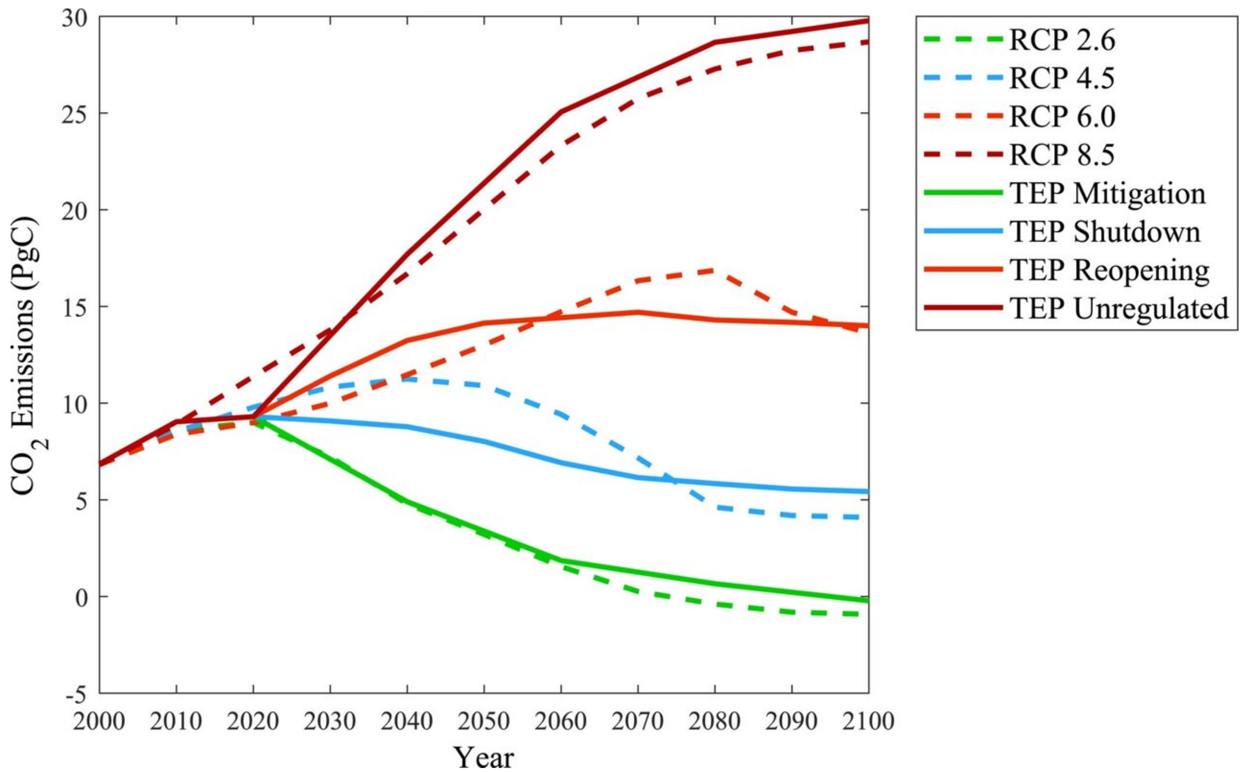
# How COVID-19 could help people relate to sea level rise

August 30 2022, by Allen Ramsey




Global $CO_2$ emissions of the translated emission pathways (TEPs) and representative concentration pathways (RCPs) (Meinshausen et al., 2011; Moss et al., 2010) under a 100-year period. Historical data used to construct the TEPs was obtained from the Global Carbon Project (Friedlingstein et al., 2020) until the year 2020. In order to satisfy the 80 years of future projections, each TEP translated $CO_2$ emission changes from the various phases of the COVID-19 pandemic across multiple years. Credit: *Earth's Future* (2022). DOI: 10.1029/2021EF002453

The COVID-19 pandemic offered a unique opportunity for climate change experts to relate sea level rise to the general public.

In her recent paper "Translated Emission Pathways (TEPs): Long-Term Simulations of COVID-19 $CO_2$ Emissions and Thermosteric Sea Level Rise Projections," published in *Earth's Future*, Texas Tech University's Ting Lin did exactly that.

Working with undergraduate McNair Scholar Alan R. Gonzalez, Lin, an assistant professor in the Department of Civil, Environmental & Construction Engineering, used $CO_2$ emissions data from various stages of the COVID-19 pandemic to create new sea level rise projections.

Using a nonlinear model developed with former doctoral student Matthew A. Thomas at her multi-hazard sustainability (HazSus) research group, Lin was able to tie those projections into the pandemic and times when industrial production, travel and emissions were at vastly different levels.

The hope for Lin and her team was to better relate what reducing emissions could potentially look and feel like for people in their everyday lives while showing what impact it would have on melting ice caps and sea level rise.

"Specifically, we used four stages," Lin said. "The first one is the emergence of COVID-19. The second one is when guidelines and some restrictions were set. Phase three is the reopening transition and phase four is the initial vaccinations."

The goal of the study and the paper is to bring the general public into the climate change discussion while encouraging people to be environmentally considerate.

"Our ability to show the corresponding data for emissions during those times and parallel it to what's already been done in the climate science community, which is portraying different types of scenarios for emissions, allowed us to use something the general public has experienced," Lin said. "Hopefully, that could help them relate how those restrictions impacted their day-to-day life."

While Lin was working to make the climate change conversation more accessible to the public, she also was putting together models and data to help the scientific community develop new methods for studying sea level rise.

In a second paper, co-authored with HazSus doctoral candidate Xiao Luo, "A Semi-Empirical Framework for Ice Sheet Response Analysis under Oceanic Forcing in Antarctica and Greenland," published in *Climate Dynamics*, Lin explains the development of a new framework for creating ice sheet response models.

After running a computationally expensive set of models, Lin and her team created simplified mathematical expressions to link the original models with the ability to input new data and create new outputs.

The hybrid approach between models and data gives scientists studying ice sheet response the ability to look at potential sea level rise using far less computing power but without loss of accuracy.

"We created this so in the future we don't have to re-simulate the whole process," Lin said. "We ran the initial process-based simulations using our High-Performance Computing Center (HPCC) at Texas Tech and it takes a very long time to run through those simulations.

"Once completed, we don't have to run all the different simulations for Antarctica and Greenland—we can generalize this and use the simplified, semi-empirical framework to generate future melting. And in turn, we can model the resulting sea level rise."

**More information:** Alan R. Gonzalez et al, Translated Emission Pathways (TEPs): Long-Term Simulations of COVID-19 CO 2 Emissions and Thermosteric Sea Level Rise Projections, *Earth's Future* (2022). DOI: 10.1029/2021EF002453

Xiao Luo et al, A Semi-Empirical Framework for ice sheet response analysis under Oceanic forcing in Antarctica and Greenland, *Climate Dynamics* (2022). DOI: 10.1007/s00382-022-06317-x

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