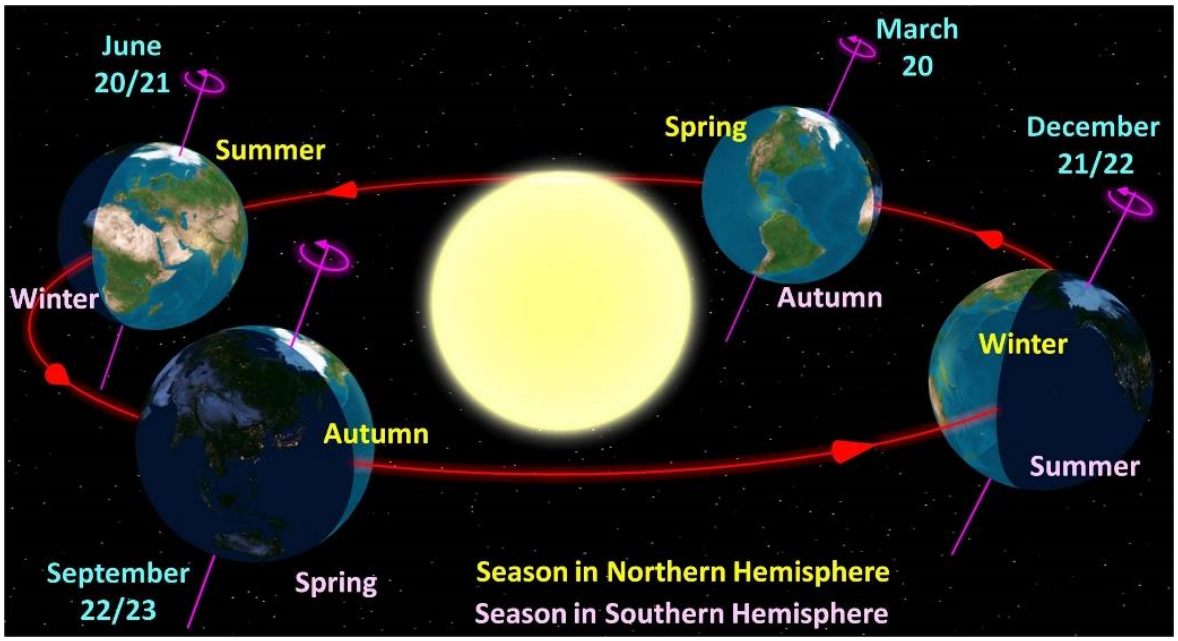
The earth tilts at an angle, is it possible that someday this angle increases and the weather changes drastically?

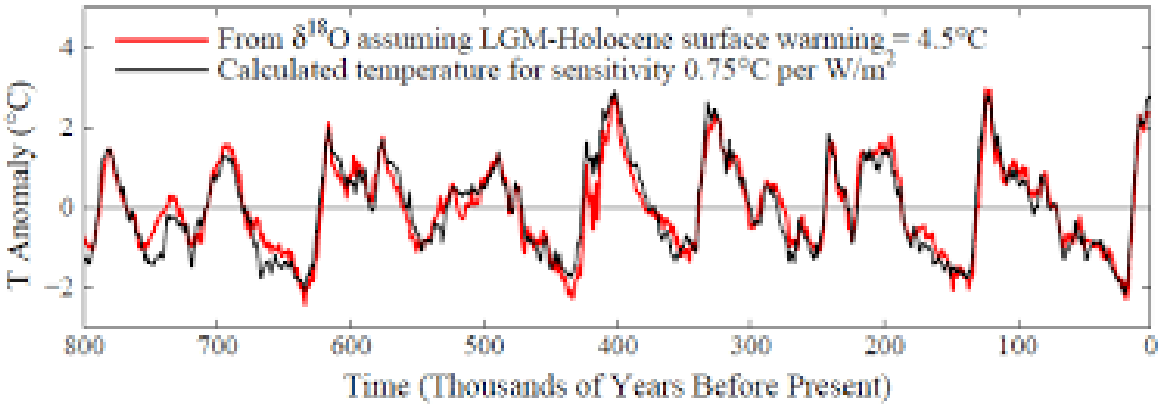
Dear Karim,

Thank you for your question. Indeed, the Earth is tilted at angle, and that angle determines the seasons, as you can nicely see on the picture below. When the northern hemisphere is



tilted toward the sun, it is summer in the south and winter in the north. As the Earth moves around, the southern hemisphere will get closer and closer to the sun, and summer will come to the south. So, the tilt of the Earth makes seasons. But that was not your question.

Can this tilt change? Yes it can! In fact, the tilt of the Earth's axis slowly changes between ~ 22.1° and 24.5°. It takes the axis ~ 41,000 to make a full cycle from 22.1° to 24.5° and back to 22.1°. As you can maybe imagine, these changes of the tilt modify the climate. When the Earth is very tilted, the difference between winter and summer is very strong. Moreover, the sun can better melt the ice at the poles in the summer. When the tilt is lower, the seasons are less extreme, milder, and ice can stay at the poles for longer. Even though these changes are small, the climate will change, because the climate system is very sensitive. Once climate is pushed in one direction – for example in the direction of making the climate colder – there are many feedbacks that push the climate more and more until the temperature changed by several degrees. In the last 800,000 years, the climate has changed from warm to



cold every 41,000 years (see plot above), and the variation of the tilt was the small change that was enough to push the climate in that direction. Now that humans are producing so much CO_2, we are pushing in the direction of warming, and we may actually change the natural pattern that occurs with the changes in the tilt of the Earth.