**NASA DEVELOP National Program**

Langley Research Center

**Summer 2015**

**Virtual Poster Session Script**

**DEVELOP Short Title:** Arizona Health and Air Quality

**Team Location:** Langley - Virginia

**Project Lead & Email:** Amy Stuyvesant amy.stuyvesant@nasa.gov

**VPS Title:** Beat the Heat: Mapping Temperature Exchange in the Valley of the Sun

**Intro:** Official DEVELOP Introductory clip (Audio - “Appear”)

**Landsat 8 areal clip:** Narrator - *“Delivering a constant flow of information, NASA Earth Observations provide a means of viewing the world in a unique perspective. Understanding the integrative processes that support a functional and changing planet help to address the challenges facing society and future generations.”* (Audio - “Spaceship Atmosphere 04”)

“Arizona, we have a problem.” (Audio - “Apollo 13: Houston We’ve Had a Problem”)

**Title: Beat the Heat: Mapping Temperature Exchange in the Valley of the Sun.**

* The Trammps - “Disco Inferno” for rest of video

**Background:**

**WHAT & WHO:** Narrator - *“Compounding issues result from a warming climate and the vastly increasing rates of land cover becoming more impermeable with less vegetative cover. These dense urban areas around the globe are now experiencing amplified urban heat island effects resulting in more heat-related and heat-caused deaths. We know that on average, nearly 100 people die annually in Maricopa County from the heat and thousands more suffer from some form of heat-related illness. Individuals at highest risk include children, the elderly, homeless, and ethnic minorities. Areas of highest concern include houses with no air conditioning and poor insulation, as well as construction worksites and vehicles.”*

(Video - Arizona landscape, urbanization + Construction Worker Heat Stroke Incident, 38.96 sec)

**WHERE:** Narrator - *“Maricopa County is located in southwestern Arizona and is characterized by steep, linear mountain ranges alternating with lengthy deserts. This diverse landscape, in conjunction with Arizona’s semi-arid climate, sparse cloud cover, and low annual precipitation, dramatically affect the seasonal and daily temperatures along with the heat index. The majority of heat distress calls occur during the hot and moist summer rainy season, therefore this research focuses on the extreme heat events during the hottest months of the year from May through September. Maricopa County is the leading megapolitan area in the United States for population growth and urbanization. On top of this, the area is specifically recognized for its high heat index. Currently, the Arizona Department of Health Services, Maricopa County Department of Public Health, Arizona State University, and the Phoenix Heat Relief Network are monitoring these incidences and are working to create an effective network of warning systems and cooling stations on both the neighborhood and individual levels.”*

(Video - Zoom in on Phoenix, Arizona desert and urban light rail clips, 59.17 sec)

**Interview:** Kate Goodin - “*Heat is a chronic problem here in Phoenix and most of the desert southwest which means that during the summer months it is extremely hot, pretty much all the time. And one of the challenges when you have a chronic health issue, like exposure to high heat and high temperature, is that people seem to not appreciate the risk as much. The subtlety of exposure to high heat is a challenge in both messaging as well as getting people to pay attention and take action*.” (Video - 31.82 sec clip)

David Hondula - *“We think we can deploy our intervention strategies really to where the greatest need is with high precision and it is our hope that compiling the thermal imagery that this DEVELOP team has will enable us to incorporate environmental conditions into that discussion in a way that has never been done before.”*

(Video - 17.57 sec clip)

**Methods & Results:**

**Data Usage:** Narrator - *“Land surface temperature and emissivity satellite data came primarily from the Aqua satellite as it more closely represented the true minimum and maximum daily temperatures with pass over times at 1:30 AM and PM. This study period begins in 2005 and continues up to the present. Landsat 8 and Terra satellites will be used for classifying surface features under consistent hotspots. The percent of impermeable surfaces, percent tree cover, and land use type from the National Land Cover Database and ASTER, along with in-situ measurement collected by MESOWest, were used in comparison with the calculated values. A community heat emergency response survey was completed by the Maricopa County Department of Health during this period resulting in high or low incidence areas.****”***

**Analysis:** Narrator -*“A threshold of one hundred and four degrees fahrenheit was implemented and any day with a temperature greater than this threshold was considered an anomaly. These irregular days were analyzed for duration and recurrence. Spatial and temporal variation such as seasonal and daily as well as urban and suburban land cover showed unique patterns that will be used to help in future decision making. The survey conducted provided demographic factors that were grouped by census tract boundaries to better understand the socioeconomic concerns and visualize the most vulnerable areas, which help to pinpoint optimal locations for cooling centers and public warning systems.”*

**Results:** Narrator - *Give specific details and examples showing how results will solve the problem.*

*“Not only does average surface temperature vary between years and months within a season, more importantly, these values vary by day, where the hottest 30% of tracts are not the same spatially or by intensity, with the early season having the most variation on all time scales. When looking at night surface temperatures, there is a lag into the late season not apparent in daytime temperatures. The survey analysis demonstrated that as income goes down, the likelihood of someone not using AC goes up or down by a factor of X%.”*

**Conclusions:** Narrator**: *“****Using this information, the DEVELOP team has located areas with consistent extreme heat throughout the season given this variability that also encompasses areas most affected by no air conditioning. The team further recommends anticipating large inconsistencies in the early season and a night time lag into the late season that should not be underestimated.”*

**Interview:** David Hondula - *“Should we be issuing warnings at different times for different places or at different threshold temperatures at different places? These are just a couple of decisions that we hope will be made in the future as we move toward reducing heat-related health risks here in the valley of the sun.”*(Video - 15.33 sec clip)

**Participant Introductions:** Group photo with names (zoom in).

**Attributions:**

Video, audio and song lists with author and sources.

**Collaborators & End-Users:**

* The Arizona Department of Health Services (End-user)
* Environmental Remote Sensing and Informatics lab (ERSL) at Arizona State University (End-User)
* Center for Policy Informatics (CPI) at Arizona State University (End-User)

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Arizona Department of Health Services

Arizona State University's

\*Environmental Remote Sensing & Informatics

Lab and

\*Center for Policy Informatics

Special Thanks To:

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Brian Tubbs

Narrator

**Outro:** Official DEVELOP ending clip (Audio - “The Curtain Rises” by Kevin MacLeod)