Citizen and Machine Learning-aided High-resolution mapping of urban heat exposure and stress
Supplementary Information

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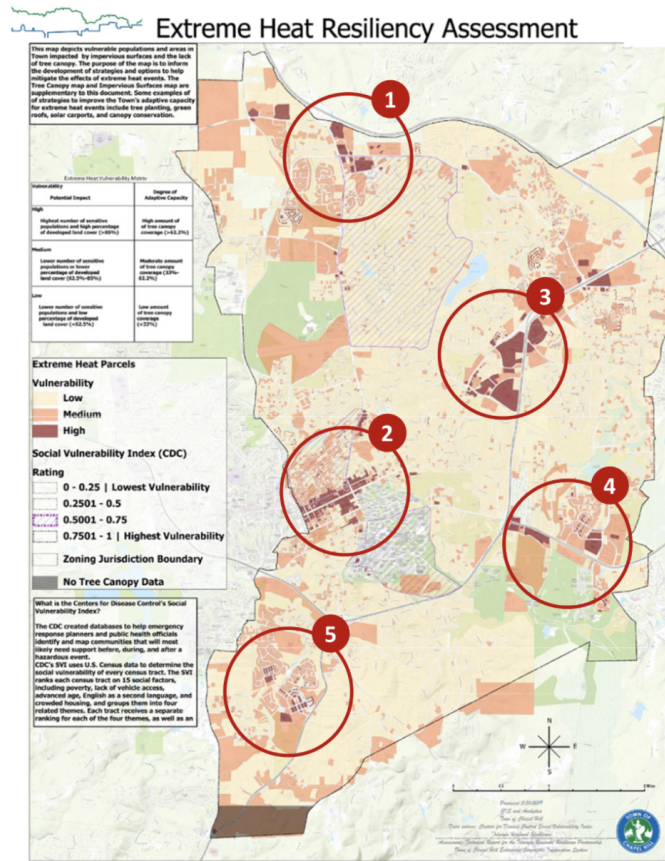
Figure S1. Town of Chapel Hill Extreme Heat Resiliency Assessment Map
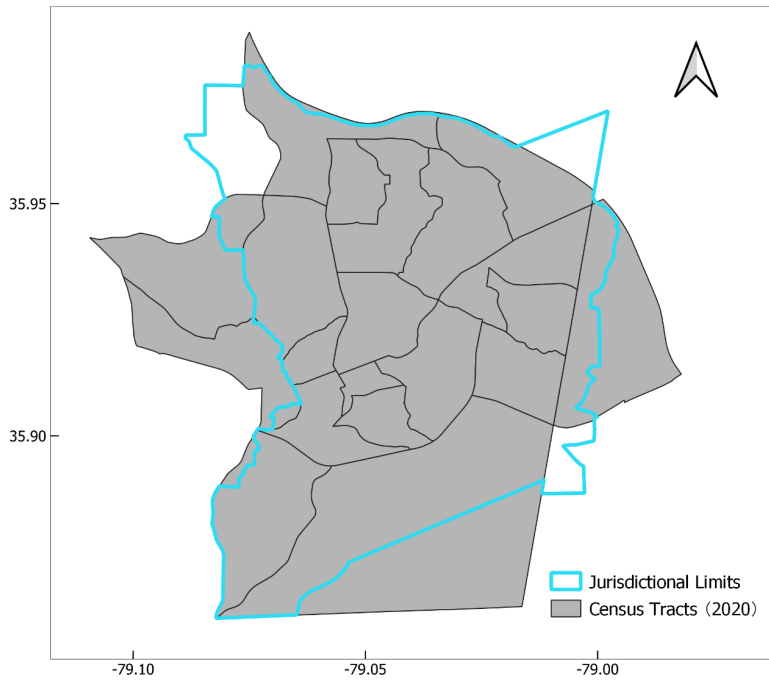Adapted from: Town of Chapel Hill, (2020)

Figure S2. Chapel Hill Jurisdictional Limits and 2020 Census Tracts in this study.
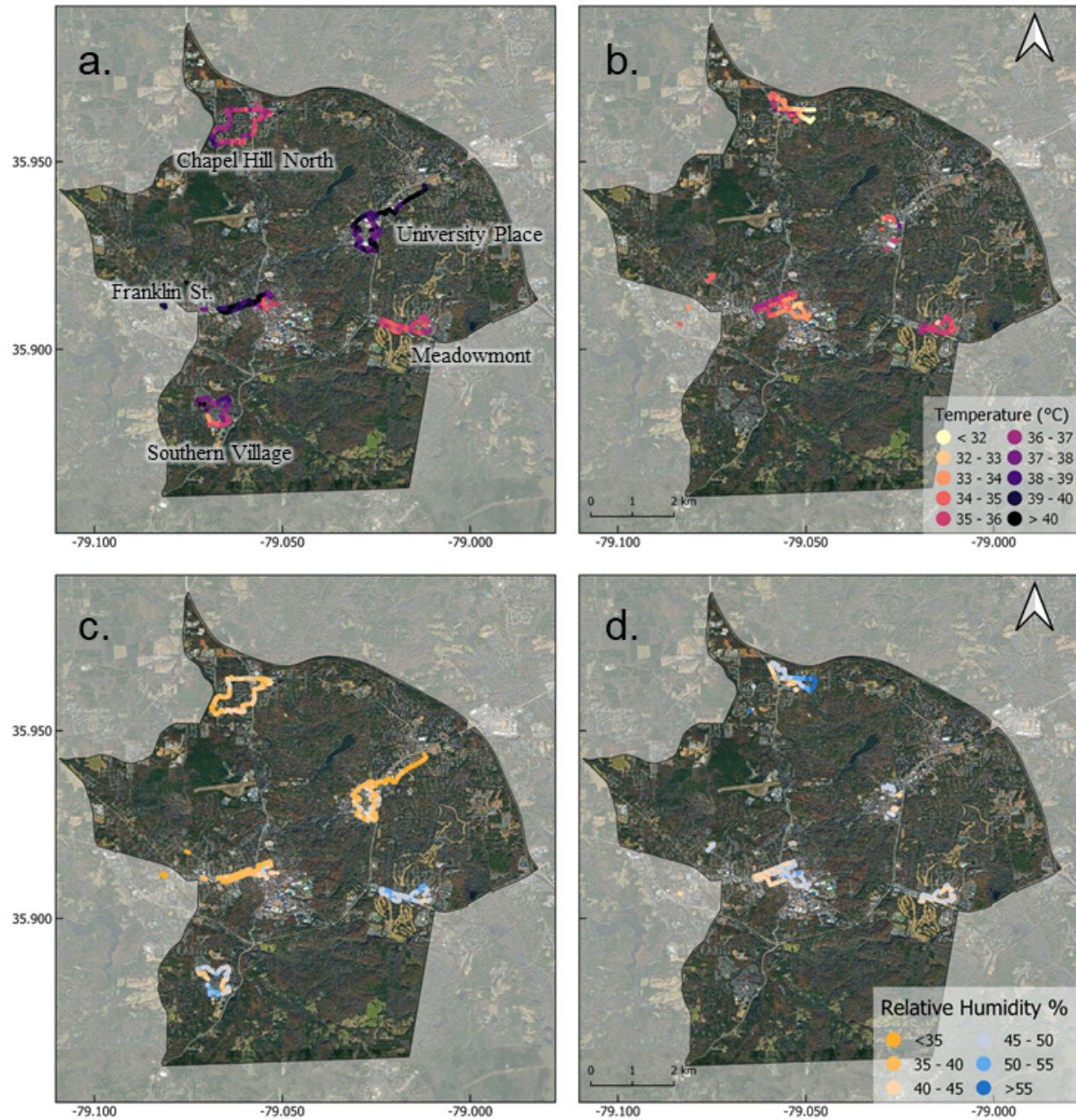
Figure S3. Traverse maps of air temperature and humidity collected by citizens for the a) air temperature - afternoon session; b) air temperature - evening session; c) humidity - afternoon session; d) humidity - evening session. Basemap: Google Satellite, Map data ©2015 Google
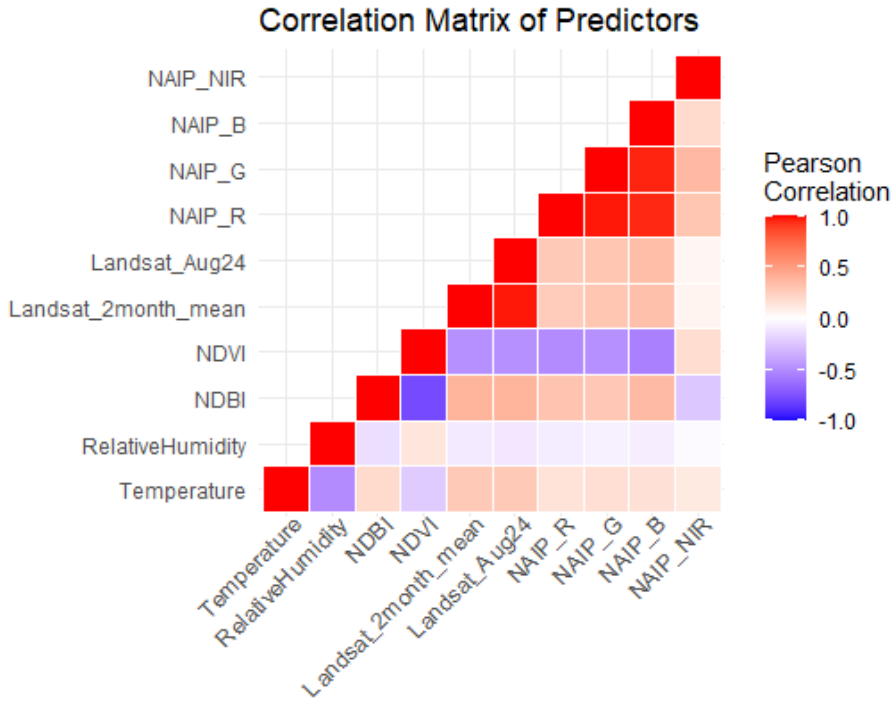
Figure S4. Correlation matrix of predictors (Landsat_2month_mean: the two-month average Landsat 8 LST of August and September, 2021; Landsat_Aug24: a single scene of Landsat 8 LST on August 24th, 2021)
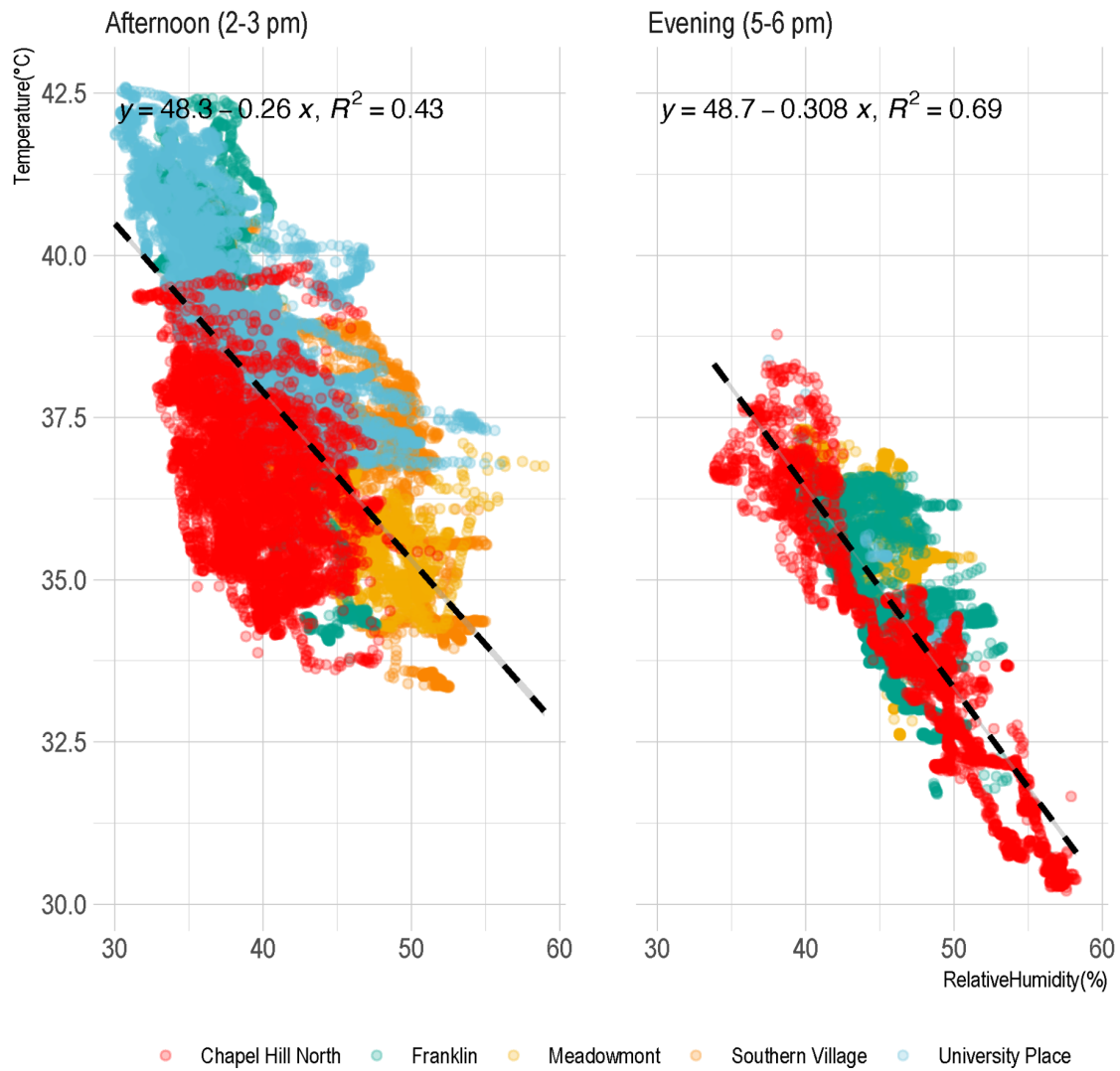
Figure S5. Relative humidity (x-axis) versus Temperature recorded by citizen science volunteers in five neighborhoods in Chapel Hill show a negative correlation.
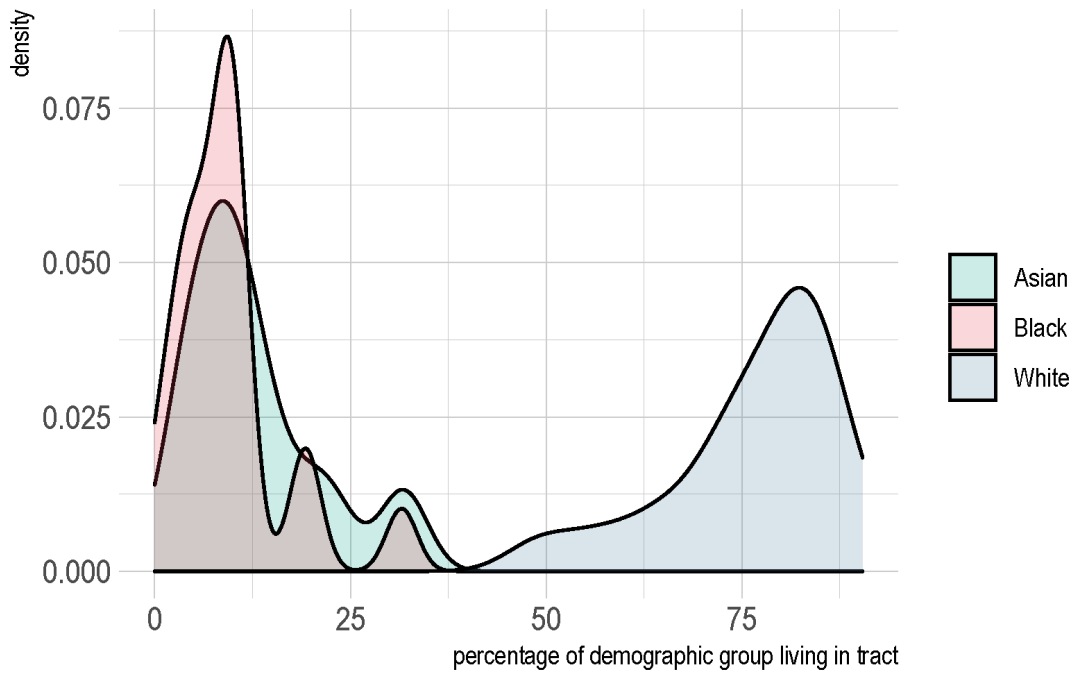
Figure S6. Distribution of percentages of top three racial and ethnic demographic groups in Chapel Hill, NC by census tract. All other U.S. Census-classified racial and ethnic groups (Pacific Islander, Native American, and Other) comprised less than 2 percent of the population living within each census tract.

Table S1. Air temperature Model Comparison Results – Without NAIP

	MLR	**Random Forest**	**XGBoost**	**SVR**
Session1 Train	RMSE = 1.84 $R^2 = 0.16$	RMSE = 0.54 $R^2 = 0.92$	RMSE = 0.56 $R^2 = 0.92$	RMSE = 0.60 $R^2 = 0.91$
Session 1 Test	RMSE = 1.86 $R^2 = 0.14$	RMSE = 0.76 $R^2 = 0.86$	RMSE = 0.74 $R^2 = 0.86$	RMSE = 0.92 $R^2 = 0.79$
Session 2 Train	RMSE = 1.35 $R^2 = 0.28$	RMSE = 0.35 $R^2 = 0.95$	RMSE = 0.38 $R^2 = 0.94$	RMSE = 0.38 $R^2 = 0.94$
Session 2 Test	RMSE = 1.34 $R^2 = 0.27$	RMSE = 0.48 $R^2 = 0.91$	RMSE = 0.48 $R^2 = 0.91$	RMSE = 0.56 $R^2 = 0.87$
Training time	Less than 1 min	6.7mins+ 2.2 mins	52mins + 38 mins	8min +2mins

Table S2. Model evaluation results on the dataset with and without NAIP using Random Forest

	With NAIP	**Without NAIP**
Session 1 Test	RMSE = 0.88, $R^2 = 0.81$	RMSE = 0.76, $R^2 = 0.85$
Session 2 Test	RMSE = 0.58, $R^2 = 0.86$	RMSE = 0.48, $R^2 = 0.9$

Table S3. Demographic percentages in Chapel Hill according to 2020 ACS Census

Native American	Asian	Black	Other	Pacific Islander	White
0.3	12.6	10.0	1.2	0	75.9

Table S4. Population-weighted heat exposure metrics by group

metric	White	Black	Native American	Asian	Other	All People of Color
lst	32.4	33.2	32.7	32.4	32.4	32.7
air temp	36.1	36.2	36.1	36.1	36.1	36.2
humidity	39.8	39.5	39.8	39.7	39.8	39.6
humidex	43.9	44.0	43.9	44.0	43.9	44.0