AN INTEGRATED SURVEILLANCE SYSTEM TO TRACK AIR POLLUTION AND DISEASE

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Abstract: Environmental air quality has a major impact on human health. An example is the documented effect of air pollutants on asthma and other respiratory diseases. An integrated surveillance system that tracks and correlates air pollution with pollution-related disease incidence can assist in risk assessment, public awareness, and healthcare preparedness. At the University of Mississippi Medical Center (UMMC), we have developed GeoMedStat, an evolving surveillance system capable of tracking, mapping and analyzing both real-time and historical patient encounters along with environmental pollution data. GeoMedStat has links to hospital information systems that allows access to both chief complaint and International Classification of Diseases (ICD9) codes of patient encounters. For air pollution estimation, GeoMedStat utilizes NASA satellite data and EPA ground-monitor data as inputs for surface modeling of air pollution. The two air pollutants included in this project are particulates with a diameter less than or equal to 2.5 microns (PM$_{2.5}$) and Ozone (O$_3$). Satellites provide extensive cost-effective data useful for environmental pollution estimation. There are limitations inherent to satellite sensors for the estimation of ground level air quality but there are ongoing efforts to improve these estimates using a combination of data processing and data fusion techniques. The availability of more reliable daily air pollution estimates will continue to enhance the effectiveness of GeoMedStat in tracking air pollution and related diseases. This presentation will demonstrate: a) development of the different components and functionality of GeoMedStat, and b) recent developments in air quality estimation by satellite data and its use for environmental health studies.

Key words: Respiratory diseases, asthma, air pollution, particulates, PM$_{2.5}$, surveillance system, GIS, Remote Sensing, GeoMedStat

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