Cornell, like most of our peer institutions, is trying to determine how best to reduce or eliminate our carbon footprint over the coming decades. As many are finding, this is a non-trivial challenge in cloudy, snowy upstate New York. The biggest question, because it is the single biggest part of Cornell’s energy portfolio, is how to heat the campus. One approach being studied by the university is the possibility of using deep geothermal heat. Geothermal resources are too modest for conventional electricity generation in the eastern United States, but may be sufficient to provide low grade thermal energy for district heating. Beyond that general description of the resource and its usage, there are numerous technical options to be tested. A geothermal well field could target either moderate temperature sedimentary rocks, or higher temperature rocks in the metamorphic basement where the technology needed would be enhanced (or engineered) geothermal (EGS). The university has taken to calling this potential resource “earth source heat” (ESH) in homage to Cornell’s once risky, but now highly successful “lake source cooling” whereby cold bottom waters from Cayuga Lake are used to cool the campus in the summer.

EAS earth scientists are actively helping Cornell begin to explore this option. Professor Terry Jordan led a team of graduate students and several collaborators on a recently completed study of geothermal resources in the Appalachian basin for the Department of Energy. Their group has shown that temperatures near the base of the sedimentary section in the Ithaca area are likely to be about 80–90°C. Professor Katie Keranen is likewise helping to advise the university on the potential hazard of induced seismicity, and Professors Larry Brown and Rick Allmendinger along with the others are designing and helping to advise on the preparation phase studies. One happy coincidence of this effort is renewed contact with Rick’s former Ph.D. student, Trenton Cladouhos, who is now vice president for research at AltaRock geothermal.

Is such a geothermal energy extraction project feasible? That big question cannot be answered without a range of studies, for which EAS earth scientists will be at the center. For example, what is the composition and foliation in the basement? What fracture systems exist and how will fluids change the state of stress on those fractures? What is the best way to image the subsurface and, eventually, fluids in the subsurface? Answering these questions will enable a lot of interesting scientific research that will be of value even if ESH turns out not to be feasible. And, if Cornell is actually successful in implementing ESH, it will be transformational.

Written and submitted by Terry Jordan and Rick Allmendinger.