**A Web-Based Tool to Forecast Wet Bulb Globe Temperature for Populations Who Engage in Exertional Outdoor Activities**

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**Goal**

The Need for WBGT Information
- Since 1995, an average of 3 football players per year have died due to heat stroke (National Center for Catastrophic Sport Injury Research)
- High schoolers are vulnerable during afternoon summer practices
- WBGT is the standard measure for heat stress by the American College of Sports Medicine and U.S. Dept. of Defense, but there is a lack of WBGT monitoring
- Better forecasts for heat stress could be used to adjust practice schedules based on the expected heat threat throughout the week

WBGT Decision Support Tool Goals
- Develop a publicly accessible interface for viewing WBGT forecasts
- Facilitate informed decisions about scheduling exertional outdoor activities
- Provide guidelines for actions to take in each WBGT risk category

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**What is Wet Bulb Globe Temperature (WBGT)?**

A measure of human heat stress that is based on:
- Black globe temperature (radiant heat)
- Natural wet bulb temperature (evaporative potential, or ability to sweat)
- Dry bulb temperature (heat in ambient air)

**Heat index vs. WBGT**

- Heat index: temperature, RH; measured in shade
- WBGT: temperature, RH, wind speed, solar radiation; measured in sun

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**Prototype of Tool**

*Wet Bulb Globe Temperature Decision Support Tool*

*Search for your location within the bounding box or select a location from the map below.*

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**Methodology**

- **Gridded Data:**
  - Past 24 hours: Real-time Mesoscale Analysis (RTMA)
  - 5-day Hourly Forecast: National Digital Forecast Database (NDFD)

- **Method of WBGT Estimation:**
  - Standard equation for WBGT, but many methods to calculate NWB and GT from meteorological variables

**Validation**

- **Validation**
  - WBGT estimations were compared to measurements taken from Kestrel 4400s at 2 test sites in the Piedmont
  - Found that the tool overestimates WBGT by a few degrees F and wind speed plays a big role in WBGT
  - Will adjust values from the tool to more closely align with Kestrel, used by high schools in North Carolina

**Future Work**

- Perform additional validation for various surface types
- Expand the tool to the Southeast U.S.
- Incorporate additional user groups (children, average citizens that are acclimated/unacclimated to the heat)
- Provide maps of forecasted WBGT across the SE

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