Trouble Brewing

Discovering new regions for optimal coffee growth

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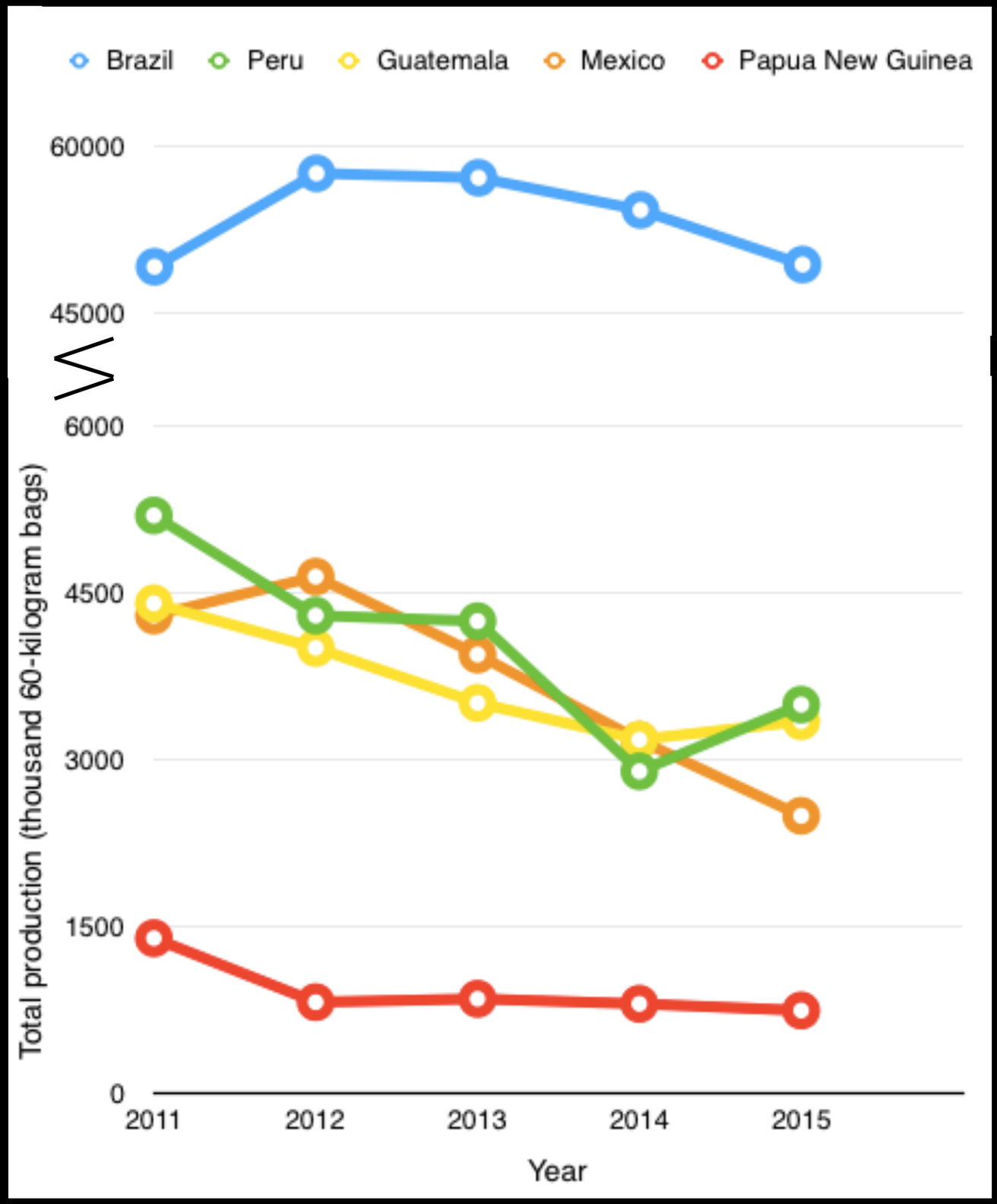
Decreasing production over the years in many countries



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Trouble Brewing

Coffee biodiversity data
(127 species)

Nonnegative matrix factorization
Stochastic gradient descent

Recommender system

What insight can we glean from our recommender system?

- Not much..

Recommending places CURRENTLY good for coffee planting is not helpful if we are planning for the future

Coffee
biodiversity data
(127 species)

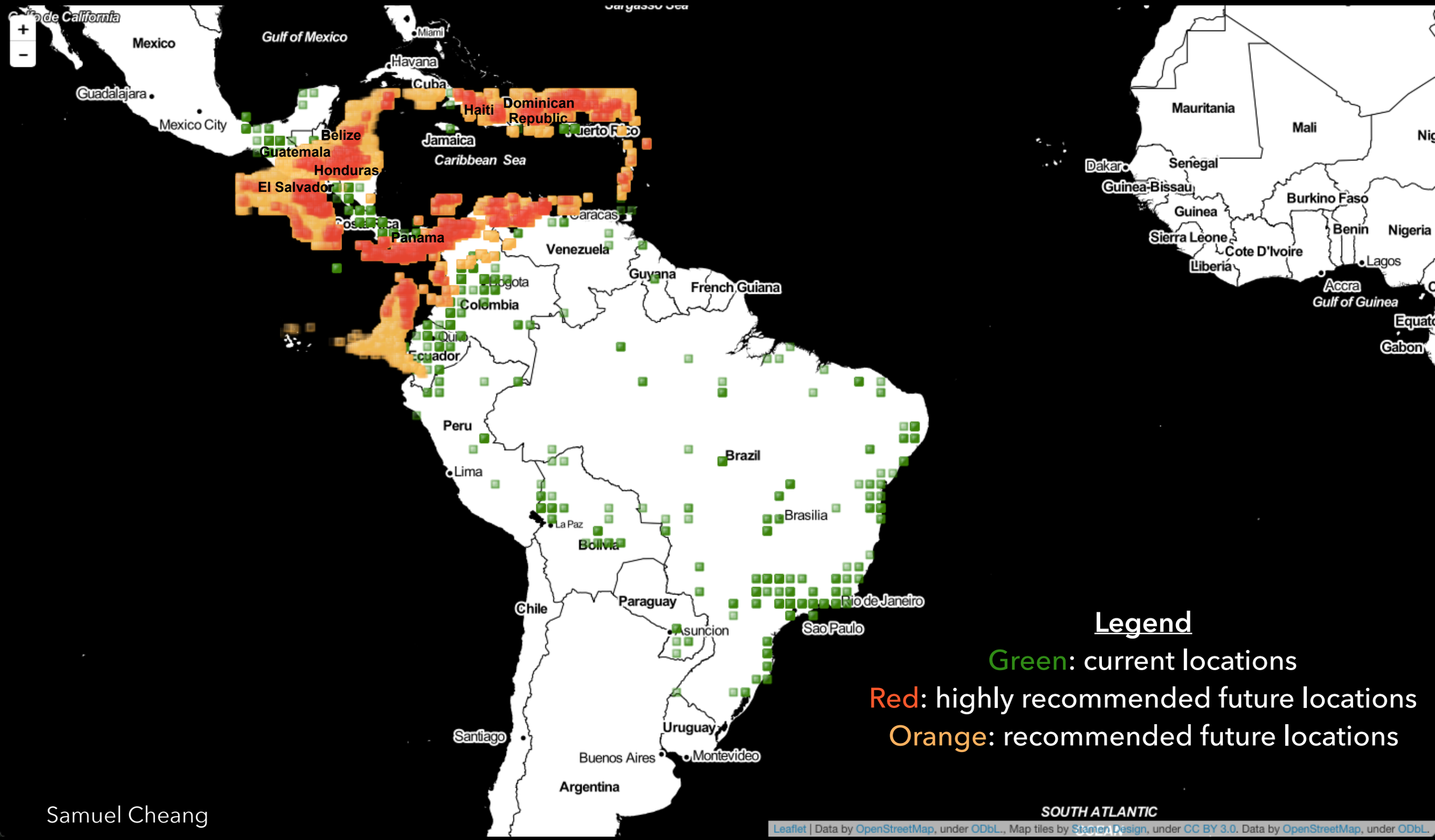
Nonnegative matrix factorization
Stochastic gradient descent

Recommender system

Current and
forecasted climate
data of Central and
South America
(19 bioclimatic variables
4 scenarios of the future
3 models)

Similarity using standardized
Euclidean distance

Coffea arabica L. (2020-2049)



Legend

Green: current locations

Red: highly recommended future locations

Orange: recommended future locations

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Takeaway

- Significant reduction in regions suitable for coffee growth in traditionally dominant production regions of Brazil

- Increased reliance on Central American countries and Colombia for coffee production, especially Coffea arabica

- Look into other coffee species traditionally not grown in South America

References

- http://www.ipcc-data.org/guidelines/pages/gcm_guide.html
- http://www.espressocoffeeguide.com/all-about-coffee-2/coffee-plants/arabica-coffee/
- http://www.espressocoffeeguide.com/all-about-coffee-2/coffee-plants/robusta-coffee/
- S Ponte, 'The "Latte Revolution"? Regulation, Markets and Consumption in the Global CoffeeChain,' World Development 30 (2002): 1099–1122 doi:10.1016/S0305- 750X(02)00032-3.
- http://apps.fas.usda.gov/psdonline/circulars/coffee.pdf
- https://www.theatlas.com/charts/ry6JYSDs

Thank You

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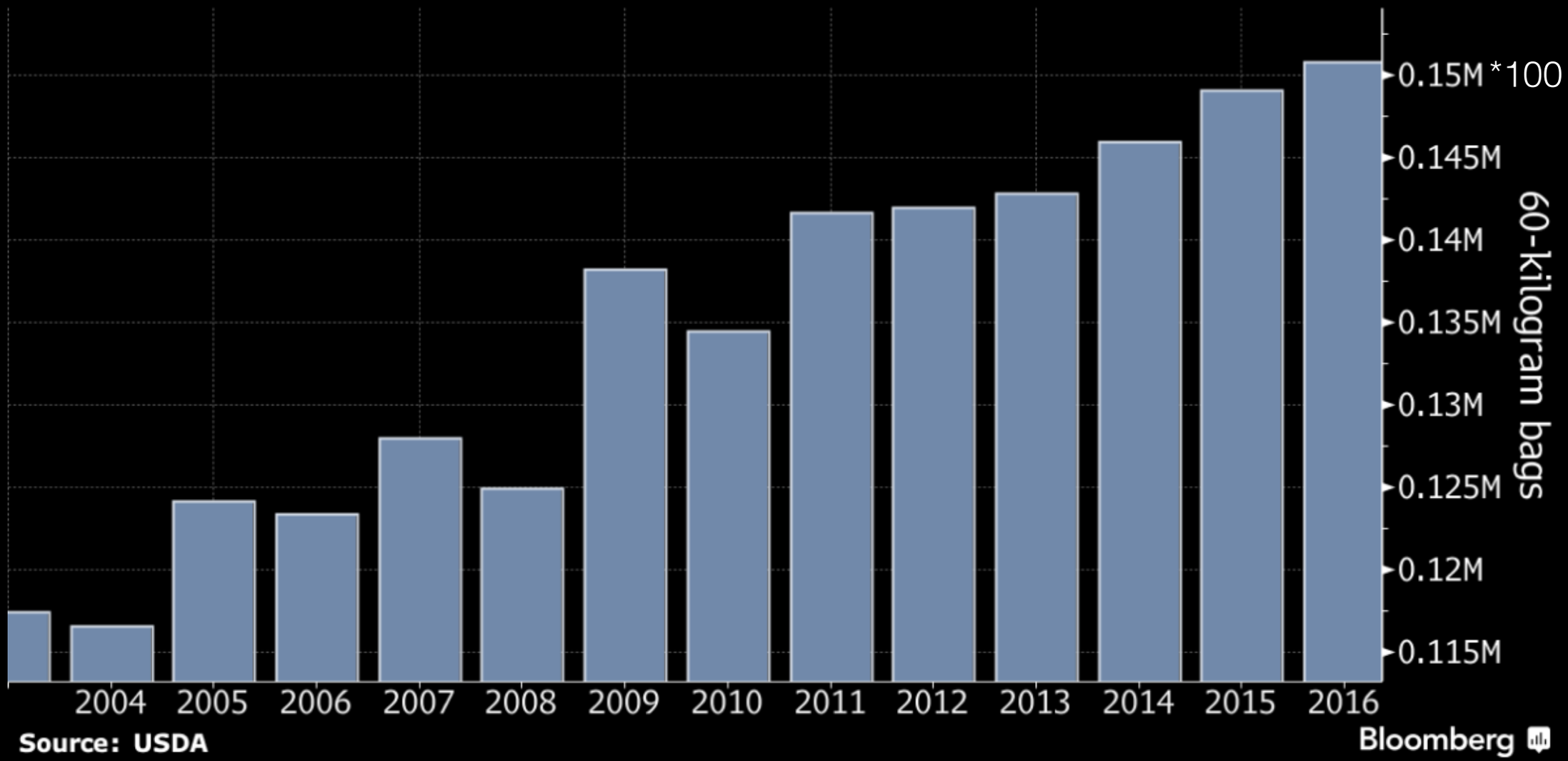
Coffee Cravings

World demand is poised for a record



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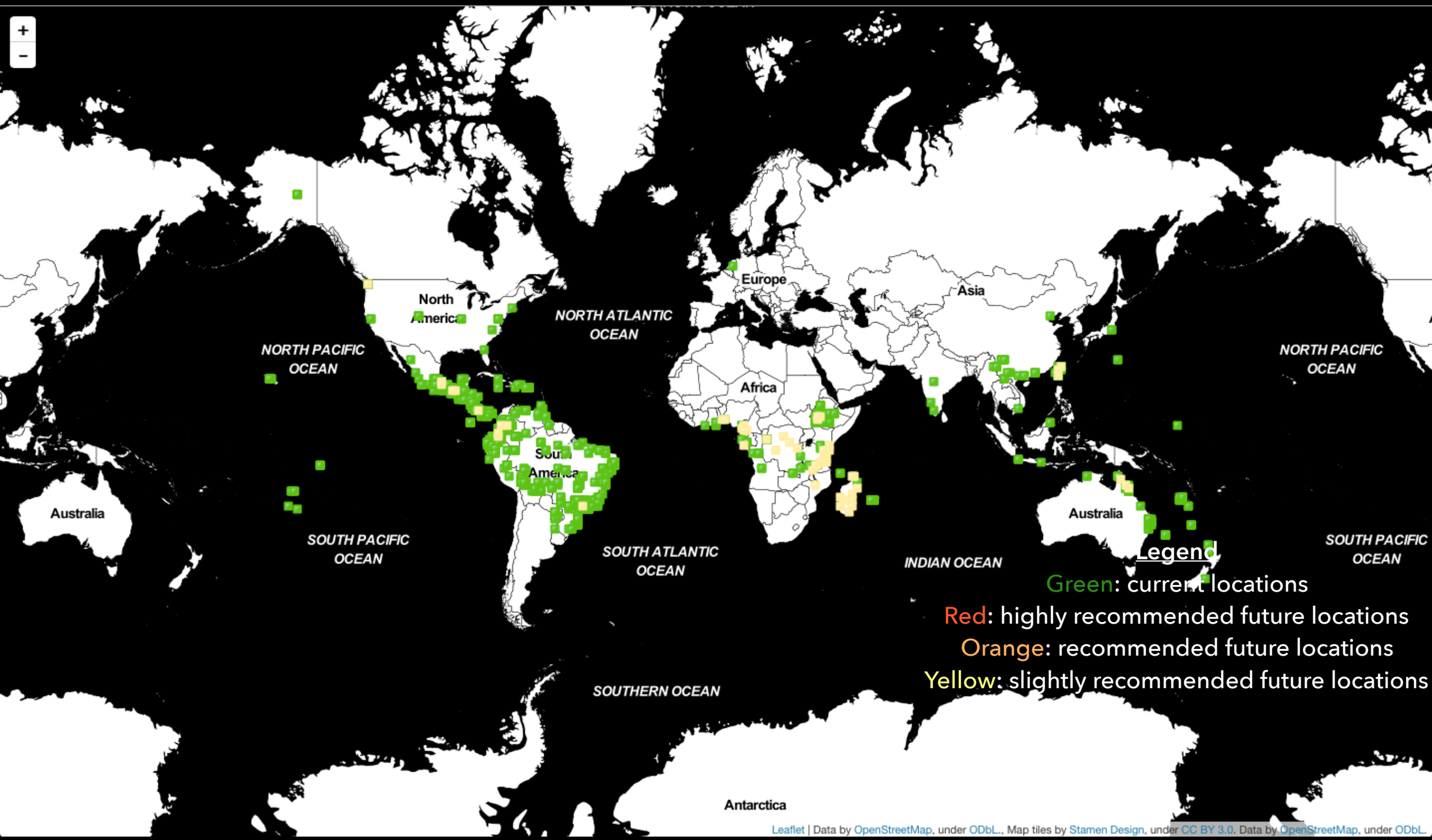
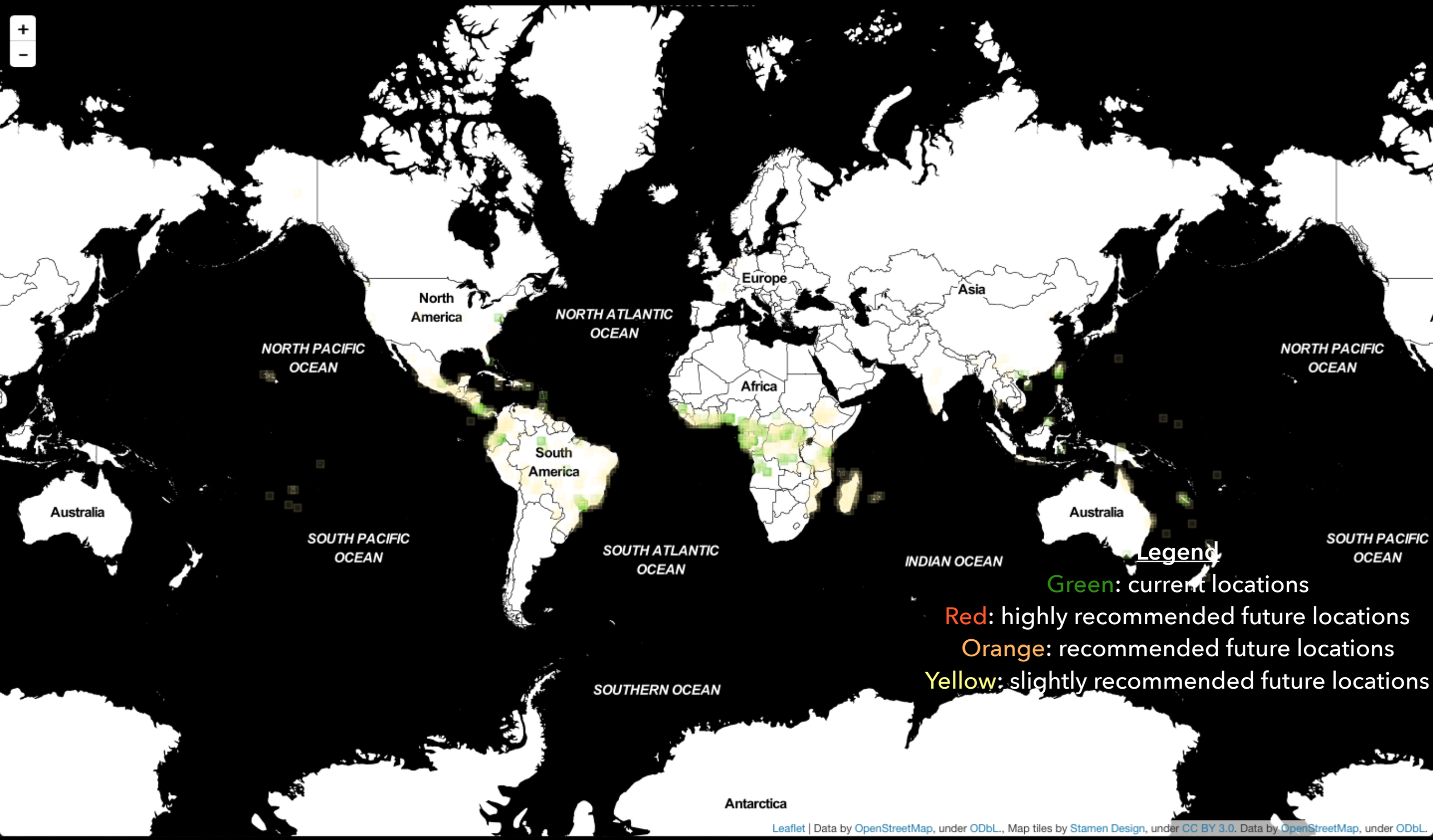
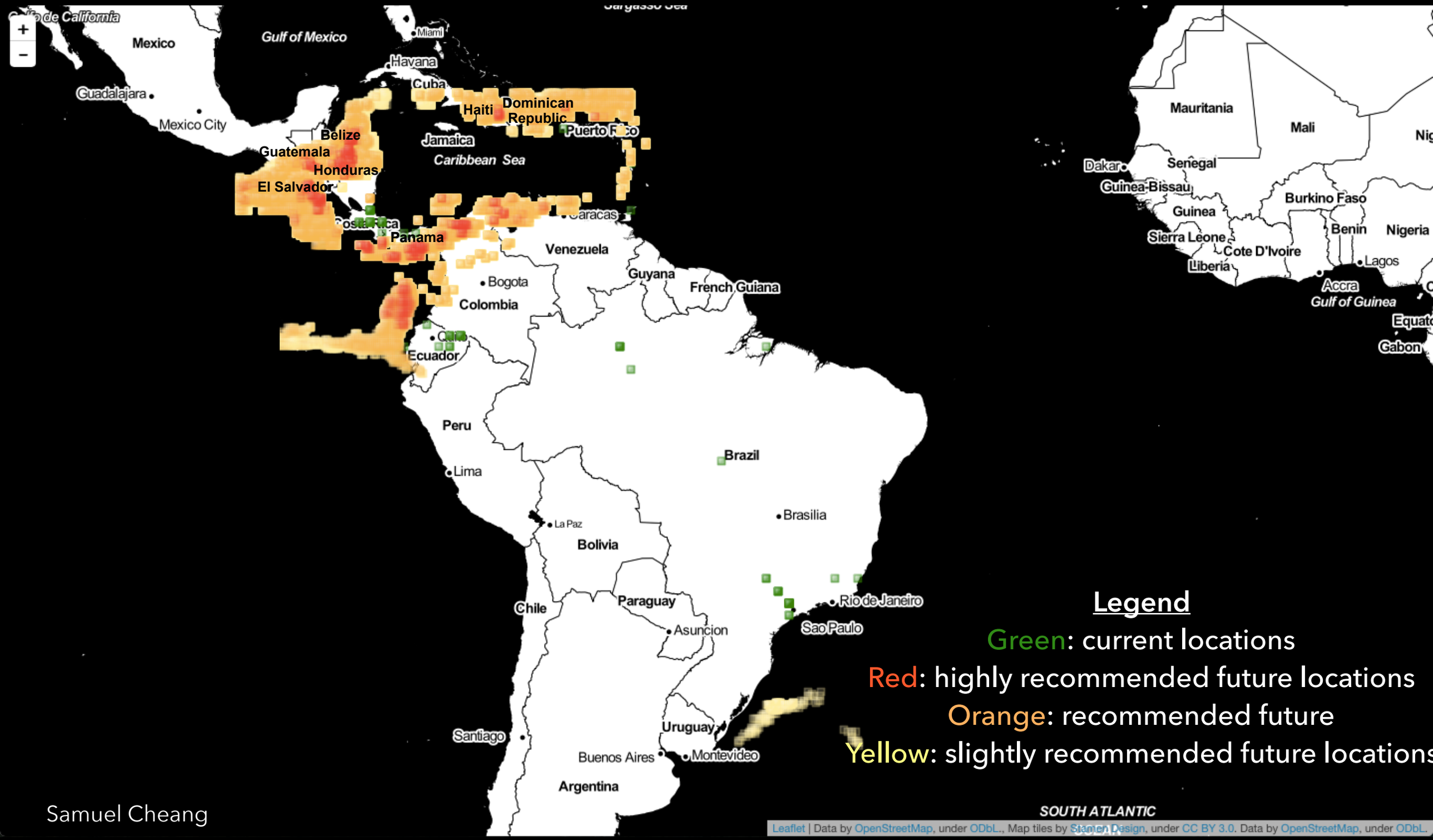
Coffea arabica L. (current)



Coffea robusta L.Linden (current)



Coffea robusta L.Linden (2020-2049)



Legend

Green: current locations

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Yellow: slightly recommended future locations

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Coffea racemosa Lour. (2020-2049)

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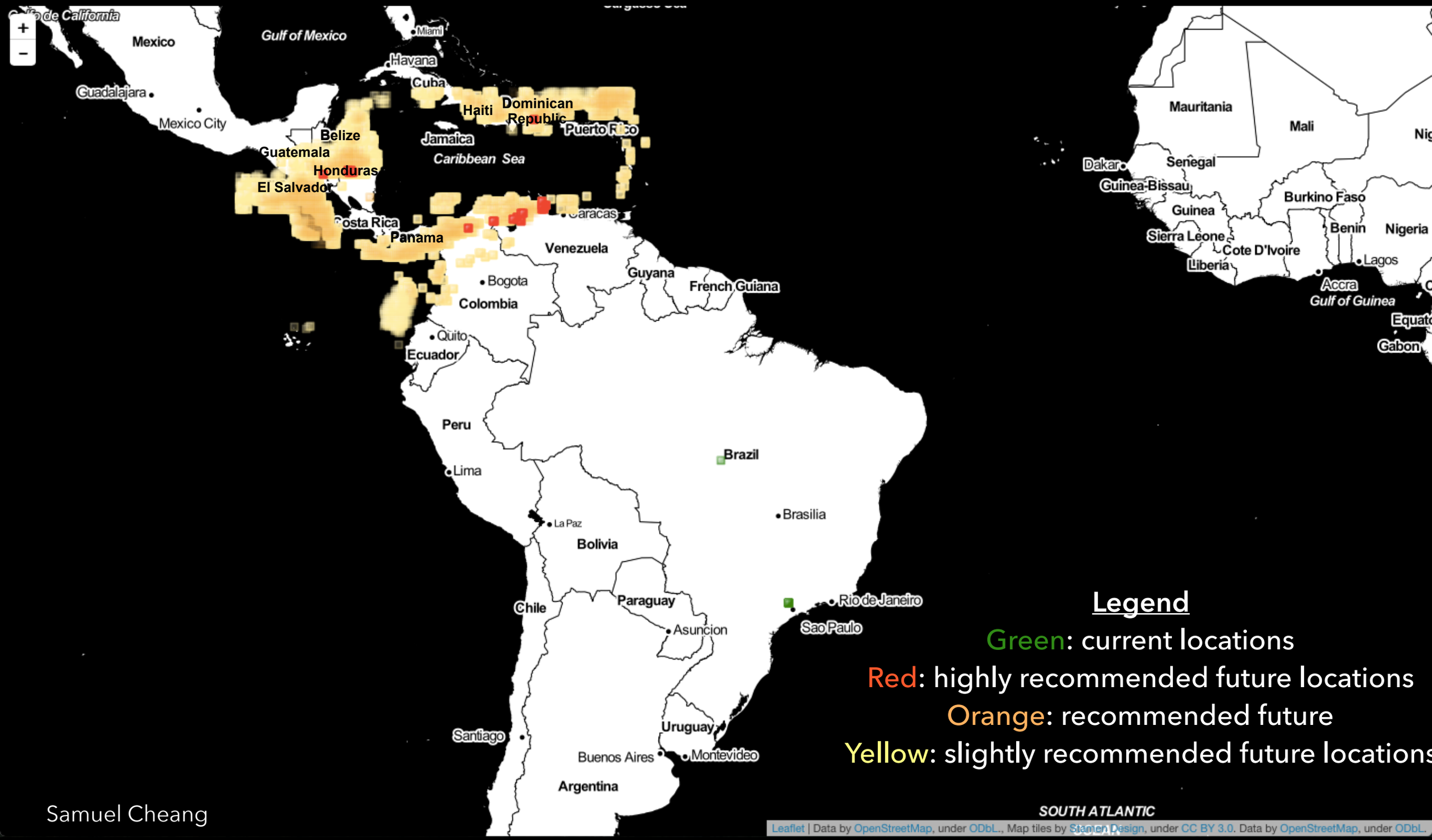
Coffea eugenioides S.Moore (2020-2049)



Legend

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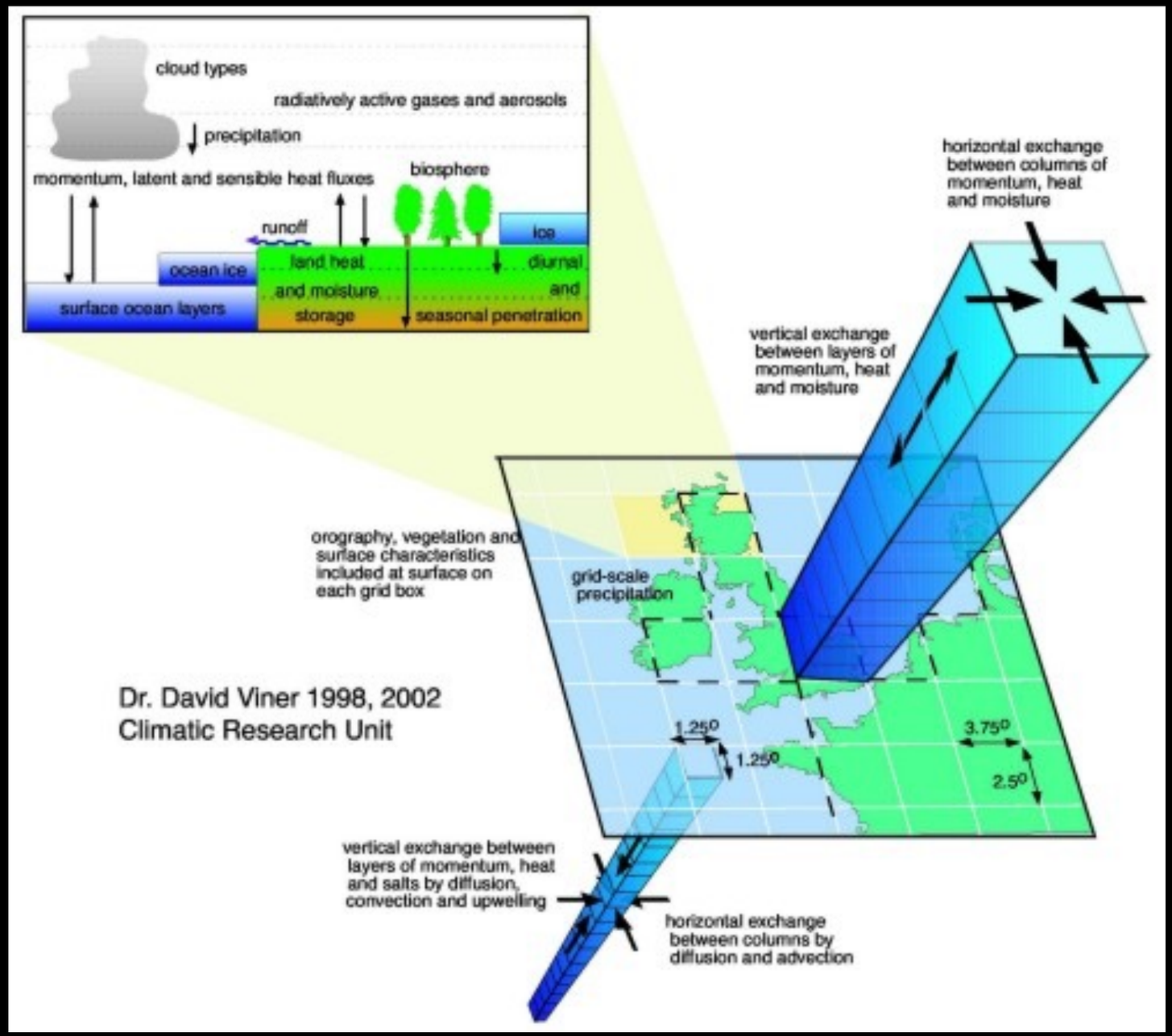
General circulation model (GCM)

Mathematical model simulating the response of the global climate system to increasing greenhouse gas concentrations



What else can we do?

- Hope that the world's nations will abide by their commitments to limit global warming made during the international climate conference held in Paris last year (the Paris Agreement)
- Cross-breeding commercial coffee cultivars to become more resistant to climate change
- Consider alternative locations to grow coffee