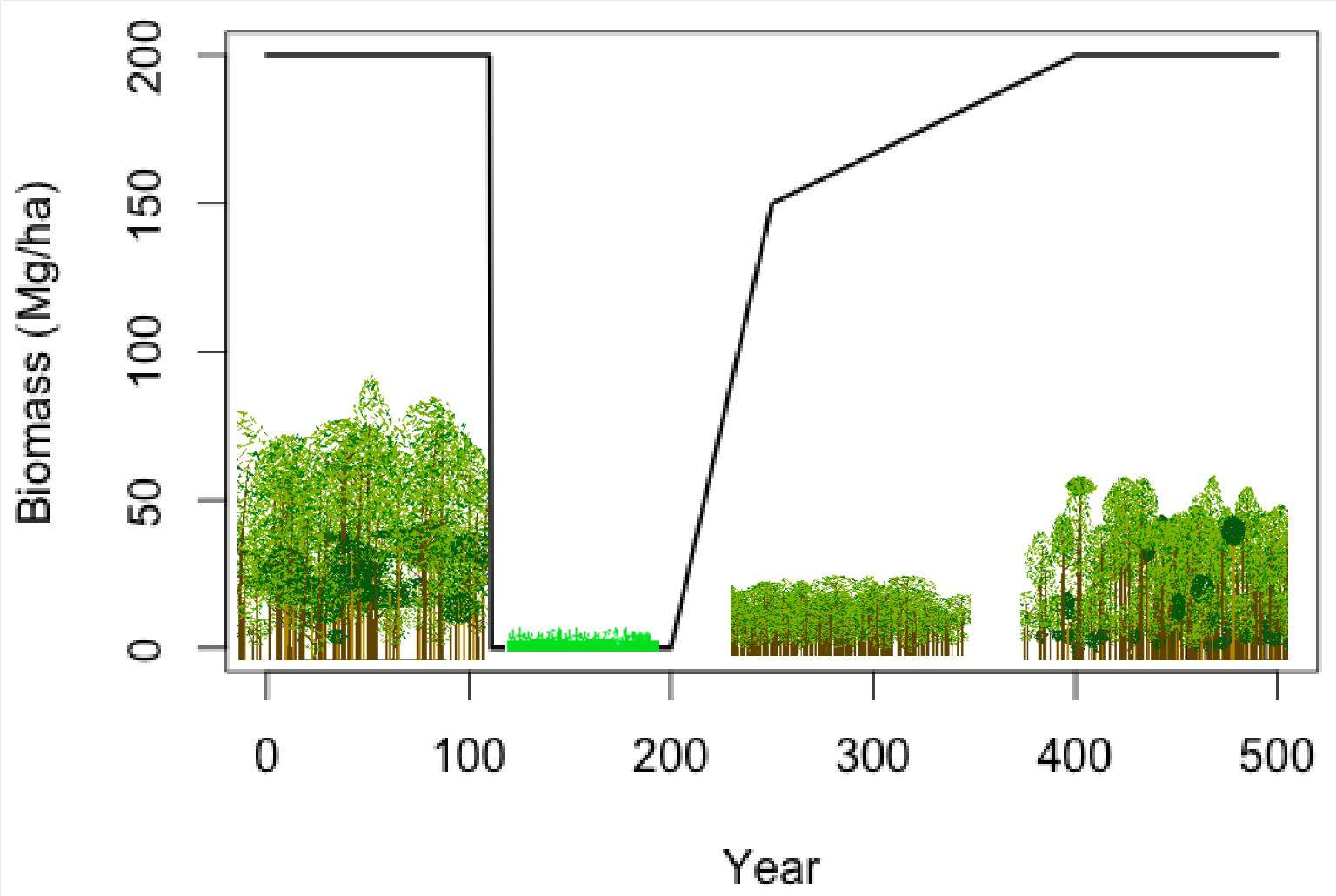
BACCINI ET AL. APPROACH

DATA

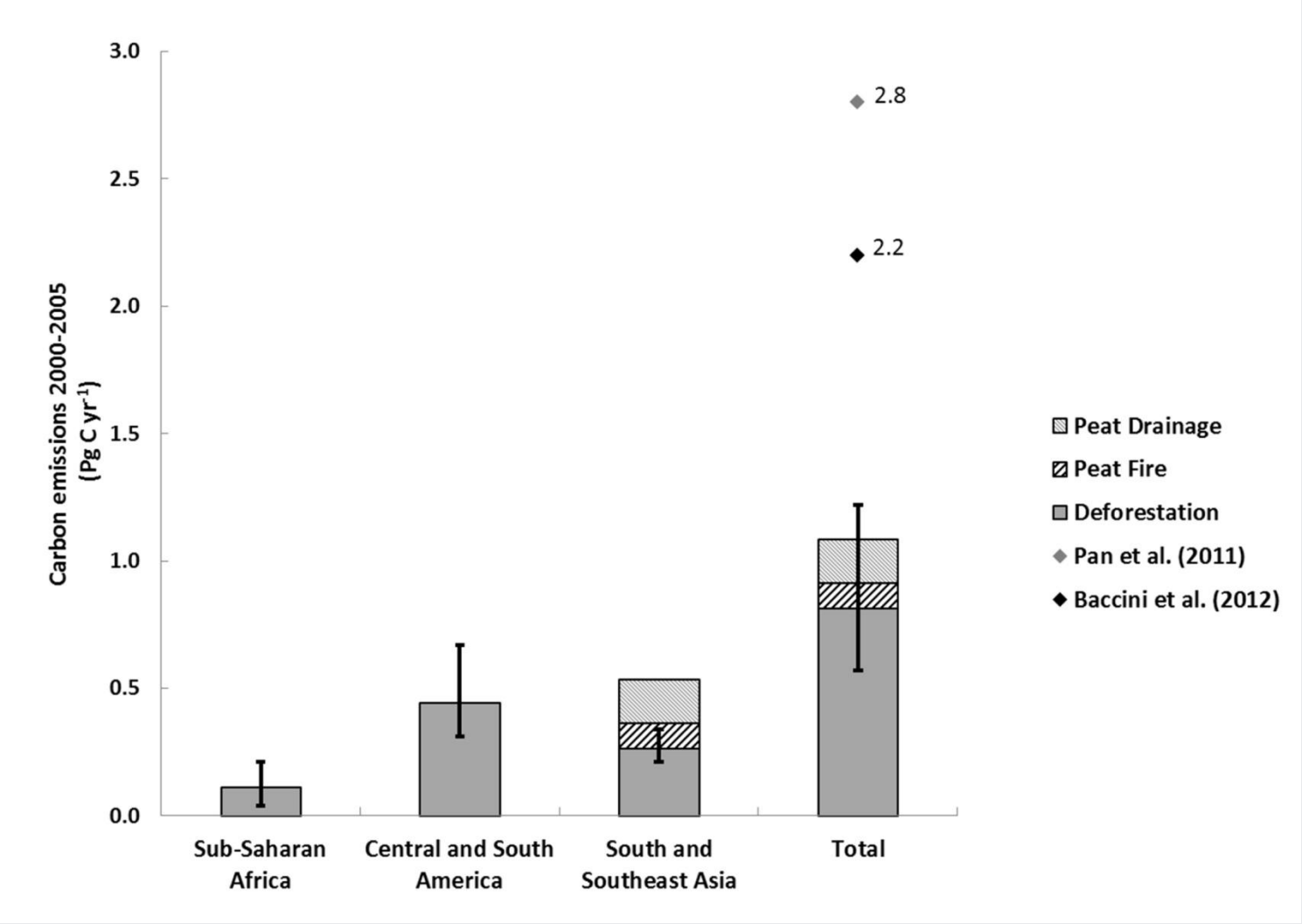
1. Satellite derived carbon densities
2. Satellite deforestation locations
    a) **To better characterize carbon of forest lost**
3. Rates of land use & land-cover change

CARBON TRACKING (BOOKKEEPING) MODEL

BOOKKEEPING MODEL

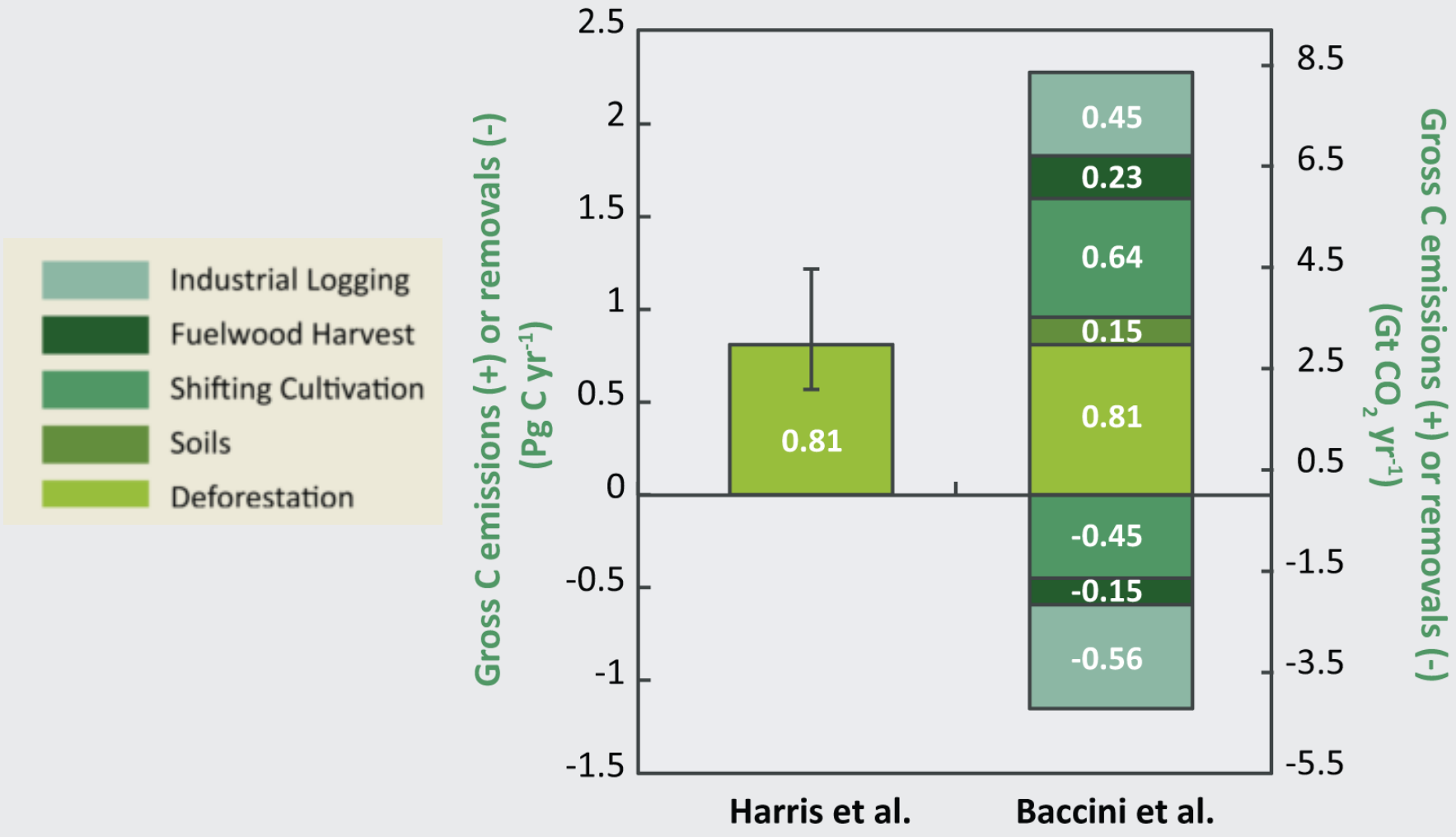


INITIAL COMPARISON



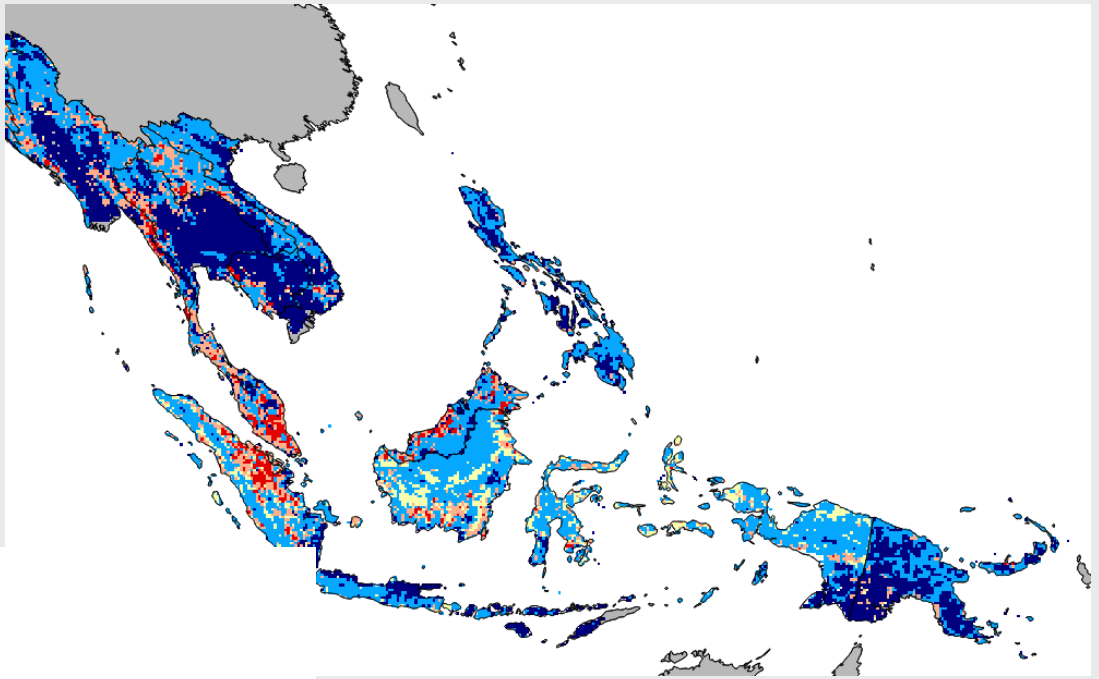
Harris et al. 2012. *Science* Figure 1

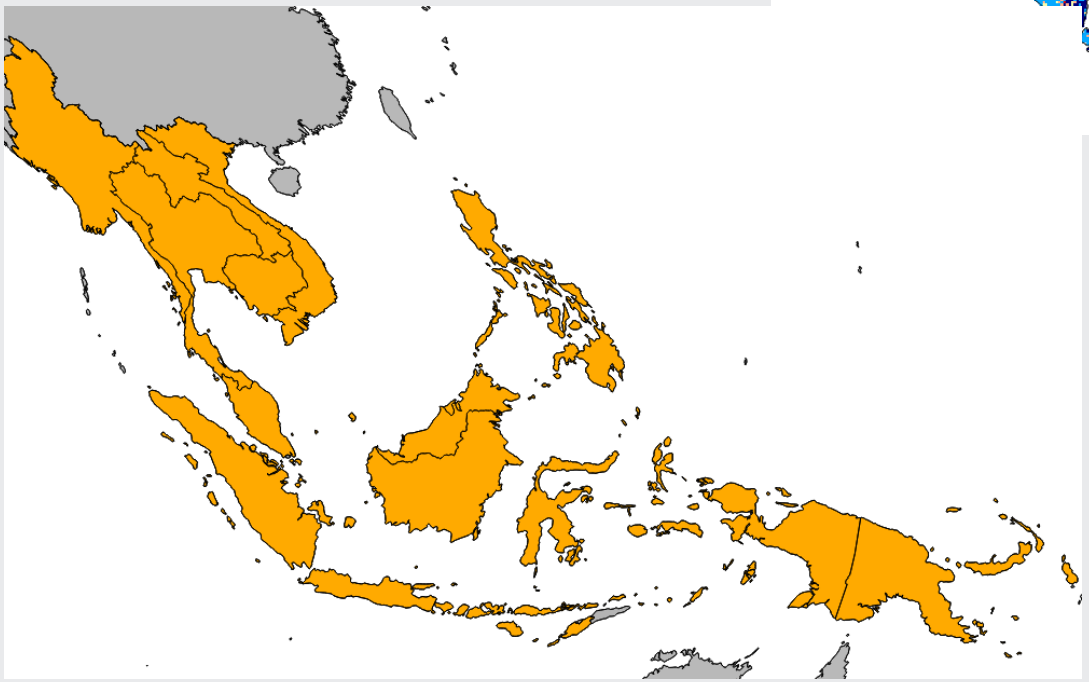
DIFFERENCE #1: SCOPE



DIFFERENCE #2: SCALE

Harris et al.
18.5 km resolution
2000-2005





Baccini et al.
8 regions
2000-2010

DIFFERENCE #3: DATA

	WHRC team	Winrock team
Mean forest carbon stocks in deforested blocks (Mg C ha^{-1})		
Sub-Saharan Africa	40	61
Latin America	88	90
South and Southeast Asia	56	144
Pantropics	69	95
Rates of gross forest loss (10^3 ha yr^{-1})		
Sub-Saharan Africa	3,610	1,889
Latin America	4,882	4,873
South and Southeast Asia	1,230	1,785
Pantropics	9,722	8,547
Gross carbon emissions (Pg C yr^{-1}) *		
Sub-Saharan Africa	0.23	0.11
Latin America	0.47	0.44
South and Southeast Asia	0.11	0.26
Pantropics	0.81	0.81

DIFFERENCE #4: MODELS

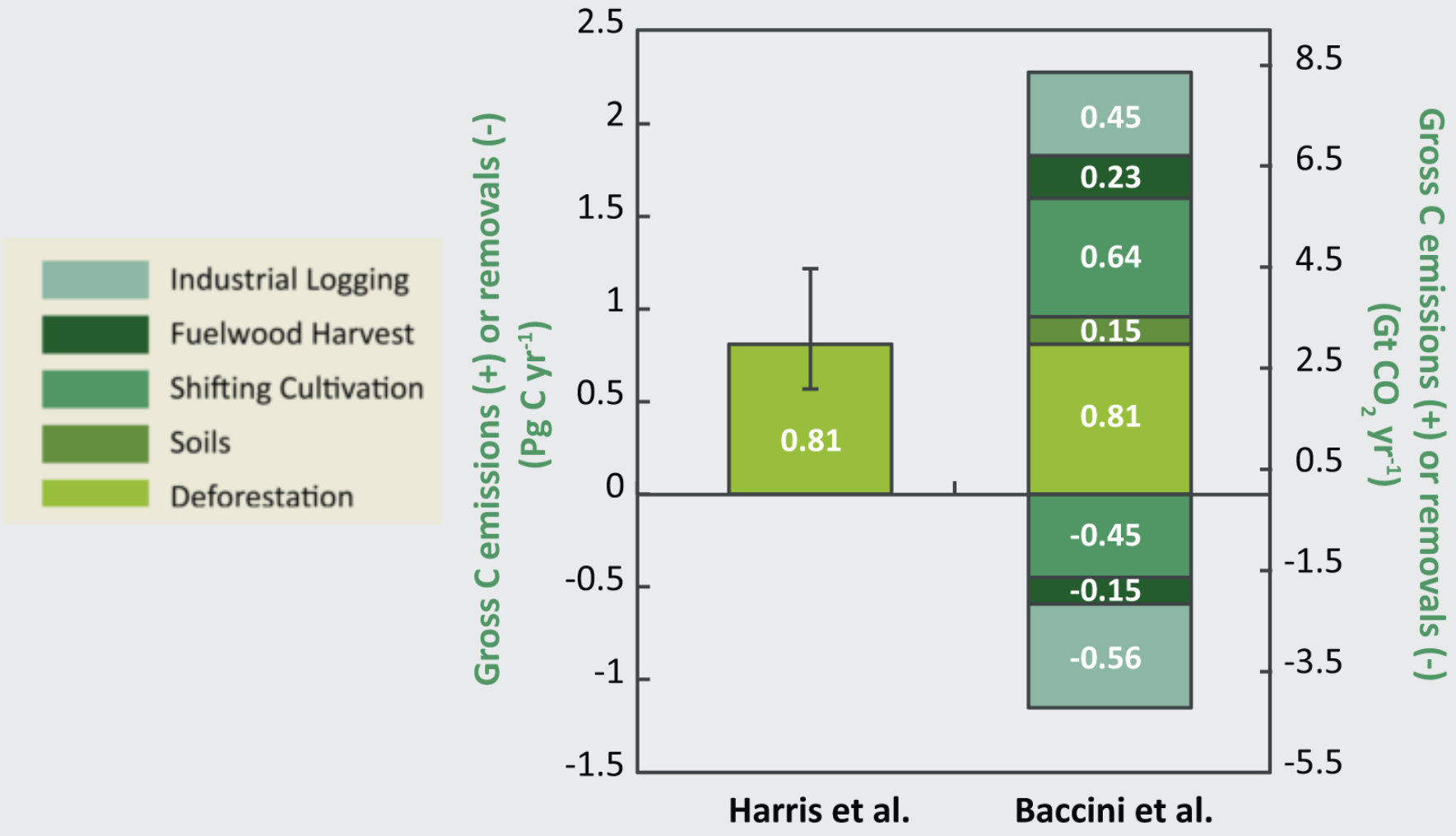
HARRIS ET AL.

- Observation-based
- Spatially explicit combination of area x C stocks
- Uncertainty = statistically based, randomization approach

BACCINI ET AL.

- Model-based
- Carbon response curves based on “average” values
- Uncertainty = sensitivity analysis (varying model input parameters)

WHERE WE AGREE



WHERE WE DON'T AGREE

	WHRC team	Winrock team
Mean forest carbon stocks in deforested blocks (Mg C ha^{-1})		
Sub-Saharan Africa	40	61
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GOING FORWARD

1. **SOILS**
    - Methods and samples
2. **DEGRADATION**
    - Logging and wood harvesting
3. **AREA UNDER SHIFTING CULTIVATION**
4. **CONTINUITY IN SATELLITE OBSERVATIONS**