

Transcript for Video Clip 7.3

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Content area:	The Sun's effect on climate
STeLLA strategy:	Select content representations and models matched to the learning goal and engage students in their use (SCSL strategy D).
Context:	The focus question for this lesson on the Sun's effect on climate is <i>Why is it warmer in the summer than in the winter?</i> At the beginning of class, students discuss their ideas for answering this question. One student thinks it's hotter in some places on the equator because the equator is closer to the Sun, and another student thinks the tilt of Earth changes as it orbits the Sun. During the lesson, students simulate Earth's orbit around the Sun using a lightbulb, a Styrofoam ball, and a Hula Hoop.

Video Clip 3

Time Code	Speaker	Discussion
0:00:01.6	SN	It's winter, it's ... it's winter on the opposite side [of Earth].
0:00:04.8	SN	Uh-huh. Yeah.
0:00:05.9	T	So ...
0:00:06.3	SN	Well, the Earth has to be pointing towards the North Star.
0:00:08.6	SN	So it is. So over here ...
0:00:09.7	SN	So ...
0:00:10.6	SN	Right there it's winter.
0:00:11.3	SN	[And here] it's summer. Yeah. It would be summer and winter.
0:00:13.3	SN	And then wouldn't it ... then ...
0:00:14.3	SN	Oh yeah.
0:00:15.1	SN	Over here ...
0:00:15.2	SN	'Cause that's the Northern—
0:00:16.1	SN	It'd be opposite because the Sun ... It'd be winter. There's more sunlight hitting down here and less as you ... right up here.
0:00:23.6	T	So can I have you freeze in position 1, where the North Pole is pointed toward the North Star and the Sun?
0:00:31.4	T	OK. So when you put the Sun ... put the Sun there, what do you notice about how the Sun is hitting the Earth?
0:00:37.4	SN	Well, it's kind of ...
0:00:38.3	SN	It's going ... yeah.
0:00:39.6	SN	It's going more ... yeah, under.
0:00:41.7	SN	Like this.
0:00:42.4	SN	And by the equator.
0:00:44.2	SN	Then, like, right up here and then down here, but it's more going on the equator.
0:00:49.8	T	So if you say up here and down here, what are the vocabulary terms we have for—

0:00:53.1	S	So the North—
0:00:53.8	SN	Northern Hemisphere ...
0:00:55.3	SS	Southern Hemisphere.
0:00:56.5	T	OK, so Christina, are you saying that the Sun is hitting more in the Northern Hemisphere or on the equator?
0:01:01.4	SN	More on the equator, but it's also a lot of bright light on the ...
0:01:05.9	SN	Northern.
0:01:06.1	SN	on the Northern ... Northern Hemisphere, just to give enough light. But it's more [light] hitting the equator.
0:01:12.5	T	OK, so you think there's more [light] on the equator than on the Northern Hemisphere?
0:01:15.4	S	Uh-huh.
0:01:15.9	T	What's happening in the Southern Hemisphere when you have that?
0:01:18.0	S	Um ...
0:01:18.8	SN	There's not as much [light].
0:01:19.5	SN	[Inaudible] it's not as much.
0:01:21.7	SN	There's not as much sunlight, so it's winter.
0:01:25.7	T	OK. What do you guys observe when the Earth is in position 3?
0:01:31.4	SN	So ...
0:01:31.7	T	So this is still pointed toward the North Star, but it's pointed away from the Sun.
0:01:34.8	SN	I think it ... it would be right here. Or right there.
0:01:36.7	T	OK, let's see.
0:01:37.6	SN	The sunlight, we use it over here. [Inaudible]
0:01:42.9	T	[Inaudible], thanks for holding our Sun.
0:01:44.5	SN	It'd be totally opposite here.
0:01:46.4	SN	Yeah, because when [Earth] was in position 1, this was winter, but now this would be summer.
0:01:53.2	T	So you're saying it's winter. What makes you say that it's winter?
0:01:56.2	SN	It'd be ... because there's less light hitting the Northern Hemisphere.
0:02:00.9	T	Oh, OK.
0:02:01.1	SN	And I ... I kind of noticed that wherever we move it, there's more light hitting the equator than anywhere else.
0:02:06.7	SN	Well, there's more hitting, like, right—
0:02:08.6	SN	Because, like—
0:02:09.2	SN	It's not exactly—
0:02:10.2	SN	So, like, there's still less light up here, but there's more light hitting the equator 'cause it's more direct.
0:02:16.6	SN	Yeah.
0:02:16.7	T	You've made—
0:02:16.9	SN	There's more direct light.

0:02:18.1	SN	It's warm, I think, 'cause that's the ... like, the little circle that's in—
0:02:22.5	SN	Yeah, it's technically just hitting it, like, right there.
0:02:24.6	SN	'Cause when you hit it, there's like a little circle of light, like, the brightest circle.
0:02:28.9	SN	Yeah.
0:02:30.2	SN	There's a bright light circle ...
0:02:31.0	T	Let's see.
0:02:32.1	S	and then it's right there.
0:02:34.1	T	So Mara says the brightest part is down here, and Christina was saying the brightest part is up here. What do you think?
0:02:39.2	SN	When it's, like, there.
0:02:40.1	SN	Whoa, whoa. Put the light right here.
0:02:42.2	SN	And right in the middle. But that's technically still right here.
0:02:44.7	SN	Well, yeah, it's still hitting ...
0:02:46.3	SN	Yeah.
0:02:46.8	SN	It's hitting, like, right here, 'cause that's where I see, like, the circle.
0:02:50.9	SN	Yeah.
0:02:51.1	T	Oh, so ...
0:02:51.2	SN	Like the bright light—
0:02:51.8	T	So—
0:02:52.3	SN	If this is Colorado and this is Argentina, right there'd be summer in Argentina.
0:02:55.9	SN	Uh-huh. And it ... over there—
0:02:57.1	SN	But then if you come over here—
0:02:59.1	SN	in Colorado—
0:02:59.8	SN	it ... it goes up and not as much under.
0:03:02.2	SN	Yeah, so it depends on where [Earth] is in the—
0:03:06.4	SN	The rotation.
0:03:06.8	SN	'Cause if it's right there, then it can't—
0:03:08.4	SN	It depends on where [Earth] is in the orbit.
0:03:10.6	T	In the orbit, OK. You notice a pretty big difference between Colorado and Argentina, right?
0:03:15.8	SS	Yeah.
0:03:16.4	T	So I want you to play around a little bit more with that idea of comparing the Northern Hemisphere with the equator and the Southern Hemisphere with the equator in position[s] 1 and 3.
0:03:24.7	T	Let me know what you notice, OK?
0:03:25.6	SN	OK, like I was trying—
0:03:26.8	SN	Could we do ...