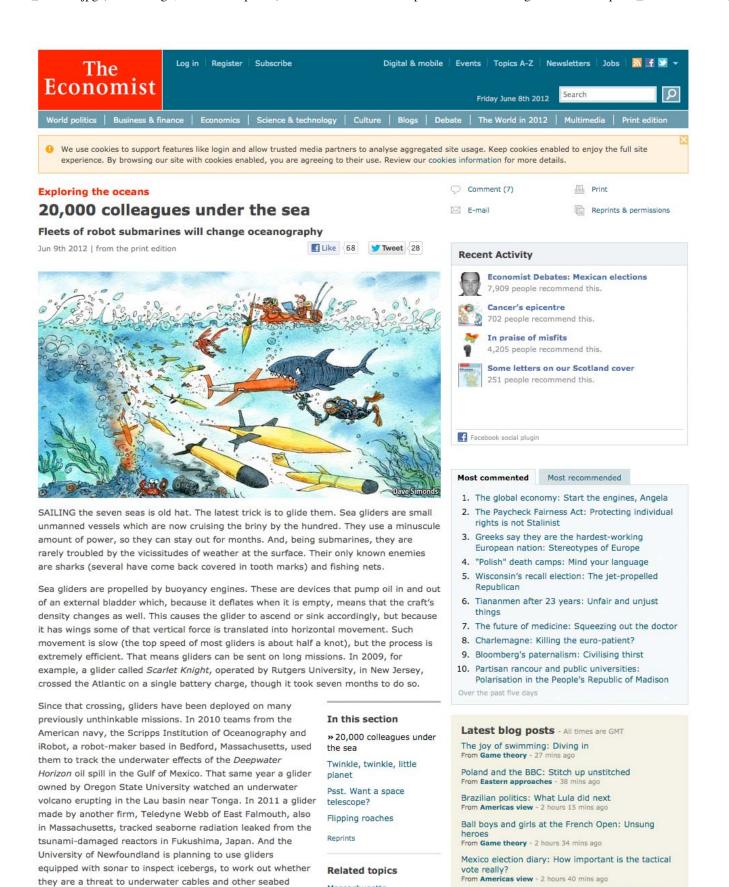
infrastructure.

Skinning under the ocean

Tension in the South China Sea: Trouble ahead?

From Analects - 2 hours 52 mins



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Ten years ago there were fewer than 30 gliders in the world, all built either by academic institutions or the armed forces. Now there are at least 400, and most are made by one of three firms: iRobot, whose product is called, simply, Seaglider; Teledyne Webb, which manufactures the Slocum Glider (named after Joshua Slocum, the first man to sail solo around the world); and Bluefin Robotics (the third member of the Massachusetts sea-glider cluster, based in Quincy), which sells the Spray Glider. Broadly speaking, these machines have three sorts of application: scientific, military and commercial.

At the moment, science rules the roost. For cash-strapped oceanographers, gliders are a blessing. Their running costs are negligible and, though buying one can cost as much as \$150,000, that sum would purchase a mere three days of, say, a manned trip to the Southern Ocean.

Gliders, moreover, give a continuous view of what is going on, rather than the series of snapshots yielded by equipment lowered from a vessel at the surface. Besides tracking pollution, watching volcanoes and measuring icebergs, they are following fish around, monitoring changing temperatures in different layers of seawater and mapping the abundance of algae. The Ice Dragon, a modified Seaglider operated by the Virginia Institute of Marine Science, has explored under the Antarctic ice shelf, and another modified Seaglider, the Deepglider, can plumb the depths down to 6km (20,000 feet). Teledyne Webb's Storm Glider, meanwhile, lurks in hurricane-prone areas, bobbing up to take readings during extreme weather.

Gliders are also quiet—so quiet that, as one researcher puts it, you can use them "to hear a fish fart". This was demonstrated by a recent project run by the University of South Florida, in which a glider successfully mapped the locations of red grouper and toadfish populations on the West Florida Shelf from the noises the fish made.

Military applications are growing, too. America's navy, for example, has ordered 150 gliders from Teledyne Webb's sister company, Teledyne Brown, for what it calls its Littoral Battlespace Sensing-Glider programme. To start with, these gliders will be used individually, to measure underwater conditions that affect things like sonar. Eventually, the plan is to link them into a network that moves around in a co-ordinated manner.

Gliders are also ideal for gathering intelligence. Having no propellers and no engine noise, they are difficult to detect. They can be delivered by submarine, and can lurk unseen for as long as is necessary. Any shipping, whether on the surface or under it, which passes near a glider can be detected, identified and pinpointed without it realising it has been spotted. Indeed, the American navy is now evaluating a design called the Waveglider, made by Liquid Robotics of Sunnyvale, California, for submarine-detection work.

The third use, commerce, seems, at the moment, to be the smallest—though that may be because the companies involved are keeping quiet about what they are doing. But Joe Dyer, the chief strategy officer at iRobot, thinks oil-and-gas exploration will be a big market for the firm's gliders, because they can survey large areas of seabed in detail at low cost.

ACSA, a French glider firm, has a similar market in mind. In March it launched the SeaExplorer, a streamlined, wingless glider with a speed of one knot—twice as fast as the American competition. According to Patrice Pla, ACSA's marketing manager, SeaExplorer's lack of wings reduces the chance of its getting tangled in nets. Its payload bay, meanwhile, is designed to take interchangeable modules so that it can hold whatever equipment is required. That means customers do not have to buy different gliders for different applications.

A glide path to discovery

Nor is ACSA the only non-American in the field. A glider called Sea Wing, for example, has been developed at the Shenyang Institute of Automation, in China, by Yuan Dongliang of the country's Institute of Oceanography. It was tested last year and operated successfully in the western Pacific at depths of up to 800 metres. Meanwhile, at Tianjin University, a team of glider researchers is trying to improve the machines' endurance. They are testing fuel cells instead of batteries and are also working on the idea of powering them with a thermal engine that draws its energy from the differences in temperature between seawater at different depths.

Japanese researchers, too, are building gliders. At Osaka University, Masakazu Arima is involved in several glider projects. One is a small, low-cost version called ALEX that has

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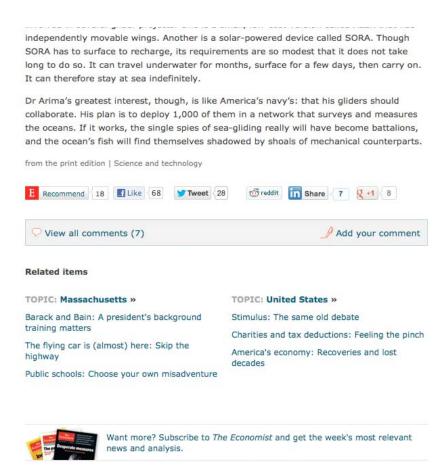
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