



Carbon and Sustainability Tracking

Speaker Background

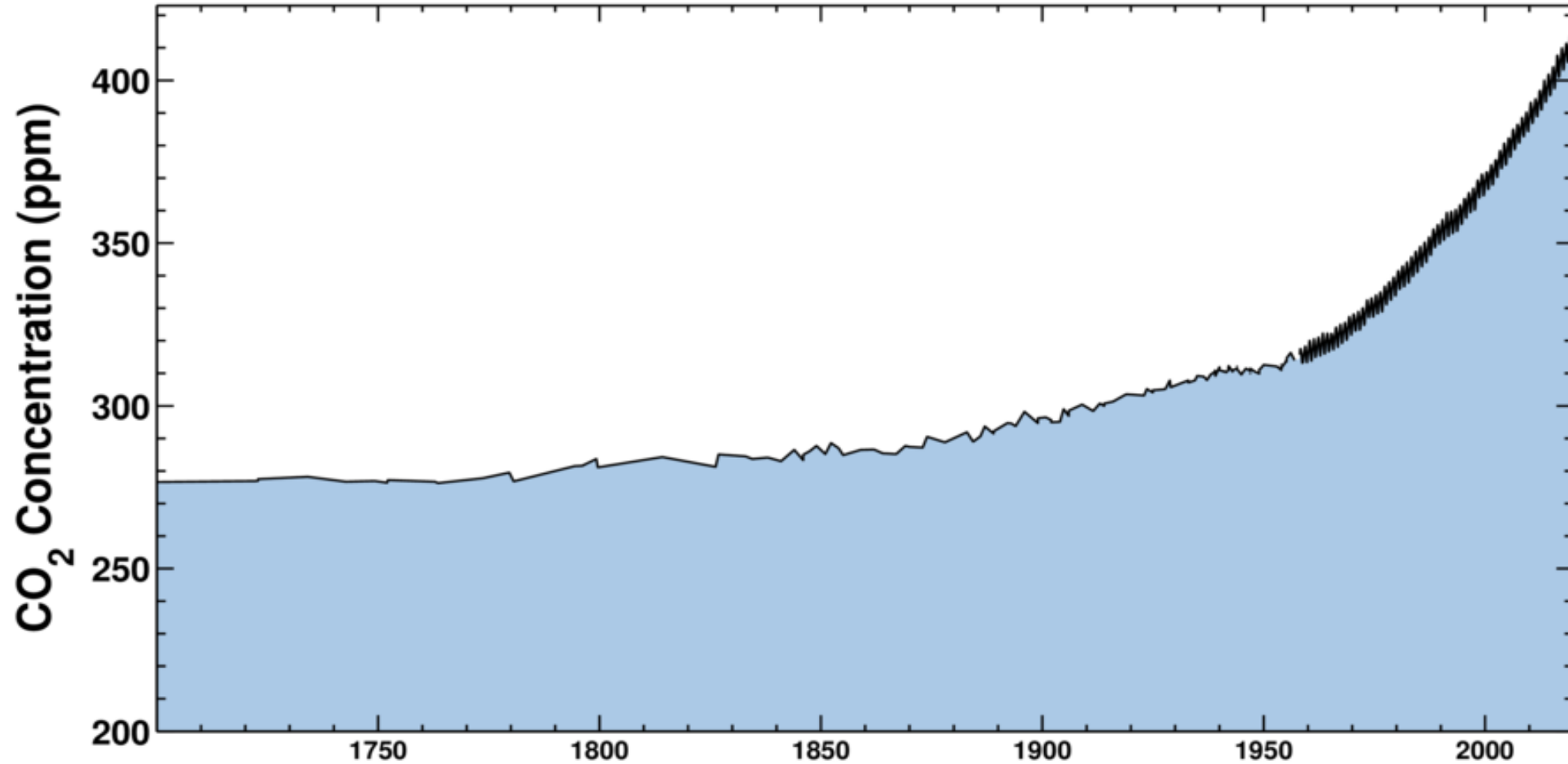
- Grant Domke
 - Current position:
 - Research Forester and Group leader, USDA Forest Service
 - Fellow, Institute on the Environment, University of Minnesota
 - Adjunct Assistant Professor, Department of Forest Resources, University of Minnesota
 - Credentials:
 - Ph.D. Forest Ecosystem Science, University of Minnesota
 - M.S. Forest Ecology, University of Toronto
 - Key experiences
 - Lead scientist and UNFCCC inventory compiler for forest land and harvested wood products in the US
 - IPCC, Lead Author
 - National Climate Assessment, Lead Author
 - Second State of the Carbon Cycle, Coordinating Lead Author



Why is this important?

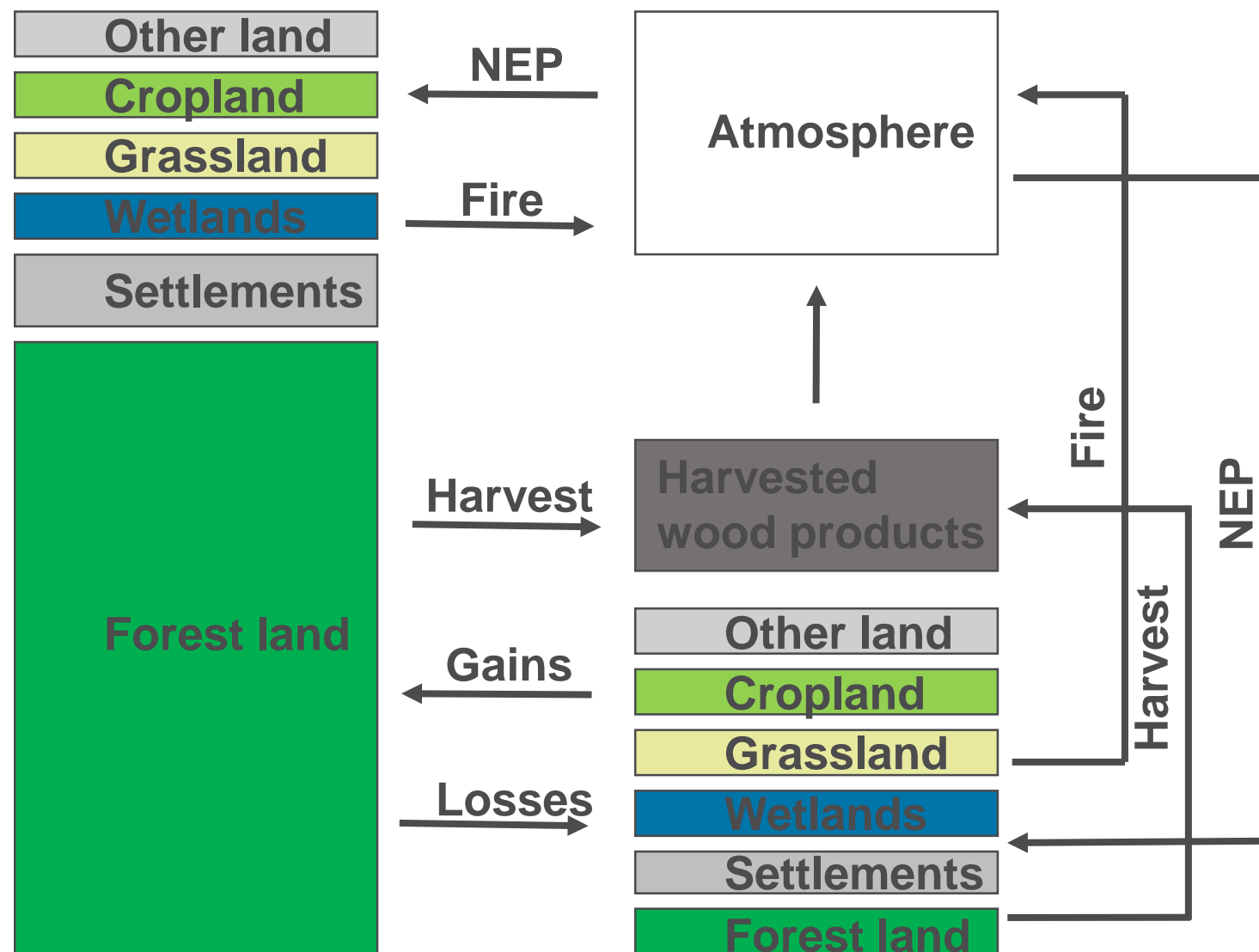
May 18, 2020

Ice-core data before 1958. Mauna Loa data after 1958.



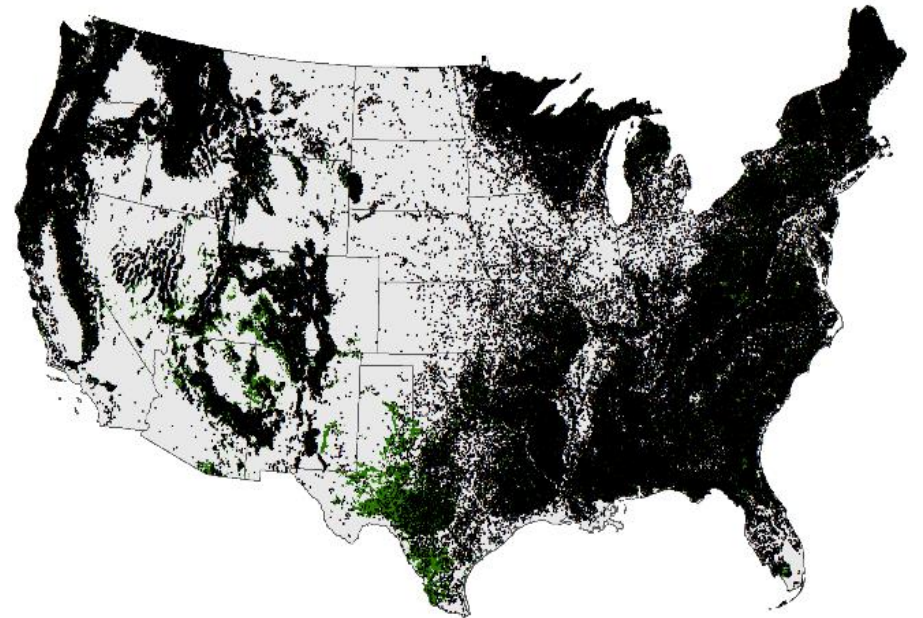
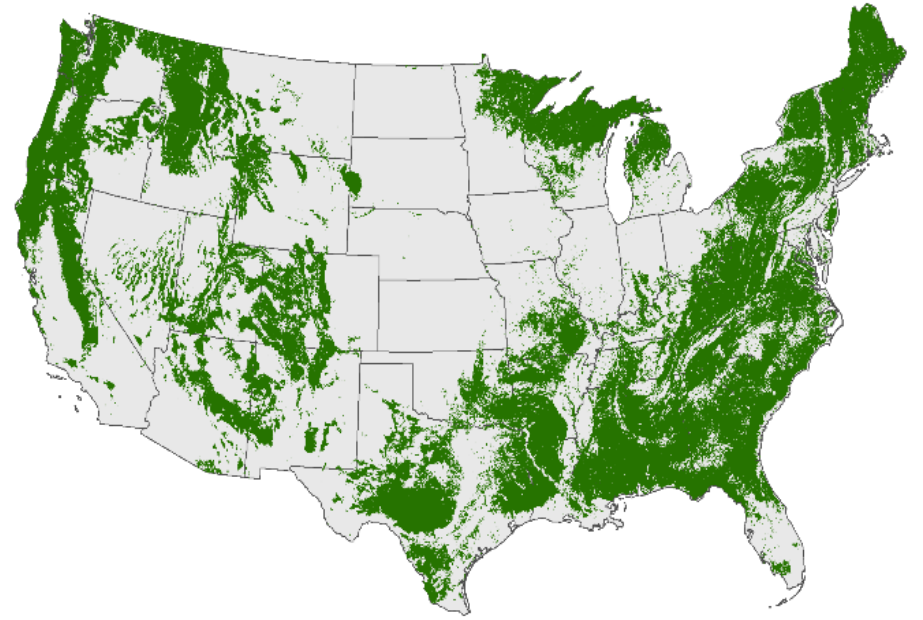
Scripps Institution of Oceanography, San Diego

Context within the land sector



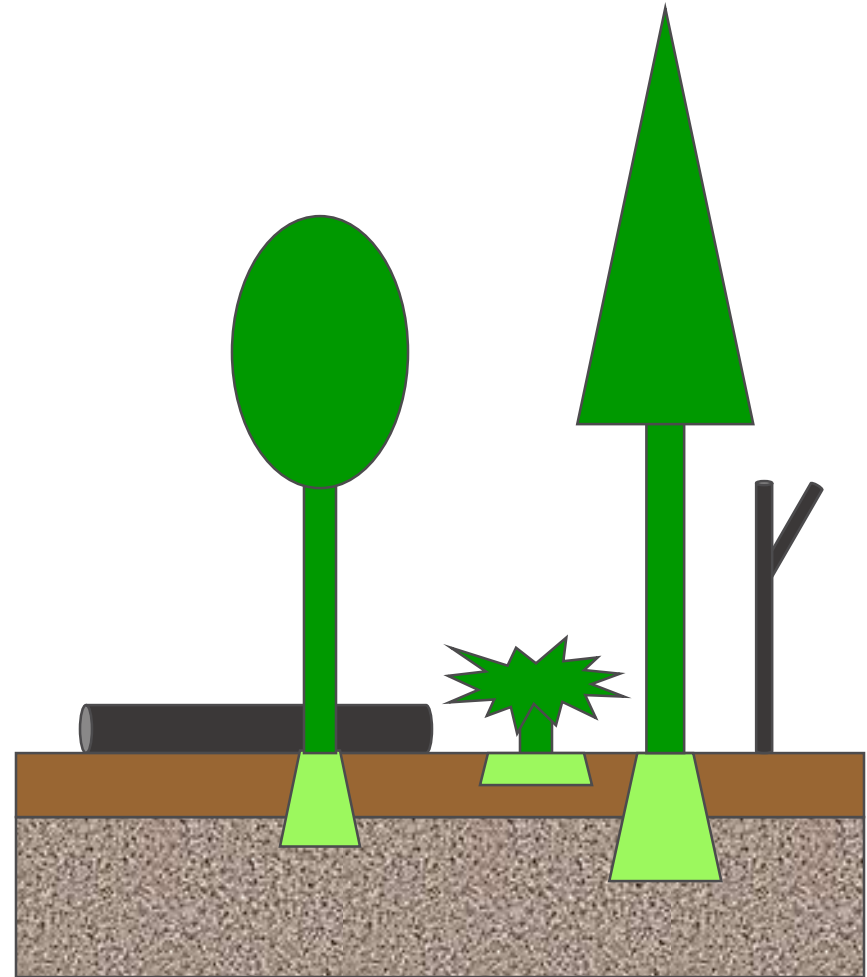
National forest inventory (NFI)

- Designed to track change over time
 - Permanent sample plots
 - Remeasurement every 5-10 years
 - ca. 15% of plots remeasured annually
- Multiple approaches for assessing disturbance (e.g., disturbance code), and ecosystem variables (e.g., growth, mortality, removals)
- Observed land cover and land use attributes



Ecosystem C pools

- Aboveground live biomass
- Belowground live biomass
- Dead wood
- Litter
- Soil organic matter
 - Mineral
 - Organic



Carbon stocks by pool in the US

Carbon Pool ^a	1990	1995	2000	2005	2010	2017	2018	2019
Forest	51,527	52,358	53,161	53,886	54,663	55,746	55,897	56,051
Aboveground biomass	11,833	12,408	12,962	13,484	14,020	14,780	14,884	14,989
Belowground biomass	2,350	2,483	2,612	2,734	2,858	3,033	3,056	3,081
Dead wood	2,120	2,233	2,346	2,454	2,568	2,731	2,753	2,777
Litter	3,662	3,670	3,676	3,647	3,646	3,639	3,640	3,641
Soil (mineral)	25,636	25,636	25,637	25,639	25,641	25,637	25,637	25,638
Soil (organic)	5,927	5,928	5,928	5,929	5,929	5,926	5,926	5,926
Harvested wood	1,895	2,061	2,218	2,353	2,462	2,616	2,642	2,669
Products in use	1,249	1,326	1,395	1,447	1,471	1,505	1,513	1,521
SWDS	646	735	823	906	991	1,112	1,129	1,148
Total stocks	53,423	54,419	55,380	56,239	57,124	58,362	58,539	58,720

Domke, Grant M.; Walters, Brian F.; Nowak, David J.; Smith, James, E.; Ogle, Stephen M.; Coulston, J.W.; Wirth, T.C. 2020. Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990-2018. Resource Update FS-227. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 5 p. <https://doi.org/10.2737/FS-RU-227>.

U.S. Environmental Protection Agency [US EPA]. 2020. Inventory of U.S. greenhouse gas emissions and sinks: 1990-2018. EPA 430-R-20-002. Washington, DC: U.S. Environmental Protection Agency. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018>

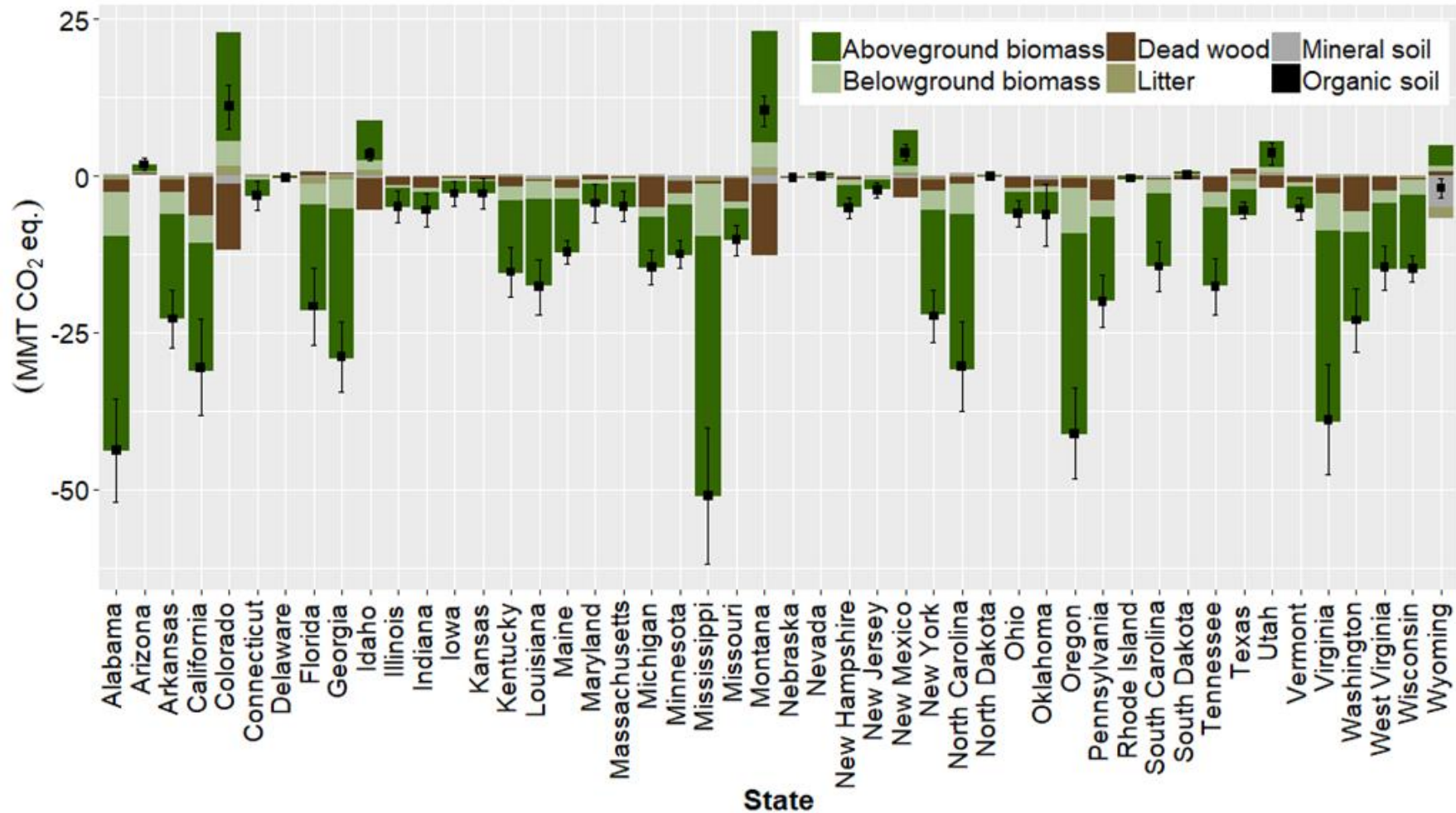
Estimated emissions and removals

Emissions and Removals Category^a	1990	1995	2000	2005	2010	2016	2017	2018
Forest land remaining forest land ^b	(610.1)	(598.7)	(572.1)	(572.6)	(556.2)	(565.5)	(552.0)	(564.5)
Non-CO ₂ emissions from fire	1.5	0.6	2.9	8.2	4.6	5.6	18.8	18.8
N ₂ O emissions from forest soils	0.1	0.3	0.5	0.5	0.5	0.5	0.5	0.5
Non-CO ₂ emissions from drained organic soils	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Forest land converted to non-forest land ^b	119.1	120.8	122.5	124.4	126.0	127.4	127.4	127.4
Non-forest land converted to forest land ^b	(109.4)	(109.7)	(109.9)	(110.2)	(110.4)	(110.6)	(110.6)	(110.6)
Harvested wood products	(123.8)	(112.2)	(93.4)	(106.0)	(69.1)	(92.4)	(95.7)	(98.8)
Woodlands remaining woodlands ^c	5.0	4.9	4.8	4.6	4.4	4.1	4.0	4.0
Urban trees in settlements ^d	(96.4)	(103.3)	(110.4)	(117.4)	(124.6)	(129.8)	(129.8)	(129.8)
Total Emissions and Removals	(813.9)	(797.2)	(755.0)	(768.4)	(724.7)	(760.6)	(737.3)	(752.9)

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EPA. 2020. Inventory of U.S. Greenhouse Gas Emissions and Sinks. <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

Emissions and removals, 2018

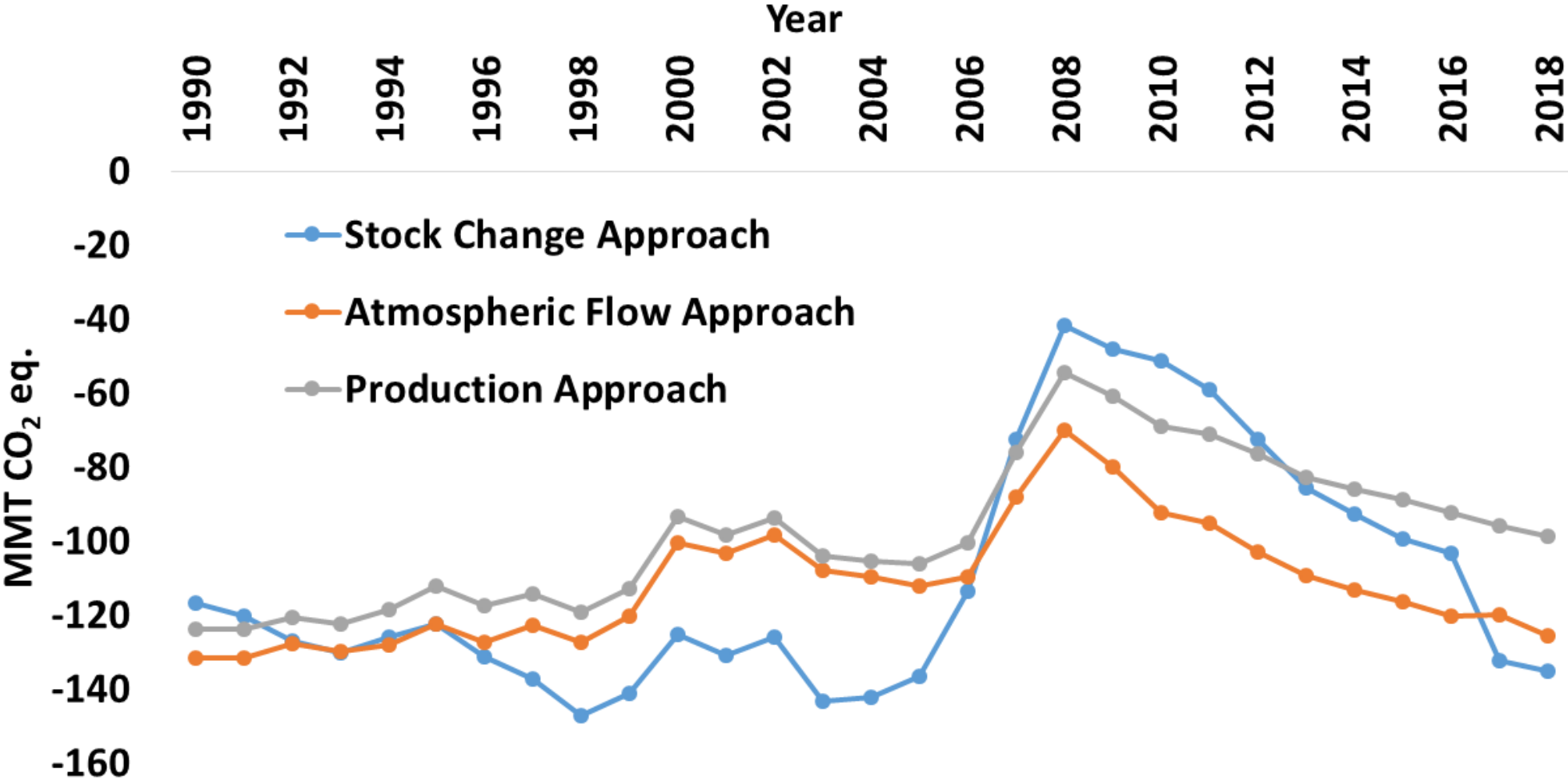


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Aboveground live carbon by ownership



Harvested wood products estimation



IPCC 2019, 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). Published: IPCC, Switzerland.

Final thoughts



- Forest Service continues to expand role in GHG estimation and reporting
- FIA data serves as the foundation
- Developing more spatially and temporally resolved information
- Continue to improve and expand capabilities - collaboration and partnerships are essential
- Inform policy and land management practices across scales

Thank you

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FIA program: www.fia.fs.fed.us

FIA carbon: <http://www.fia.fs.fed.us/forestcarbon/>