



Open Innovation For Health and Air Quality

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WHY PRIZE COMPETITIONS?

“discover and demonstrate innovative and practical uses of Earth observations”

SOLICITING SOLUTIONS FROM THE CROWD

Engage non-traditional audiences to help advance our scientific knowledge and impacts by:

- Focusing on basic, critical problems to solve to help achieve desired outcomes
- Openly sharing challenges and resources to invite out-of-discipline expertise
- Co-developing and refining solutions with users



PROJECT HIGHLIGHT: NASA AIRATHON

- Challenge developed with Abbey Nastan (JPL, MAIA), Aaron Naeger (MSFC, TEMPO); collaboration from EPA, Department of State; Vendor: DrivenData, HeroX
- Goal: Generate daily estimates of surface-level PM2.5 and NO2 for a set of 5km x 5km geometries across Los Angeles, Delhi, Taipei
- Media Coverage: 14 articles including Aviation Week and Air Quality News; 165 press release pickups; estimated reach: 254 million
- 1,250+ submissions; 1,000+ participants from 123 countries
- Winners from 4 continents – only one with expertise in air quality
 - Winning models were tree-based and made ~2-16 fold increases in accuracy over benchmark models for PM2.5 and NO2 respectively
 - Low computational cost and memory requirements of the winning solutions = models can be implemented on most computing environments and provide air quality information in a timely manner to the public
 - Participant challenges included missing data from reflective surfaces, clouds; large file sizes; reliability of data sources (GFS data down at various times)



<https://appliedsciences.nasa.gov/our-impact/news/nasa-airathon-air-quality-challenge-winners-announced>

Participant Highlight:

“This was an interesting challenge for me as I didn't know anything about how to process satellite imagery, or have a background in air quality nor atmospheric science. I had to read a lot of articles about the topic to finally understand what I was doing. And thanks to the challenge, I am more confident of my skills.”

TICK TICK BLOOM: HARMFUL ALGAL BLOOM DETECTION CHALLENGE

Duration: December 12, 2022 – February 17, 2023 | Budget: \$100,000 + \$100,000

Data science contest designed with and for the users

- Dataset generated using ground-based measurements from 18 state and local organizations
- Competition structure customized for desired outputs (algorithm that performs across US, model report to learn from participants' processes and challenges)
- Resource allocation to transition from static code to regularly generated estimates

Place	Prize Amount
1st	\$12,000
2nd	\$9,000
3rd	\$6,000
Bonus prize	
1st	\$2,000
2nd	\$1,000



UNITED STATES CENSUS REGIONS AND DIVISIONS



Image source: Mappr

$$\text{Final score} = \frac{\text{West RMSE} + \text{Midwest RMSE} + \text{South RMSE} + \text{Northeast RMSE}}{4}$$



- Optimizing for:
- Efficient use of resources
 - Robustness, configurability
 - Integration into existing workflows

Bridging the implementation gap between algorithm code and ability to estimate severity of cyanobacteria at given longitude and latitude points in water bodies



NASA EARTH SCIENCE IN ACTION COMIC STRIP CONTEST

Duration: July 2 – August 31, 2022 | Budget: \$50,000

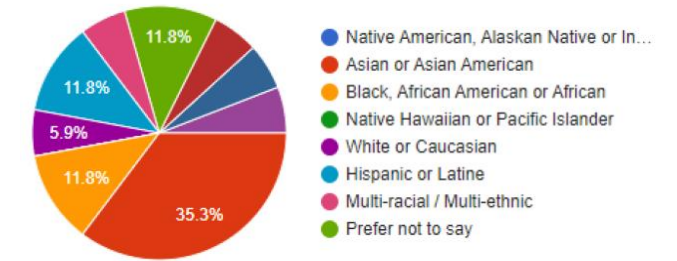
Contest launch livestreamed from 2022 Smithsonian Folklife Festival, 693 views

96 eligible submissions from artists in 14 countries (most in USA and India)

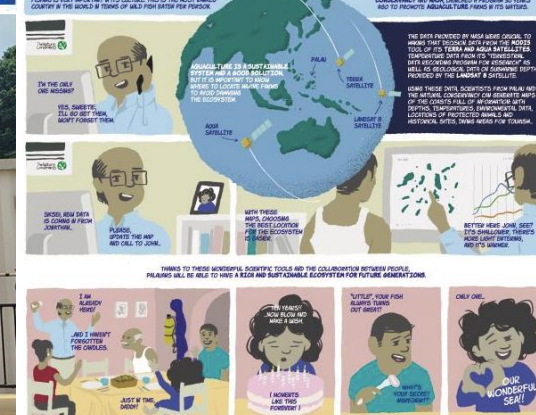
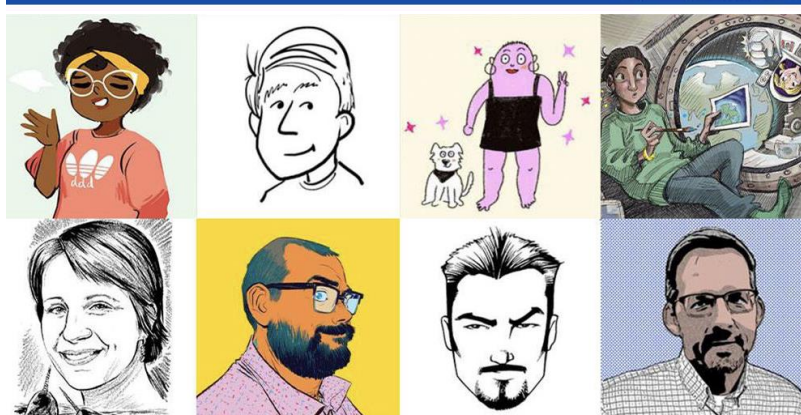
Winners from Canada, Spain, Guatemala, USA, UK, Colombia, India, Pakistan

Dedicated DEIA efforts including outreach in Spanish, and to Art Programs at MSIs

Participant Survey (18% response)



70% participants identifying as female



COLLABORATING FOR SUCCESSFUL COMPETITIONS

Project Formulation

Stakeholders identify critical problem, solution requirements, and constraints based on end user priorities



Platform and Vendor Selection


Create Request for and evaluate proposals to select project contractor



Prize or Challenge Execution

Contractor leads kickoff and project formulation discussions




Develop focused problem statements, submission evaluation criteria



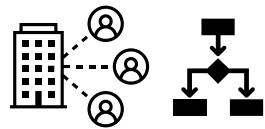
Support outreach e.g., informational webinars, Q&A during competition




Evaluate submissions and select winners

Solution Transition

Share solutions with stakeholders and support transition into implementation into decision-making workflows



Sharing Outcomes

Share methods, results, lessons learned with relevant communities at meetings and through publications



WHAT DO YOU NEED?

- ENTHUSIASTIC PROJECT CHAMPIONS TO LEAD WORK
- “PROBLEM” EXPERTS INCLUDING END USERS AND OTHER KEY STAKEHOLDERS
- RESOURCES AND/OR PARTNERS TO SUPPORT PROJECT

THANK YOU

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<https://appliedsciences.nasa.gov/>



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