

EARTH MEASUREMENTS:
Learn microcontrollers and environmental science together.

Recommended for ages 16+

Earth Measurements text

PARALLAX

Earth MEASUREMENTS

temperature probe

water pump

plant not included

BASIC Stamp II on the Board of Education

"Nearly everything we need a microcontroller to do can be done with the BASIC Stamp II."

Prof. Don Zimmerman, California State University, Long Beach

Topics such as El Nino, stream water level, light for plant production and temperature of a greenhouse are the kinds of scientific projects that motivate the use of microcontrollers in environmental science.

Learning to measure the earth's parameters is easy with the Parallax BASIC Stamp. Programs are written in BASIC and downloaded using an ordinary PC. The BASIC language has versatile input/output instructions.

With Earth Measurements you will build a light and temperature data logger with a closed-loop water pump system. The BASIC Stamp controls this project and collects the data in an EEPROM for future retrieval. Electronic circuits are shown in pictorial and schematic format. Need help or advice? Our educational support group is available by phone or e-mail (stampsinclass@parallaxinc.com) for no charge.

• Earth Measurements Full Kit #28131 - \$169 (BASIC Stamp II, Board of Education, & all the parts you need to build the Earth Measurements projects.)

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Biology

When sharks just open wide and say yum

Basking sharks may not be living on the knife-edge of starvation after all.

Watching sharks and modeling their energy use has convinced David W. Sims of the University of Aberdeen in Scotland that the animals get by quite well with less than half the prey density that researchers believed sharks need. In the July 22 PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON B, Sims releases more results of an ongoing project that's challenging 40 years' thinking about sharks.

Basking sharks feed by stretching open their jaws and barrel through clouds of little water creatures such as copepods.



A basking shark's life may not be so tough after all.

However, Sims found that basking sharks in the English Channel routinely dined until food patches thinned out to 0.5 to 0.6 g/m³. Those numbers agree with conclusions from a feeding model that Sims updated to include such factors as modern measurements of shark metabolism and swimming.

The numbers undermine the old theory that skimpy prey

Bristle-like rakers near the sharks' gills filter out the good stuff. The method may yield a decent dinner, but it's hardly an efficient way to swim. Old calculations suggested that the sharks need a food density of at least 1.4 grams per cubic meter (g/m³).

drives the sharks into hibernation, Sims says. He doubts that they hibernate at all. —S.M.

Skunk cabbage has on-off heat switch

New measurements show that the skunk cabbage bloom has a thermostat that turns flower-power heat on and off depending on air temperature.

In North American woodlands, the eastern skunk cabbage's hollow, brown, teardrop-shape blooms poke out of the ground in winter and can give off enough heat to melt snow. The spike of tiny flowers inside each cavity heats up to between 16° and 24°C, report Roger S. Seymour and Amy J. Blaylock of the University of Adelaide in Australia.

They hitched monitoring devices to Canadian skunk cabbage blooms and discovered that when temperatures dropped too low, the plants gave up. Below 3°C, many of the blooms' heaters shut down, but they switched on again when the air warmed up.

A relative of the skunk cabbage, the dragon lily, also turns on built-in heaters in its blooms. Seymour and Paul Schultze-Motel, also at Adelaide, monitored these flowers in hopes of figuring out how heat benefits the plant.

One heater is a long black spike that emerges from the flower and releases a putrid odor to lure pollinating insects. The other warms a flower chamber that traps insects overnight. The plant keeps the chamber around 20°C, which is up to 12°C above the air temperature, enabling insects to stay active during their captivity.

The researchers presented both reports at the 16th International Botanical Congress in St. Louis. The skunk cabbage results will be published in the JOURNAL OF EXPERIMENTAL BOTANY. —S.M.