\*Note: This is an example of how we structured a three-day workshop with middle school teachers. We have provided this as a resource to support you in developing your own workshop.

**Sample GLOBE Weather Workshop OUTLINE**

Workshop length: 3 Days (8:30-3:30); 2 facilitators

Notes:

* Bring photo release forms for participants to sign
* Bring code of conduct forms
* Give teachers a Student Activity Sheet packet (3-hole punched) at the start each section to take notes on/work through and then add into the clean copies of that section in their binder.
* Attend to classroom culture/culture of talk piece, modeling thinking
* Basic flow (repeated for each section):
  1. Introduction to the concepts for the section
  2. Activities exploration/ stations for the section
  3. Group sensemaking for the section
* GLOBE protocol practice

POLL EVERYWHERE INFO:

* <https://www.polleverywhere.com/>
* Once you are logged in to PollEverywhere and are in PRESENT mode in Google Slides, the polls should activate when you navigate to the slide. If for some reason they don’t work within the slides, access them from MY POLLS on the PollEverywhere website.
* NOTE: you must have the Poll Everywhere for Google Slides extension for Chrome installed for this to work (must use Chrome also!)

**DAY 1**

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| 8:30- 8:40 | Welcome   * Introduce ourselves/ UCAR * Schedule for the day, resource handouts |
| 8:40-9:00 | Introduction to GLOBE Weather   * Background of the project * Overview * Features (Achor, LS1-3 progression of topics); being looking through the binders   + Curriculum Scavenger Hunt   + 5 Es of Inquiry & where they are noted in the curriculum (look at LS1 as an example) * NGSS: level of familiarity?   + Poll everywhere question   + Explain 3D teaching   + Reference **Science Practices handout**   + Look at NGSS page in the curriculum (Lesson 2, pg 36) as an example * Write personal goal(s) for the course * Our goals for you   + Improve confidence in teaching weather: both in content and pedagogy, familiarity with GLOBE weather curriculum as a tool   + Introduce “focal student” concept |
| 9:00-9:30 | * What words come to mind when you think about teaching weather?   + Poll everywhere word cloud * Why teaching weather is challenging * Misconceptions/Introduce ourselves activity   + **1-2-4-All discussion** using the misconceptions cards |
| 9:30-10:00 | Anchor   * + Watch video   + Introduce phenomena     - Have teachers jot down any evidence from the video about what happened and what might have caused the storm to be so severe (T-chart)     - 2013 there was an unusual storm that lasted for 7 days, dropping over 15 inches of rain, causing about $2 billion worth of damages.   + Use Talk Moves/prompts to lead short discussion to elicit ideas from the video about the storm     - Teachers use sentence stems     - **Record ideas on chart paper** * Share a story of a storm you have experienced with a partner   + Whole class share out, use Talk Moves/prompts to bring in water cycling to the discussion and call out/record ideas   + Teachers use sentence stems   + Create first model (Step 3): Draw what led to the Colorado Storm   + Share out to whole class   + Teachers use sentence stems * Explain Inquiry questioning/coaching strategies & sentence stems MELISSA   + Reference **Checklist of Talk Moves** as a resource   + Pass out **Talk Primer**; have teachers look through the list of 7 things to support productive talk.   + Discuss Primer & their experiences creating a culture of talk in the classroom |
| 10:00-10:10 | BREAK |
| 10:10-10:30 | Driving question board activity (Step 5):   * Pose the questions: *What causes different kinds of storms? What questions do you have about weather?* * Individually generate questions, one per post it * Form “Scientist Semi-circle” and take turns reading/posting questions to the DQB. After a question is added, ask if anyone else has the same question or a related question. Group like questions together. * Chart papers hanging on wall, divided into 4 sections: LS1, LS2, LS3, Other. As question is read out, we decide which section the question should be posted in. |
| 10:30-11:10 | Learning Sequence 1 Topics & Progression (Lessons 2-3)   * Observing an isolated storm   + **What do you think are the important pieces to put in place to understand how a storm forms?**   + Make a list with partner * Science Talk video: Clouds and Convection   + sensemaking from science talk video (Poll everywhere) * Quick overview of what students do in Lessons 2&3 and big ideas   + Pass out packets, have teachers turn to each page as I show the activities   + Point out where misconceptions start to show up (Lesson 3) |
| 11:10-11:55 | Activities Exploration time I (LS1)   * Stations to visit at own pace, using activity sheets   + Sunny Day/Stormy Day (Lesson 2: Steps 1-3)     - ipad w/ time lapse videos   + Weather Balloon simulation (Lesson 3: Steps 1-3)     - Laptop w/ simulation   + Temperature Graph (Lesson 3: Step 4)     - WIS/WIM (instruction page about WIS/WIM at station) * 3 teachers serving as coaches using prompts/coaching strategies   + Clipboards with coaching prompts/Talk Moves checklist |
| 11:55-12:55 | LUNCH |
| 12:55-1:40 | GLOBE Protocols   * Introduce GLOBE * Cloud observations/GLOBE Observer app * Surface temperature |
| 1:40-2:10 | Sensemaking   * Individually make a model of sunlight warming atmosphere (Lesson 3: Step 5) * Discussion of Models and Revisions using **share-trade** * Introduce Model idea tracker   + Carry over items from the first list of ideas about what caused the CO storm * Challenges to teaching/learning (Connect-Extend-Challenge)   + Sharing experiences: Where does the focal student get stuck? What challenges come up for you? |
| 2:10-2:20 | BREAK |
| 2:20-2:50 | Learning Sequence 1 Topics & Progression (Lessons 4-6)   * Understanding how a storm forms (contd)   + **Why are there storms on some days but not others?** * Science talk video: Moisture in the Atmosphere   + Sensemaking from video-poll everywhere * Quick overview of what students do in Lessons 4-6 and big ideas   + Pass out packets, have teachers turn to each page as I show the activities |
| 2:50-3:30 | Activities Exploration time II (LS1)   * Temp & Humidity graphs (Lesson 4; Steps 1-2   + I2 Strategy handout * Bottle Model (Lesson 4: Step 3)   + 2L bottles & lamp set up * Mylar Balloon (Lesson 5: Step 1&2)   + Balloon & hairdryer * Thunderstorm simulation (Lesson 6: Step 1&2)   + Laptop * 3 teachers serving as coaches using prompts/coaching strategies |
| 3:30 | Wrap up   * Take your temperature |

Make word cloud from today into a slide and insert into day 3 to do comparison

**DAY 2**

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| 8:30-8:45 | Welcome; schedule for the day   * Re-define/extend question from the day before: **Why does warm air rise and cool air sink?** * Might need more time to finish LS1 activities from end of day 1, have set up if so |
| 8:45-9:45 | Sensemaking   * Create model for an isolated storm independently (Lesson 5: Step 3) * Model Idea Tracker * Create consensus model for an isolated storm (on chart paper, altogether) * Assessment: Do Lesson 6: Step 3 together   + Poll everywhere * DQB * Misconceptions   + Turn to pg.34 and have teachers look over the list of misconceptions there and discuss: *How do you help students to shift their thinking when they hold these misconceptions?* * Challenges to teaching/learning (connect-extend-challenge)   + Sharing experiences: Where does the focal student get stuck? What challenges come up for you? |
| 9:45-10:15 | GLOBE Protocols   * Humidity (wet/dry bulb) * Barometric pressure |
| 10:15-10:25 | BREAK |
| 10:25-11:00 | Revisit the phenomenon (the Boulder Storm) to see if the model for an isolated storm explains what we saw in the video   * + Look at slider photo of the storm * **What other types of storms cause precipitation?**   + Turn to shoulder partner and discuss * Science talk video: Fronts   + Sensemaking from video (poll everywhere)   Learning Sequence 2 Topics & Progression (Lesson 7-9)   * Quick overview of what students do in Lessons 7-9 and big ideas   + Pass out packets, have teachers turn to each page as I show the activities |
| 11:00-12:00 | Activities Exploration Time III (LS2)  AS WHOLE GROUP:   * Density tank demonstration (Lesson 9: Step 1&2)   SPLIT UP FOR ACTIVITIES EXPLORATION   * Time lapse video of a storm front (Lesson 7: Step 1 & 2)   + iPad w time lapse video * Interpret a weather forecast (Lesson 7: Step 3) * Interpret temp/humidity/wind speed data (Lesson 8)   + WIS/WIM * Interactive reading (Lesson 9: Step 4&5) * Density tank available for practice (Lesson 9: Step 1&2)   + iPad w density tank slow motion video * 3 teachers serving as coaches using prompts/coaching strategies |
| 12:00-1:00 | LUNCH |
| 1:00-1:40 | Sensemaking   * Create model for explaining precipitation during a cold front individually (Lesson 9: Step 3) * Model Idea Tracker * Create a consensus model for a cold front   + On chart paper, at table groups   + mini-gallery walk * Do Lesson 9: Step 6 together (groups of 4) |
| 1:40-1:50 | BREAK |
| 1:50-2:40 | Concluding LS2   * Lesson 10: Step 1 and pressure demo w balloon & beans * Arm wave Steps 2&3   + Teachers label their SAS Step 2   + Teachers call out pressure trends before, during & after a cold front in Step 3 * Revisit the anchor   + Do Lesson 11 Step 1 as a poll everywhere * Wrapping up the colorado storm investigation   + Do Lesson 11: Step 2 then find a partner to share your model and discuss the questions in Step 3. * DQB & Model Idea Tracker * Misconceptions (pg. 68 in Teacher Guide)   + *What strategies have you had success using to address these misconceptions?* * Challenges to teaching/learning (thinking routine)   + Sharing experiences: Where does the focal student get stuck? What challenges come up for you? |
| 2:40-2:50 | BREAK |
| 2:50-3:20 | Learning Sequence 3 Topics & Progression   * Understanding global weather patterns   + **How do storms move around the world?** * Lesson 12: Video of N American storms & NASA video of annual precipitation w/ Find-Capture-Explain-Wonder protocol   + What patterns do you notice   + What are you initial explanations for those patterns * Science talk video: Global Atmospheric Circulation   + sensemaking from science talk- poll everywhere |
| 3:20-3:30 | Wrap up   * snowball |

DAY 3

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| 8:30-8:40 | Housekeeping   * Paperwork for stipends |
| 8:40-8:50 | Re-visit/re-define question from the day before: *What evidence are you aware of that storms move in patterns around the world?* |
| 8:50-9:50 | Activities Exploration Time V (LS3)   * Patterns in annual temperatures (Lesson 13: Step 1)   + iPad w slide of World Average Temps * Energy Angles (Lesson 13: Step 2&3)   + Clipboard, flashlight, graph paper, ruler * Temperature & latitude sorting activity (Lesson 13: Step 4)   + printed/cut activity cards * Convection demonstration & articulate metaphor (Lesson 14: step 2-4)   + Plastic bin, cups, red/blue coloring, pipettes, hot water/tea kettle, tap water * 3 teachers serving as coaches using prompts/coaching strategies |
| 9:50-10:00 | BREAK |
| 10:00-11:00 | Sensemaking   * Create a model for air movement in the tropics individually (Lesson 14: Step 5) * Create consensus model for air movement in the tropics   + Each table makes own consensus model   + Include Key Model Ideas from pg 122 TG   + Gallery walk * Watch the NASA video again, compare to our models (Lesson 15: Step 1) MELISSA * Do Coriolis Activity w/ a partner (Lesson 15: Step 2)   + Balloon, sharpies * Demonstrate Understanding (back to back)   + Use prompts from 121 * Model Idea Tracker * Do Lesson 15: Step 3 together * Connections (discuss with a partner)   + How can we make these connections clear for our students? * DQB * Misconceptions (pg. 101 in teacher guide) * Challenges to teaching/learning (thinking routine)   + Sharing experiences: Where does the focal student get stuck? What challenges come up for you? |
| 11:00-11:30 | Flex time. Give more time to section above? |
| 11:30-12:30 | LUNCH |
| 12:30-12:50 | Culminating Task: Challenge 1   * **Why did the storm cause rain in some places and snow in others?** * Participants are working together, facilitators are circulating * Call out model ideas applicable here (in groups) |
| 12:50-1:20 | Culminating Task: Challenge 2 & 3   * **Where will there be a snow day on Feb 24?** * Participants are working together, facilitators are circulating * Between Challenge 2&3 have teachers “find someone who..” and discuss what we learned from Challenge 2. * Call out model ideas applicable here (in groups) |
| 1:20-1:30 | Wrap up GLOBE Weather curriculum |
| 1:30-1:40 | BREAK |
| 1:40-2:20 | GLOBE Connections   * Orient and explore on website * Do Example 2 together * Planning time to create an activity using GLOBE Connections with students? |
| 2:20-2:30 | Assessments in GLOBE Weather |
| 2:30-2:50 | Using the website: [www.globeweathercurriculum.org](http://www.globeweathercurriculum.org) |
| 2:50-3:00 | Wrap Up   * Poll Everywhere word cloud: repeat from first day to see how our thinking about teaching weather has changed * Sharing circle? Revisit goals * Evaluations (google form) |