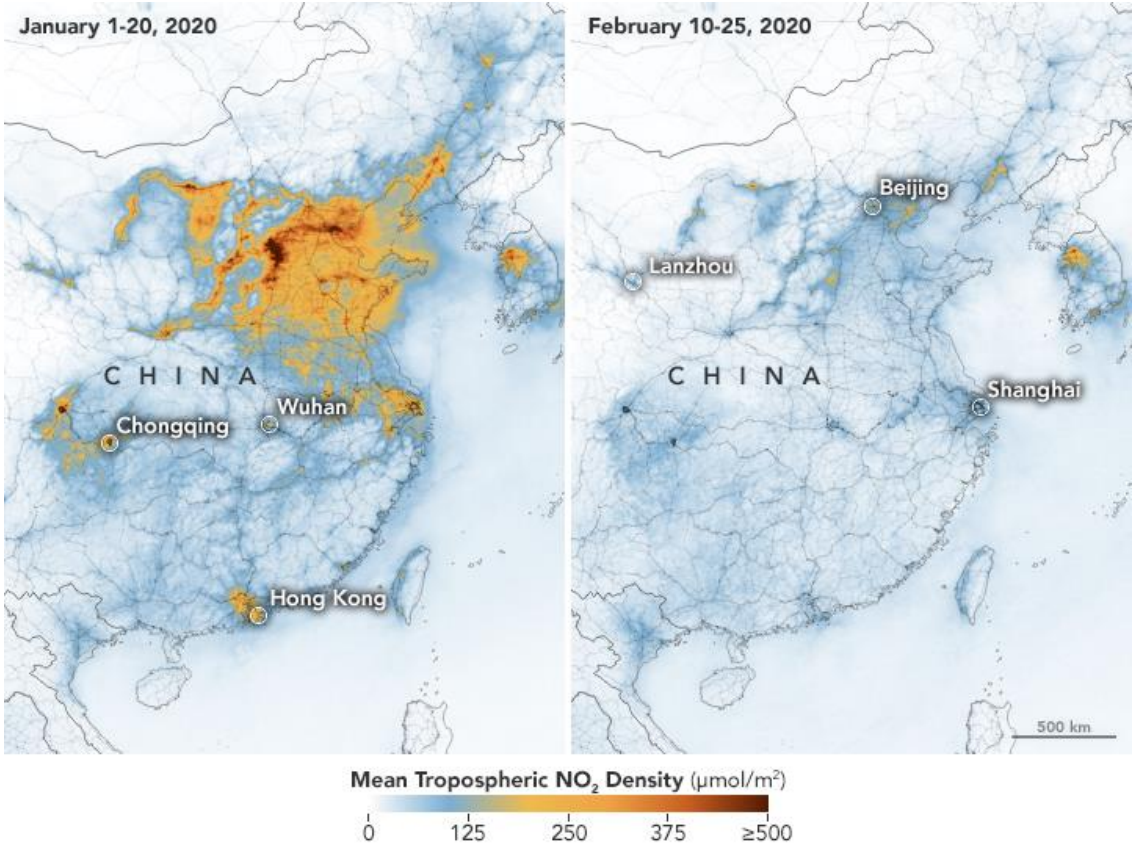
GEO VIRTUAL SYMPOSIUM 2021

Seasonality of COVID-19

21 June 2021

Benjamin F. Zaitchik

Earth Observations and COVID-19



First off:

Kudos to the EO community

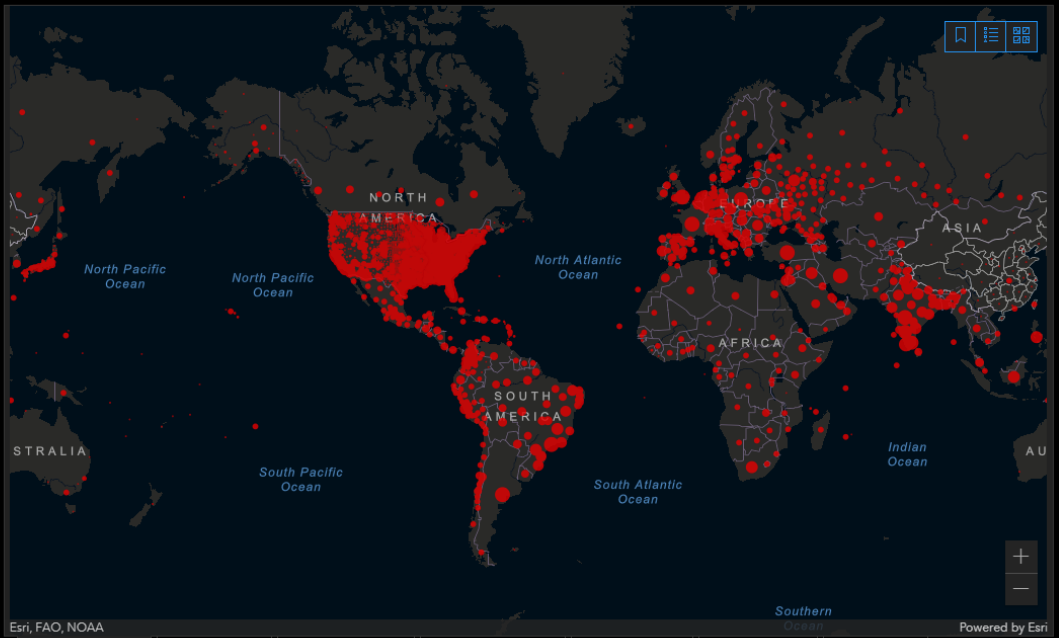
COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Last Updated at (M/D/YYYY)
6/20/2021, 7:21 PM

Cases	Deaths	Vaccine Doses Administered
178,420,884	3,864,339	2,600,021,719

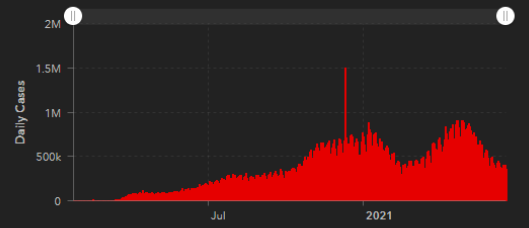
Cases and Deaths by Country/Region/Sovereignty

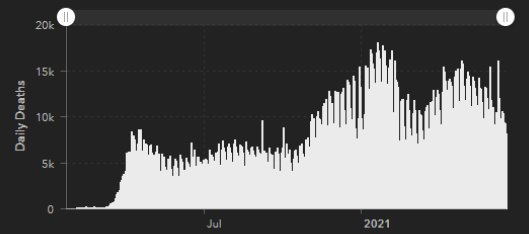
	Cases	Deaths
US	33,541,528	601,826
India	29,881,772	386,708
Brazil	17,927,928	501,825
France	5,819,088	110,900
Turkey	5,370,299	49,185
Russia	5,255,214	127,206
United Kingdom	4,646,065	128,240
Argentina	4,268,789	89,043
Italy	4,252,976	127,270
Colombia	3,945,166	99,934
Spain	3,757,442	80,652
	3,730,126	90,392

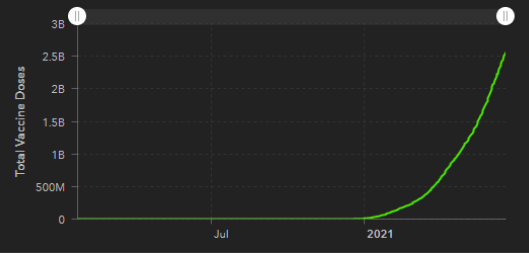


Admin0 | Admin1 | Admin2

Cumulative Cases | Incidence Rate | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | US Testing Rate | Terms of Use







JOHNS HOPKINS UNIVERSITY & MEDICINE | CORONAVIRUS RESOURCE CENTER

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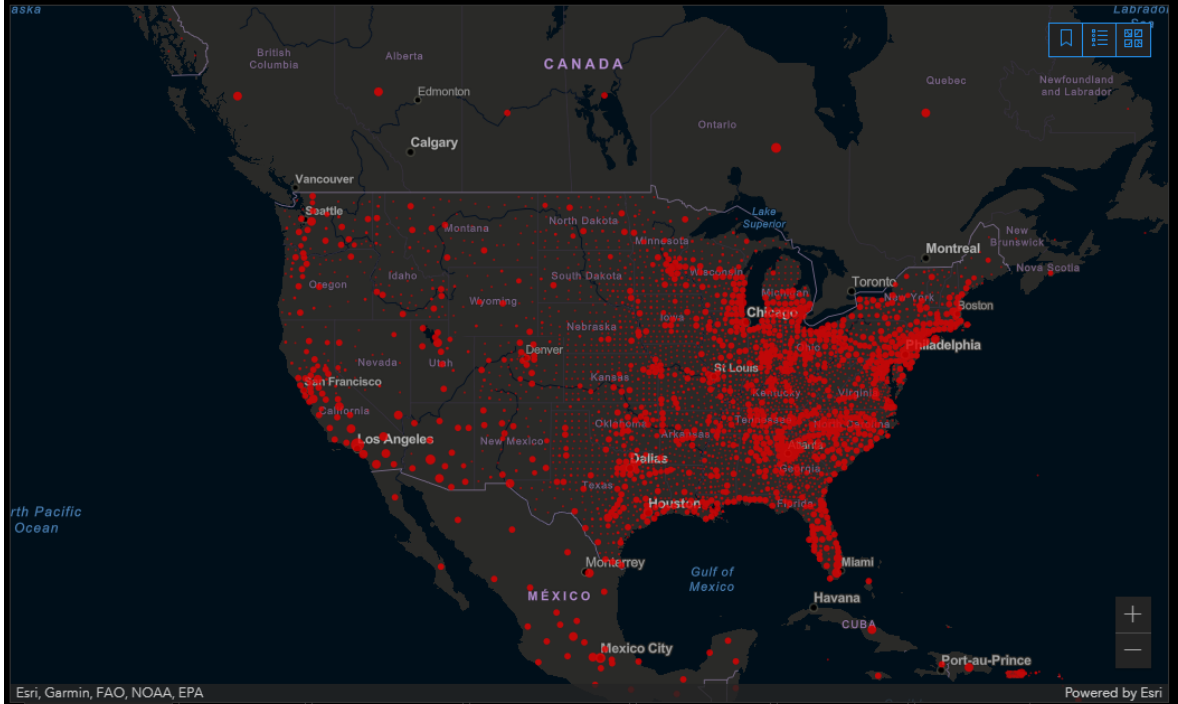
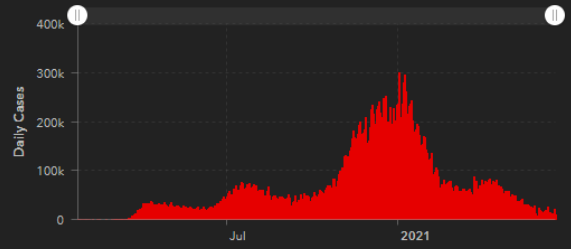
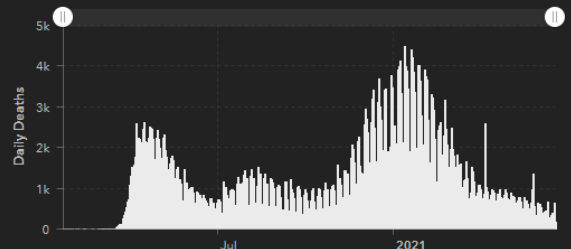
Tracking Home | Data Visualizations | Global Map | U.S. Map | Data in Motion | Tracking FAQ

d by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Cases	Deaths	Vaccine Doses Administered
33,541,528	601,826	317,453,669



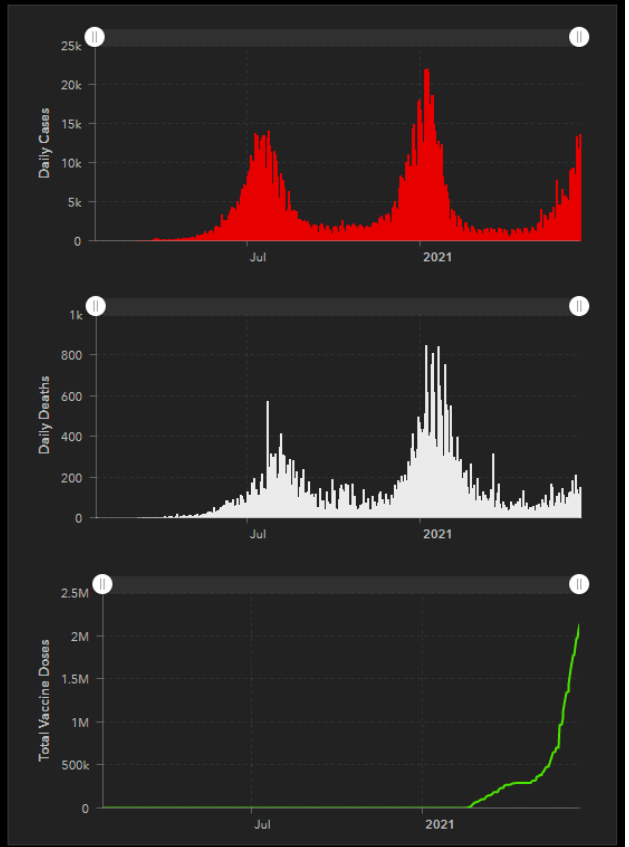




Cumulative Cases | Incidence Rate | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | US Testing Rate | Terms of Use

d by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

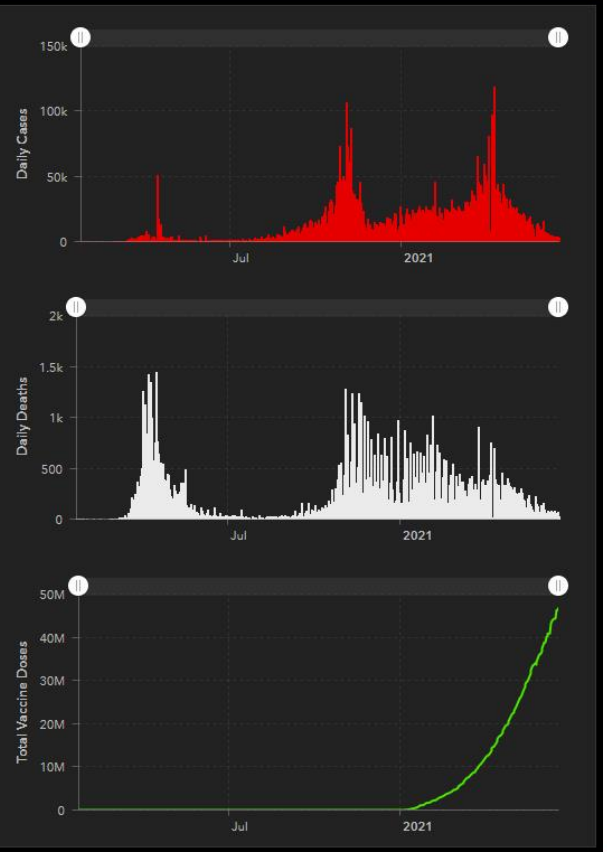
Cases	Deaths	Vaccine Doses Administered
1,823,319	58,702	2,141,624



Cumulative Cases | Incidence Rate | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | US Testing Rate | Terms of Use

by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

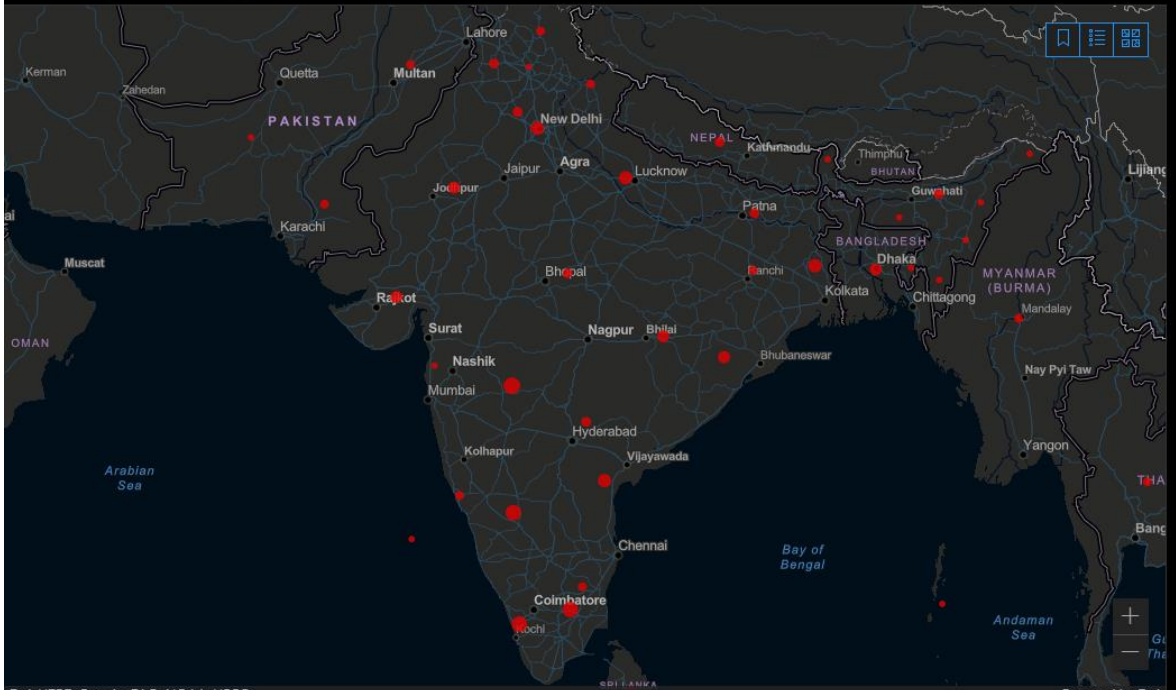
Cases	Deaths	Vaccine Doses Administered
5,819,088	110,900	47,714,865

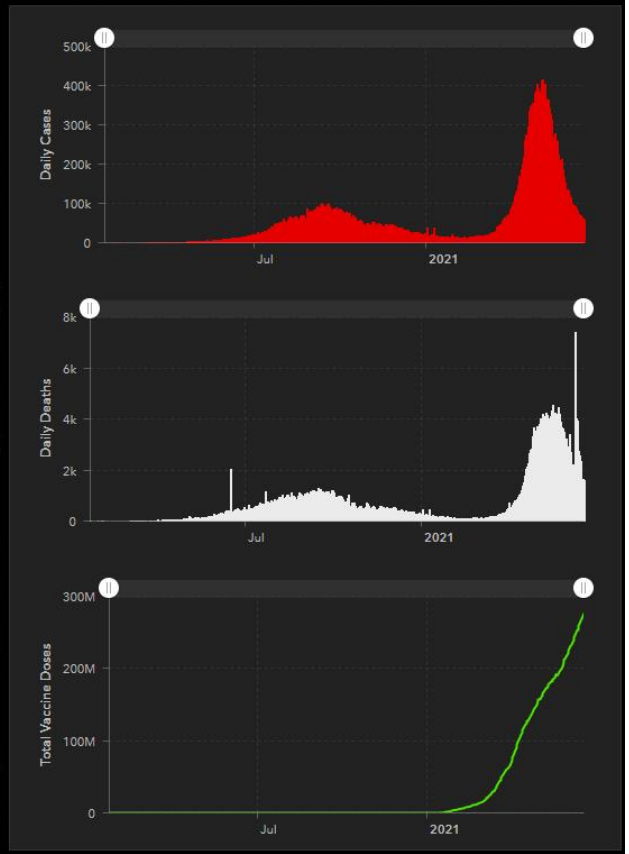


Cumulative Cases | Incidence Rate | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | US Testing Rate | Terms of Use

by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Cases	Deaths	Vaccine Doses Administered
29,881,772	386,708	276,693,572

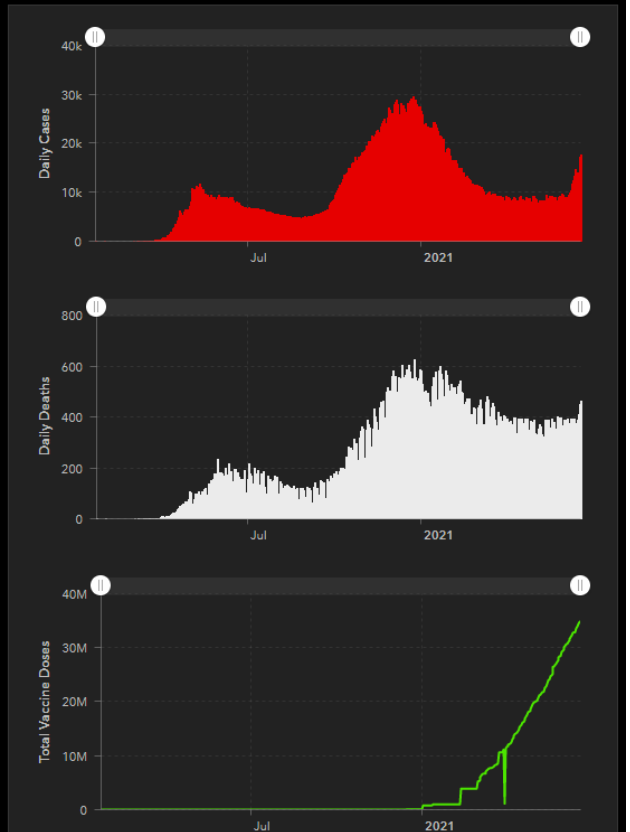




Cumulative Cases | Incidence Rate | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | US Testing Rate | Terms of Use

d by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

Cases	Deaths	Vaccine Doses Administered
5,255,214	127,206	34,924,096



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COVID-19 outbreaks can happen at any time of year and in any climate zone.

And yet:

- There is considerable **prior reason** to expect that an upper respiratory infectious disease like COVID-19 may be seasonal.
- There is **laboratory evidence** of environmental sensitivities consistent with these prior expectations.
- Some epidemiological studies claim to have **isolated a meaningful seasonal pattern in COVID-19 case data.**

This matters because:

- We need to understand the extent to which northern hemisphere summer 2021 declines are due to immunity rates vs. seasonal protection.
- Should COVID-19 persist, we can inform vaccination strategies and Non-Pharmaceutical Interventions based on seasonal patterns.

Understanding seasonality is important

Why expect seasonality?

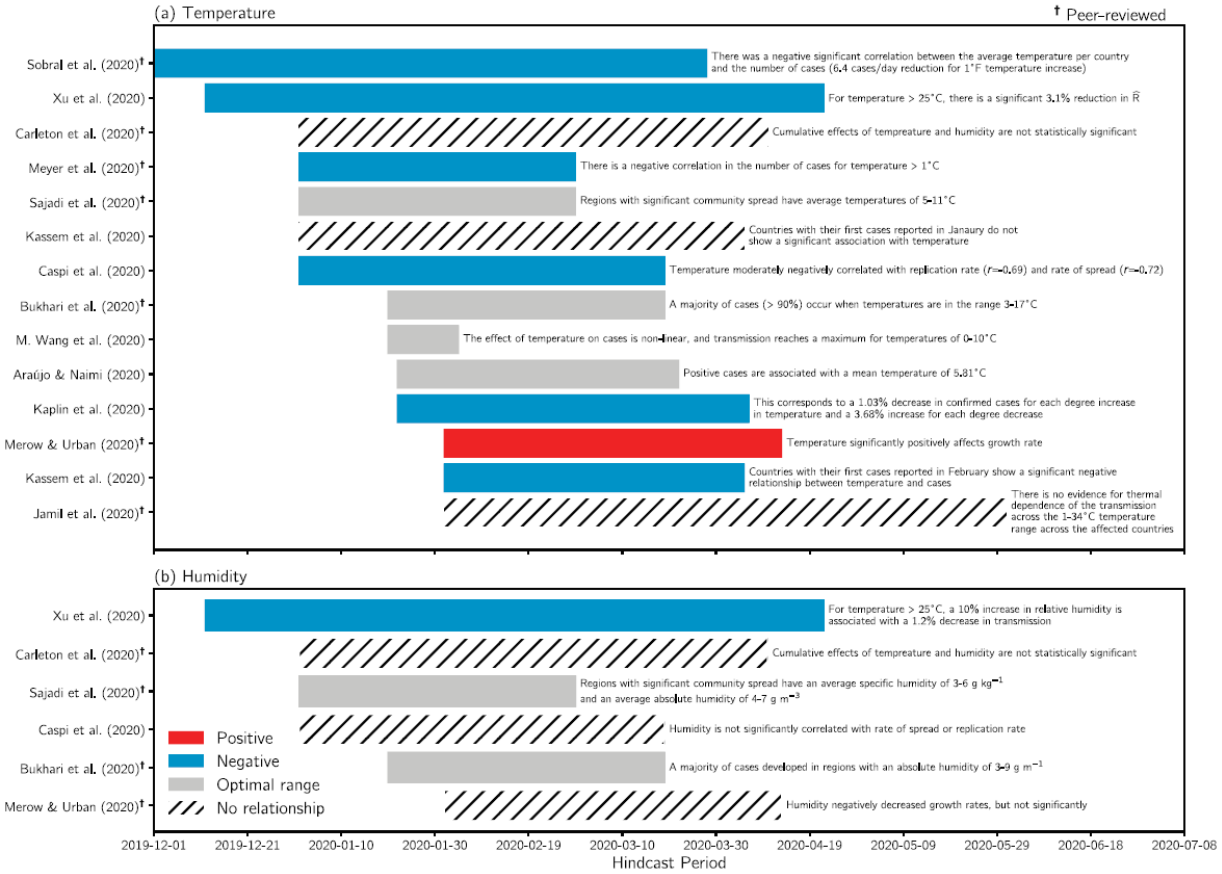
- Virus stability and viability
- Host susceptibility and immune response
- Human Behavior
- Societal patterns

Why expect seasonality?

- Virus stability and viability – weather and indoor environment
- Host susceptibility and immune response – weather and indoor environment
- Human Behavior – weather
- Societal patterns – calendar-driven

Seasonality is not synonymous with meteorological sensitivity

Seasonality vs. meteorological sensitivity



Kerr et al. (2021)
https://doi.org/10.1016/j.onehlt.2021.100225

Seasonality vs. meteorological sensitivity

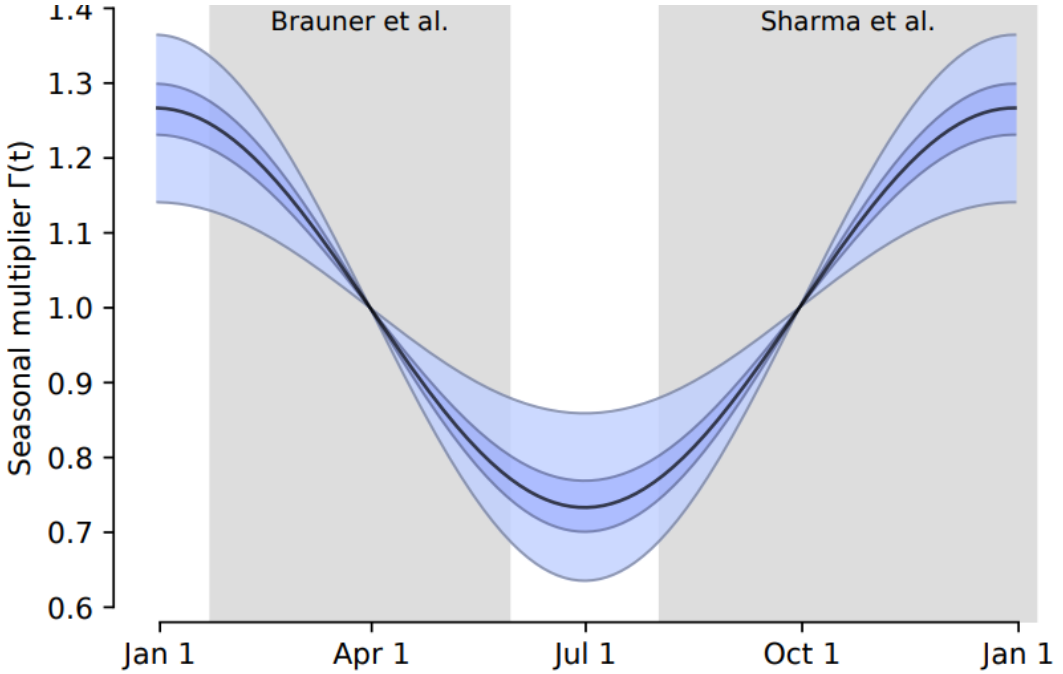
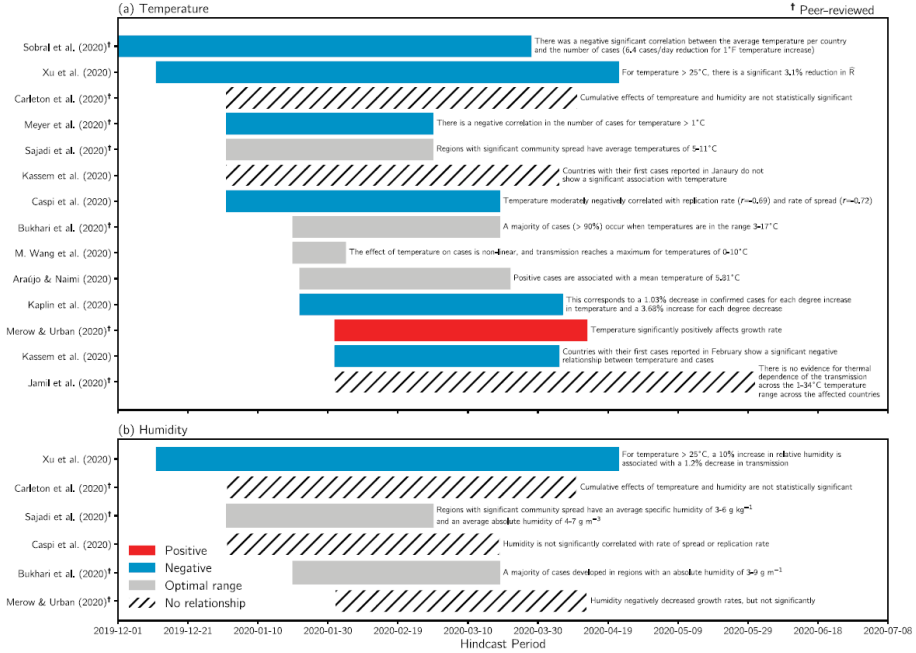
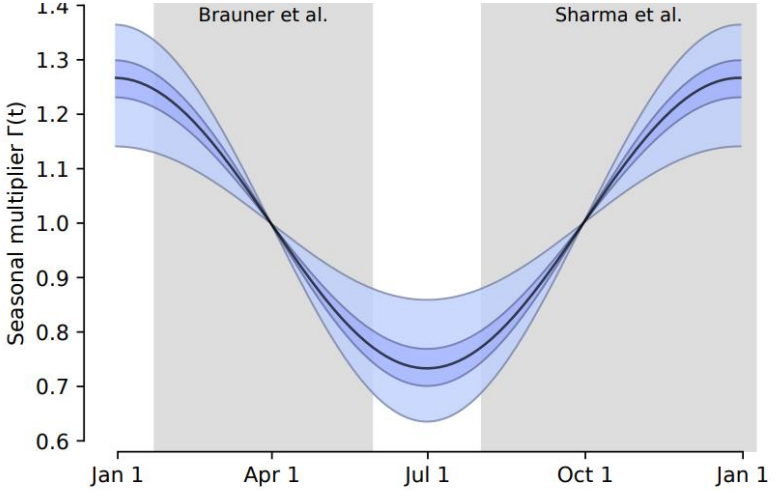


Figure 1: The inferred seasonal R multiplier $\Gamma(t)$ of the combined models estimate, with 50% and 95% confidence intervals. Gray boxes indicate data range of each dataset.

Gavenciak et al. (pre-print)
https://doi.org/10.1101/2021.06.10.21258647

Seasonality vs. meteorological sensitivity





Earth Observations have a critical role to play

The role of Earth Observation

- Work proactively to harmonize EO data with relevant health data and covariates.
  - https://github.com/CSSEGISandData/COVID-19_Unified-Dataset
  - https://www.medrxiv.org/content/10.1101/2021.05.05.21256712v1

The role of Earth Observation

- Work proactively to harmonize EO data with relevant health data and covariates.
- Take responsibility to integrate environmental and non-environmental data.

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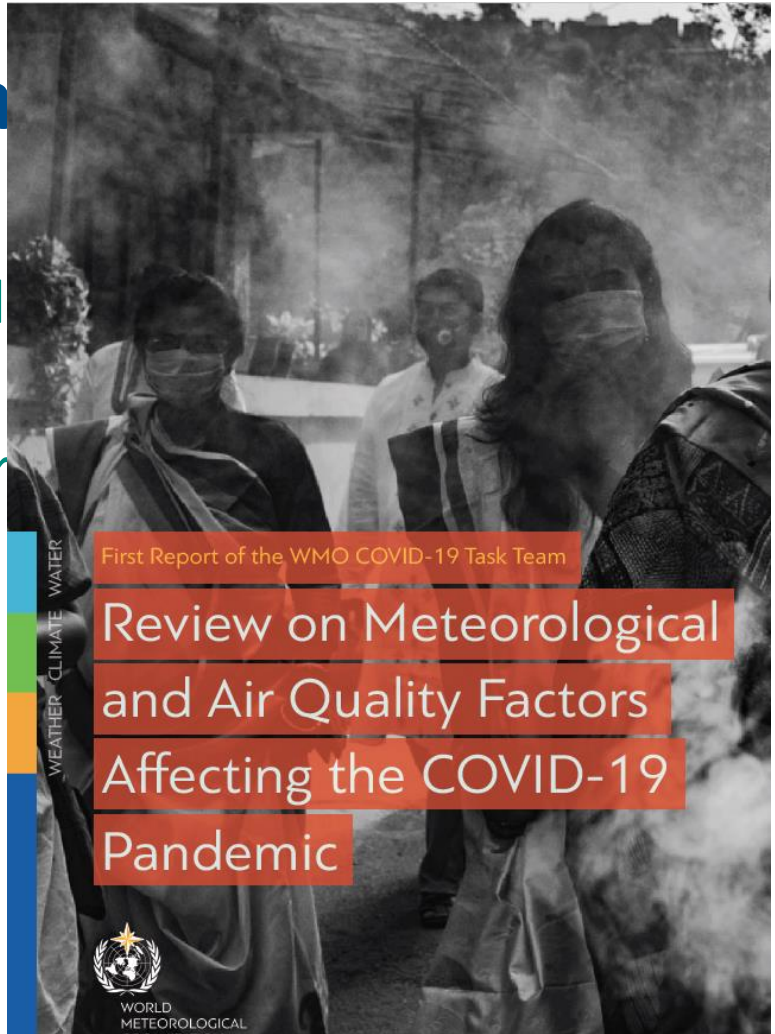
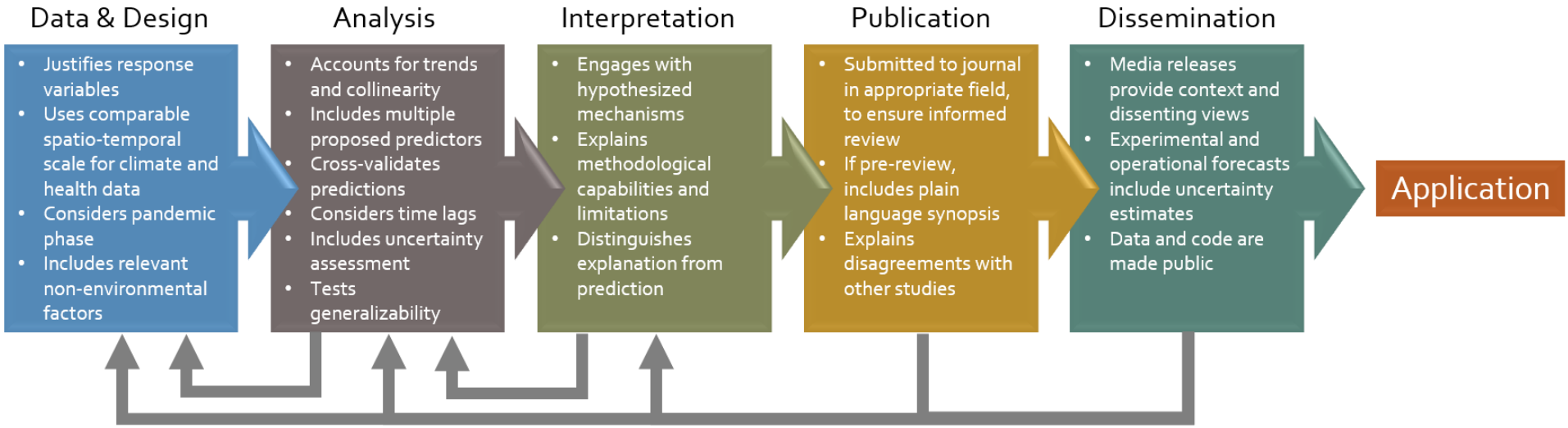


The role of Earth Observation

- Work proactively to harmonize EO data with relevant health data and covariates.
- Take responsibility to integrate environmental and non-environmental data.
- Communicate findings clearly and cautiously.

The role of Earth Observation



https://www.nature.com/articles/s41467-020-19546-7

Thank You!

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Collaborate and communicate with GEO: