



Implementing Shared Socioeconomic Pathways (SSPs)

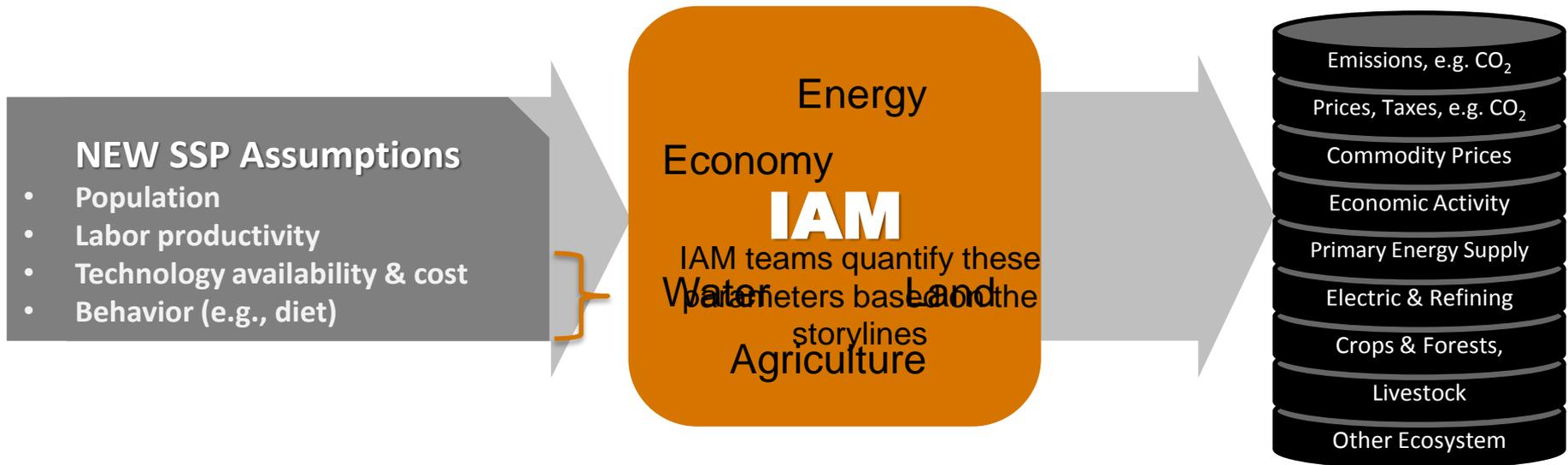
KATE CALVIN

Workshop on U.S. Land Use/Land Cover Scenarios and Projections

Rockville, MD

SSPs provide quantitative and qualitative drivers for IAMs

- ▶ SSP specification:
 - Population and GDP estimates by country
 - Storylines including information about technology, trade, etc.
- ▶ IAM outputs are NOT specified.





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An example: GCAM SSP quantification for USA land scenarios

Agriculture and Land Use Storylines

SSP5

Land use change is incompletely regulated, i.e. tropical deforestation continues, although at slowly declining rates over time. Crop yields are rapidly increasing. Unhealthy diets with high animal shares and high waste prevail. Barriers to international trade are strongly reduced, and strong globalization leads to high levels of international trade. .

SSP3

Land use change is hardly regulated, i.e. tropical deforestation continues at current rates. Rates of crop yield increase decline strongly over time, due to little investment. Unhealthy diets with high animal shares and high waste prevail. A regionalized world leads to reduced trade flows..

SSP2

Land use change is incompletely regulated, i.e. tropical deforestation continues, although at slowly declining rates over time. Rates of crop yield increase decline slowly over time, but low-income regions catch up to a certain extent. Caloric consumption and animal calorie shares converge towards medium levels. International trade remains to large extent regionalised.

SSP1

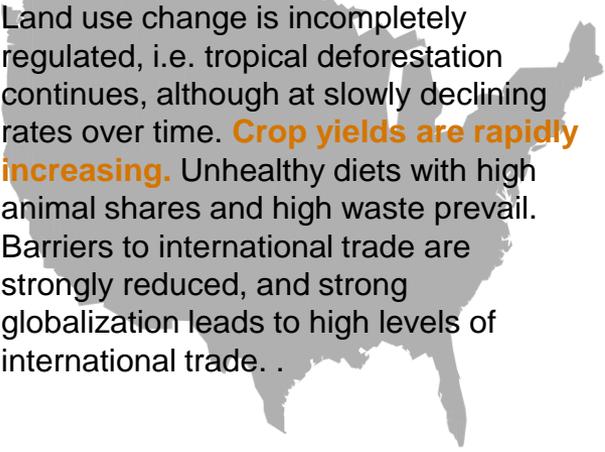
Land use is strongly regulated, e.g. tropical deforestation rates are strongly reduced. Crop yields are rapidly increasing in low- and medium-income regions, leading to a faster catching-up with high income countries. Healthy diets with low animal-calorie shares and low waste prevail. In an open, globalized economy, food is traded internationally.

SSP4

Land use change is strongly regulated in high income countries, but tropical deforestation still occurs in poor countries. High income countries achieve high crop yield increases, while low income countries remain relatively unproductive in agriculture. Caloric consumption and animal calorie shares converge towards medium levels. Food trade is globalized, but access to markets is limited in poor countries, increasing vulnerability for non-connected population groups.

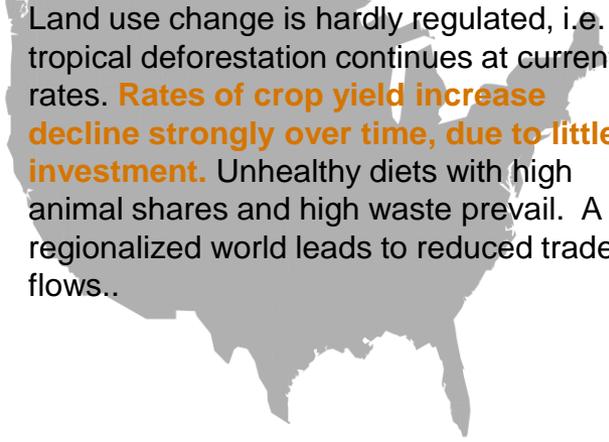
Agriculture and Land Use Storylines

SSP5



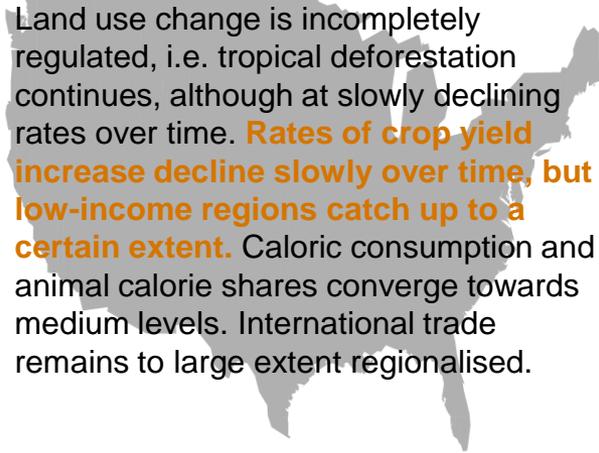
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SSP3



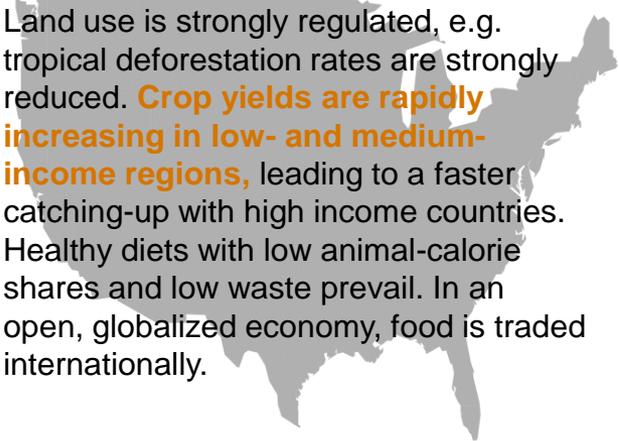
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SSP2



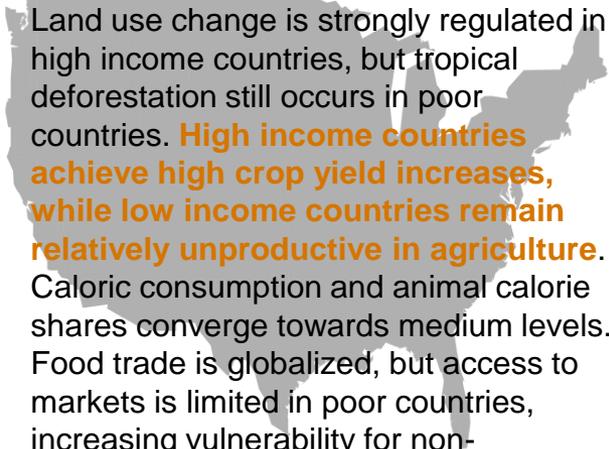
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Crop Yield Assumptions in the GCAM

SSPs: Growth is more rapid in 1, 4, 5 than 3



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SSP5



2050

SSP3



SSP2



SSP1

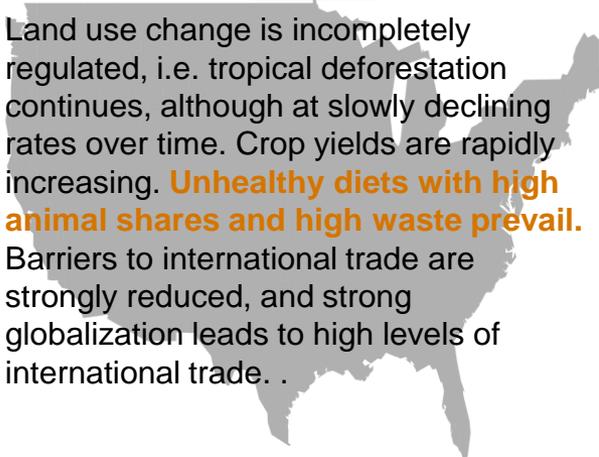


SSP4



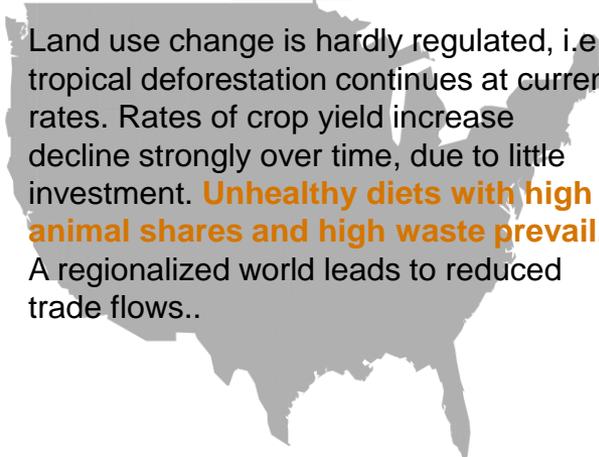
Agriculture and Land Use Storylines

SSP5



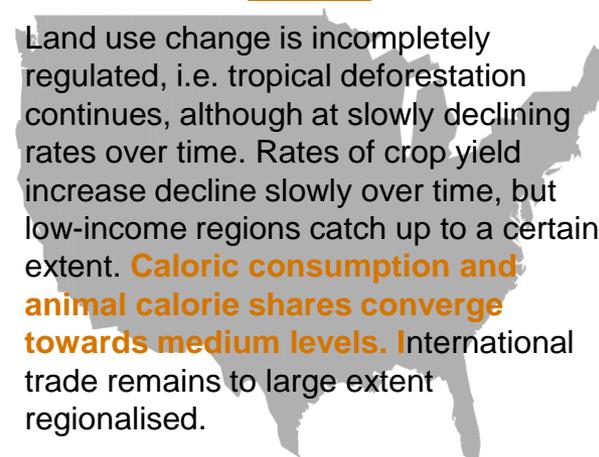
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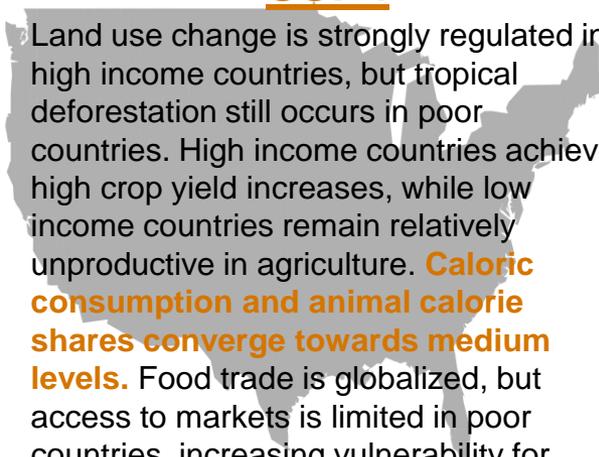
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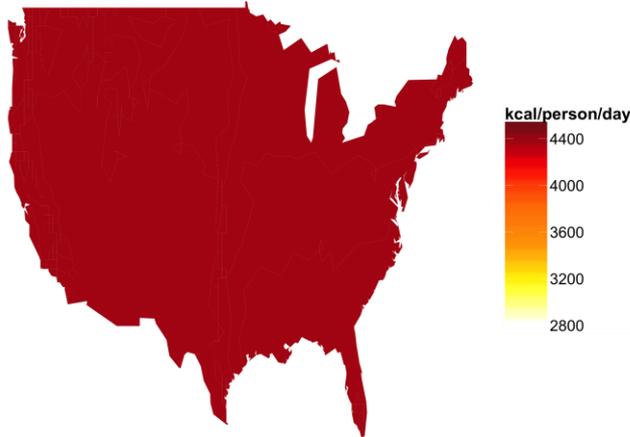
SSP4



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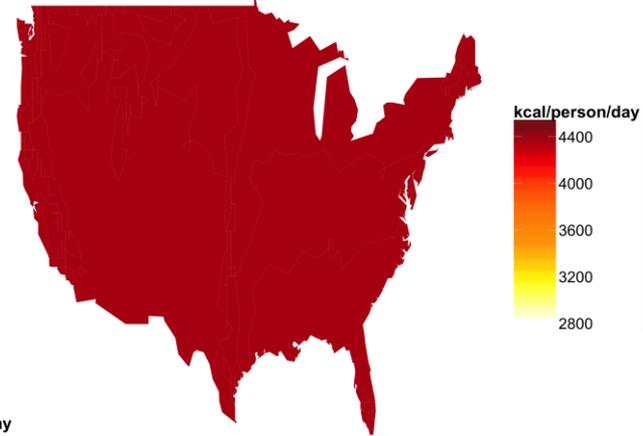
Food Consumption Assumptions in the GCAM SSPs: More demand in 3, 4, 5 than 1

SSP5

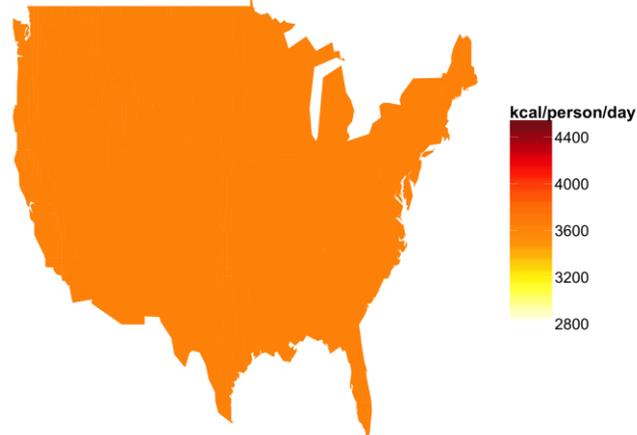


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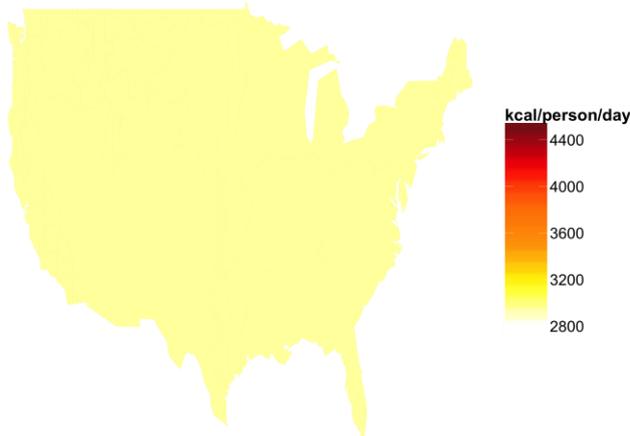
SSP3



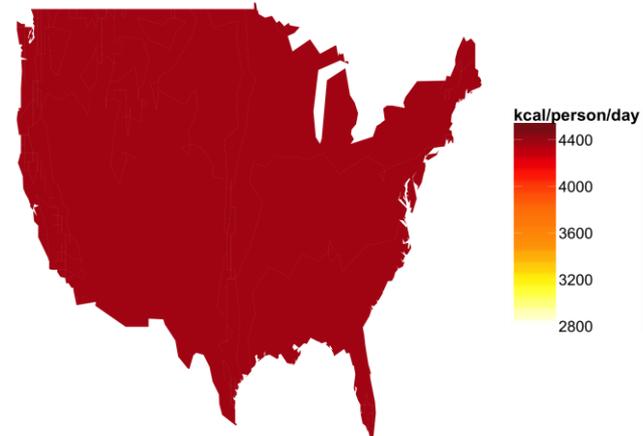
SSP2



SSP1



SSP4



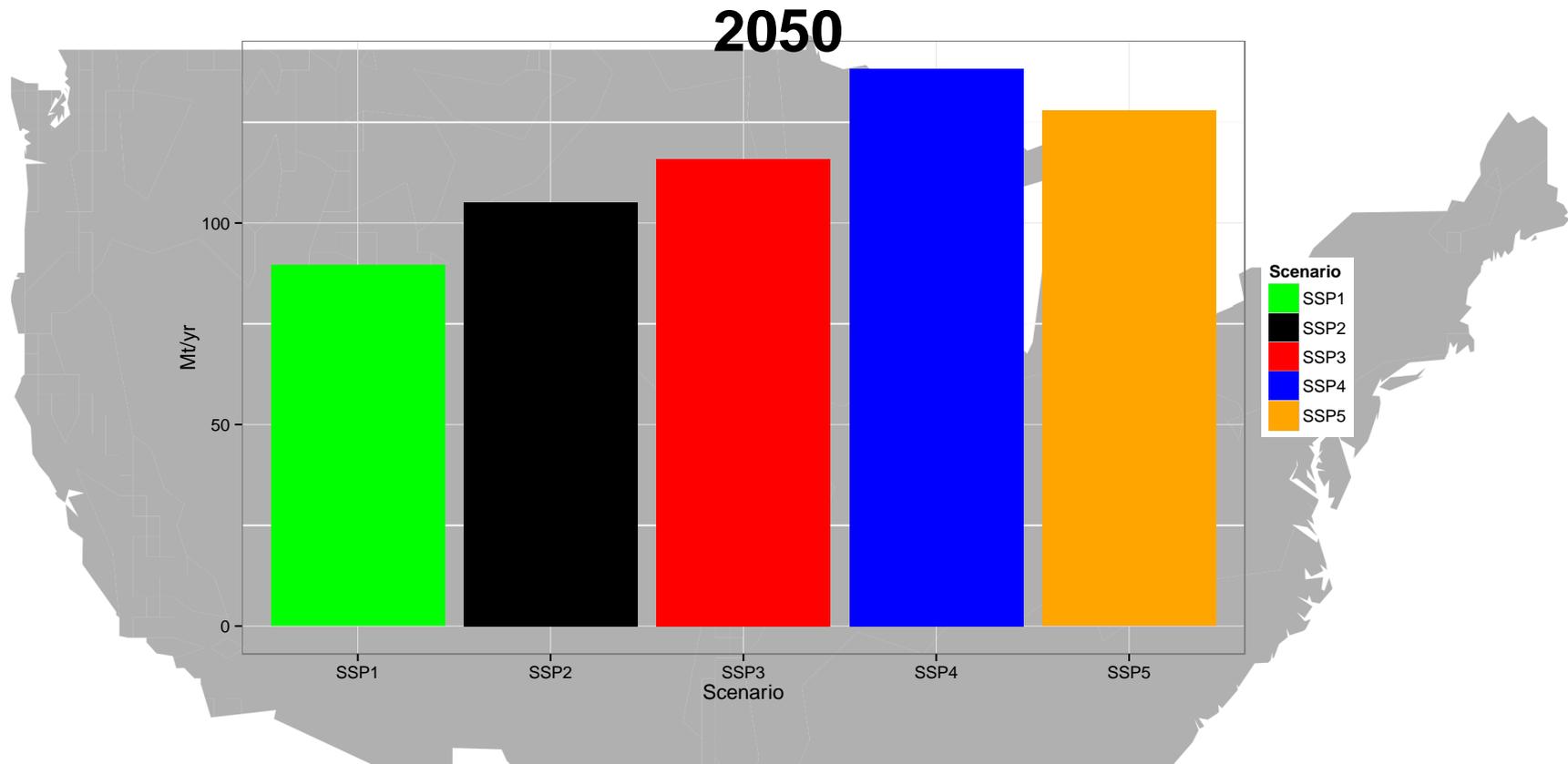


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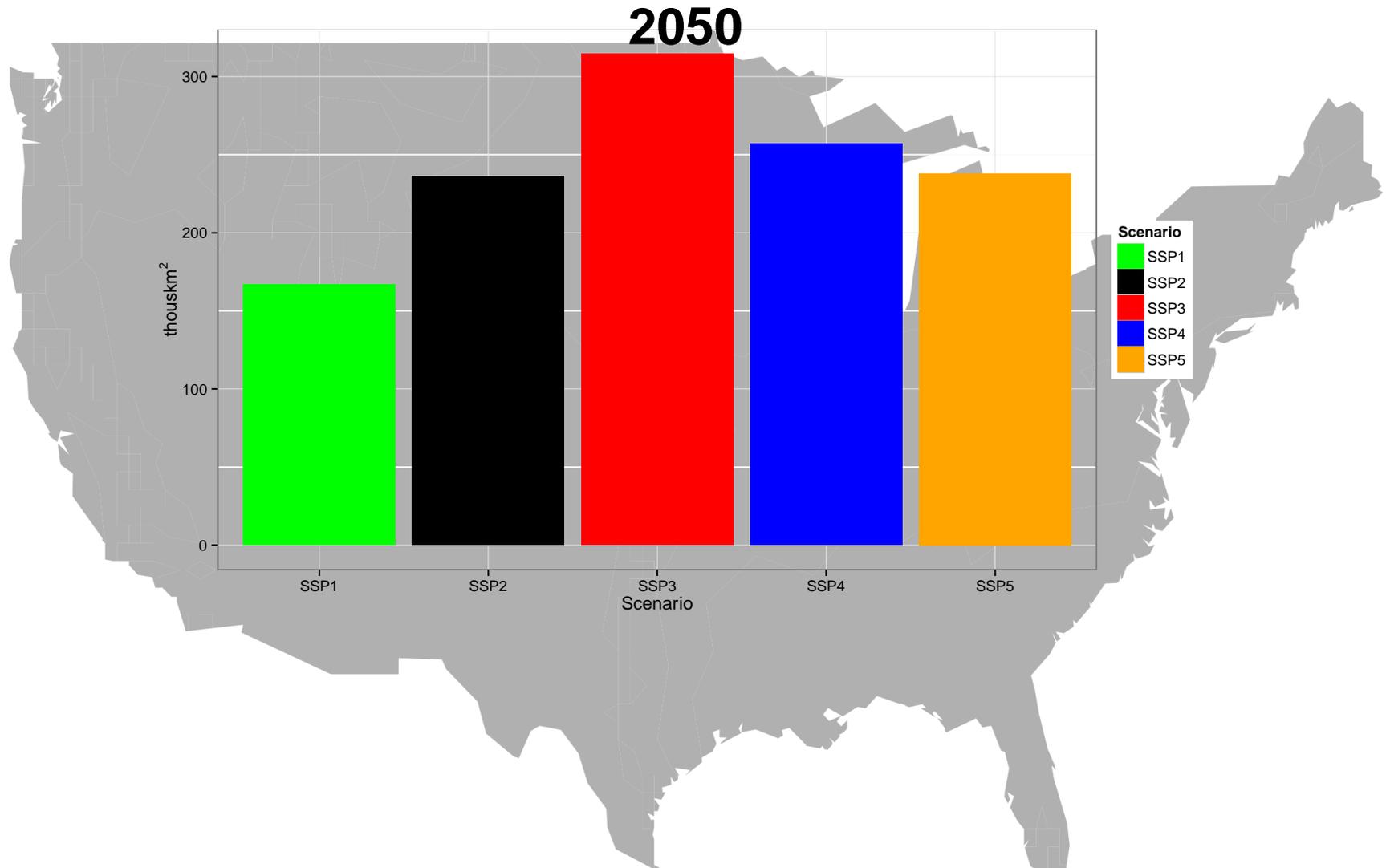
Preliminary Results: GCAM SSP quantification for USA land scenarios

USA Wheat Production in the GCAM SSPs



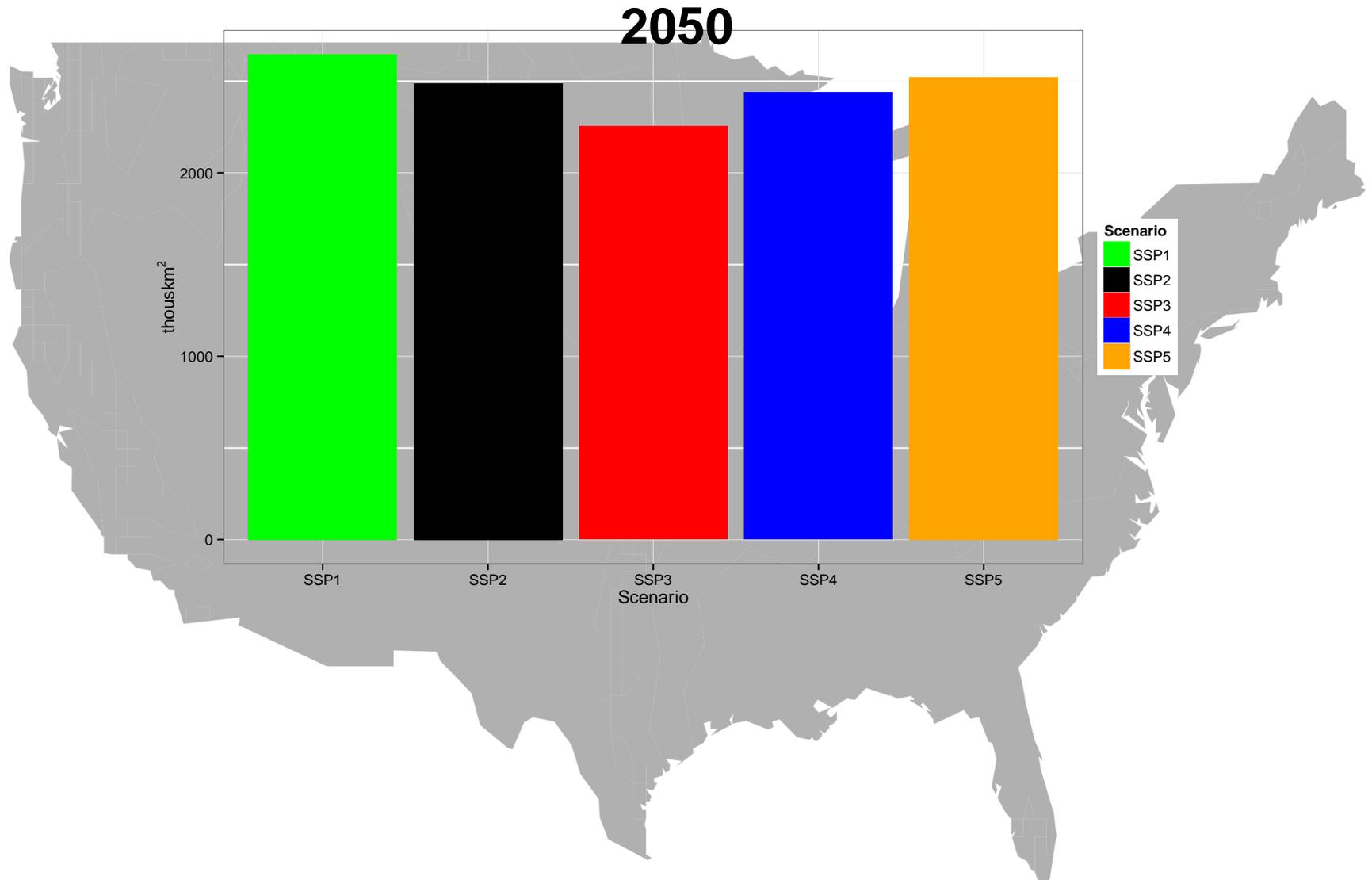
Globally, more wheat is produced in SSP3 than in SSP4 due to the high population and high waste. However, because of the USA's comparative advantage in this scenario, the USA produces more wheat in SSP4 than in SSP3.

USA Wheat Land Area in the GCAM SSPs



Because of differences in yield growth, more land is used for wheat in SSP3 than in SSP4, despite producing more wheat in SSP4.

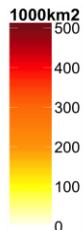
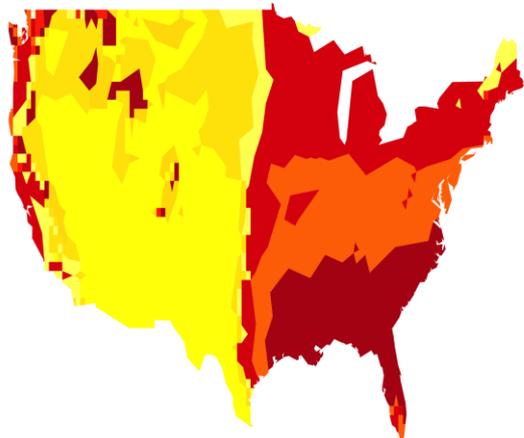
USA Forest Land Area in the GCAM SSPs



Differences in cropland extend affect the amount of forest area in the USA...

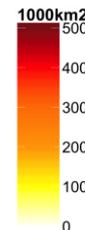
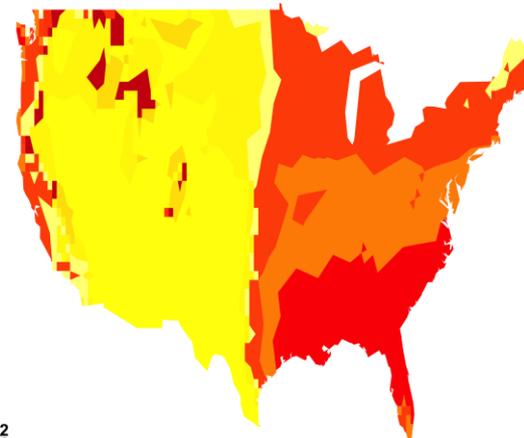
Forest Land Area in the GCAM SSPs

SSP5

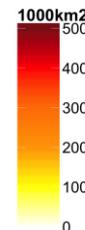
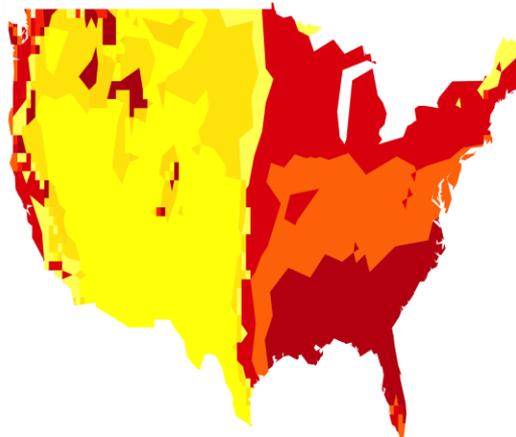


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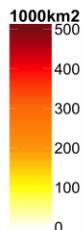
SSP3



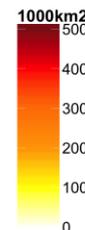
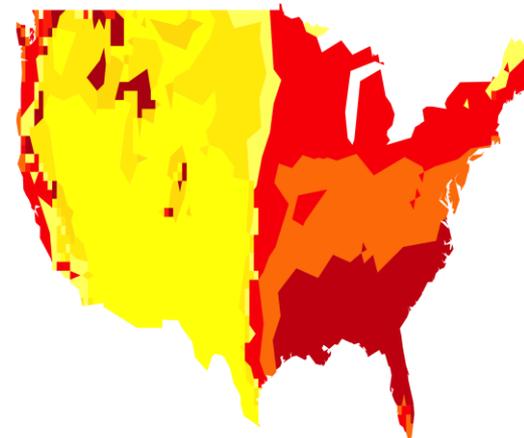
SSP2



SSP1

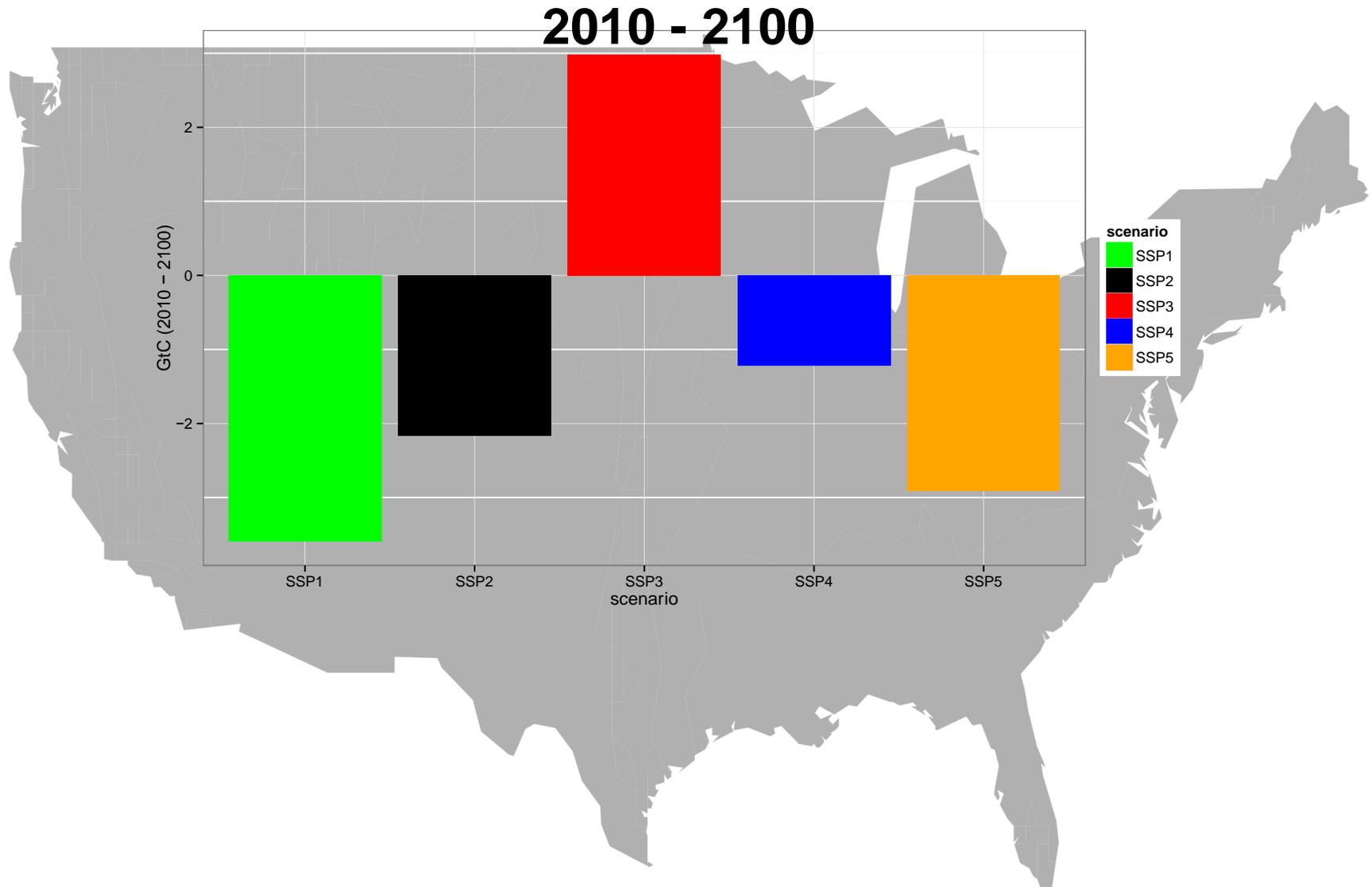


SSP4



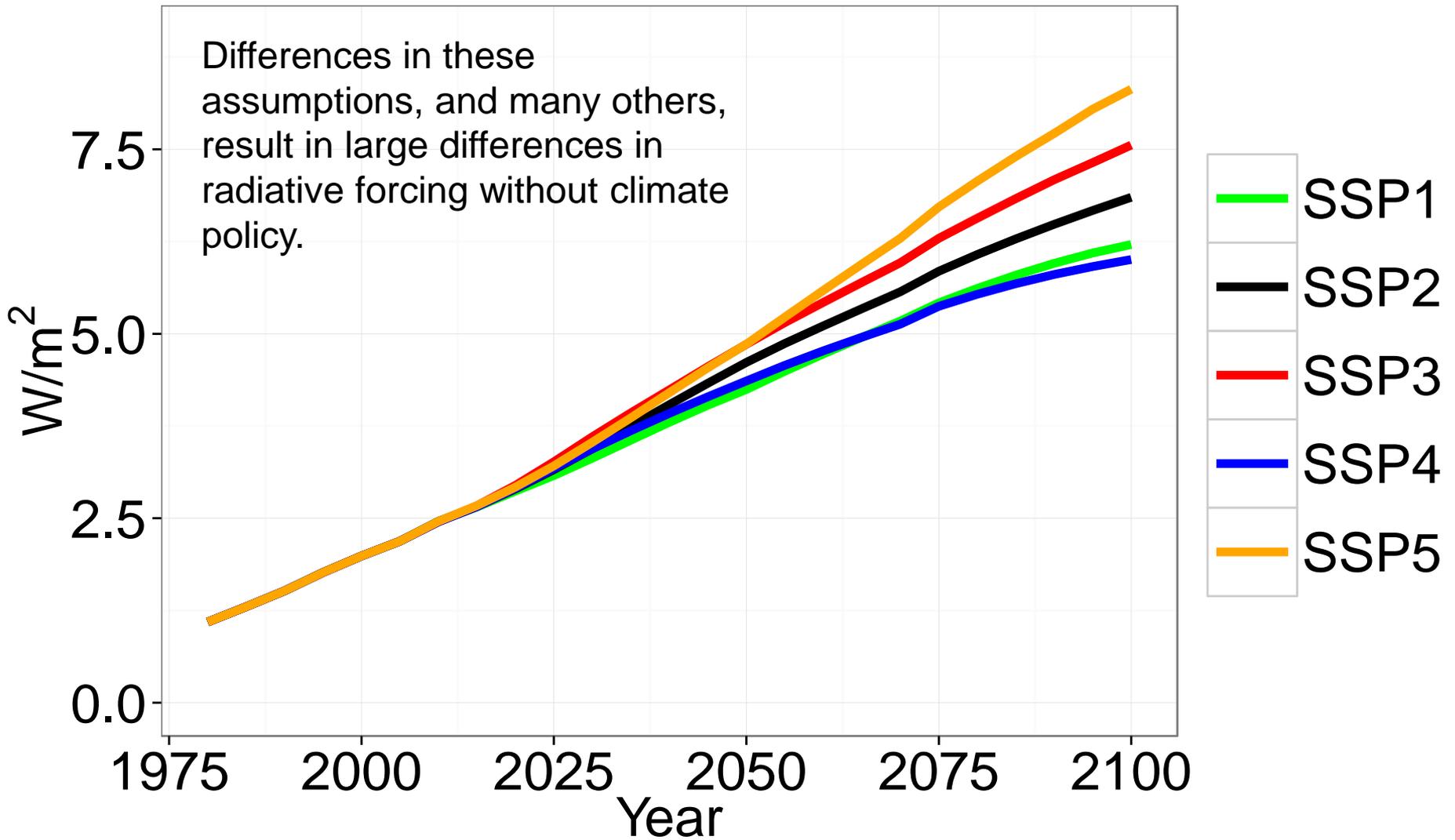
We can look at all of these variables sub-nationally as well.

Change in Terrestrial Carbon Stock in the USA



Differences in land cover result in different terrestrial carbon fluxes.

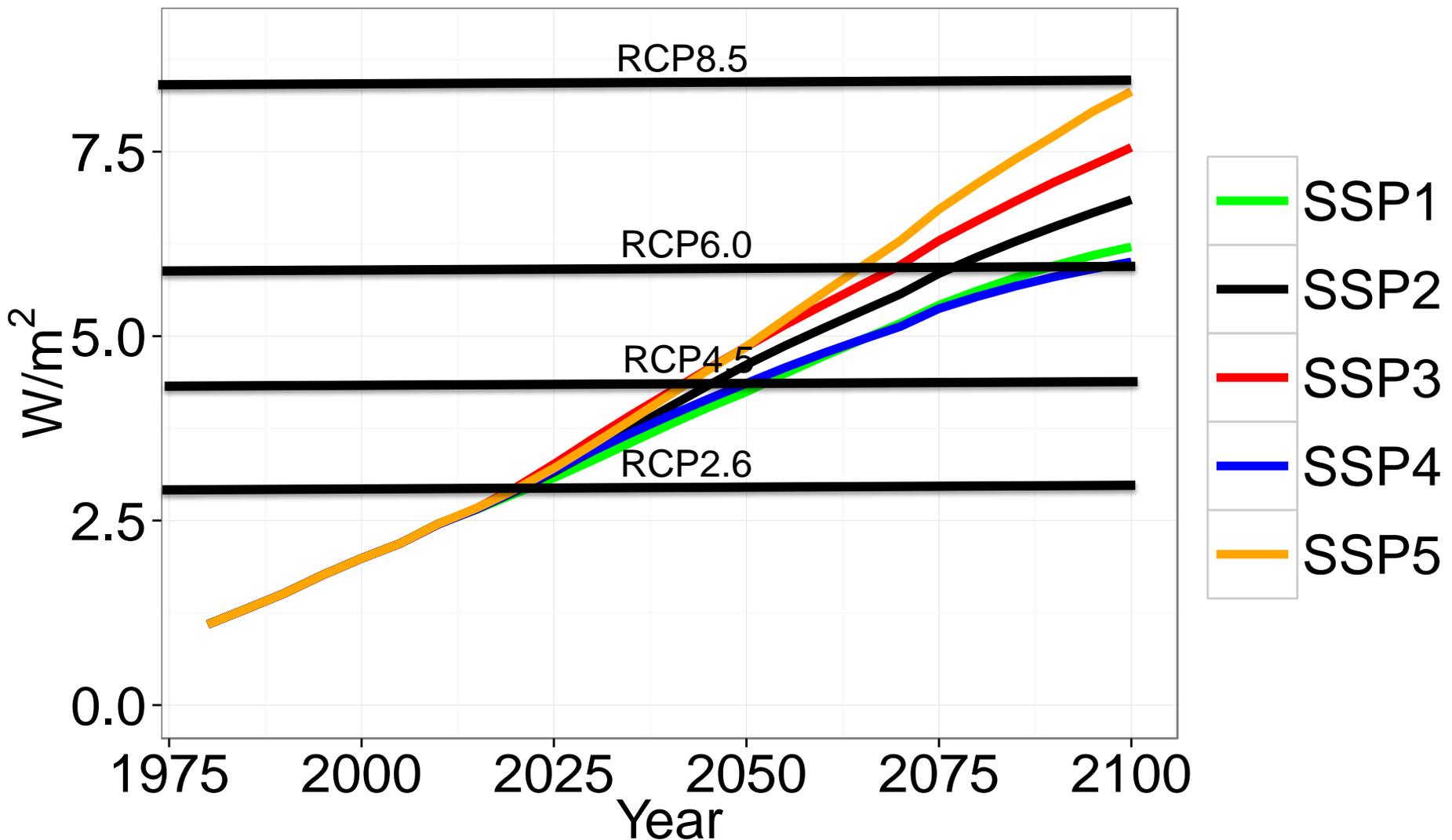
Radiative Forcing in the SSPs



Note: Uses the RCP definition of total radiative forcing, which excludes albedo, nitrate, and mineral dust.

- ▶ The IAM teams are in the process of cleaning up and refining the SSP scenarios.
- ▶ We are also developing and implementing a set of policies, consistent with the SSP storylines, that can limit radiative forcing to the RCP levels.

Limiting Radiative Forcing to RCP Levels



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- ▶ The IAM teams are in the process of cleaning up and refining the SSP scenarios.
- ▶ We are also developing and implementing a set of policies, consistent with the SSP storylines, that can limit radiative forcing to the RCP levels.
- ▶ We anticipate having scenarios completed by the end of October 2014 and papers submitted by the end of December 2014.



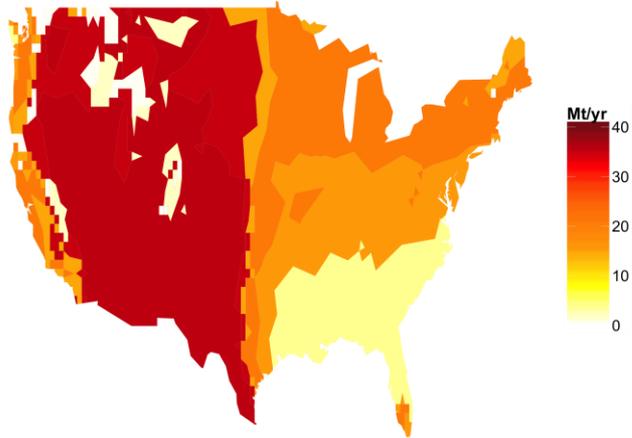
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THANK YOU!

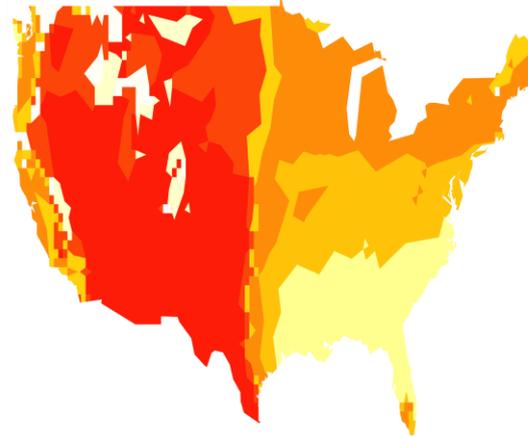
Wheat Production in the GCAM SSPs

SSP5

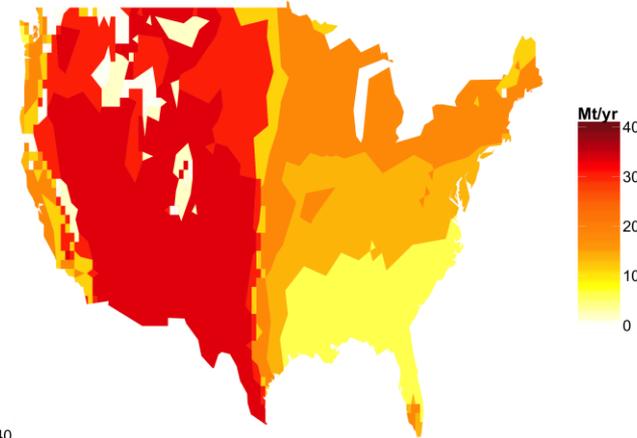


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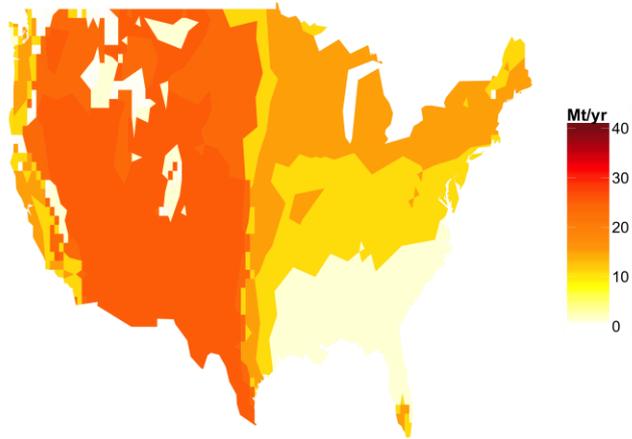
SSP2



SSP3



SSP1

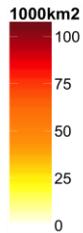
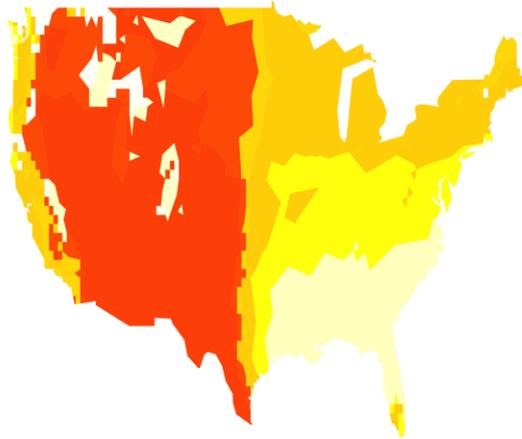


SSP4



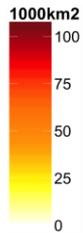
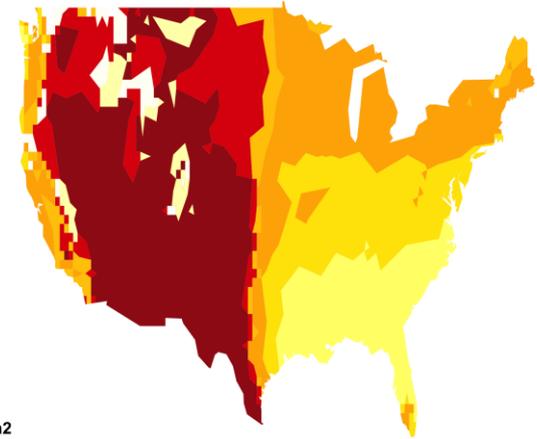
Wheat Land Area in the GCAM SSPs

SSP5

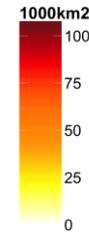
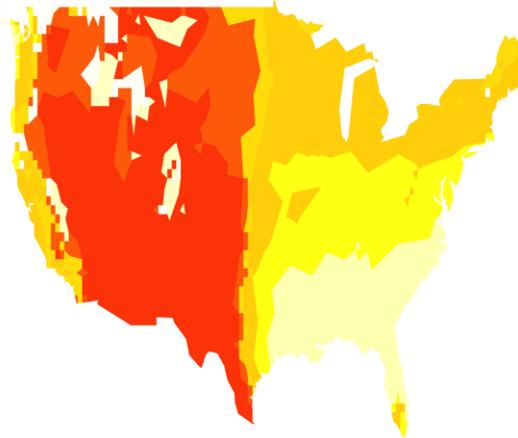


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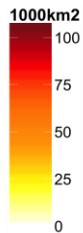
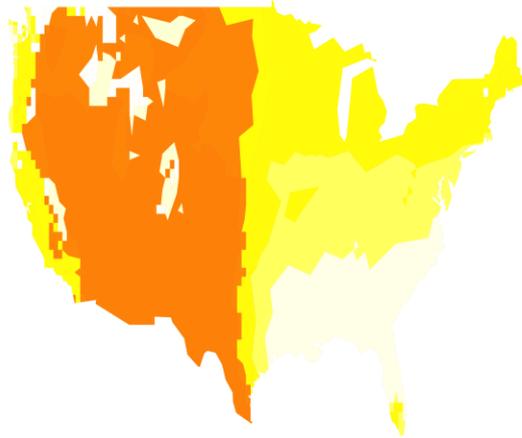
SSP3



SSP2



SSP1



SSP4

