Using Remotely Sensed Data and GIS Tools to Characterize Living Environments for Evaluation with Blood Pressure Data

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NASA Marshall Space Flight Center is collaborating with the University of Alabama at Birmingham (UAB) School of Public Health to assess the relationship between living environment defined as urban, suburban, and rural and day/night land surface temperature with blood pressure in four 200 km by 200 km study areas around Chicago, Philadelphia, Atlanta, and Minneapolis. The blood pressure data were available from the UAB Reasons for Geographic and Racial Differences in Stroke (REGARDS) national cohort as Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) measurements. Methods were developed to characterize living environment using NASA's MODerate-resolution Imaging Spectroradiometer (MODIS) 1-km Land Surface Temperature (LST) and Landsat-derived 30-meter Land Cover Land Use (LCLU) data from the National Land Cover Dataset (NLCD). To be consistent with the MODIS LST data spatial resolution, the raw NLCD data were resampled in this study from 30 m to 1 km. Data were also analyzed utilizing a 3-km scale to study the effect of scale on such potential relationship. We've developed an algorithm that uses the raw dataset (30-m NLCD) and calculates the areas of all the LCLU classes within each coarse 1-km or 3-km grid cell (filter window) and assigns the most dominant LCLU class to that coarse grid cell in a Geographic Information System (GIS). We've also developed a methodology to delineate rural, suburban, and urban zones from the LCLU data. The REGARDS health data set of the participants located within those study areas were spatially linked to the living environment categories and LST in a GIS in order to evaluate their effects on SBP, DBP, and hypertension.