Will the approaching austral winter (c̄ typical flu season) impact COVID-19 transmission rates?

The COVID-19 Environmental Reference Group is functioning under the auspices of the Department of Science and Technology in South Africa:

Questions addressed (among others):

1. What confidence can we ascribe to the likely role of climate parameters such as ambient temperature & humidity in affecting infection rate and how so?
2. To what degree is infection rate influenced by seasonal climate variability and at what stage of local epidemics does it play a relatively important role?
3. Is air quality a confounding factor in infection rate or in mortality rates and if so, how so?
4. How can environmental variables be assimilated into epidemiological modelling efforts globally?
5. What other seasonal ecological, social and behavioral factors (e.g. human behavior) should be considered in understanding the potential seasonality of COVID-19 incidence?
6. What are the likely scenarios of the COVID-19 pandemic over the next 6-24 months in respect of seasonal variability globally and how do we manage uncertainty?
7. What are the remaining knowledge gaps regarding the environmental confounders of infection rate, and how should these be addressed?
8. What can the global scientific community learn and what systems can be developed in respect of the environmental drivers of global pandemics in the future?

What we are doing:

1. CERG provides algorithms, near-real-time observation data sets and climate predictions to the Department of Health & National Institute of Communicable Diseases spatial epidemiological model.
2. Reviewing incoming literature and considering a range of environmental parameters (climate, UV, AQ etc.)
3. Reaching out regionally and globally - promoting the idea of a urgent global conference on this topic.

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Preliminary results: projections of climate impacts on SARS-CoV-2 transmission probability from March to June 2020

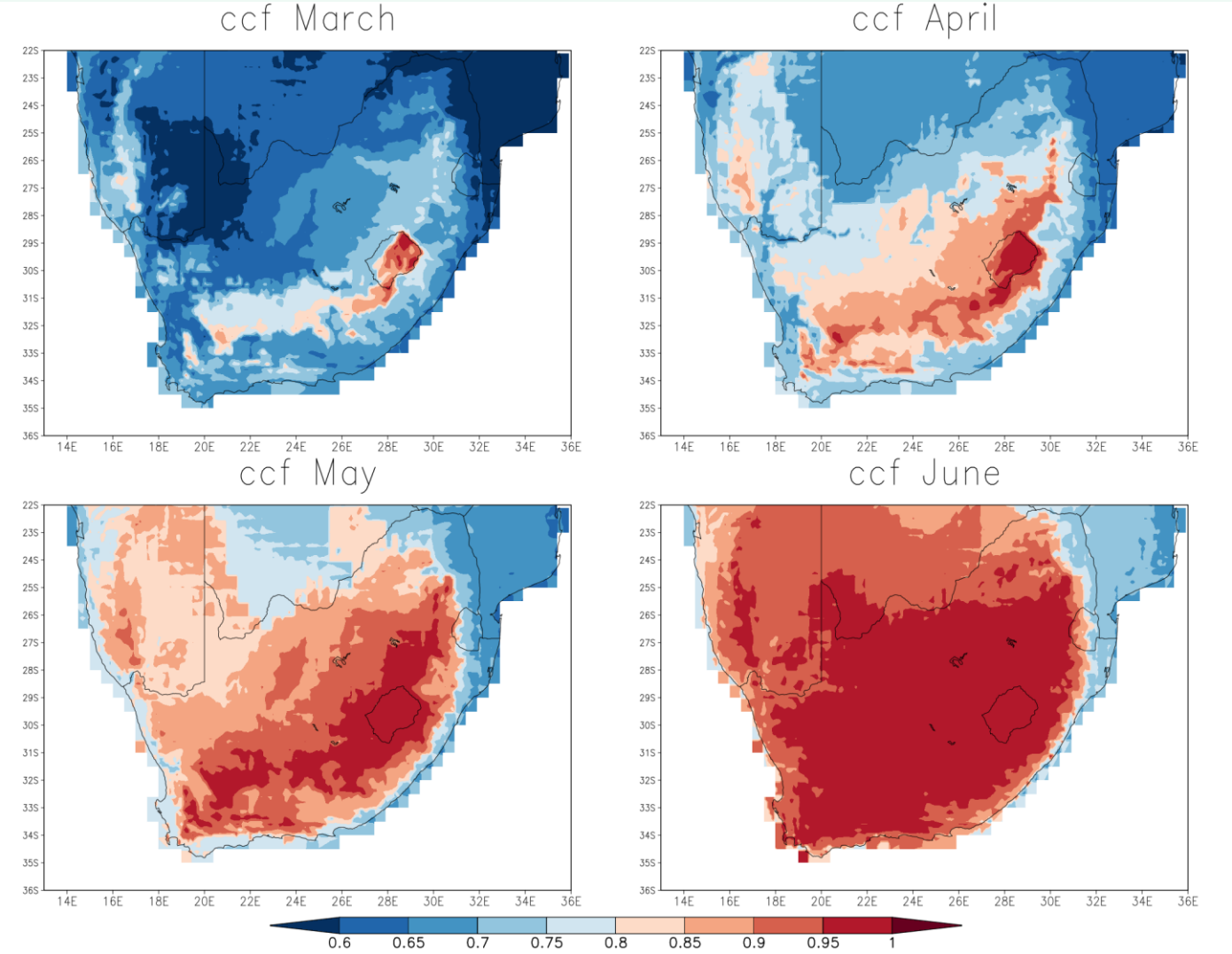

Figure: Calculations of the climate-correction factor performed at the Wits-GCI as part of DSI-CERG research

Current understanding of climate impacts on COVID-19 entails that cold and dry weather increases transmission probability.

All other factors held constant, transmission probability is predicted to be 30% higher by June compared to March

Ongoing research: input data sets & expected research outputs

- Using South African data on local climate anomalies, air quality and local COVID-19 infection rates in regression-based studies to empirically estimate the impact of climate & AQ on COVID-19 infection rates.
- Climate data: SAWS stations interpolated to spatial grids
- AQ data: TropOMI measurements to quantify column NO_2 and SO_2 concentrations, MODIS-based AOD.
- Inverse modelling using SEIR epidemiological models to estimate key parameters, e.g. effective reproduction number, α (exposed), β (infected) and γ (recovered).
- Operational (daily) data flows to the national spatial epidemiological model: Weather observations of the last few days (to inform on incubation rate), short-range to sub-seasonal to seasonal weather predictions, climate scenarios (e.g. cold vs warm vs average winter).

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