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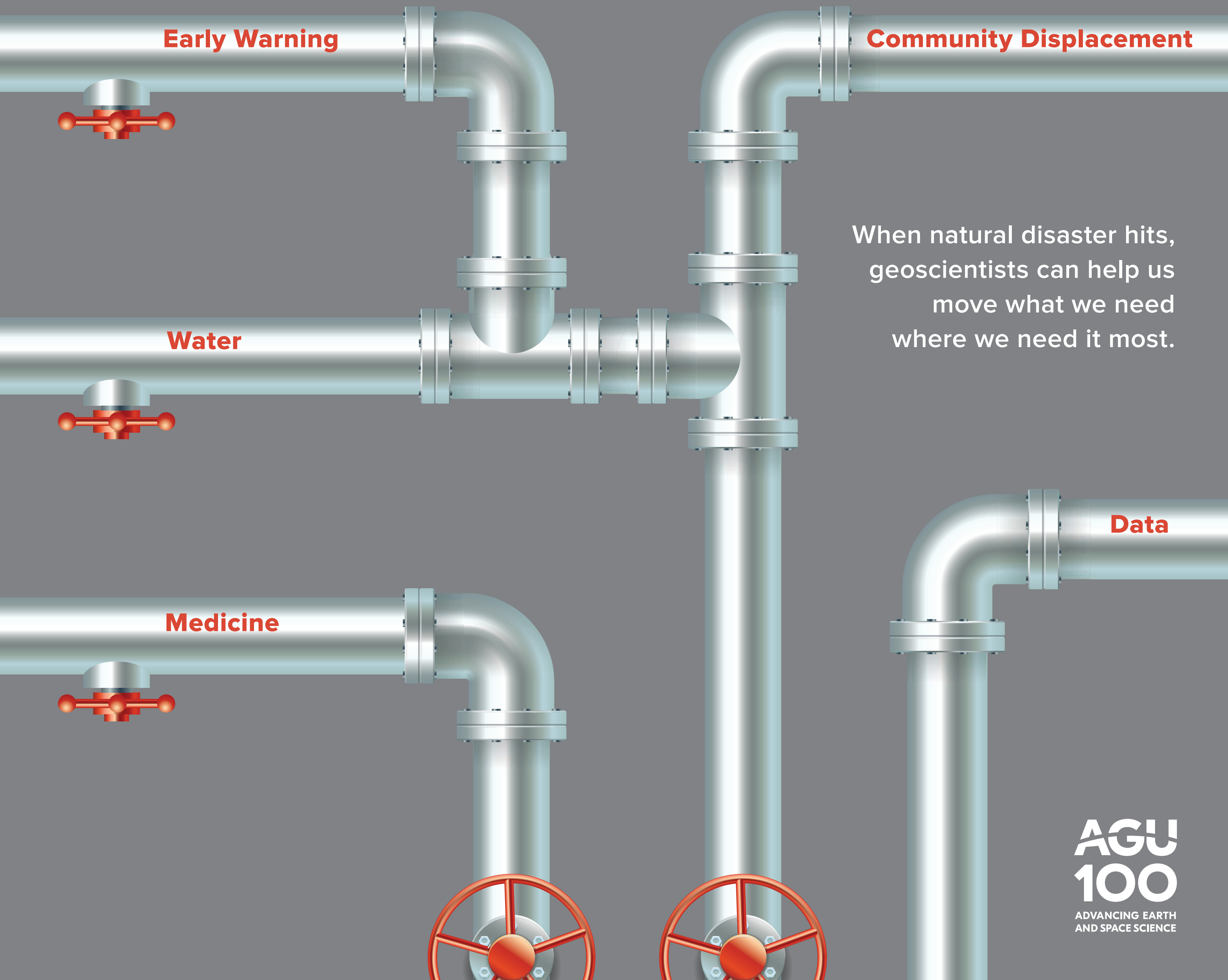
Earth & Space Science News

100 YEARS

GeoHealth is the Pipeline

When natural disaster hits, geoscientists can help us move what we need where we need it most.



AGU 100
ADVANCING EARTH AND SPACE SCIENCE

deployment," Price and her colleagues write in the study.

"For any large data compilation such as this" covering "global-scale patterns over multiple decades," researchers often encounter "issues of variance due to patterns being potentially confounded in time, space, methodologies, etc., but this is such a large data set and the patterns [are] clear enough that I find the documentation both convincing and useful," Hay wrote.

In addition, "the variance that is inevitable in such studies makes it more likely that real patterns will be missed rather than false patterns found," he noted.

Are Corals Finding Climate Refuge?

Though the tropical and worldwide declines in corals still outweigh the boost in subtropical recruitment, these results provide a "glimmer of hope," Price said. The numbers suggest that some corals "may find refuge" in the face of rising temperatures and other oceanic conditions ill suited to their survival, she noted.

Still, the long-term effects of relocation on corals are unknown. Differences in environmental factors in the subtropics, such as light availability and seasonal temperature variations, could affect coral populations, Price said. Researchers also don't know how interactions with other organisms, especially kelp, will play out.

Both kelp and reef-building corals behave as ecosystem engineers, constructing three-dimensional structures that serve as homes for other living organisms, Price noted. Only time will tell whether their habitation of the same space will lead to competition or some form of coexistence.

Another possibility? The climate crisis might also drive kelp species to migrate, Price said.

By **Rachel Crowell** (@writesRCrowell), Science Journalist

ARTIFICIAL INTELLIGENCE CAN SPOT PLANKTON FROM SPACE

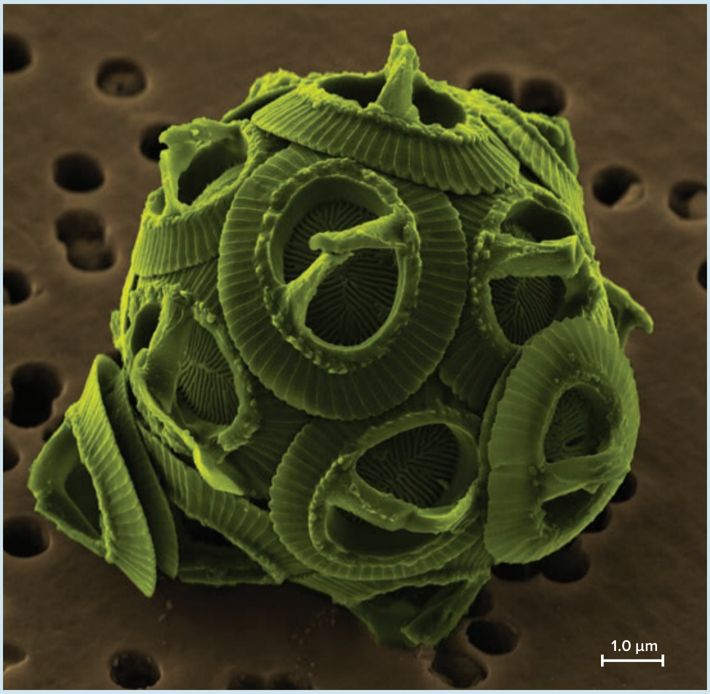
Scientists mimicked the neural networks of the brain to map phytoplankton types in the Mediterranean Sea. A study published in the *Journal of Geophysical Research: Oceans* presented a new method of classifying phytoplankton that relies on artificial intelligence clustering (bit.ly/satellite-plankton).

Phytoplankton blanket surface waters of the world's oceans, and pigments in their cells absorb certain wavelengths of light, like the chlorophyll that gives plants their green color. Viewed from space, the color of the ocean's surface changes depending on the phytoplankton growing there. In the Mediterranean Sea, where the latest study focused its efforts, an array of phytoplankton species bloom throughout the year.

Past research has mined satellite images of ocean color in the Mediterranean for common pigments found in phytoplankton. A combination of pigments can reveal a certain type of dominant phytoplankton in the area, like certain species of diatoms that can be spotted because of their unique orange pigment, fucoxanthin. But connecting the complex relationships between satellite image pixels, pigments, and phytoplankton types can make for a tricky analysis.

The latest study turns to artificial intelligence to parse the multidimensional data. The process mimics the brain's ability to take in new information and learn over time, giving the algorithm a chance to identify relationships in the data that may not be readily apparent. The algorithms cluster similar nodes of information near one another, creating a two-dimensional diagram called a self-organized map. The scientists trained two algorithms used in the study with 3 million pixels from satellite images and over a thousand measurements taken by boat in the Mediterranean.

The results show six types of phytoplankton and how they come and go by season. In winter, haptophytes and chlorophytes (both algae) are common in the western Mediterranean. In the summer months, the most abundant photosynthetic organism on Earth, the cyanobacteria *Prochlorococcus,* rules broad swaths of the sea. The new method revealed how the blooms changed over time, giving the scientists a way to ask questions about marine food chains and possible effects of climate change in the future.



This species of phytoplankton, Gephyrocapsa oceanica, *(seen here in a scanning electron microscopic image) grows in the Mediterranean Sea. Credit: NEON ja/Richard Bartz, CC BY-SA 2.5 (bit.ly/ccbysa2-5)*

The scientists called the new method "very general" in their paper and said that it could be applied elsewhere in the world's oceans.

By **Jenessa Duncombe** (@jrdscience), News Writing and Production Fellow