Climate Draws the Map Lab: NYSSLS Alignment

Teacher guide for the student worksheet at mrsajdak.com/climatemap (two pages, 18 questions; a low-write version has the same numbering). Environmental Science, Chapter 6, Chapter Summary and Review (SE pp. 190-193). The answer key is a separate file, kept off the public site.

Performance expectations

> **HS-ESS2-5**
> Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. *"Where water falls, and how warm it is, sets what can live in a place: students read rain and sea temperature across the planet and test what changes when they change."*

> **HS-ESS2-7**
> Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. *"Climate sets where life can live, and life changes climate in return: students argue from real numbers about what decides the map."*

Practices and concepts, where students do them

Practice or concept	Questions	What students do
SEP 2 Developing and Using Models	6, 17	Model check: what the two-number grid leaves out, and what a one-click map cannot show.
SEP 3 Planning and Carrying Out Investigations	14	Plan check: what is changed, measured and kept the same when testing warming alone.
SEP 4 Analyzing and Interpreting Data	1, 3, 7, 9, 13	Read real climate numbers, then find the pattern along each cut.
SEP 5 Using Mathematics and Computational Thinking	8, 15	Percent less rain; share of the tundra lost.
SEP 7 Engaging in Argument from Evidence	18	Answer "latitude alone decides what grows" with numbers.
CCC Patterns	2, 9	Stripes on the map; wet at the Equator, dry near 25 degrees.
CCC Cause and Effect	10, 11, 12	Name the climate factor behind each pattern.
CCC Structure and Function	4	Needles, waxy skin and broad leaves fit a climate.
CCC Stability and Change	13, 16	Biomes shift as the climate shifts.

Opening: pick a phenomenon

The slideshow's first slides offer three openers. Pick one per class.

Opener	What happens	Notes
Video: One Year of Green	Spinning Earth from NOAA Visualizations: a year of plant life seen by the Suomi NPP satellite. Backups: a tour of Earth with the same data, and USGS on global vegetation.	Picked from titles. Preview the clips. Stop before any narration explains the pattern.
Activity: Draw the Stripes	4 minutes. On a blank world map, shade where you think is green, then tan. Compare with a partner.	Needs a blank world map and two colored pencils. Do not explain it.
Photos: Earth in January and July	The same satellite view, six months apart.	Ask what moved and what stayed. The tan belts stay.

Part by part

Part 1, Draw the map (Tab 1). Explore: Q1 to Q3. Learn It on biomes, plant parts, the model's limit and the sea sits between Q3 and Q4. Apply: Q4 to Q6. The Model check is Q6.

Part 2, Why there? (Tab 2). Explore: Q7 to Q9. Learn It on four climate factors sits between Q9 and Q10. Apply: Q10 to Q12.

Part 3, Change the climate (Tab 3). Explore: Q13 to Q15, with the Plan check at Q14. Learn It sits between Q15 and Q16. Apply: Q16 and Q17. Q18 closes the lab.

The district section

BPS Environmental Science Unit 2, Chapter Summary and Review (SE pp. 190-193): Tying It All Together: Coral Reef Recovery; Chapter 6 Summary, Word Wall; Chapter 6 Assessment; Activity A, Investigate: Leaf Characteristics; Activity B, Citizen Science. This lab serves the Chapter 6 Summary and mirrors Activity A: plant parts fit a climate. **Addition:** the lab itself, the world grid and the what-if runs are beyond the district list. The grid is the same one as the Two Numbers Make a Biome lab.

Sources. Willmott, C. J. and K. Matsuura, Terrestrial Air Temperature and Precipitation, v5.01, University of Delaware, served by NOAA PSL; averaged here from the monthly files, 1981 to 2010, because the December layer in that server's long-term-mean files is empty. NOAA OI SST v2, monthly means 1991 to 2020 (Reynolds et al., NOAA PSL). NASA Blue Marble Next Generation, July and January 2004 (Stockli et al., NASA Earth Observatory). Reef dots placed by hand from rough coordinates. Environmental Science (National Geographic Learning / Cengage), Chapter 6. Photo credits are on the lab page.