****TPO1 Listening (Uranium-Lead Dating)****

Narrator: Listen to part of a lecture in a geology class.

Professor: Ok, let’s get started. Great. Today I want to talk about a way in which we are able to determine how old a piece of land, or some other geologic feature is - dating techniques. I’m going to talk about a particular dating technique. Why? Good dating is a key to good analysis. In other words, if you want to know how a land formation was formed, the first thing you probably want to know is how old it is. It’s fundamental.

Um… Take the Grand Canyon for instance. Now, we geologists thought we had a pretty good idea of how the Grand Canyon in the southwestern United States was formed. We knew that it was formed from sandstone that solidified somewhere between 150 and 300 million years ago. Before it solidified, it was just regular sand. Essentially, it was part of a vast desert.

And until just recently, most of us thought the sand had come from an ancient mountain range fairly close by that flattened out over time. That’s been the conventional wisdom among geologists for quite some time. But now we’ve learned something different, and quite surprising, using a technique called Uranium-Lead Dating.

I should say that Uranium-Lead Dating has been around for quite a while. But there have been some recent refinements. I will get into this in a minute. Anyway, Uranium-Lead Dating has produced some surprises. Two geologists discovered that about half of the sand from the Grand Canyon was actually once part of the Appalachian Mountains. That’s really eye-opening news, since the Appalachian Mountain Range is, of course, thousands of kilometers to the east of the Grand Canyon. Sounds pretty unbelievable, right?

Of course, the obvious question is how did that sand end up so far west? The theory is that huge rivers and wind carried the sand west where it mixed in with the sand that was already there. Well, this was a pretty revolutionary finding. Um… and it was basically because of Uranium-Lead Dating. Why?

Well, as everyone in this class should know, we usually look at the grain type within sandstone, meaning the actual particles in the sandstone, to determine where it came from. You can do other things too, like look at the wind or water that brought the grains to their location and figure out which way it was flowing. But that’s only useful up to a point, and that’s not what these two geologists did.

Uranium-Lead Dating allowed them to go about it in an entirely different way. What they did was: they looked at the grains of Zircon in the sandstone. Zircon is a material that contains radioactive Uranium, which makes it very useful for dating purposes.

Zircon starts off as molten magma, the hot lava from volcanoes. This magma then crystallizes. And when Zircon crystallizes, the Uranium inside it begins to change into Lead. So if you measure the amount of Lead in the Zircon grain, you can figure out when the grain was formed. After that, you can determine the age of Zircon from different mountain ranges.

Once you do that, you can compare the age of the Zircon in the sandstone in your sample to the age of the Zircon in the mountains. If the age of the Zircon matches the age of one of your mountain ranges, then it means the sandstone actually used to be part of that particular mountain range. Is everybody with me on that? Good. So, in this case, Uranium-Lead Dating was used to establish that half of the sandstone in the samples was formed at the same time the granite in the Appalachian Mountains was formed.

So because of this, this new way of doing Uranium-Lead Dating, we’ve been able to determine that one of our major assumptions about the Grand Canyon was wrong. Like I said before, Uranium-Lead Dating has been with us for a while. But, um… until recently, in order to do it, you really had to study many individual grains. And it took a long time before you got results. It just wasn’t very efficient. And it wasn’t very accurate.

But technical advances have cut down on the number of grains you have to study, so you get your results faster. So I’ll predict that Uranium-Lead Dating is going to become an increasingly popular dating method. There are a few pretty exciting possibilities for Uranium-Lead Dating.

Here is one that comes to mind. You know the theory that earth’s continents were once joined together and only split apart relatively recently? Well, with Uranium-Lead Dating, we could prove that more conclusively. If they show evidence of once having been joined, that could really tell us a lot about the early history of the planet’s geology.