

# Air Quality, Wildfires, and Respiratory Health

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GEOHEALTH COP WORKING GROUP UPDATE

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# Goals and Objectives

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Primary goal:

- Identify components and a modeling framework that would enable development of space-time specific assessments, monitoring, and forecasts quantifying the levels of exposure of populations to wildfire-related pollutants and aeroallergens associated with those levels of risk for various population groups.

# Progress in the state of knowledge on key elements previously identified

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- Identify components and a modeling framework
  - New book in progress (Loboda, French, Puett Eds. *Fire, Smoke, and Health: Following the smoke from fire to health and well-being*. Contract with Wiley/AGU publication)
- Understand and address the implications of changes in heat, wildfires, and aeroallergens on air quality and human health implications including loss of life due to wildfires
  - Matz, C.J., Egyed, M., Xi, G., Racine, J., Pavlovic, R., Rittmaster, R., Henderson, S.B., Stieb, D.M., 2020. Health impact analysis of PM2.5 from wildfire smoke in Canada (2013–2015, 2017–2018). *Science of The Total Environment* 725, 138506. <https://doi.org/10.1016/j.scitotenv.2020.138506>
  - US and Canada are working on documenting the “total cost” of fires (health, suppression, property loss, cleanup, lost business and tax revenue, repairs and reconstruction, etc)
- Model daily fire spread, associated emissions, and atmospheric transport of those emissions (by species) to build a model linking wildfire occurrence and characteristics with respiratory distress in population as reported by health care utilization (e.g. emergency room visits).
  - Multiple examples now available including: British Columbia with the provincial CDC (S. Henderson), State of California with CA DHP (N. French), Alaska with AK CDC and DPH (T. Loboda – ongoing)

# Progress in the state of knowledge on key elements previously identified

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- Extend wildfire health outcomes studies to cover long-term repeated exposure
  - In part covered in Matz et al. (2020) for Canada, ongoing work in Alaska (Loboda)
- Propose appropriate verification standards to assess the accuracy of existing wildland fire smoke forecast systems, for surface level concentrations of pollutants and aeroallergens.
  - Canada is comparing the performance of NOAA, ECCO and ECMWF forecasts over North-America. A multilateral WG was created to come to an agreement for verification standards.
- Assess the performance of available tools and methods for wildfire pollution characterization developed in the United States, Canada, and European Union over the developing world (e.g. South and Latin America) to bolster existing fire-monitoring capabilities
  - Ongoing projects involve North America (Davignon)

# Key elements of the work stream activities for the upcoming year (proposed)

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- Major theme: Draw on the knowledge and expertise of the WG members and their networks to assimilate information about advances, data sources, and methods to create a “living reference” source for the global community:
  - Document the advances made for individual subcomponents of the desired outcomes
  - Develop metadata-based document tracking global distribution of surface monitoring networks and parameters acquired
  - Develop document tracking EO assets involved in various components of the monitoring chain with a sample of citations to peer-reviewed literature or government reports (as appropriate) with methods describing their use

# Connection to the integrative information systems

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- Map / document existing wildfire- and air quality-related networks and major initiatives and connect with them to form a network of networks
- Assimilate the database of global and regional air quality forecasting systems that include wildland fire emissions

# Gaps

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1. Health data records
2. Studies directly measuring individual's exposure on health outcomes
3. Finer spatial scale meteorological data to support atmospheric transport modeling
4. Near-real time plume monitoring:
  - Advances are being made using GEOS data (Davignon)
  - Geostationary satellites offer promising opportunities