

GEO Health Community of Practice (CoP)

Telecon: Focus on COVID-19 Activities

April 24, 2020

In Attendance: 120 participants

John Haynes (NASA HQ), Juli Trtanj (NOAA), Helena Chapman (NASA HQ/BAH), Sue Estes (U. of Alabama in Huntsville), Laura Judd (NASA Langley/SSAI), John Balbus (NIH/NIEHS), Trisha Castranio (NIEHS), Ann Liu (NIEHS), Virginia Selz (NOAA), Chris Sinigalliano (NOAA), Tracy Collier (NOAA), Michael Kolian (EPA), Leslie Friedlander (EPA), Jeffrey Luvall (NASA Marshall), David Green (NASA HQ), Amy Robinson (NASA HQ), Abigail Seadler (NASA HQ), Christine Mataya (NASA HQ/BAH), Laura Mulvey (NASA HQ), Brady Helms (NASA HQ/AI Solutions), Joel Scott (NASA Goddard), Rob Levy (NASA Goddard), Hongbin Yu (NASA Goddard), Sean McCartney (NASA Goddard), Assaf Anyamba (NASA Goddard), Cynthia Hall (NASA Earth Science Data Systems), Adam Voiland (NASA Earth Observatory), Elizabeth Goldbaum (NASA Earth Sciences), Robert Levy (NASA Goddard), Stephanie Schollaert Uz (NASA Goddard), Ricardo Quiroga (NASA Goddard), Emma Knowland (NASA/GMAO, USRA/GESTAR), Ana Prados (NASA Goddard/U. of Maryland Baltimore County), Kim Locke (NASA Goddard), Dorian Janney (NASA Goddard/GPM), Andrea Portier (NASA Goddard/SSAI), Brock Blevins (NASA Goddard), Helen Amos (NASA Goddard/SSAI), Pawan Gupta (USRA/MSFC), Sushel Unninayar (NASA Goddard/GESTAR/MSU), Michael Garay (Jet Propulsion Laboratory/California Institute of Technology), Olga Kalashnikova (Jet Propulsion Laboratory), Jeff Morisette (National Invasive Species Council), Amanda Quintana (USGCRP), Bob Chen (CIESIN/Columbia U.; NASA/SEDAC; GEO Human Planet and Data WG), Isabel Walls (USDA Food Safety and Inspection Service), Kiersten Johnson (USAID Bureau for Resilience and Food Security), Lt Col Robert Branham (Directorate of Air Force Weather), Corey Hummel (HQ USAF, Directorate of Air Force Weather), Ying Zhou (CDC), Rish Vaidyanathan (CDC), Curt Hammill (Esri), Jeff Morisette (National Invasive Species Council), Bryan Richards (USGS National Wildlife Health Center), Hye-Youn Park (California Air Resources Board), Hyung Joo Lee (California Air Resources Board), Niloofar Ganjian (Health Finance Institute), Ben Zaitchik (Johns Hopkins U.), William Pan (Duke U.), Tatiana Loboda (U. of Maryland, College Park), Talat Odman (Georgia Institute of Technology), Margaret Baguio (NASA Texas Space Grant Consortium/U. of Texas Center for Space Research), Ali Akanda (U. of Rhode Island), Mike Wimberly (U. of Oklahoma), Ashish Sharma (U. of Illinois, Urbana-Champaign), Maribeth Gidley (U. of Miami), Greg Carmichael (U. of Iowa), Ali Akanda (U. of Rhode Island), Susan Anenberg (George Washington U.), James Kubicki (U. of Texas at El Paso), Diana Mastracci (U. of Oxford), Augustin Vintzileos (U. of Maryland), Douglas Rao (North Carolina State U./NCICS/CISESS), Josh Colston (U. of Virginia), Diane DiEuliis (National Defense U.), Prakhar Misra (Research Institute of Humanity and Nature, U. of Tokyo), Anil Kumar Roy (CEPT U, India), Tanya Maslak (Battelle Memorial Institute), Joy Shumake-Guillemot (WHO/WMO), Oksana Tarasova (WMO/GAW Programme), Jorge del Rio Vera Unoosa (UN Office for Outer Space Affairs), Vincent-Henri Peuch (European Centre for Medium-Range Weather Forecasts), Carlo Buontempo (European Centre for Medium-Range Weather Forecasts), Astrid-Christina Koch (European Commission, DG DEFIS – Copernicus), Ian Coady (Department for International Development, UK), Rachel Lowe (London School of Hygiene & Tropical Medicine), Didier Davignon (Meteorological Service of Canada), Guy Aube (Canadian Space Agency), Celine

Audette (Environment and Climate Change, Canada), Serge Olivier Kotchi (Public Health Agency of Canada), Naledzani Mudau (South African National Space Agency), Lesiba Tsoeleng (South African National Space Agency), Thando Oliphant (South African National Space Agency), Neville Sweijd (COVID-19 Environmental Reference Group, South Africa), Rebecca Garland (Council for Scientific and Industrial Research, South Africa), Pravesh Debba (Council for Scientific and Industrial Research, South Africa), Bob Scholes (Global Change Institute, University of Witwatersrand, South Africa), Francois Engelbrecht (Global Change Institute, University of the Witwatersrand, South Africa), Fernando Belda (National Meteorological Service, Spain), Luis Chaves (National Reference Lab, Costa Rica), David Rodriguez (Council of Health Ministries in Central America, COMISCA), Ken Takahashi (SENAMHI, Peru), Romina Caminada (SENAMHI, Peru), Edson Arias (SENAMHI, Peru), Iphigenia Keramitsoglou (National Observatory of Athens), Gerrit Kuhlmann (Empa Swiss Federal Laboratories for Materials Science and Technology, Switzerland), Dominik Brunner (Empa Swiss Federal Laboratories for Materials Science and Technology, Switzerland), Adam Lewis (Digital Earth Africa, Geosciences Australia), Jeff Donze, Kawa Shinbun, Molly Olonoff, Paula Nieto, Steven Arce, Adam Viland, AJ Smit, Andrea Miranda, Bill Frey, Elvis Medina Dionicio, Julian Reyes, Ray Kiess.

Summary Notes:

**Prepared by Helena Chapman (NASA HQ/BAH) and Helen Amos (NASA Goddard/SSAI)*

John Haynes (NASA HQ) and **Juli Trtanj (NOAA)** opened the telecon by welcoming all participants. They described that the next telecon would be held on a different day (Tuesday, May 5, 2020) and time (8:30-10AM EDT/GMT-4), in order to facilitate the participation of members from the Asia-Pacific region.

John Haynes (NASA HQ) and **Juli Trtanj (NOAA)** moderated a dialogue on current CoP activities and updates related to the ongoing COVID-19 pandemic. **Neville Sweijd (COVID-19 Environmental Reference Group, South Africa)** mentioned that he was exploring funding opportunities through the WHO/WMO to coordinate a global e-conference on the role of environmental drivers on the COVID-19 pandemic. He stated that they also plan to propose a special issue with the Elsevier journal to fast-track publications (no article processing charges). **John Haynes (NASA HQ)** reminded members about [NASA's Rapid Response and Novel Research in Earth Science](#) solicitation, which encourages the innovative use of NASA satellite data to address environmental, economic, and/or societal impacts of the COVID-19 pandemic. He mentioned that any additional funding opportunities and challenge competitions related to COVID-19 activities can be added to the [Funding Opportunities & Challenge Competitions](#) tab.

Dominik Brunner (Swiss Federal Laboratories for Materials Science and Technology, Switzerland) presented an overview of air pollution changes (NO_x, PM, O₃) over Switzerland due to COVID-19. He mentioned that their lab was responsible for operating the Swiss National Air Quality Monitoring Network. He stated that his team would like to explore Earth observations for better aerosol observations, tropospheric O₃ observations, spectral surface reflectance/BRDF data, and spatial resolution. He referred to some [previous research](#) using

random forest models (decision tree machine learning technique) for PM₁₀ trend analysis in Switzerland.

Sushel Unninayar (NASA Goddard/GESTAR/MSU) asked about the machine learning tool. **Dominik Brunner (Swiss Federal Laboratories for Materials Science and Technology, Switzerland)** mentioned that they trained with 2019 data, meteorology, and emissions, and the predictions assumed the same conditions as training data. Hence, if they observed any differences in the observations, then resulting changes in emissions would have been attributed to the COVID-19 lockdown.

Fernando Belda-Esplugues (National Meteorological Service, Spain) presented an overview of the influence of temperature, humidity, UV radiation, and air pollution on COVID-19 incidence and spread in Spain. He described modeling efforts with data provided by the Ministry of Health and National Meteorological Service in Spain. In their work, preliminary plots showed an inverse relationship between new COVID-19 cases and temperature. He stated that they aimed to develop an early warning system at the state level, based on the influence of the analyzed environmental factors.

Juli Trtanj (NOAA) asked about how the early warning system would be used with health partners, in efforts to take action on these environmental predictions. **Fernando Belda-Esplugues (National Meteorological Service, Spain)** mentioned that although they had preliminary results, they remained hopeful that they would be able to work with health partners.

Francois Engelbrecht (Global Change Institute, U. of Witwatersrand, Johannesburg, South Africa) presented on the impact of COVID-19 transmission rates based on the approaching winter months (e.g. typical flu season). He illustrated projections of climate impacts from March to June 2020, noting that transmission probability (with other factors constant) was predicted to be 30% higher by June 2020 (when compared to March 2020). In their COVID-19 Environmental Reference Group, he mentioned that they provided algorithms, near real-time observation data, and climate predictions to the Department of Health and National Institute of Communicable Diseases. With most information on environmental factors and COVID-19 transmission of the northern hemisphere, he hoped that additional data from the southern hemisphere would provide more scientific findings.

Jeff Morisette (National Invasive Species Council) offered three resources, including a [research paper](#) (*High Temperature and High Humidity Reduce the Transmission of COVID-19* by Wang et al., 2020), the [Food and Environment Reporting Network platform](#), and [guideline report](#) (*Meat and Fabrication-Room Temperatures for Food Safety* by Amézquita et al., 2005).

Astrid-Christina Koch (European Commission, DG DEFIS – Copernicus) provided an update on the [COVID-19 Data Portal](#) for research exchange and the recent [Copernicus report](#) (*Assessment of Temporary Health Facilities and Public Gathering Places during the COVID-19 Emergency in Italy*).

Joy Shumake-Guillemot (WHO/WMO) shared an [article](#) that described a collaboration between UK Met Office and partners to provide COVID-19 researchers with access to this data and compute platform.

Helena Chapman (NASA HQ/BAH) thanked all presenters for their insightful presentations to the group. She introduced **Ben Zaitchik (Johns Hopkins U.)** as the principal investigator for the EO4HEALTH Project, *Environmental Determinants of Enteric Infectious Disease*, and leader of the GEO Health CoP Small Work Group, *Heat: Predict and Prevent Heat-related Health Risks across Time Scales*.

Ben Zaitchik (Johns Hopkins U.) moderated the group discussion on seasonality and environmental determinants related to COVID-19 transmission. He provided a general overview of current findings on environmental factors related to COVID-19 transmission, which were described on previous GEO Health CoP telecons. He summarized research applications by various CoP members: Air Force 14th Weather Squadron examining seasonal risk; European Commission (Copernicus) adding a virtual map to visualize associations between COVID-19 cases and environmental covariates; Johns Hopkins U. team developing dynamic models and inverting SEIR models for select countries; and Joint Research Centre (Italy) exploring time-varying relationships between temperature and COVID-19 cases. He stated that the U. of Connecticut researchers published a [pre-print paper](#) (*Seasonality and Uncertainty in COVID-19 Growth Rates* by Merow and Urban) on UV radiation as a covariate, which subsequently was recently highlighted in the *New York Times* and presidential policy conference. He shared that the US National Academies of Sciences, Engineering, and Medicine provided a [rapid review of literature](#) (*Rapid Expert Consultation on SARS-CoV-2 Survival in Relation to Temperature and Humidity and Potential for Seasonality for the COVID-19 Pandemic*), concluding that there were no definitive associations between seasonality and COVID-19 transmission. Although the UN Food Program agreed that there were no definitive findings about seasonality and COVID-19 transmission, he said that they made some projections in a hypothetical case where seasonality influences COVID-19 transmission.

Carlo Buontempo (European Centre for Medium-Range Weather Forecasts) asked about the most suitable indicator (e.g. population density, GDP, socio-economic status) of COVID-19 spread to be compared with climatological factors. He also asked about the best strategy to isolate the effect of climate from these indicators. **Ben Zaitchik (Johns Hopkins U.)** mentioned that his team has been looking at COVID-19 cases, where the incidence depends on geographic location. They have heard about two potential approaches – inverting the disease dynamics models (SEIR) or using a big data approach with empirical regressions. **William Pan (Duke U.)** stated that the analysis of separating climatological variables versus other factors is the same challenge encountered for any infectious disease.

Neville Sweijd (COVID-19 Environmental Reference Group, South Africa) stated that he read a report where an estimated 80% of COVID-19 transmissions occurred indoors. Aside from the biological role of temperature on COVID-19 transmission and the potential of high indoor transmission, he asked about the potential role of ambient temperature versus indoor temperature regulation or human behavior in response to temperature variation (e.g. colder weather). **Ben Zaitchik (Johns Hopkins U.)** mentioned that previous literature on influenza and other

coronaviruses have examined which outdoor measurements served as a better proxy for the mechanisms of indoor environments. He emphasized the need for cross-collaborations between researchers who examine the dynamics between indoor and ambient air. **Fiorella (Chile)** mentioned that Chilean researchers developed a model that demonstrated that wind speed could influence the dispersion of COVID-19 in ambient environments. **Jeffrey Luvall (NASA Marshall)** stated that the challenge with air temperature and relative humidity is the location of measurement and the spatial and temporal variability. He said that this variability was related to the physical structure of the environment. Given the complexity of urban areas worldwide, he stated that it would need to be addressed through thermal remote sensing.

John Balbus (NIEHS) asked about the frequency required for updates applied to model parameters. **Francois Engelbrecht (Global Change Institute, U. of Witwatersrand, Johannesburg, South Africa)** mentioned that inverse modeling would be valuable for supplementing and testing empirical relationships. **Juli Trtanj (NOAA)** mentioned that CDC researchers have been using modeling with humidity and temperature. **Francois Engelbrecht (Global Change Institute, U. of Witwatersrand, Johannesburg, South Africa)** stated that the initial algorithms applied to models incorporated data from the northern hemisphere during the first few months of COVID-19 spread, prior to widespread lockdowns, use of protective masks, and adherence to social distancing measures. He said that they were comparing COVID-19 cases across climate anomalies in South Africa, hoping to identify empirical relationships based on dynamics occurring in South Africa. He expressed challenges in isolating social and climatological factors and advocated for inverse modeling with SEIR models to identify critical parameters.

John Haynes (NASA HQ) mentioned that NASA has supported a global UV radiation dataset (since 2005), down to the county-level in the United States, available on the [CDC National Environmental Public Health Tracking Network](#). **Vincent-Henri Peuch (European Centre for Medium-Range Weather Forecasts)** stated that their team had global gridded hourly UV Index available from Copernicus, based on the assimilation of multiple satellite sensors and accounting for ozone, clouds, and aerosol effects.

Prakhar Misra (Research Institute of Humanity and Nature, U. of Tokyo) stated that COVID-19 is a zoonotic disease that may mutate further, especially given the human-wildlife conflict. He asked if researchers should identify locations (based on human-animal contact and climatic parameters) where there is potential for virus mutations. **Ben Zaitchik (Johns Hopkins U.)** mentioned that there have been extensive laboratory studies (e.g. influenza) to evaluate the virus stability based on diverse factors (e.g. humidity, vapor pressure). He said that other researchers have examined air quality parameters such as aerosols (including liquid phase) and virus stability. He mentioned that epidemiologists continue to debate the relevance to ambient real-world conditions. **John Balbus (NIEHS)** stated that researchers should think through the transmission chain, where there are implications for certain factors that affect the stability of protein binding to cell surfaces and host responses related to mucosal surfaces. He recognized that the models developed from laboratory research are complex.

Carlo Buontempo (European Centre for Medium-Range Weather Forecasts) mentioned that they have analyzed temperature and are now examining PM₁₀ and NO₂ on the [Monthly Climate Explorer for COVID-19](#). **Ken Takahashi (SENAMHI, Peru)** mentioned that current pre-prints have used number of COVID-19 cases, rather than the growth rate or search for temporal relations, without correcting for the irregular delays observed in the COVID-19 infection date and the national reported date. Since results are conflicting, he recommended that researchers filter the results. He believed that the previously mentioned research [paper](#) (*High Temperature and High Humidity Reduce the Transmission of COVID-19* by Wang et al., 2020), was the best paper to date, but said that authors did not jointly consider temperature and absolute humidity in the analysis.

Sushel Unninayar (NASA Goddard/GESTAR/MSU) shared an update that he, Juli Trtanj (NOAA), and Jared Entin (NASA) have proposed a panel session at the American Geophysical Union Fall Meeting 2020 on environmental modelling applications related to COVID-19 transmission.

John Haynes (NASA HQ) and **Juli Trtanj (NOAA)** thanked all GEO Health CoP members for their outstanding presentations and engagement in the group discussion. They agreed that this telecon had provided an opportunity to share information, connect researchers, and leverage resources that can amplify current activities related to the COVID-19 response.

John Haynes (NASA HQ) and **Juli Trtanj (NOAA)** closed the telecon and mentioned that the next telecon would be scheduled for Tuesday, May 5th at 8:30AM EDT (GMT-4).

Adjourned: 12:30 PM EDT