



COLORADO SCHOOL OF
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Using Climate Mode Indices to Forecast Carbon Monoxide Variability in Fire-Prone Southern Hemisphere Regions

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IGAC - MANGO Flash Talk

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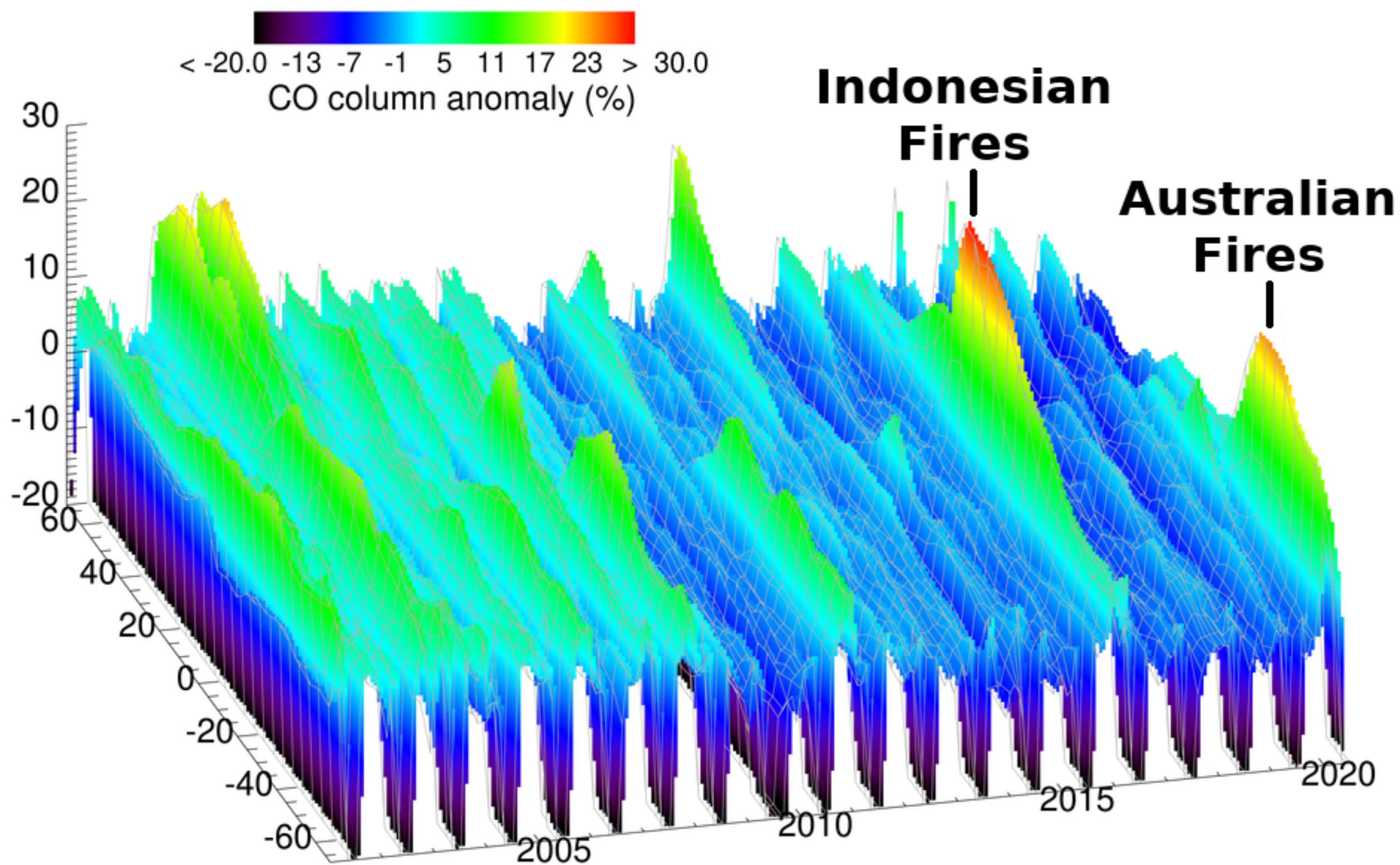
September 13, 2021

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Motivation

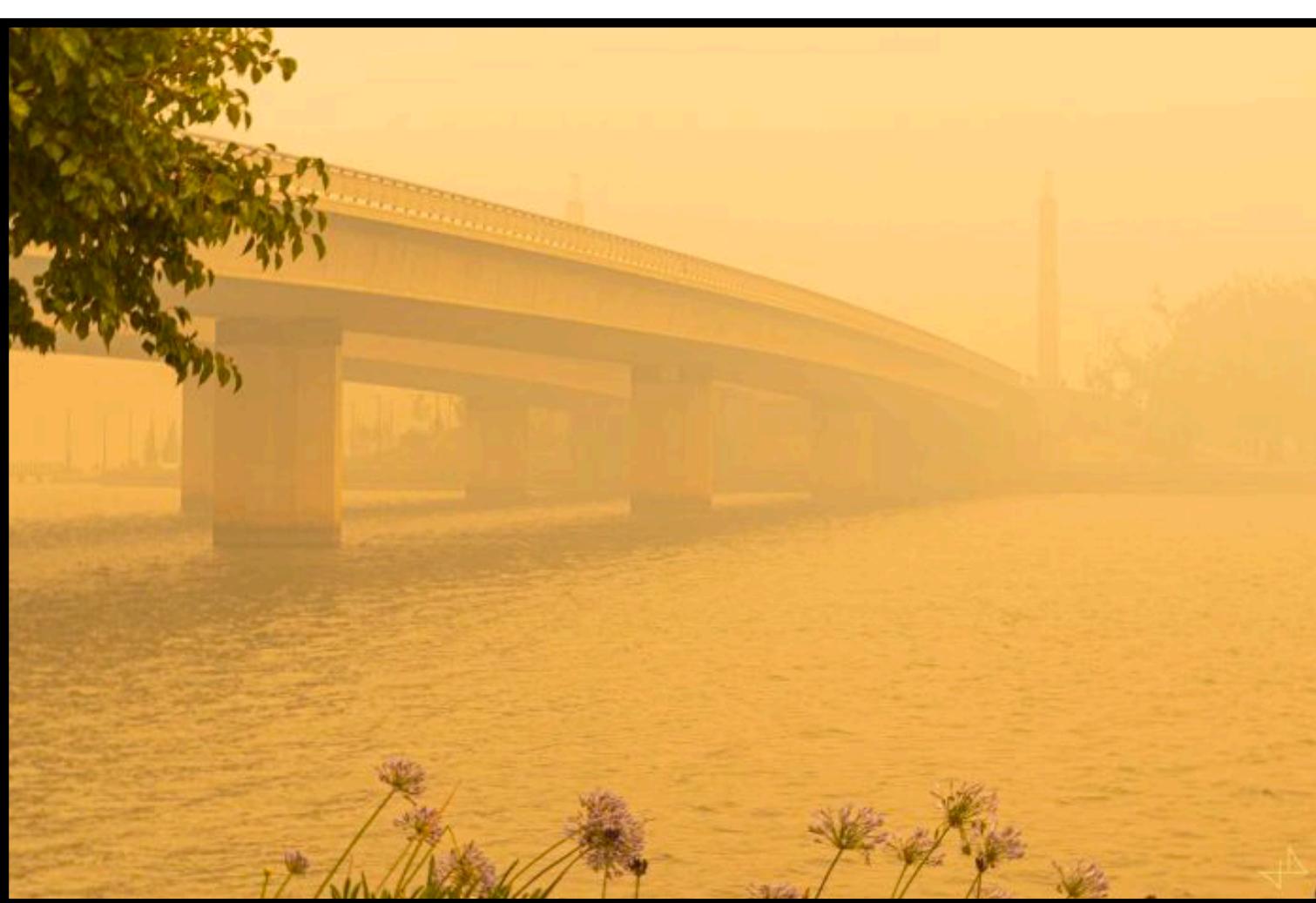


Certain Southern Hemisphere regions experience extreme carbon monoxide (CO) anomalies as a result of biomass burning.



October 2015

Palangkaraya,
Indonesia



January 2020

Canberra,
Australia



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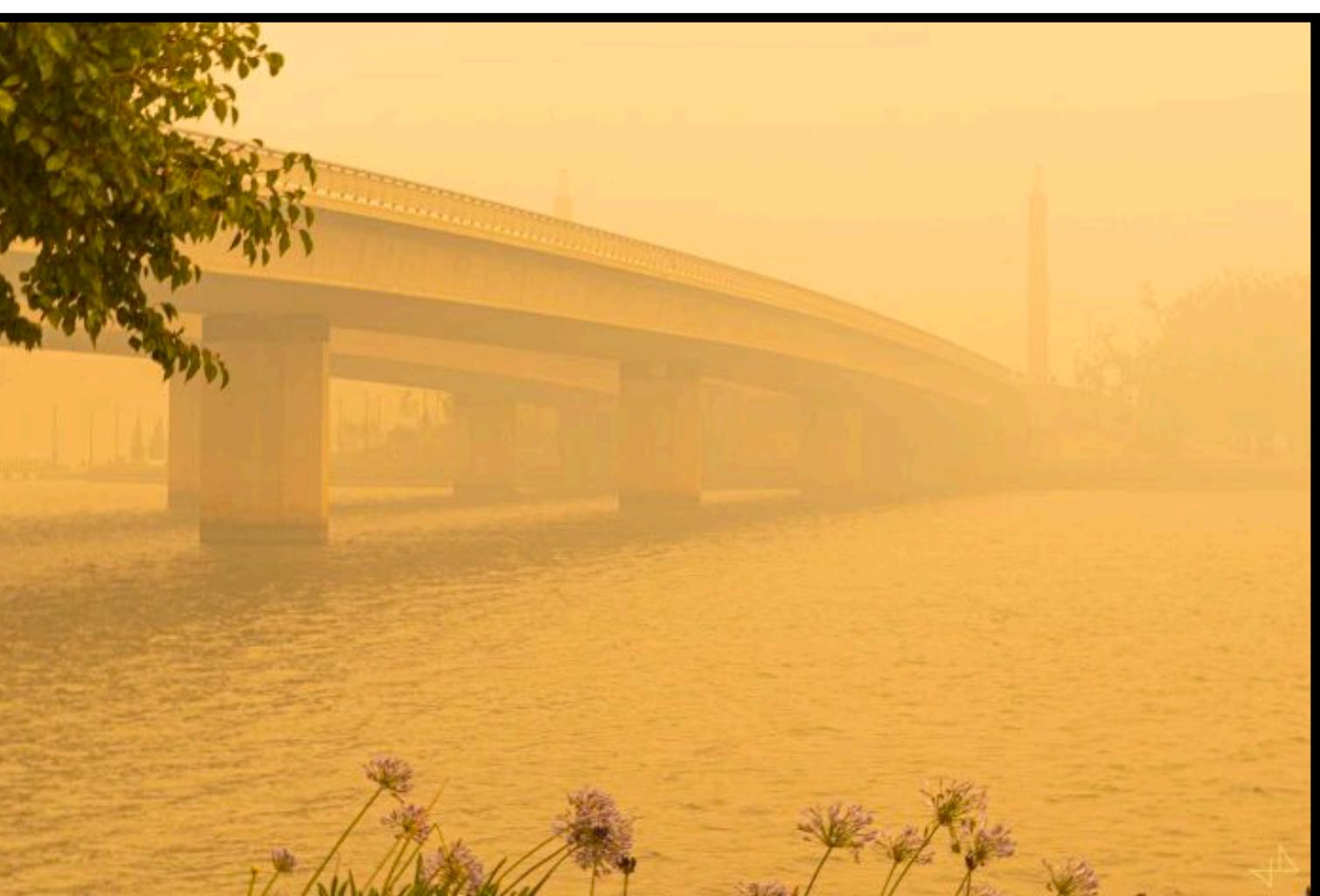
Our goals:

1. Make predictions of CO anomalies (as a proxy for fire intensity) at useful lead times
2. Draw scientific conclusions from models
→ make interpretable models



October 2015

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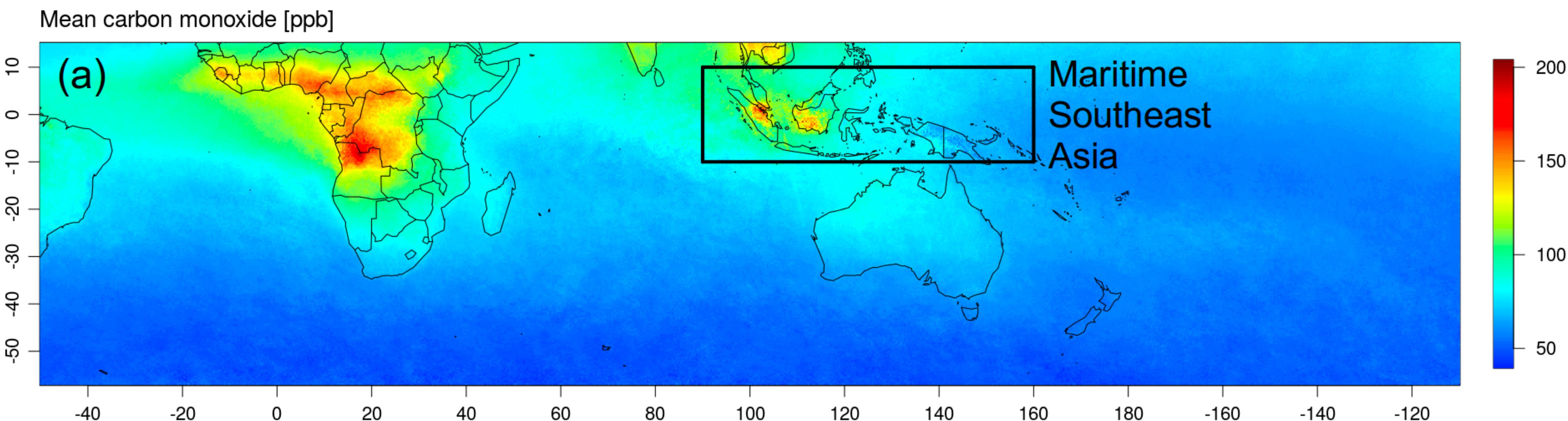
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Model and data

We use a regression framework with a response variable modeled as a linear combination of predictor variables.

Response variable: Deseasonalized, week-averaged CO anomalies at time t within a given region

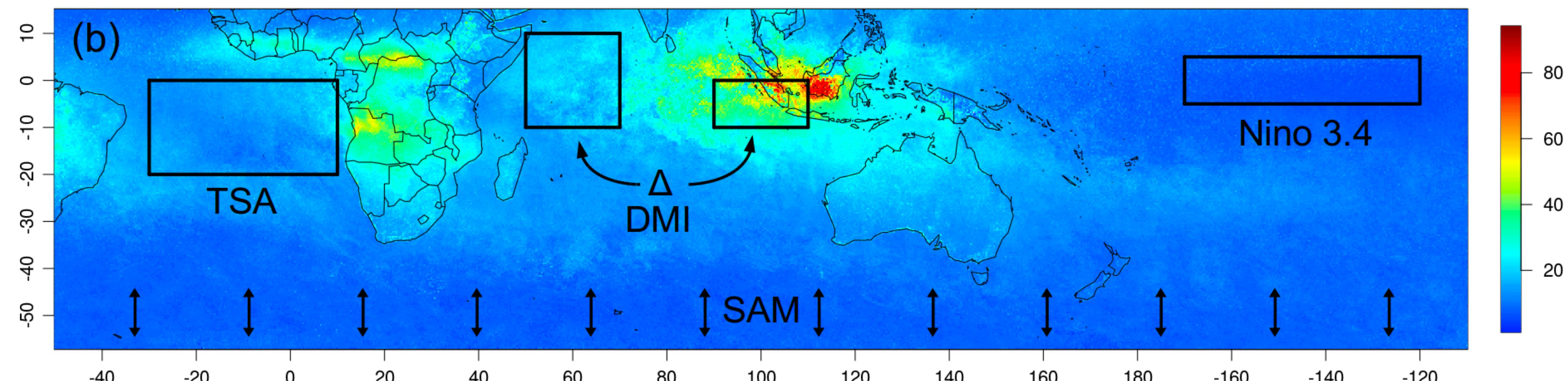




We use a regression framework with a response variable modeled as a linear combination of predictor variables.

Predictor variables: Week-averaged climate mode indices lagged at time $t - \tau$

Carbon monoxide standard deviation [ppb]



Included indices: Nino 3.4, DMI, SAM, TSA, and OLR (as a proxy for the MJO)

Summary of results

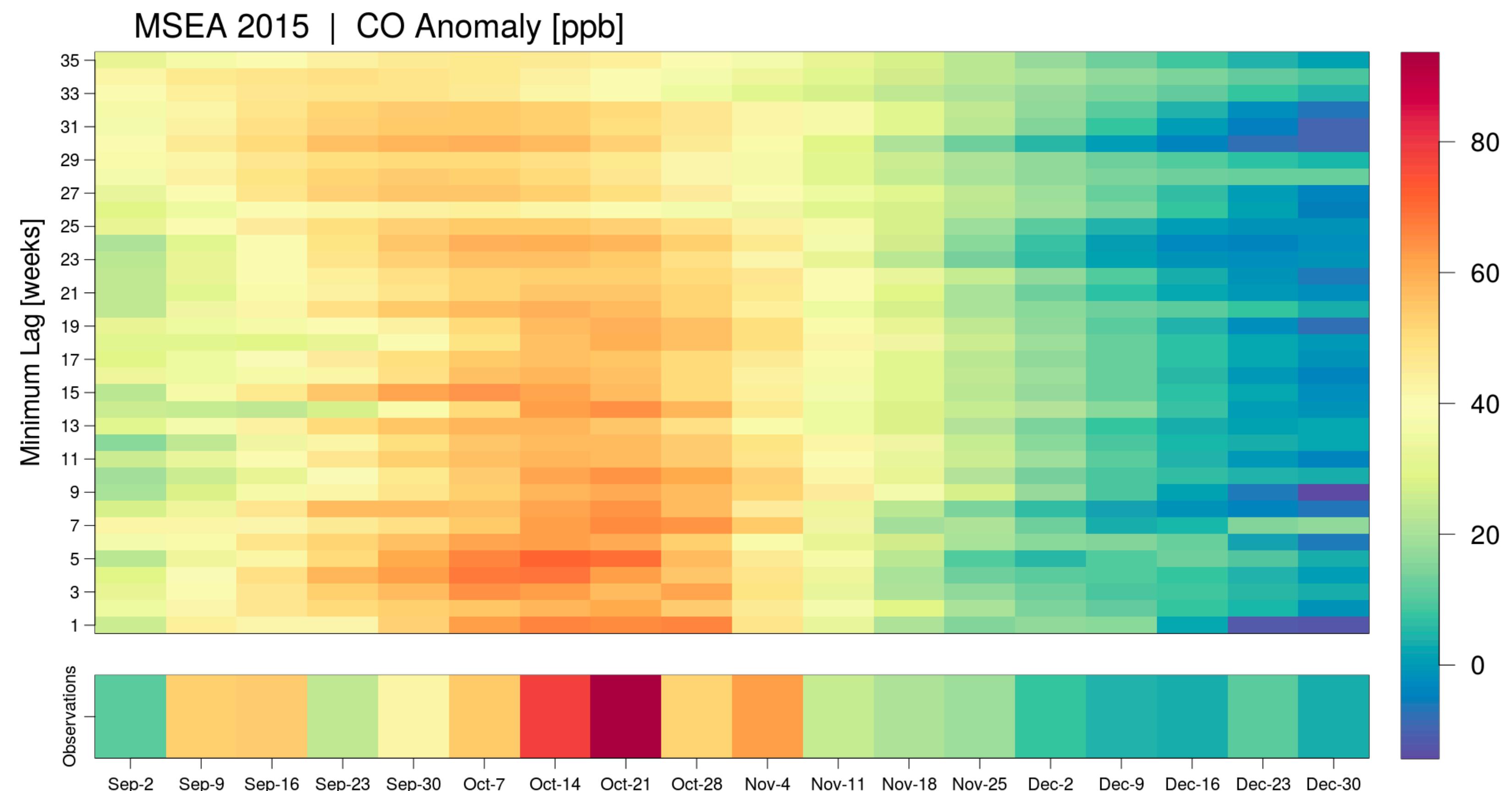


Interpretable models

	Est	(Std. Error)
(Intercept)	0.3	(0.70)
nino_4	7.6	(0.83)
dmi_1	5.7	(0.79)
dmi_12	-6.1	(0.75)
dmi_43	1.8	(0.65)
tsa_3	-2.2	(0.64)
sam_2	-3.6	(0.61)
sam_38	-2.2	(0.64)
sam_51	-1.6	(0.63)
olr_1	2.3	(0.74)
olr_13	3.4	(0.71)
nino_4:olr_1	3.2	(0.66)
nino_4:dmi_1	3.2	(0.81)
dmi_1:dmi_12	-4.5	(0.56)
nino_4:sam_51	-4.2	(0.77)
tsa_3:olr_1	-2.3	(0.63)
sam_2:olr_13	-2.1	(0.68)
nino_4:sam_2	-1.8	(0.70)

Standard error: 10.22
Multiple R-squared: 0.70
Adjusted R-squared: 0.68
DF: 17

Good predictive skill at lead times of up to ~6 months



Thank you! Questions?

I will be by my poster in
gather town on:

Monday Sep 13: 14-15 UTC
Tuesday Sep 14: 14-15 UTC
Wednesday Sep 15: 22-23 UTC



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