

FROM SEA TO SHINING SEA: LOOKING AHEAD WITH THE NATIONAL PARK SERVICE
MOODY'S MEGA MATH CHALLENGE 2017

In recent years, the National Park Service (NPS) has tallied more than 300 million annual visits to the sites that make up its national park system - 417 "units" covering more than 84 million acres. These sites range from well-known national parks like Yellowstone and the Grand Canyon, to smaller historic designations like the Theodore Roosevelt Birthplace in New York City. Despite being in an era of accelerated technological and digital advancement, America loves to visit its national parks, as evidenced by a 17% increase in NPS site visits over the last 20 years.

During the last weekend of February 2017, more than 5,100 students from the Digital Generation used their technological expertise in SIAM's Math Modeling Challenge, an online math modeling competition in which teams were required to make recommendations about the future of the ever-important U.S. national parks to the NPS, the federal bureau within the Department of the Interior responsible for managing, protecting, and maintaining all units within the National Park System. Per the NPS, in working with SIAM to develop the problem, global change factors such as climate are likely to affect park resources and visitor experience in coming years and, thus, its mission is to preserve the natural and cultural resources and values of the system.

More than 1,100 teams of 11th and 12th grade students from throughout the U.S. spent 14 hours during the intensive Challenge weekend gathering and evaluating data on the changing landscape of our nation's parks and investigating the effects of all climate-related events on coastal park sites. First charged with building a mathematical model to determine sea level change risk for five specific parks for the next 10, 20, and 50 years, participants were then tasked with assigning a single climate vulnerability score to any NPS coastal unit. Finally, students used this information to create a new model that predicts long-term changes in visitors for each park, and advised NPS on prioritization of where future financial resources should go.

Submitted solutions underwent three rigorous stages of judging. Students from **Adlai E. Stevenson High School** (Team # 8597) in Lincolnshire, Illinois, (teacher-coach: Paul Kim; students: Joshua Yoon, Haoyang Yu, Andrew Hwang, Deepak Moparthi, Albert Cao) were awarded top honors – and top dollar – in late April 2017, when their team was named "Champs" at the twelfth annual Moody's Mega Math (M³) Challenge. They received \$20,000 in scholarships for presenting the *best* answer to the question.

"It would be absolutely wonderful to see ideas from Challenge teams become part of the NPS discussion," says Dr. Neil R. Nicholson, Associate Professor of Mathematics at North Central College, and 2017 Challenge problem author. "To take ideas from eager, interested high school problem solvers and make meaningful real-world changes to existing systems? That's just cool."

Organized by the Society for Industrial and Applied Mathematics (SIAM), the Math Modeling Challenge gives high school students the opportunity to answer broad questions by applying mathematics and quantifying the related variables, and encourages them to study and pursue careers in science and math. For most participants, the Challenge provides a fun and unique opportunity to work collaboratively on a problem they had likely never considered before. It has ignited a future academic or career interest for some, while reinforcing that interest for many.

Since its inception in 2005, SIAM's Math Modeling Challenge has drawn the participation of more than 37,000 students, 4,000 high schools, 5,000 teachers and 400 Ph.D.-level judges, and has awarded more than \$1.2 million in scholarships.

On July 17, 2017, SIAM announced that it is "seeking a new title sponsor for the Math Modeling Challenge, the nation's most prestigious national high school mathematical modeling competition," and that "the new sponsor will assume title sponsorship of this premier competition immediately." The only math competition of its kind, the Challenge was sponsored by The Moody's Foundation for the past 12 years.

You can read the coverage in Forbes about SIAM's campaign to find a new sponsor.

At the time of this writing (August 8, 2017), the sponsor search is still ON. Visit here to learn more about the search. SIAM is asking readers to share information about this sponsorship with their contacts.

The following is the Champion team's paper from the 2017 Moody's Mega Math Challenge **with some reviewer suggestions incorporated**.

Complete information about the Math Modeling Challenge is available at <http://m3challenge.siam.org>.