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Outline



- Public communication
- Forecast models
- The synergy between COVID19 and CLIMATE

Communication: Evolution of messages from epidemiologists, CDC, WHO



February 2020

“Very, very, low risk to US”

“No clear evidence of human-to-human transmission of the novel Coronavirus”-

“No need for members of the general public to wear face masks unless they were sick or caring for someone who was”

Flawed German study hinted that people can spread virus before showing symptoms

March 2020

“People who didn’t know they were sick should wear face covering in public”

“Masks were useful in that they would keep you from touching your face”

“Worries about auto-contamination from wearing masks”

SARS-CoV-2 is prevalent along 30N-50N corridor with average temp 5-11C, specific humidity 3-6g/kg, absolute humidity 4-7g/m³

Since mid-April 2020

“Wearing non-medical masks can greatly help reduce transmission of the coronavirus”

Many independent lines of investigations converged to indicate that viral levels peak as symptoms appear.

-“Why we’ve taken down our outdated Coronavirus mask coverage”, NY times, July 2 2020

“Why the Coronavirus is so confusing?”-Ed Yong, The Atlantic,

Messaging: Preprints to Public Media



Messaging of COVID19 is amidst

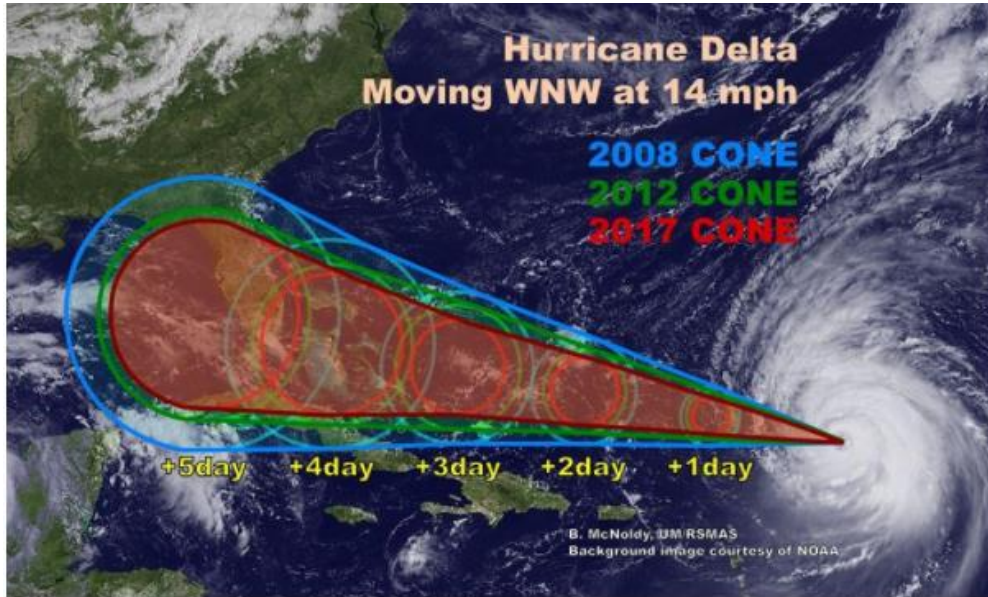
1. Rapidly evolving pandemic with novel symptoms and transmission
2. Confounding theories
3. Erratic and inhomogeneous human response
4. Highly politicized

Communication



The NHC Track Forecast Cone:

“The cone represents the probable track of the center of a tropical cyclone and is designed to enclose 2/3 of the historical track forecast errors; meaning there is still a 1/3 likelihood that storm could track outside the range of the cone.”



Courtesy: Marshall Shepherd

Cone was introduced by NHC
in 2002

--This led to confusing track error cones as threat zones. This became problematic when the wind envelope of large tropical cyclones was beyond the track cone!

Messaging: Hurricane Charley 2004



The public was overconfident in and reliant upon the track line, that is, the "skinny black line" embedded in the white cone that depicts the forecasted track of the hurricane center.

In the days and hours leading up to the landfall of Charley, multiple cone of uncertainty graphics had projected that the eye would hit Tampa. In the last hours, however, the storm veered from this track line and hit Punta Gorda and Charlotte County instead.

This shift in the track line remained well within the cone of uncertainty, and yet as described above, many subsequently criticized the NHC's graphics.





Messaging: New look of the cone

Communication to the public

1. Modification of the hurricane track cone took 15 years after much deliberation.
2. Reconciling with conflicting and evolving public health message of COVID19 is understandable from the perspective of the systematic deliberations that took to modify the track cone.

Forecast Models



The numerical weather forecast model has a very long legacy from the first ever numerical weather prediction performed on the ENIAC digital computer in 1950 in Aberdeen, Maryland to the present

The idea of probabilistic forecasts has rapidly evolved while the communication of these forecasts to the general public has occurred more gradually.....

The first successful mathematical model for the spread of communicable disease was based on compartment models—Dynamics of transmission to malaria from mosquitoes to humans—Dr. Ross (1902)

The use of stochastic modeling in disease transmission appeared in Metz (1978)

Forecast Models



Some simple facts of epidemiological modeling of COVID19:

1. Models established that an early stage, sustained social distancing measure reduce virus's reproduction number.
2. Models also showed that relaxing these measures in the absence of pharmaceutical interventions may allow the pandemic to reemerge.
3. Models also show that after the reemergence of surge of the pandemic, social distancing may be of little consequence on the total number of infections over the course of the pandemic.
4. Differences in collection methods of mortality data and confirmed data statistics lead to large differences in projected outcomes.
5. Models have provided counterfactuals: e.g. outcomes when no social distancing is practiced
6. COVID-19 has tantalizing evaded patterns
 1. Affects lungs/airways, heart, nervous system, kidneys etc.
 2. Elderly were most susceptible. But in southern US middle aged adults are getting hospitalized
 3. Mode of transmission: contact surface, air borne....
 4. Past Coronavirus epidemics (MERS, SARS) offer limited clues because they were so contained
7. Modeling human behavior and dynamic change in the reproductive number of the virus is a huge challenge for forecasting the pandemic





Forecast models: Evolution of forecast skill

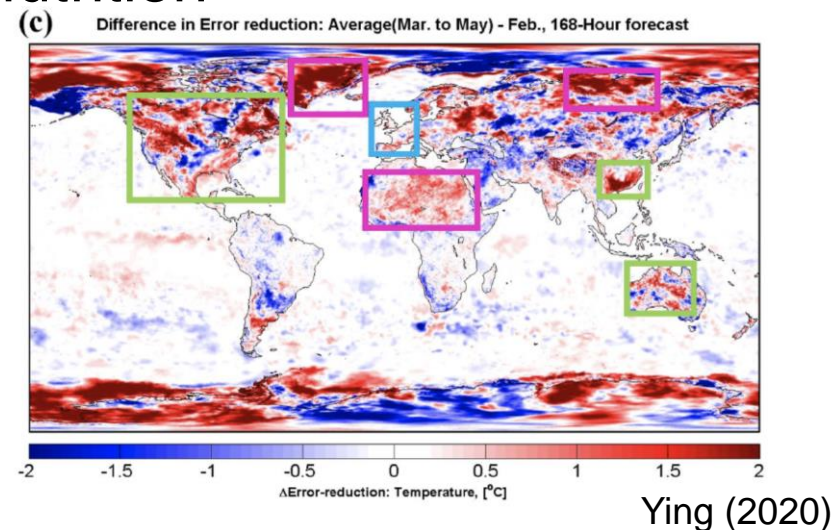
Forecast Models:

- 1) In COVID19 the of epidemiological models have been indispensable for public health guidance
- 2) The weather and climate models have developed in the presence of focused targets and dedicated resources; In contrast, epidemiological models are considered to be eclectic/niche research, although in 2017 there were 435,000 deaths from Malaria--WHO

The Synergy: Climate and COVID19



1. Public health and Environmental Health are inextricably intertwined.
2. 70% of the emerging diseases are zoonotic (i.e., a disease normally in animals, infect humans)—a result of changing habitats, rising poverty, poor nutrition
 - Rabies (early 1800)
 - Lyme disease (~1960s)
 - West Nile Fever (1999)
 - SARS (2003)
 - MERS (2014)
 - EBOLA (2014)
 - COVID19
3. Affecting weather forecasts with plunging number of commercial aircrafts in operation



Conclusions



1. Communication of weather forecasts evolved gradually and is evolving gradually over time to meet with growing needs
2. Communication of public health advisories has to evolve in a rapidly evolving situation, where likelihood of mis-steps is greater
3. Disease communication models are far more difficult to build as the current pandemic has shown from the novelty of the Coronavirus, novelty of the transmission, and novelty of policy making and implementation; despite these challenges the models have proven to be indispensable for planning
4. Just as COVID19 models have been used for guidance in public policy, we should think of climate projections as exploratory rather than consolidative perspective
5. The planet is intimately intertwined. Nurture all parts of the planet from local to remote