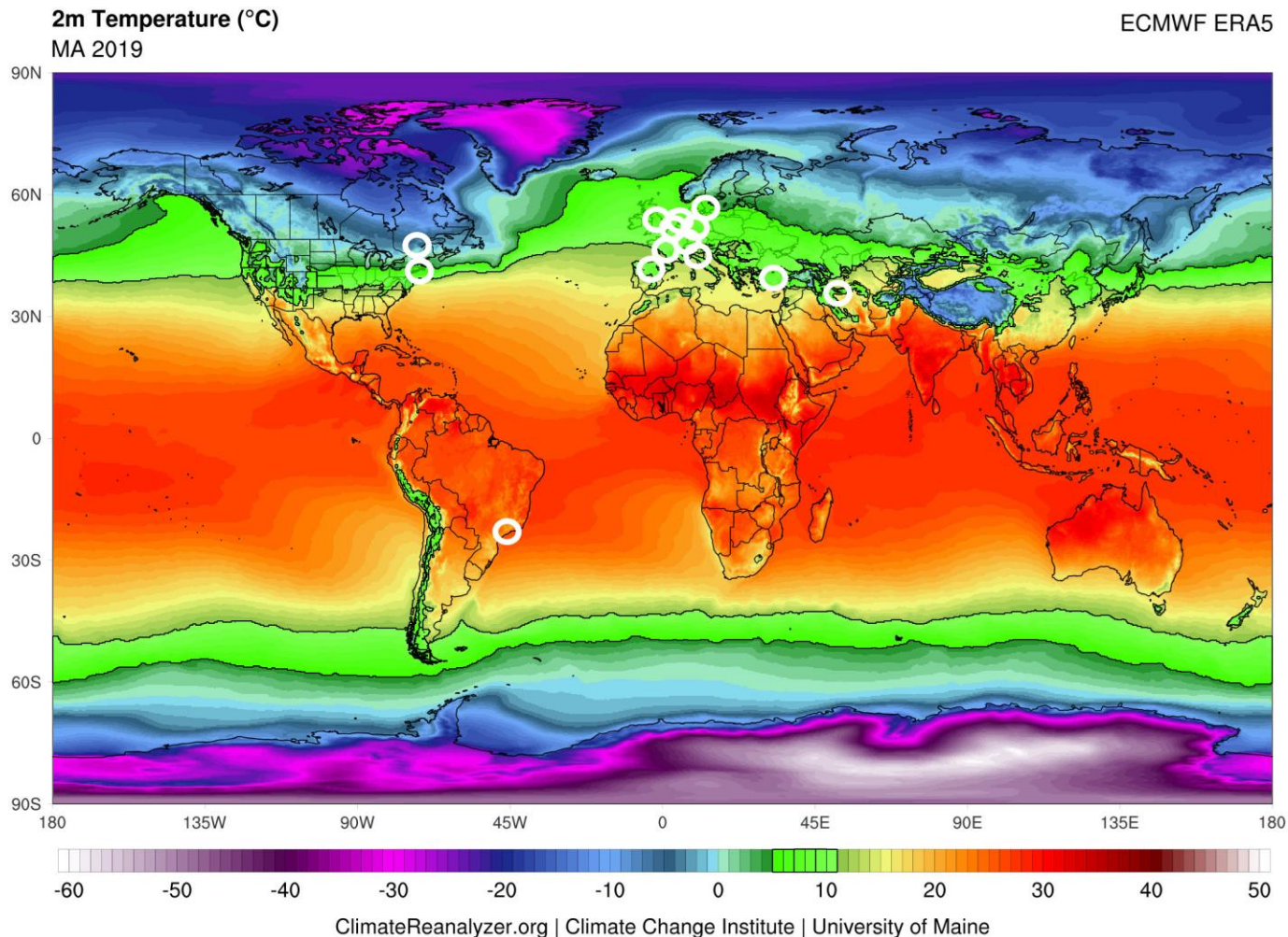# University of Maryland/IHV/MIT

- Hypothesis: SARS-CoV-2 is a seasonal respiratory virus (ie: it has certain temperature and humidity requirements that aid in its transmission ).



**World 2 meter average temperature map March 2019-April 2019 predicting at risk zone for March-April 2020.** Color gradient indicates average 2M temperatures in degrees Celsius, except neon green band which shows a zone with both 5-11°C and specific humidity between 3-6 g/kg. Tentative zone at risk for significant community spread in the near-term include land areas within the neon green bands. Top 14 countries with highest one day death total on 4/9/20 noted with white circles. Image from Climate Reanalyzer (https://ClimateReanalyzer.org), Climate Change Institute, University of Maine, USA. Digital manipulation by Cameron Gutierrez and Glenn Jameson.

We are seeking to validate the findings with study in the continental United States. We will compare COVID-19 growth rates on a state and country level, and seek correlation with temperature and specific humidity.

Other variables that will be studied include climate (UV light, wind, precipitation) and non-climate factors (air pollution, population density, median age, life expectancy, median income)

# Definition of Favorable Days

Based on our analysis we can define a 'favorable' day as a day with meteorological variables within a given range.
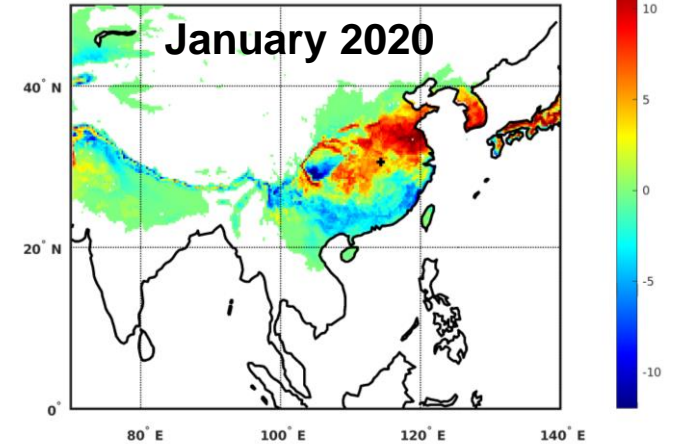
We can then define a climatological number of favorable days per month e.g. for January (based on ERA-5 data 1990-2020)

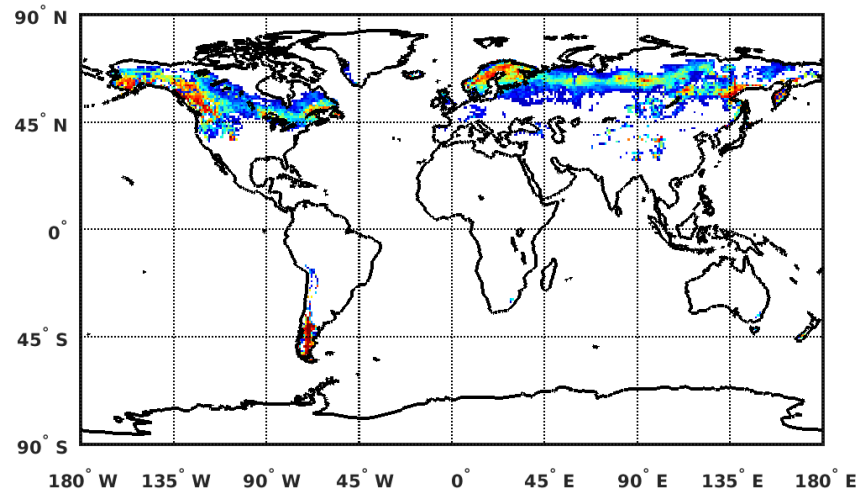**Average number of favorable days per month (January)**

January 1990 - 2019
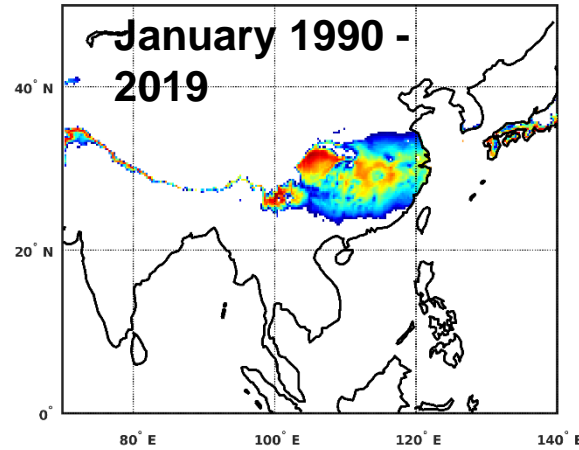
We can also define departures from this climatology (anomalies) e.g. for January 2020

Favorable days per month anomaly (January 2020)

January 2020

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# Subseasonal-to-Seasonal Forecasting

We can then forecast quantities such as the probability for more than N days of favorable conditions within a given period.

In this example we are using NOAA's Climate Forecast System (CFSv2) to compute the probability of the favorable days being higher than 20 from 21-April to 20-May, 2020.

**Probability for > 20 days with fav. cond.: 21-Apr to 20-May, 2020**

This is only an example of possible forecast formats as we have not calculated the forecast skill for this quantity yet.

Plans include the extension of the forecast system to seasonal lead times.