**Physical Geography**

**February 10, 2015**

**12:10 pm – 1:35 pm**

**Volunteer State Community College**

**ROUGH DRAFT**

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>> THE INSTRUCTOR: Pass this around, the sign‑in sheet. Okay. Evans? I can't remember. Gentry, Graves, Hansen? Hollingsworth? Honeycutt? Jeffers? Talk to me after class. How about Jackson? Kelly? Lampley? Mayne? I liked your responses, by the way, on the paper. Did you see my feedback? You have to tell me, did you send me an email about it or anything? Okay. Parks? Parks? Powell? Roland? Smith? Jacob and Kylie? Strickland? Terry? Woods? Parks and Terry.

Make sure again you sign in on that sheet so that you can get your credit for being here today.

Look through the grading of this. Looking at your answers. I think I corrected a few of them in there, but for the most part, I might have put in the order of stratosphere and troposphere, so forth, Mezo, whatever. Your mathematics is largely okay, but if you have any questions about this, please let me know.

Also your next quiz is due on Thursday, which is quiz 3. Right? I will be giving you quiz 4 then. Quiz 4 will be over Chapter what? 5. So you will be turning in, because the quiz for Chapter 4 on Thursday.

Is there any business to attend to? Yes, in that I was asked just before class, have I heard anything about our field trip? The answer is no. The last email I had sent had kind of been tabled for, let me see when a good time was, okay, we're getting closer here, how do the due dates look, and he has not written me back yet.

I will try another gentle reminder. I will try to get a commit. If you can't come, then what can I do? It's unfortunate with in individual, and he doesn't want one either. The other guys were people persons, and they were happy to see us there. I don't know.

I don't know what's going on with it. I think it's unfortunate. I think it's cool to get in there and see some of how they do what they do, and I didn't share with this with you yet, but you do know that western Kentucky has.

>> Meteorology program? Did you know that? Is any interested in weather forecasting? Okay. It doesn't matter. That's fine then.

Any other housekeeping?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: No, in fact, your paper was in there, I graded your, tell me your name. I'm sorry.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Charles May. I remember Charles, because he was talking about how he did some field work, was it Mongolia? Do you mind to tell us now?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: What were you looking for?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Anything associated with Genghis Khan? Before Khan. Okay. I happen to know about, that's pretty cool, I think, but one, were you enrolled at Kentucky? Western Kentucky. Okay. That makes more sense now to me now.

There's also a crowd sourcing thing from a residence geography for the national geographic society. They have a guy who's crowd sourcing satellite imagery across Mongolia and southern Siberian Step, and it's cool. If you look for it, they give you little quizzes. What they do is show you a satellite image. This is what we're looking at with remote sensing.

Put stuff in the Dropbox, I graded them 5. The 5. If you saw my email, you had until last night to get it done. I will grade them.

So crowd sourcing. They would give you several tests, images to say, what do you see here? Do you see a path? Do you see a burial crept. You're supposed to mark it. Then they would come back and say well, you did mark this one and that one is not anything, and help you to look in and give them ideas about what to look for as they tried to find the burial place for Genghis Khan, and there's other things with remote sensing that go on.

And I think I have written on somebody else's in an archaeological dig that they ground radar. Did anybody read their feedback from me yet? I don't know if I mentioned it. Just for a while. You can send stuff down and get an idea of what's underneath. Subterranean. And I would send it to you. I think I included on each and every one of yours the breaking of the Mia Code, which is the language.

Your video was about the Mayans. I thought you might find that fascinating. That one Spanish priest or Friar did his best to destroy as much about Mayan culture as he possibly could. Why? Because he thought it was in their best interest. He's Catholic. So let's destroy their past and give them a ticket to heaven if they take it.

That made it impossible to figure out what the hire with all those temples that they are finding now. One of the professors at Vanderbilt is working on this. But they broke the Maya codes.

They started with dates and numbers and you know about the long count of ‑‑ and that there was a lineage and then there was several different things, very cool video, documentary, but they were about how it's linguistic and pronunciation and it's a word and pronunciation and that's something.

And you're not going to believe this. But when you see in there, 12‑year‑old boy who's a son of one of the archaeologists of one of those digs and he's figured out stuff because he spends summers down there and work looking over the shoulder. She is a Maya specialist, studying all her life. She's like, how do you know? She takes him out. It's this kid who writes a paper at 12 years old that is phenomenally groundbreaking in his understanding of what's going on in Mayan society, and thus he ends up cracking the code and deciphering out of it. A 12‑year‑old kid. Awesome. But anyway.

So when I respond to your papers that I see in there I put that link and feel free to watch it. I don't care if you do it or not. It's just information. Questions?

Have to change I hope, you will change for me. I hope you be a little more energetic. It's 11:00 in the day. You come in here and you say nothing, I don't know what that is. Classes have dynamics like there's a group dynamic and if people don't bond and talk, I don't know. This would be a painful class if you come in on Tuesday and Thursday and say 0 to each other.

I would like you to make friends. It's your last time before you go in the work world and you're forced to work with people that you don't like. This is your opportunity to pick out friends. That's almost, it's not that there's a problem with you being quiet. I hope, was the weekend tough on you or something? You were up to 11:59 working on a paper, right? College students. What's that?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Where does she work? I don't know. Okay. Anybody else? Anything big happen this week? Come on. You don't want to talk about physical geography, do you? I don't have cable, but I would like to see that. My favorite, I look back at some of the, I need more cow bells. I watch that every once in a while.

The best one long ago it's very irrelevant. It's charged, our 1970s. They were when Richard Pryor and Chevy Chase has that interview. The height guy is purposely provocative so he can raise the black man's ire. I don't know. I think we have gotten so politically correct. Anybody is afraid to say anything. We were in a very different place when Archie Bunker was on TV. Did anybody watch All in the Family? We're a generation different. Things change.

So what got favorite skits or something? Yeah. I heard Eddie Murphy was back on there recently. His big one was buckwheat. The Blues Brothers were big when I was a kid. What's that?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: How many of you saw 1988? Any of you? Any of you? Only about 3 of us saw it. 1988. Anything else?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Yeah. They run out of place to put the snow, haven't they? Nashville is in a snow dome. They don't get any. They get feet of snow. Holy crap. And it ain't changing. Boston has to be the toughest mugs in the world of suffering through this.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: That's right. Yeah. They have had so much. In fact, I think it was today, he was livid they shut down the trains, and he was like, how do I get to work? Now you're talking about I'm unemployed for a while. He can't earn money. You may not think about, everyone in the south has to have a car. It doesn't make since to have a car. Where do you park it? Just ride the subways, physically, Chicago or Boston. That's hard for them. Now you don't have any transportation.

Yeah. That polar vortex. Snowagedden. They have these names for it. Exactly. Yeah. They have always always latched at it. Hell, we get out ‑‑ yeah.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Yeah.

>> THE STUDENT: Everybody go get milk from the store.

>> THE INSTRUCTOR: Yeah. The eggs, bread and milk. So you can have French toast, and that's the thing. Yeah.

>> THE STUDENT: Then on the other end, we laugh at them at their lack of tolerance. I went to Canada about 5 years ago and there was ‑‑

>> THE INSTRUCTOR: [Indiscernible]

>> THE STUDENT: Their heat wave was ‑‑ the air conditioner went out. [indiscernible]

>> THE INSTRUCTOR: Well, the 100 degrees is one thing, but add the humidity, that's the stressful factor.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Right. Right. Because the heat index here is of course we're subtropical. The heat index is stressor on you. Strokes and stuff happen because. You understand some of the stuff we have been talking about here with precipitation is, your body, I don't know if you tie your body with the environment that much. But I give you an example.

The oceans. There's a graphic and beginning, I think, isn't it? Hold on a second. It's on the next chapter. Let's look real fast at Chapter 5. I want to look at page, on page 103. Look at it real fast. Give me a second here. Okay. So if you look here real quick, you can't look if I don't turn it on. Can you see this? Okay.

The ocean. The observation covers what percent of our planet? 70, yeah. In that area. You can consider it other bodies like the Great Lakes. Over 70%, right? So we know that the ocean is also salty. At what degree of saltiness?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Yeah. So when you look at this and then if the next time you're drinking blood ‑‑ guess what it's no mystery that your blood is about the same percentage as the ocean itself, that sodium plays a big part in our lives.

These weather mechanisms that we talk about out here about precipitation, condensation, we talked about the changing calories last time, right? From ice to liquid to vapor and back again. Did you correctly, you didn't sit your ice cube outside the freezer? Did you sit one out to the side though? No? Did anybody do that? Anybody do it? Come on! Where is your ‑‑ sorry? No. No. Maybe, nothing against you. Maybe the ice thing is an American thing.

If you ever traveled, you know what? You haven't traveled then. Ice is an American thing. You go to France. If you want a Coke, here's a hot Coke. What am I going to do with that? I want some ice. Go back home. We don't have that here.

A lot of the places that I traveled, they wanted to show off to me, they put ice in desert India, here's, you have to have this ice. I was like, I can't drink that. I'm going to get sick. It's a fact. We have the purified water. The ice wasn't, I felt guilty. Of course I got sick. It wasn't purified. You should try it. It's a fun party thing. If I could tie it up like it's a thing that everybody is doing it, everybody do it.

When we talk about your body sweating, your body is ‑‑ take heat away. You understand this. As that evaporates off the skin, the temperature is brought down again. As the humidity goes up in the air, less and less you have ability to cool down. At 100% saturation. I don't care how hard you sweat. If none of it is going to evaporate, at 100, you're not going to lose any body heat.

So it's very stressful. Little kids and elderly people, and you know about the people in Chicago who may not, Chicago who may not have air conditioners because well, sometimes it doesn't get that hot, we run a fan and some of these old people in the city, they are scared and they won't open the windows. The heat wave comes, and there's dead people in apartments. You heard about this not long ago.

So think about what the body can tolerate. If you're further north you can tolerate, they had a 35‑degree day or something like that. I might have mentioned it. 40‑degree day and they were playing soccer. While 40 degrees in Florida is mittens and hats. It's all relative. It's all relative. Relative to what? Relative to the heat. Relative to what you're used to. I thought you were going to say something. Anything?

So I mean you look at some of this stuff. It may seem detached information. If it is, it's harder to learn. If it's something you can incorporate in your daily activities and stuff that you experienced, it will be easier to process it. Okay?

So we are today, I thought I was going to wrap up Chapter 3. So I'm going to, let's look, look at air temperature. We see, we measure air temperature. This is Chapter 3. With thermometers. What do we use more often now in America, or in the world what is more often used? Fahrenheit scale or Celsius or Centigrade.

There's also a Kelvin scale too. But that's usually more in scientific and stuff, and I can't remember. The Kelvin scale, unique thing about it is on the bottom end is that whatever freezing, whatever the low point of it is, it's no molecular movement. It was something negative. I don't know. Okay. There we go. Okay.

On the Celsius scale. Okay. If you can stop molecules from moving, you could guess there's no vibrations and no heat generated at all. You stopped it.

And there's something to that too that if you think about amphibians, what's it called? Eustachian? I can't remember the term. That could be frozen solid and what would they do? We hop around again. Their body is such that it's adapted to a an environment wouldn't necessarily crack the edges, the external part of the cell and rupture them and kill them. It doesn't work that way.

So they can go into these states where for long periods of time that they are by all visual indications dead but then can snap back when the rain comes or the heat comes back.

Anyway, so as we look at some of the controls of surface temperature, you can see within this chapter, what page is this on? I think it's on discussion. What's that? 64. Okay. So discussion is going on here, so latitude around the equator of course. The sun is there most of the time. It's fairly warm and most. As you move latitude, as you go to north and south, higher latitudes, it gets cooler until you're an icecap, on the poles.

So surface temperatures change throughout the year and season. Agreed? We talked about seasonality. Is there a, you want to talk about the seasons? Land and water distribution matters. We see that in the pressure ratings and temperature. Seasonality matter of the continents, which we have talked about in the past, skillets and oceans but pots of water.

The currents themselves are moving. I think I said, I said this last time, distribution of heat with ocean currents and wind. Those surface currents are driven by wind in the ocean. We didn't look at the ocean current, did we? I mentioned it, but we didn't look at it, right?

And then altitude of course. Snow and ice on tops of mountains. The higher the mountain, the more that you might find, except when you get as high as Mount Everest. How high is Mount Everest? Because of globalization, understanding satellites. When I grew up it was 29,029 feet. But once they are using satellite technology, it was 7 feet, 7 feet higher than they had it measured from sea level back in the day.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: 14,494. In the Seiras. It has here the publication of this. I'm not sure. I have to look. It reads 14,494. Do you think it's higher or that's the right one? It's higher. It may be once you get the sensors and you can measure that. They are coming from sea level. But sometimes, let me address this.

We're measuring temperature with thermometers. We measure wind speeds, all these different things. Depends on what you're calling a measurement. You could have 3 or 4 different answers depending on how you want to talk about height. We talk about mean sea level. In altitude, when Mount Everest is ‑‑ where he was going with this, okay.

Glaciers are on the top of that bug, not that mountain. It's so high the jet stream and geostrophic winds, it's like blasted all the ice, gets blasted, all of it. It's a ragged rock shape up there of imposing doom. That's really what it comes to when the people were trying to climb it.

I see your hands. You can measure from the inside of the earth out so that the mount, what mountain is it? In Ecuador. If you measure from the interior of the earth to Ecuador, further out by the poles and pick the highest, that's the tallest one. Or if we measure from the bottom of the ocean, Mount Monaloa in the Hawaiian chain is higher, much higher than Mount Everest from base to top. I'm not trying to confuse. I will let you know, different for different ways. Making sure that most of what we have been talking about is measured from mean sea level, but there are other ways. Yeah.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: That's a worthy question. I mean, worthy of questioning. The question is probably yes. When we have to take those averages of, it's kind of hard to measure out anyway. The Pacific Ocean, tides are such a thing. The worst ones are around Labrador. The highest tidal surge and how to measure that.

But certainly as you have land‑based ice, it doesn't matter for icebergs. Even ice shelves. If it's part of the ocean, it ain't changing even if it melts. As that melts and land‑based ice goes down like the glaciers on Kilimanjaro is when your sea level starts to rise.

We have seen the lowest part of the world, from Marichis, to Vilo, people are leaving them because not that they are already under water. Not that at all. But even a little bit where the storm surge, that's what it comes down to. The storm surge is the problem. Not that we're already unindated with water. If this continues at a pace, absolutely. If your measurement changes, you have to address it. Good question.

Okay. So land formed barriers we'll see in mountains affect wind streams, and human activity changes air temperature. A little later you see the urban heat island. Let's look at a couple of things real quick.

One, as you progress from the equator, this is only 23 minutes from the equator. This is right on the, I have to show you on world map. It's right there, the girdle of the belt, south of the bulge of West Africa. Right there is Liberville, their temperatures fairly constant because it's in an area at the equator. It's the same. You might get a little rain, might be rainier season, depending on time of year where the tropical zone is. We see this. But by and large heat is the same.

But then you see these ranges certainly go up. Look at the range of location and temperature. Let's see here. No, this is not showing you range. This is average. This is average. By the time you get in northwest in Canada, you're dealing with 0 here.

Let's see. The latitude. That's well beyond the Arctic Circle. What's the number for the Arctic Circle? 66 and a half degrees north latitude. So as you progress up, you can see some of the changing temperature values. Wait a minute. They get a little higher. That would give you the sense of when might their solar maximum, if you will be, and depending on where we measured this, if we measured this in a desert that would be in a very big influence, right? For a temperature change. You said you regularly, you said in California? Where?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Where in California?

>> THE INSTRUCTOR: Central value. Running up 100 degrees in the summer?

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Over 30 days of 100 degrees temperature. Water vapor in the air matters. I made that clear with humidity. Okay. Looking at this. I have something to tell you now. You're looking at ocean circulation.

Now here's the deal. There's a couple of different ocean circulations. The surface is largely dragged along by friction because of the wind. We will look pressure differences in the winds. We will look at core loss effect, and this has given you the idea of coreless effect, but there will be deep ocean gyre that is giving you ‑‑ what we are typically seeing here is this clockwise pattern in the northern hemisphere and counterclockwise in the southern hemisphere.

Is that consistent? Pretty much. A little mess up to the Indian Ocean because of the way the mechanics and geography, but by and large this is what you can expect.

So warm water carried up through here and around, and now this is all considered about this point, this is a warm current. So you can have warm current, warm current, until it turns south and then you call it a cold current. Then all of a sudden it loses the heat from heat to heat. No, it was loose, it's relative.

Now that it's heading south into an area of possibly warmer waters, obviously that's a cold current compared to what it should be running through. We talked about California current. Did we not? And surfers? Yes? Yes? I didn't mention that at all. Okay.

If you go surfing out here, anybody been surfing in California? Anybody been in the surf? When were you there? What time of year? August? Hottest part of the year? What was the temperature of the current throughout? Did you get out in the surf? Okay.

>> THE STUDENT: I did not. I didn't surf.

>> THE INSTRUCTOR: How did it feel to you? Was it a nice refreshing, because it's so hot outside, dog days and in August?

>> THE STUDENT: There was a little bit of, a little bit going on, like June bloom or whatever they call it. A little bit, a little cloudy, and truth of the matter, it was, I wasn't, Florida beach where it's 80 degrees, probably 75 or 80 degrees. It was a little cool.

>> THE INSTRUCTOR: Yeah, so it is cool. You can probably go out in board shorts and be fine. But other times of the year, I thought I mentioned this about shark diving too? My apologies. I want to tell you about that because I was discussing this per some questions of the other class. So my total apologies.

Shark diving. I will bring that in and whatever else. So the deal is though, as I start to come from this area down, you're talking about typically warmer water body here. So as it invades that area, then it is relative to the water of cold current in the same way that this one here. This is coming from Antarctica, Peru of the Humbolt current. It's this current right here. Very cold but an important aspect of fishing and other industries associated with the western part of South America. Same thing here.

So it wouldn't be a mystery for these areas here and here climatically you see later in these chapters that you would find the same type of sea climate, same growth of crops, whatever it is in the same value, if the soil, if the soil is comparable. No Napa valley wines and Chilean wines. Same stuff.

Anyway, look at this. You get specific heat of water. You can guess it's hotter and colder here and here. The circulation helps to take the cold water to here. A mixing factor. Trying to make it heterogeneous. Homogeneous. Mix it together where you have, if I go straight from the equator to the pole, I should see diminishing temperatures as I go toward the icecap. Agreed? Okay.

But if there were not this mixing, I would say real little hot temperatures and very little as I go down ‑‑ the change from 10 degrees, 10 to freezing. You would see very hot to very cold in between being sort of the same. Does that make sense? Because it's mixed together. The troposphere and our weather layer is a heterogeneous part of the atmosphere. The air currents mix it together. Higher elevations or higher altitudes.

You would see things like oxygen and nitrogen piling up at different atomic weights. They call it, what did I say it is? Hetero. Homo means that you have a certain level or certain kinds of gases. Is that in your book? Did you have that graphic to know what I'm talking about? I'm getting blank looks. I want to deal with that real fast. I want to look at that. Bear with me.

I hope one of these graphics to show it. Let me see real fast. There we go. Take a look at this one. Hope you can see it. All right.

So, oops. So in this area the troposphere, of course we have always air, hot current, thermal, descending cold air, it's dense, it moves around in this area right, up until the mesosphere you have the hemisphere, in that you have that mixing. Here though by the time you get up into the thermosphere, there you have nitrogen, your helium, hydrogen, lighter than that.

So you get a sense of how it's layered as you get out further apart. Is that helpful to know? I don't think that was in any of your graphics.

So if we're looking back at this, let's try and see where I'm going with this. So the core loss effect. I want to deal with this one right here. This is one that even I am responsible for and your book is responsible for.

Look on page 69, look below that graphic right there. And you'll see this graphic right here. Okay? What it's telling you here is that the gulf have stream impacts eastern United States and the north, part of northern Europe. Put a question mark there. Because I only just recently picked up on this myself.

So what we tend to say here is that this tropical current comes up through, warmings, it's the one that carries hurricanes from around Africa all the way over to us. Katrina and all these other you heard of. That gulf stream carrying warmth and goes all the way up here north of Scandinavia, and this is Norway or Iceland or Greenland, north of the Arctic Circle even and leads all of these ports of Norway here ice free throughout the year. In fact, if you wrap it back on the back side, let me see in this case show you real fast.

If I look at Europe here for just a second, hopefully Russia will show up and it does. So you have this current transporting warmth relative warmth up here through the Norwegian Sea. There's a couple of ports here like Mermax which is vital because it's ice free all throughout the year. That says something. In Arctic ocean, a good freezes up solid. This city here Her, Ark Angelish. That allows one to have access to the outside world.

Here's the deal. The subtext says what? Under Figure 3.26. The Gulf of Mexico stream called North Atlantic drift, and of course I'm taking online, I have looked in and found that's not true. So what happens here? These guys did a study and they looked at this. And so the myth is that warmth is carried up there and keeps that ice free. It's that warmth of that current. That's not troupe. This came from an American who was a captain, ocean going, and there's a lot of truth and many myths, but it isn't all true.

So this, these two guys put this study together to see what happened if, in their modeling and published this, they published this, and let's take the factor out of the gulf stream and what happens with it. Their model shows what? By taking the Gulf of Mexico stream out, nothing changed. When they looked at temperatures in England or in Europe, what's that mean? Then the Gulf of Mexico stream is not controlling this. What controls it? There's a maritime influence. Maritime means what? Ocean and sea. So the water itself, not the current necessarily, but the water itself, being close to water matters. Okay.

So if you go into the interior continents, you see those rapid rising in temperatures and rapid declines. The more continental you are, the more range you're going to have. But the closer to water, the less range you're going to have because water has a moderating effect on climate.

They also saw that the rocky mountains, now you're going, what the hell is he talking about? The Rockies are not on the map. What would it have to do with heat over here? It controlled the jet stream. The jet stream. You will see very soon it undulates the Rocky Mountains here. It undulates and dips and drops down over the planes over here which allows cold air into these areas.

And so as you, when you encounter long rays or long waves or Rosby wave, long waves in the sense of the jet streams meanders, what does it do? Pulls back up and goes into this area. What you're seeing is a lot of warmer airs can come from the tropics and enter into this area. So it's those two things and not necessarily the Gulf of Mexico stream at all. And the paper, this was their findings.

So let me address, our book is wrong and these are physical geographers. Do they know the difference? I should say well, yes. But if you're fair, how much can you get through every professional journal to look at what's going on here? This is ‑‑ of course I'm in a mooc. That's coming out of Manchester, England.

Did I tell you about Moocs? Let me address this real fast. One, as a college student, what you're going to hopefully do when you came in here to when you leave here is to be a lifelong learner. I get more joy than you can imagine that I was wrong about something. I promise you. Then all of a sudden I realize how ignorant I was.

So being a lifelong learner is an absolute joy that I have in engaging new information and questioning things I have seen and so forth. Anyway, that is a mooc. Massive online courses. You can take any course you want.

Have you heard of Kanacad? These are researchers in the field or earth science that work on anything from geology and meterology and climate tolling. This course I'm taking, they showed this paper. You take the Gulf of Mexico stream out, don't factor it in and nothing changes. It's still the same.

So other mechanisms are at work here. So showing you that, and you might say, why don't these geographers, it's hard to know all the literature and it's hard to debate. You see what their study show.

Let me show you two other popular fallacies that are out there after this question.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Page 90, yes.

>> THE STUDENT: Monsoons in India. If we're talking indirectly, indirectly you could say that they do. But you know, but I don't think that they do, because they deal with strictly, because the only reason I said indirectly, it's all corrected. That is a hard thing to wrap your mind around.

When we talk about a parcel of air, what, if you ever, that parcel, it's an envelope. So a parcel. How am I defining that parcel or air mass? When do I say it exists unto to itself. The reality, I can't. All of this stuff mixing together. Absolutely. But to try and understand that, we try to take a snapshot. Here is what this air mass, it had this much humidity. It had this temperature.

Obviously it's mixing and changing all the time. You would have to take that into account if you're doing weather forecasting or if you're forecasting for the monsoons. When you look at the heat that is built up in Asia, when you have the monsoon winds, their winds, so that has the impact, so jet stream affects that? You have two jet streams sometimes. It does.

How much? I don't know. Does it affect the lack thereof or the temperature? It's complex. I'm not teaching synoptic and that kind of weather forecasting. So I would say to you, if I think I understand your questions, am I nitpicky to delve so deeply? No.

>> THE STUDENT: I mean, what if it was synonymous with the seasonal monsoon winds?

>> THE INSTRUCTOR: I don't remember that question. I wrote it weeks ago.

>> THE STUDENT: [Off mic] because Rosby waves.

>> THE INSTRUCTOR: These are named for a Chicago meterologist if you don't know. We get a lot of names for stuff like that. The F scle. It's not the EF scale. The F scale of Theodore Fagita. We looked at Celsius and Fahrenheit. We see these names. But I try to keep it as book basic as I can. If I delve a little deeper, it's to help you understand. But I'm not nitpicky on my test.

This has an answer that you found. No? Yes? Page 90. Let me see if I got to 90. So I think his name is Glen Rosby. You seen a polar jet stream. So these meandering, what they are going to show you, let's address it. Page 91, if you look at it. I'm sorry. I don't have the graphic up here. If you look, you have the jet stream. It is going straight across the heart of North America. Page 91. Right?

So this is a hypothetical and there's blowing. A jet stream is conduit of air that's 100 to 200 miles, and it's very core, the speed. Diminishing outward but has a big influence on weather systems. Then it undulates, it's a ridge. The part that's going up into Canada is being influenced by the Rocky Mountains. Notice then it dips south with that cold air of Canada which is drier. So warm moist going into northern Canada and cold and dry coming down into the heartland midwest of the United States. Do you see that?

>> THE STUDENT: Yes.

>> THE INSTRUCTOR: So then what happens, it continues undulated and meanders much like the rivers do. Didn't I bring that up with the Mississippi River? It will cut it off.

So what will happen is you see a high pressure system in the internal part of Canada and then the low pressure system and our pressure system will bring not good weather. You will have rainfall along the cold fronts. All this is saying this somewhat directs how storms are formed, the origin. They call it cyclogenesis. That's the word. A cyclone that was berthed. The beginning of a cyclone.

That's what that low pressure creates. Rosby waves are there illustrating that. Is there anything? It's very generalized. But nonetheless you get a sense of how it transpired, right? Questions? You're looking for the summer monsoon. I'm getting ahead of myself.

Monsoon is a wind. I don't know if it says it in the book. This is an Arabic word. We have Arabic words in English. You have lots of different words brought wholesale. So it's a monsoon. It's the changing win. If you look around in the areas of the tropics, you see that the trade winds dominate there. Trade because people are sailing from one place to another with goods from point A to drop and trade at point B and back again. Guess what you can do? Six months we go to India, buy some tea and spices and be happy. Drop the gold and glass that we brought from Europe.

Then the next six months what happens? Monsoon shifts. So you turn your boat the opposite way. These are very dependable winds. When we look at climate, you see what it does for South Asia. You have high pressure, no rainfall, almost no rainfall. And then the summer monsoon, and guess what happens? It brings moisture that is wrung out over South Asia because it heads long into the Himalayas.

I will go over this again. I promise. I will go over it again so you feel more comfortable. Do you have any questions about it now since you addressed it? Part of the quiz. Okay. I will look at the quiz again to see if I asked an accurate question.

So if this one is myth or at least we have an idea better now what's driving the outcome of temperatures all the way up into Northern Scandinavia, what else do we have wrong? It's very difficult to unlearn stuff. Seriously, as you go through your college career and then live life, you trip over similar, along the line, well, hell, I thought it's not a thing. So here's a couple of very popular things.

One, that this is still published in textbooks. Your tongue, your tongue has these sensors. Here's where salty tastes. Bitter is in the back of the tongue. Sour, sweet. Have you ever encountered this? Did it look exactly or did you learn the difference?

This entered into a book not necessarily as a purpose, with purpose, duplicity. It was supposed to be a general region something or other. But it got taken as a bona fide fact. So if this is true, and I put some sugar on that part, you would not be able to taste it. That's not the way the tongue works. This gets replicated into textbooks all the time, and it's debunked the same way this has been debunked.

Anybody see this? Okay. Have you ever heard anybody say it's a colloquialism? Lime lemons to sea. What does that mean? You just follow the guy in front of you. You didn't know where you were going but everybody is going. Run! Well, this is the idea. Well, you don't ask questions. You follow the guy in front of you, and you get to where you're going. This is what this is built on. We're just a stupid species of creatures that would jump in the ocean and kill themselves.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: When I was looking for this, I was telling my daughter, I was looking, this is all video game. What the hell is this? Please tell me. I never heard of it.

>> THE STUDENT: [Off mic]

>> THE STUDENT: It started off as a certain number.

>> THE INSTRUCTOR: Uh‑huh. Flame throwing? All right.

>> THE STUDENT: The guy in front reached a certain point, he blows the hole ‑‑

>> THE INSTRUCTOR: [Indiscernible] did you have to ‑‑

>> THE STUDENT: [Off mic]. You were assigned a certain whatever to whoever to get through whatever maze you were going through. If it was leak [indiscernible] a flame thrower, so the rest of them ‑‑

>> THE INSTRUCTOR: Has anybody heard of this game? But all the screen captures were about that game. What is this? All right.

Let me address this. White will difference was a Disney film. If you read about this, they gathered these animals, took them to a place, herded them off the cliff. No kidding. Go read about it. So this stuck in popular. Disney films are all true. All the prints, that is all stuff. So this became gospel to people, but nobody thought about this.

How did that species live if they were so stupid to run off the cliff anytime? It doesn't make biological sense whatsoever. So that is kind of where this is coming from. I'm getting my pitches going on there, but any number of these things that perpetuate that we fall back on old knowledge because it's secure and comfortable like a warm old coat. But you would be better off if you threw the coat away and go with the new depiction.

Did you get rational here? The hardest part of your education is unlearning the old crap that you learned in the previous 18 years. Seriously.

Okay. I'm done with that. Questions? All right. So we get a sense of what happened here. So as you see here the North Pacific current way further are much warmer than the California current. It's all a relative thing. This is in your textbook on page 95 if you wish to see it. They give a generalized on page 69. But if you want to see the 95, you can see it. I thought I had talked with you, and I didn't clearly, about the bingual, but I talked about it, excuse me, with a different class.

So there is an aquarium here in Cape Town, a beautiful city, if you compared it to where Cape Town is where coastal what's the name of the coastal city there? Naparazo. It's the same geography settings. Same thing with coastal California here, and all of these are wine regions.

In Cape Town you get the two oceans aquarium and then here, up the bay, you go to a place called ‑‑ dad gum it. I thought I had my pictures. I have got pictures of them. They were shark diving here. So you go. It's rich feeding waters for great whites. You can touch great whites if you're foolish to. You can see them.

This is something too where you have different currents mixing with different properties. Very often you have a much wider range of biodiversity because you have a spectrum. Instead of just cold and just warm, you get all things going on. You have a very diversive habitat. Does that make sense? Okay.

So I will tell you quick then too, the sailors had to work. We mentioned the monsoon winds. The sailors had to work this, and it took them a while to figure it out. It takes a long time to sale against the big currents out of Spain or actually at Portugal. Spain was going over here. Portugal was going to here. That was in their purview. 1494. Up into Spanish and hemispheres. I wanted to get that out.

So the Portuguese are looking, and it takes them a long time. They finally get here. We're past it. That's great. Then you can catch this current going here. No, well, that's hard too. So you know, catching these currents is a hard thing. When they figure it out, let's skip around this current, let's sail around it. One guy, Cabral, he swung out so wide he ran into Brazil. Anyway, he went around it, then he could follow the currents pretty easily.

So before motorized transport and a combustion, tacking was a big thing. You know about tacking? You can sail into the wind but you have to go out. You have to zigzag your way. Is that accurate enough or do you know? You didn't have a need to say. Tacking is zigzagging through the wind. Taking you a lot longer but you don't have to row. All right.

So you see some of these different currents here. The east wind drip. Off of this stuff is about, ice flows and sheet ice. That's associated with an Arctica. Of course you have other currents here. Let's think about this for just a second, hypothetically.

You have a cold water current here dipping into a warm water current, and this is, this is how some of the deeper gyres work. So this top, the top part of the ocean is warm here, but then it circulates back around seasoned affected by a cold current that takes it down into here. So you have got an ocean gyre. I think it's in the next chapter or maybe in the chapter on oceans, but it's a big conveyer belt throughout.

These are surface. I will say this louder and more. These are surface ocean currents. But they are deep ocean currents that is the mechanism of transporting warmth throughout the ocean bases and around the world. There's another one that you can't see here that you see in a map later on. Okay?

Now think about this for a second. If you saw Al Gore's Convenient Truth. Any of you seen that? One person seen it. All right. There's a part in here where he tells about a very quick climactic shift as a possibility. The fact is, it could happen. This is fresh water, potential fresh water. These glaciers up here. It's not a glacier. It's a ice sheet. This is land‑based ice. And it's largely fresh water.

If you imagine the fresh water coming in the density of this thing, this could mechanize this, mechanism could shut off these deep ocean gyres. It's possible. Which is what they were building on back in 2014 when the day after tomorrow, is that the one? Dennis Quaid, the big everything freezing. Everybody below this area, above this area is dead. Some of you may have a southpaw reference to this one too. I don't know.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: I don't know what that is. I don't know. I don't watch it. But I had a student point that out. I had a student point that out after I mentioned it, and it had him drawing lines, a map that turned into something else. It's very perverse. Everything on South Park is profane.

So you do have this as a possibility, and you could have rapid climate shifts. I don't know what's possible with your currently changing atmosphere with carbon and methane. I don't know. I'm not a doomsdayer. Even the quickest models that they have out there, it's going to be ‑‑ before anyone would notice. It's not like Floridian. It's low in elevation. They wake up in salt water. It's not going to happen. I'm not a squash monger. In a few hundred years time, yes. That's definitely a possibility. And we're already seeing climate migrate in the world. Go ahead.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Up in the permafrost in Siberia this is where, you go back to Jurassic Park. The good thing about the author, Michael Creighton, he's a cerebral dude. I do too. He wrote one about global warming. He was not a ‑‑ in his early works he would do what your ‑‑ what was the one? The pathogen from outer space? Think Jurassic Park.

If you can take the DNA from long dead dinosaurs and put it into something else. You can go down ‑‑ is it possible? That makes for a good science fiction, yes, but it's more probable taking a mammoth or mastodon which were extinct and their nearest relative might be an elephant and drop a cloned egg that potentially you could have an elephant birth mastodon. There's talk about that in several different species up there.

Well, we cloned Dolly. In a few years, it will be a scientific scourge if you ask me, that we will clone humans. That discussion is already out there, and how ethical is this? I don't know. I mean, if it's ethics class, you probably need to take philosophy. But yes, it's so cold throughout. It doesn't take long to shut down all metabolism and it's very well preserved if it's sealed up.

That is to say, you can freeze it, but also if you keep air away from it it won't decay. It could decay. When we saw, anybody, I'm sorry. Somebody else had their hand up? I'm sorry.

When we went to Peru the year on Poto Ice Maiden a girl that was sacrificed in Inca society in Peru. Her head was smashed, and they discovered her only because her head became free of the ice. And so here's the deal. Everything that was covered by ice was perfectly preserved. There was decay on the top part of the head because the air got to it. If you take away all oxygen, decomposition, then it can be preserved forever.

So they are finding all of these, not just one. There's hundreds of these things, these ice maidens and other children and people who were sacrificed in the Inca time and even before that they found in the mountains. We got to see her. It was in, she's in cold storage. The lights are dim. You can make her out so she doesn't, she's out in the world now. So obviously she could decay, but they try to keep ‑‑ not many people, no, and you can see this woman. You have go to Herekepa. All right. Your question. Need to wrap up. Go ahead.

>> THE STUDENT: [Off mic]

>> THE INSTRUCTOR: Yeah, yeah. Shhh. Amphibian DNA. The problem with that was what? Do you remember, any of you read that book? It's an awesome book. Even some that had been determined could switch. I mean, it's like Bruce Jenner over again. That's bad. Somebody did die. I'm not a heartless SOB. But when he was in that wreck, damn women drivers. I don't mean that. I'm not sexist. It's a joke. Anyway, that's bad.

But yeah, that says something how adaptive creatures are and the absence of males, can become males. That's pretty cool. Anyway. Yeah, yeah, yeah. But I think the guy that pointed it out, of course, well, he used DNA and certain conditions. I mean, the alligators, the monitor lizards and these others, they keep a nest, and if it's too cold, they put stuff on it. If it's too hot, they monitor the temperature and keep it at a nice area.

We have 10 more minutes. Let's wrap this up. Here you're looking at directions of air temperature, so you're looking at isotherms and we're looking at January. So our hottest, the temperatures found around the equator, but more specifically where? Can you make out the underlining outline of the continents? So in the Outback we have what? You have desert. And it's what? In the Outback? It's summer. Yes. And then? South America. And the southern part of the Amazon Basin.

So rainforest largely. Here though, well, this does. Well, no. This still is the heart of, the southern area I'd say, most of the forest in this area has been removed. The Redoya state. This is Cala. The horn of Africa. But we get a sense of our highest temperatures are south of the equator because it's summer in that part of the world. Agreed? So we see colder and colder as you go. So those isotherms are showing.

I know you're looking. It's on page 72. You can get a sense of what transpires once we move into summer. Northern hemisphere. Here we are in July. Here's your driver on monsoons. In fact, they have a local name here called the harmaton. These winds change rapidly when you get summer in the Sahara. It's bigger than the United States. Easily. You can take the United States and put it in the Sahara desert and it would fit.

So when you think about this, you have got, you have got winds that will come out at a certain time. You have monsoons associated with it. This is hot air here. I mean, the heat is going up. The heat is rising. Agreed? Agreed. Then air has to come into the Sahara. Agreed? So it comes out of the ocean. This is ocean area. And then it drops along the coastline of Liberia and so forth. So they have a wet season in here.

Now at the other turn, dust storms are typical of this time. So it's much colder in the desert during the wintertime and high pressure pushes down and dust storms all along here. To all of them, so you see localized monsoon winds there.

Finally, if we look at these, pay close attention to what's on page 73. So you turned in an assignment already. Your next assignment is about drawing climographs. I believe that's what your next assignment is going to be.

So take a look at it and I will talk with you more about it. But you're going to be ‑‑ these things. One of the questions is why different temperature occur. We can see that this continues in the summertime. You see, right? Winters, it's colder. It's in the northern hemisphere.

Even though they tell, you can tell, if I didn't show you anything here at all and I just gave you a red line and said January, December, you tell me almost immediately what? You can tell that's the southern hemisphere. Right? Australia. This is Sydney, I believe. So Sydney, it's influenced by water because it's on the coast.

All right. Any questions? Let me tell you real fast that we're going to be looking at deflections of winds. So take a look at Chapter 4 real fast. Working through here and reading pages 76 and 77. Real fast next time.

Because we talked about a lot of different things today. I think I got off‑pace on that. But we will be looking at pressure differential, and then we have to draw some of these things out. Bring a little assignment so you can work on that, and we will work through some of the pressure and wind of some of the graphics here.

So bring your artist palate. You're working on maps. Drawing diagrams and stuff. And I won't be talking nearly as much as I did today. That's a promise for Thursday.

Any questions at all? Okay. Let me know if you have questions. But we will be hitting 4, Chapter 4 hard and heavy, and then you get quizzed 4 next time. Right? You're working on 3 now. It's due Thursday. I will give you 4 on Thursday. Okay. Have a good day. Goodbye.