2021 Mathematical Contest in Modeling®
Press Release—April 23, 2021

COMAP is pleased to announce the results of the 37th annual Mathematical Contest in Modeling (MCM). This year, 10,053 teams representing institutions from fifteen countries/regions participated in the contest. Seventeen teams from the following institutions were designated as OUTSTANDING WINNERS:

Shanghai Jiao Tong University, China (3)
(2100454 SIAM Award & COMAP Scholarship Award)
Beijing Institute of Technology, China (Ben Fusaro Award)
Nanjing University of Posts & Telecommunications, China
(Frank Giordano Award & SIAM Award)
Jiangnan University, China
Xi'an Jiaotong University, China (AMS Award)
Xidian University, Shannxi, China
Beijing Jiaotong University, China (ASA Award)
University of Colorado Boulder, CO, USA
(MAA Award, SIAM Award & COMAP Scholarship Award)
University of Oxford, United Kingdom
(INFORMS Award & AMS Award)
Chongqing University, China
National University of Defense Technology, China
Central South University, China (INFORMS Award)
University of Electronic Science and Technology of China, China
(AMS Award)
Soochow University, China
Hohai University, China

This year's contest ran over a single weekend from Thursday, February 4 to Monday, February 8, 2021. During that time, teams of three students researched, modeled, and wrote a solution to an open-ended real world modeling problem. The 2021 MCM was an online contest, where teams registered and obtained contest materials through COMAP's MCM Website.

The 2021 MCM problems represented a variety of challenging problems spanning the familiar to new. Each problem required teams to apply unique mathematical modeling skills to answer the questions posed. All three problems were created by the MCM Problem Committee, a unique blend of academicians and industry professionals with many years of mathematical modeling experience. Teams again had to be at the top of their game to excel.

The A problem asked teams to model and analyze the relationship of traits of fungi with the rate of decomposition of plant material and woody fibers. Using results of a broader research study, this problem focused on two specific traits of fungi, growth rate and moisture tolerance, in asking teams to address several questions. How do different fungi interact and decompose ground litter in different environments? How is decomposition impacted over time as conditions vary? How do environmental changes impact the long-term dynamics of decomposition? Additionally, teams predicted relative advantages and disadvantages for fungi species and combinations of species like to persist is various environments.

The B problem used the scenario of the 2019-2020 fire season in Australia, which saw devastating wildfires in every state, to consider the use of drones in firefighting. Teams learned of the capabilities of two types of drones, surveillance and situational awareness drones and hovering drones that can carry repeaters (to extend radio range), and then created a model to determine the optimal numbers and mix of these two types of drones. Teams addressed adaptation of their model to the changing likelihood of extreme fire events over the next decade, as well as to equipment cost increases. Teams also developed a model to optimize locations of hovering drones for fires of differing sizes on differing terrain.

The C problem investigated the discovery and sightings of Vespa mandarina (also known as the Asian giant hornet) in the State of Washington. After providing some background information and a significant amount of data, teams addressed several questions. How can we interpret the data provided by the public reports? What strategies can we use to prioritize these public reports for additional investigation given limited resources? As most reported sightings of the Vespa madarina are erroneous, teams developed a model to predict the likelihood of a mistaken classification. Teams then used their model to prioritize the investigation of reports most likely to be positive sightings. Additionally, teams addressed possible updates to their model over time and indicators of eradication.

A selection from the Outstanding solution papers will be featured in *The UMAP Journal,* along with commentaries from the problem authors and judges. All 10,053 of the competing teams are to be congratulated for their excellent work and enthusiasm for mathematical modeling and interdisciplinary problem solving.

2021 MCM Statistics

- **10053 Teams Participated**
- **4487 Problem A (45%)**
- **3105 Problem B (31%)**
- **2461 Problem C (24%)**
- **17 Outstanding Winners (<1%)**
- **284 Finalist Winners (2%)**
- **697 Meritorious Winners (7%)**
- **2414 Honorable Mentions (24%)**
- **6400 Successful Participants (64%)**
- **26 Unsuccessful Participants (<1%)**
- **204 Disqualified (2%)**
- **11 Not Judged (<1%)**

To obtain additional information about the MCM and to obtain a complete listing of all team designations, please visit the MCM Website at: www.mcmcontest.com, or contact COMAP at: mcm@comap.com.

Major funding for the MCM is provided by COMAP. Additional support is provided by the Institute for Operations Research and the Management Sciences (INFORMS) and Two Sigma Investments. COMAP's Mathematical Contest in Modeling and Interdisciplinay Contest in Modeling are unique among modeling competitions in that they are the only international contests in which students work in teams to find a solution. Centering its educational philosophy on mathematical modeling, COMAP uses mathematical tools to explore real-world problems. It serves the educational community as well as the world of work by preparing students to become better informed—and prepared—citizens, consumers, and workers.

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