Ancient rocks hold climate forecast

Charlie Riedel / AP

Burning fossil fuels such as coal has helped push up atmospheric CO2 to levels not seen for nearly 30 million years.

By John Roach

What will the planet's climate be like by the end of this century? The answer may lie in really, really old rocks, according to a new report that urges a coordinated research effort to study them.

Scientists have already pieced together a comprehensive record of Earth's changing climate from studies of rocks and ice that stretches back about 2 million years. The problem is that the amount of carbon dioxide already pumped into the atmosphere is 25 to 30 percent higher than at any point in that record.

"If we continue to emit CO2 into the atmosphere and don't do something about abating those emissions, by the end of this century we are looking to be where we were 35 million years ago," Isabel Montañez, a geologist at the University of California at Davis, told me.

To understand what that amount of the greenhouse gas in the atmosphere will do to the global climate in the future, scientists are keen to study what it did to it in the deep past. Existing studies already paint a worrisome picture, noted Montañez, who chaired the team behind the National Research Council's new report.

"Those past times of higher CO2 were much warmer … and there were processes operating that don't operate in our current climate. And they lead to amplified change, accelerated warming, changes in ice sheets, things like that," she said.

For example, a massive burst of volcanic eruptions about 55 million years ago filled the atmosphere with carbon dioxide and pushed global temperatures higher. This, in turn, warmed the oceans, which released massive amounts of methane, another greenhouse gas, into the atmosphere. The methane release, in turn, accelerated the warming. The event triggered an extinction event known as the Paleocene-Eocene Thermal Maximum. Scientists view this period as a good analog to what could happen today.

Montañez and colleagues want to study this and other transitions between "icehouse" and "greenhouse" states at various sites around the world to gain a deeper understanding of these transitions in the climate. They can do this by studying cores of rock and dirt.

These sediment cores are full of shells, minerals and plants that scientists can correlate to levels of carbon dioxide and temperature.

"These are all proxies [and] the technology that allows us to define these proxies has been revolutionized in the last decade in terms of its ability to do that and to actually read time in old sediments and rocks," Montañez said.

In the distant future, scientists may look at rocks and sediment from today to better understand the transition to what geologists are starting to call the Anthropocene, or the age of man. They'll be looking for similar things.

"If you go to the end of the Anthropocene, maybe 80,000 years from now, it would look just like many of those intervals in the past," she said. "The difference is, it is just a snippet in geologic time. But for those of us living in it now, is is much more than just a snippet."