Heat Waves in Missouri (Is it getting hotter, or is it just me?)
Scaffolds Summary

This multimodal text set is designed to help middle school learners work toward mastering the grade-level moderately complex **Anchor Text** "Heat Waves in Missouri (Is it getting hotter, or is it just me?)", adapted from a published study that models summer heat stress in the St. Louis region during future climates (Steinweg and Gutowski, 2015).

This anchor text and scaffolds address the following standards:

Next Generation Science Standards	ELA Common Core Standards	Mathematics Common Core Standards
6-8.MS-LS1-3: Use argument supported by evidence for how the body is a system for interacting subsystems composed of group of cells. **6-8.MS-LS2-4**: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **6-8.MS-LS3**: Heredity: Inheritance and Variation of Traits **6-8.MS-ESS2-4-6**: Earth's Systems **6-8.MS-ESS3-2**: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. **6-8.MS-ESS3-5**: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	**RST.6-8.1-3:** Key Ideas and Details **RST.6-8.4-6:** Craft and Structure **RST.6-8.7-9:** Integration of Knowledge and Ideas **RST.6-8.10:** Range of Reading and Level of Text Complexity **WHST.6-8.1:** Write arguments focused on discipline-specific content. **WHST.6-8.9:** Draw evidence from informational texts to support analysis reflection, and research.	**Math.Content.6.RPA:** Understand ratio concepts and use ratio reasoning to solve problems. **Math.Content.6.EE.C:** Represent and analyze quantitative relationships between dependent and independent variables. **Math.Content.6.SPA.A:** Develop understanding of statistical variability. **Math.Content.6.SPA.B:** Summarize and describe distributions. **Math.Content.7.SPA.A:** Analyze proportional relationships and use them to solve real-world and mathematical problems. **Math.Content.7.SPA.A:** Use random sampling to draw inferences about a population. **Math.Content.8.SPA.A:** Investigate patterns of association in bivariate data. **Math.Content.8.F.B:** Use functions to model relationships between quantities.

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Science Scaffolds

Science Content Scaffolds		
Scaffold	**Level**	**Description**
The Amazing Human Body Video – Segment 2 Survive *PBS-BBC*	Grades 6-12	**Video:** Excellent scaffold of human body systems adapting to thermal stress
Thermoregulation: definition and vocabulary Option 1 Option 2 *KidzSearch* *Kiddle Encyclopedia*	Ages 6-20	**Text:** Wikipedia and Encyclopedia articles on thermoregulation
The Brain *Arizona State University – Ask a Biologist*	Grades 6-8	**Text:** Explains the brain's role in thermoregulation
How Heat Kills *Science News for Students*	Grades 6-9	**Text:** Description of human body response to heat stress
Heat, Energy, and Bicycling in New York City *ReadWorks*	Grades 6-8	**Text and Audio:** Describes human body responses to heat stress (includes vocabulary and question set)
What happens when you get heat stroke? *TedEd*	Grades 6-9	**Video/Animation:** The effects of heat stroke
States Take Aim at Heat Stroke *Newsela*	Grades 4-9	**Text:** Efforts to reduce heat stroke in athletes
Vehicular Heat Stroke *RedCastle Crusade*	N/A	**Video:** Safety film about dangers of vehicular heat stroke
Mercury Rising *FilmRise – Years of Living Dangerously*	Grades 7-12	**Video:** Series 1 Segment 8 of *Years of Living Dangerously* video with Matt Damon talking about heat stress in LA (10 min)
Human Homeostasis Option 1 Option 2 *ExploreLearning: Gizmos* *PBS; WGBH; NSF*	Grades 6-12	**Simulations:** Human homeostasis during exercise
Sickle Cell: Natural Selection in Humans *hhmi BioInteractive*	Grades 8-12	**Video:** Sickle cell trait in English or Spanish with accompanying student and teacher guide. Links biology of blood cells to health and medical care.

Athletes: Don't Get Sidelines by Sickle Cell Trait! *U.S. Department of Health & Human Services: CDC*	Grades 6-12	**Text:** Fact sheet and helpful tips about Sickle Cell Trait (provided in English, Spanish & French)
Surviving the Playing Field When it is Too Darn Hot *The New York Times*	1100 - 1200 Lexile	**Text:** News article about athletes and sickle cell disease
Ryan Clark Gets a Pedicure and Talks About the Time He Almost Died *Vox Media: SB Nation*	600 - 700 Lexile	**Text:** News article about athlete (Ryan Clark) confronting sickle cell disease
Doris Wethers Oral History NYT Obituary: Dr. Doris Wethers *American Academy of Pediatrics: Gartner Pediatric History Center* *The New York Times*	600-1200 Lexile	**Text:** Oral History of African American physician who pioneered a treatment for Sickle Cell Disease (Interview) **Text:** Dr. Doris L. Wethers Obituary
Bees and Climate Change *High Country New: Wild Science*	Grades 4-9	**Video:** Measuring how climate change affects bees and other pollinators
Grounded Airplanes *PBS: NewsHour Productions*	Grades 7-12	**Video and Lesson:** Effect of global warming on airplanes (Is it the same for organisms that fly?)
How Water Loss Affects Biodiversity *ReadWorks*	1180 Lexile	**Text and Audio:** Explains how droughts and humans affect biodiversity (includes vocabulary and question set)
Climate Change in the Midwest *PBS Digital Studios and Texas Tech University Public Media: Global Weirding with Katharine Hayhoe*	Grades 6-8	**Video:** Describes effects of climate change on Midwest agriculture
The Bearded Seal My Son May Never Hunt *The New York Times*	1020 Lexile	**Text:** Article about climate change and ocean temperature affecting seals and peoples
Climate change may bring big ecosystem changes *NASA*	1600 Lexile	**Text:** Article about NASA Vital Signs
Climate Change Chronicles *Society for Science & the Public: Science News for Students*	Grades 6-9	**Texts and Videos:** Climate change affecting ecosystems (10 articles in the series)
Coral Bleaching *NASA*	N/A	**Simulation:** Effects of water conditions on coral

Thermal Energy Science Experiments for Kids *Sciencing by Leaf Group*	Grades 6-8	**Experiments: E**asy experiments for students to learn about thermal energy transfer
States of Matter: Basics *PHET Interactive Simulations – University of Colorado Boulder*	Grades 6-8	**Simulation:** Interactive simulation of phase changes
Greenhouse Effect *PHET Interactive Simulation*		**Simulation:** Interactive simulation of greenhouse effect.
Heat Transfer *Possible Worlds – Institute of Education Sciences*	Grades 6-8	**Lesson Sequence: H**eat transfer middle school games and activities that help teach concepts of heat transfer
Climate Generation Resource Library *Climate Generation*	Grades K-8	**Curriculum and Resources:** Science, math, and ELA materials relating to climate change, effects on ecosystems, and renewable energy for elementary – middle school learners
Uncovering Student Ideas in Earth and Environmental Science: 32 New Formative Assessment Probes *NSTA*	N/A	**Formative Assessments:** Earth and environmental science formative assessment probes and activities
Carbon TIME: Human Energy Systems Unit *Michigan State University - NSF*	Grades 6-12	**Unit:** Environmental science curriculum unit that focuses upon the carbon cycle in Earth systems
Climate Kids *NASA*	Grades K-12	**Games, Activities, Videos:** Educational resources about climate change
The Importance of Preserving Biodiversity *Lyndsey Capen PSA*	N/A	**Video:** preserving biodiversity
Hot Research Career Path of Mike Angilletta *Arizona State University – Ask a Biologist*	Grades 6-8	**Text:** How and why temperature effects on organisms are studied **Text:** Description of career path of Dr. Mike Angilletta, ecologist
Ways to Protect Biodiversity *Leaf Group Media: Sciencing*	1130 Lexile	**Text:** How to protect biodiversity
What are governments doing to protect biodiversity? *Greentumble*	1320 Lexile	**Text:** Describes how governments are preserving biodiversity
What is an Urban Heat Island? *NASA*	940 Lexile	**Text:** Description and explanation of urban heat islands

Cool Roofs *U.S. Department of Energy*	1290 Lexile	**Text:** Benefits and types of cool roofs
Climate Change and your community *PBS: NewsHour Productions*	Grades 7-12	**Lesson Plan**: Explores how has climate change impacted your community?
Southeastern Forests and Climate Change *Project Learning Tree*	Grades 6-12	**Curriculum:** Free curriculum developed by U-FL and the National Forest Foundation to help teach learners (Middle-High School) about climate change and effects on forests/carbon cycle
Videogames to Shape Our Future *Earth Games*	Grades 6-8	**Video Games:** Videogames about climate and ecosystems
Carbon Brief *Carbon Brief Ltd*	N/A	**Texts: A**rticles about climate science
Elementary Globe *NASA: The Globe Program*	Grades K-4	**Modules:** A collection of resources (texts, activities, teacher guides) in several languages to help teach Earth System Science
Globe Current Temperature Lab Precipitation Lab Relative Humidity Lab *NASA: The Globe Program*	Grades 5-12	**Website:** A collection of resources (texts, activities, teacher guides) in several languages to help teach Earth System Science (three labs attached to the left)
Global Atmospheric Change *Baylor College of Medicine & The Center for Collaborative and Interactive Technologies: BioEd*	Grades 3-5	**Website:** Resources about Earth's Systems
Our Home Planet *ReadWorks*	900 Lexile	**Articles and Audio:** Collection of science articles and resources about Earth's Systems
Weather and Climate: What is weather? *NewsELA*	660 Lexile	**Article:** Differences between climate and weather (other articles pertaining to climate and weather available)
The Water Cycle *National Science Foundation: NBC Learn*	N/A	**Video:** Illustrates and explains the processes of the Water Cycle
Water From the Air: Cloud Forests *ReadWorks*	Grade 6	**Text and Audio:** Information about Cloud Forests
What is Happening in the Oceans? *NASA*	Grades 6-8	**Text and Video:** Importance of oceans and oceans' effects on climate

Taking the Oceans' Temperature *Smithsonian: Ocean Find Your Blue*	N/A	**Video:** Using float transmits to understand ocean temperature and climate
How do Hurricanes Form? *NASA*	1080 Lexile	**Text and Video:** Explains the formation of hurricanes
Interview with Systems Engineer *NASA*	N/A	**Text:** Interview with a systems engineer for Soil Moisture Active Passive
Extreme Hurricane Season Driven by Climate Change *Scientific American*	1200 Lexile	**Text:** Climate change's influence on hurricanes
Winds and Where They Come From *Society for Science & the Public: Science News for Kids*	1000 Lexile	**Text:** Explains how and why the winds blow
Earth's Atmosphere *University Corporation for Atmospheric Research: Center for Science Education*	1100 Lexile	**Text:** Gases and layers in the Earth's atmosphere
The Power of Wind *Society for Science & the Public: Science News for Kids*	1000 Lexile	**Text:** Aspects of wind (tornadoes, clean energy, etc.)
The Transfer of Heat Energy *ReadWorks*	Grades 7-8	**Text and Audio:** How solar energy is converted to heat and changes the atmosphere
Storm Chasing *PBS: NewsHour Productions*	Grades 7-12	**Lesson:** Extreme weather events impact on humans now and in the future
The Vortex *ReadWorks*	Grades 6-7	**Text and Audio:** Informational fiction about Earth and space science
Weather and Climate *NASA*	N/A	**Video and Poster:** Explains weather and climate and the difference
Tree Rings Tree Rings Video *NASA and TREX*	Grades 4-9	**Text and Video:** Effects of climate on tree growth and tree rings
Climate Change and Extreme Weather *PBS Learning Media*	N/A	**Video:** PBS Learning discusses evidence for climate change and its effects

The Greenhouse Effect *University Corporation for Atmospheric Research: Center for Science Education*	990 Lexile	**Text and Video:** Explains the Greenhouse Effect
How do we know the climate is changing? *NASA*	850 Lexile	**Text:** Explains climate change
Global Warming *ReadWorks*	840 Lexile	**Text and Audio:** Explains global warming
How Hot Will it Get? *Society for Science & the Public: Science News for Kids*	Grade 6	**Text:** Global warming with questions
Tropical Forest Carbon Storage *Carbon Brief*	1250 Lexile	**Text:** Explains tropical forest carbon storage and the current state of the rainforests
Climate Change: Lines of Evidence (7 videos) *The National Academies of Sciences, Engineering, and Medicine*	N/A	**Video Series:** Explains current climate change and the causes
What Is Heat? *ReadWorks*	910 Lexile	**Text and Video:** Informational text that describes nature of heat and relation to solar energy
How Water Loss Affects Biodiversity *ReadWorks*	1180 Lexile	**Text and Audio**: Explains the affects of water loss on Biodiversity
Thousands of Australian animals die in heat wave *LabX Media Group: The Scientist*	Grades 7-12	**Text:** Effects of Australia heat wave on biodiversity
Does Climate Change Cause Extreme Weather? *PBS Learning Media*	Grades 5-9	**Video:** Climate change's role in extreme weather
Climate Change Enhancing Hurricanes *Society for Science & the Public: Science News for Kids*	1100 Lexile	**Text:** Climate change's effect on Hurricane Florence
Discoveries on how tornadoes form and how climate change could make them stronger. *CBS News*	Grade 8	**Article and Video:** Climate change's effect on tornadoes
Solar Absorbers and Electricity *ReadWorks*	Grade 5	**Text:** Reducing use of fossil fuels

What is a Computer Model? *Society for Science & the Public: Science News for Kids*	Grades 7-9	**Text:** Computers modeling real world events
What might happen in the future? *MakeWay: Climate Change Connection*	1250 Lexile	**Text:** Modeling future climate
The Disarming Case to Act Right Now on Climate Change *TED Talks*	Grades 6-8	**Video:** TED talk by Greta Thunberg (14 yr old) about climate change; transcript has been translated into 32 languages, providing a great resource for ESL.
NASA Vital Signs Video *NASA*	N/A	**Website & Video:** Data that students can track and graph trends over the past century
SageModeler *Concord Consortium & CREATE for STEM Institute – Michigan State University*	Grades 6-12	**Modeling:** Tool to construct dynamic models
Gizmo -Carbon Effect		**Simulation:** Free gizmos (do change periodically) - Carbon Cycle one is particularly relevant.

Science Inquiry Content Scaffolds		
Scaffold	**Level**	**Description**
Physiology of Exercise *American Physiological Society; Life Science Teaching Research Community*	Grades 5-8	**Learning Cycle Unit with Inquiry:** Relating exercise to respiratory and cardiovascular function
Notice, Identify and Interpret *NSTA Science and Children*	Grades 3-6	**Science Text and Inquiry:** Human heart and circulatory system
Power Play *Baylor College of Medicine: BioEd*	Grades 5-8	**Inquiry Teacher Guide:** Measure body properties and effects of exercise
Does the Weather Affect your Body *NSTA Science and Children*	Grades 3-6	**Inquiry Teacher Guide:** How weather affects health
Sickle Cell Disease: Relating Community Health and Heredity *NSTA Science Scope*	Grades 6-8	**Inquiry Teacher Guide:** Sickle cell trait (cell form and function and genetic inheritance)
From Facts to Solutions	Grade 5	**Inquiry:** Suggestions for inquiry to help 5th grade learners address changes in climate and biodiversity

NSTA		
Human Thermoregulation *New Visions for Public Schools: Living Environment*	Grades 8-12	**5E Instructional Model Plan:** Human Thermoregulation with a variety of activities including a lab
Netlogo Models		**Inquiry/Simulation**: Model of climate change that can be used as a part of an inquiry.

ELA Scaffolds

ELA Content Scaffolds		
Scaffold	**Level**	**Description**
On the Banks of Plum Creek *by Laura Ingalls Wilder*	Grades 3-8	**Fiction Novel:** Can be used to discuss the challenges posed by environmental stressors
The Forest is Life *AIPP and IWGIA*	N/A	**Graphic Book:** Graphic book describing the causes and effects of climate change, with suggestions as to how to mitigate the causes and effects through environmental action
Heat *by Hilda Doolittle (H. D.)*	Grades 6-8	**Poem:** Describes heat stress
Horegallu *by Sudha Murthy*	Grades 6-8	**Short Story:** Childhood memories in the summer heat
Twilight Zone Episode (Midnight Sun)	Grades 6-12	**Video:** A dystopian account of heat stress in New York City
Same Sun Here *Written by: Silas House & Neela Vaswani* *Illustrated by: Hilary Schenker*	Grades 6-8	**Novel:** Two young people who attempt to address multiple environmental and social stresses
The Grapes of Wrath The Grapes of Wrath Readers Resource *by John Steinback* *National Endowment for the Arts*	Grades 6-12	**Novel:** Novel set during the Depression that chronicles the trials of the Joad family driven from their home by drought and economic hardship **Reading Resource:** Information about the book, author, historical and literary context, other works/adaptations, discussion questions, and more
Goodbye Earth *by Zayne Cowie*	N/A	**Picture book**: Zayne Cowie (9 yr old) created a picture book describing climate change
Dry		**Novel:** When the California drought escalates to catastrophic proportions, one teen is forced to make life and death decisions for her family in this harrowing story of survival from *New York Times* bestselling author Neal

		Shusterman and Jarrod Shusterman.
Two Degrees		**Novel:** Four different kids. Three different threats. Two degrees of temperature rise. One single cause: Climate change.

ELA Instructional Scaffolds		
Scaffold	**Level**	**Description**
Dissecting a Scientific Article *Arizona State University – Ask a Biologist*	Grades 6-8	**Interactive Article**: Describes how to dissect scientific articles and guides step-by-step through an example article
Anatomy of an Article *Arizona State University – Ask a Biologist*	Grades 6-8	**Article:** Explains each part of a scientific article.
Rolling Journal *Student Achievement Partners. Achieve the Core. Text set project: Building knowledge and vocabulary.*	N/A	**Rolling Journal Strategy:** Students utilize the journal to synthesize information from multiple sources.
Think Aloud *Linking Science & Literacy for All Learners*	Grades 6-8	**Think Aloud Strategy:** Outlines protocol for modeling a scientific text think aloud.
Word Tournament *STEM Literacy Project*	Grades 6-8	**Word Tournament Strategy:** Build vocabulary instruction and review and/or summarize learning.
Using the Jigsaw Cooperative Learning Technique *Read Write Think - NCTE*	Grades 3-8	**Article:** Explains how to differentiate instruction using the jigsaw strategy.
CER – Claim Evidence Reasoning *Bozeman Science*	Grades 6-8	**Video:** How to use CER for scientific argumentation.
Claim Evidence Reasoning Graphic Organizer *Gallagher, K. (2011)*	Grades 6-8	**Graphic Organizer:** Guides students through the CER Framework.
Argumentative Frames – A Planning Guide for Students *Linking Science & Literacy for All Learners*	Grades 6-8	**Graphic Organizer:** Guide to plan argument with claim, evidence, and reasoning.
The Multidimensionality of Children's Picture Books for Upper Grades Chapter 15: "Using Picture Books with Older Learners"	Grades 6-8	**Picture Books: Rationales and sample lessons that you can use to support picture book use in your classrooms for this and all anchor texts.**

A How-to Guide for using Picture Books with Older Students Sample Lessons from *Read Write Think - NCTE* *Susan R. Massey* *Martinez et al.* *Pernille Ripp* *Fresch & Harkins*		

Mathematics Scaffolds

Mathematics Content Scaffolds		
Scaffold	**Level**	**Description**
Earth Data *NASA*	N/A	**Data Sets:** Website that provides full and open access to NASA's Earth science data
Climate Data Guide *NCAR – NSF -*	N/A	**Data Sets:** Website that has over 200 climate data sets and climate indices
Climate Data Online *National Centers for Environmental Information – National Oceanic and Atmospheric Administration*	N/A	**Data Sets:** Website that has an archive of global historical weather and climate data
ArcGIS Living Atlas of the World *ESRI*	N/A	**Data Representations:** Website that has climographs, bar graphs, and other representations of climate data
Historical Temperature and Precipitation Charts for Missouri *Missouri Climate Center – University of Missouri*	N/A	**Data Representations:** Website that has temperature and precipitation graphs

Mathematics Instructional Scaffolds		
Scaffold	**Level**	**Description**
Slow Reveal Graphs *Slowrevealgraphs.com*	Grades 6-8	**Interpreting Data Activity:** Show students a graph without the features (e.g., title, axis labels, legends). Discuss what students notice, wonder, and what they think the data may represent. Then, slowly reveal the graph features one by one. After each reveal, continue to discuss what students notice, wonder, and what they think the data may represent. Once the graph is fully revealed, interpret the graph and discuss the purpose of graph features.
Understanding Two Way Frequency Tables	Grades 6-8	**Two Way Frequency Tables Activity:** Complete the following steps:

Activity from Kayla Hogenmiller		• Give students a completed two way table to observe and compare. Use something of INTEREST to your students so they can visualize the story that the numbers provide for them. • Discuss the connections between the first columns with the last. • Discuss the connections between the first rows and the last. • Discuss the types of questions that had to be asked to get this information. • Have students complete a two way table with missing information/numbers. Discuss the types of questions that had to be asked to get this information. Build their own surveys to ask their class. Use that data to complete their own two way table.
Part I: Exploring the Data Representations in the Anchor Text Part II: Collecting and Interpreting Your Own Data *Activity from Kayla Hogenmiller*	Grades 6-8	**Part I Analyzing Data Activity:** Students analyze the data representations in the Anchor text by: • Observing the graphs in the article. • Discussing the pieces of the graph without the data (title and axis labels) • Discussing how the data is presented (units) • Ask the students to tell the story that the data displays. • Ask students to discuss ideas they deem as missing information. • Provide a specific questions that will yield the data they feel like they need. **Part II Collecting and Interpreting Data Activity:** Students answer the following questions. Then, they create a Google Form to collect data from their peers. Next, they interpret the data, represent the data, and share the data with their peers. • If you wanted to collect data to create a graph like the one in the Anchor Text, what questions would you ask? • What information would you collect with that question? • How do you present that data? • What information would you like to know about your student body and vaping? • What questions would you ask? • How can you present this data?
How Fast Are You? *Huey et al. (2017) - The American Statistical Association*	Grades 6-8	**Lesson:** Measures of Center and Spread, including mean absolute deviation
12 Engaging Activities for Mean Absolute Deviation *Math Idea Galaxy*	Grades 6-8	**Activities:** 12 Mean Absolute Deviation activities
Fizzy Juice Illustrative Mathematics – National Council of Teachers of Mathematics	Grades 6-8	**Activity:** Introduction to ratios

Exercise Away the Big Mac: Ratios, Rates, and Proportions in Context *Ozgun-Koca et al. (2013)* *Website has free access with login: Read online free*	Grades 6-8	**Activity:** Ratios, rates and proportions
Reading and Interpreting Data *Victoria State Government – Department of Education*	Grades 6-8	**Activity:** Reading and interpreting graphs and tables
Twizzler Lab *Activity Created by Dee Leible*	Grades 6-8	**Activity:** Students measure twizzlers after bites, record and graph the data, and analyze the relationship. This helps them define independent and dependent variables.
Interpretations of Boxplots: Helping Middle School Students to Think Outside the Box *Edwards et al. (2017)* *Journal of Statistics Education*	N/A	**Practitioner Article:** Provides ways to support middle school students interpret box plots

Created by the *Linking Science, Math & Literacy for All Learners* team
https://scienceandliteracy.missouri.edu/
with funding from

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH