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Down to the depths: a killer whale in the wild has just been tagged with a CATS camera, which will automatically detach from its skin in 72 hours.

GONE DIVING

The German Alps, of all places, was where two future marine biologists grew up. Crossing paths for the first time as adults in Australia, Dr. Peter Kraft and Dr. Nikolai Liebsch bonded over surfing, research, and CATS—one of the world's most innovative companies in the field of animal tracking.

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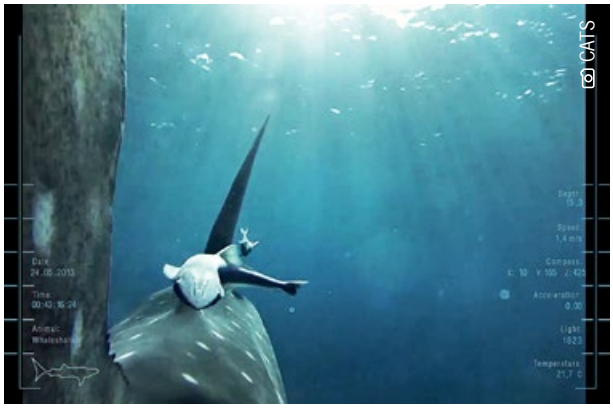
Big Al sends his five-meter frame and 1,400 kilograms of body mass hurtling up toward a seal. Just before reaching the surface, he stops short. What looked like prey proves to be a large piece of seaweed. The entire sequence is captured in outstanding quality by an HD camera attached to his dorsal fin. Big Al is a great white shark. Whether he wants to or not, he also "works" for CATS—a company that actually sends him diving.

The background, in brief: Peter Kraft was working as a marine biologist at the University of Queensland when he got a call from his sister in Germany. Would he like to meet her supervisor's son, also a marine biologist, who would soon be going to Australia? Kraft said yes. He and Nikolai Liebsch quickly realized they shared a passion for surfboards, technology, animal welfare, and the relevant research. And sharks held a particular fascination for them. Since their student days, they had known that fish can only be tracked for short distances, if at all. There was a great need for long-term data on movement patterns, hunting behavior, resting and eating periods, body temperatures, and other crucial parameters of animal behavior. Biologists the world over were eager to overcome this deficit. Ever more frequently the two scientists were asking themselves, "What if we knew...?"

Customized Animal Tracking Solutions, or CATS for short, was born in 2012. Kraft and Liebsch left their jobs in academia and dedicated themselves to developing cameras, transmitters, and the associated software. The shapes, sizes, and weights of the equipment had to be perfectly adapted to a wide range of aquatic animals including turtles, sharks, and whales. And the attachment systems had to be designed so as not to constrain the animals' natural movements. Their efforts have produced unique images and unprecedented data. "Our biggest development challenges had to do with the battery capacities and the data transmission systems," says Kraft. Sensors were the key to the solution. They only activate the cameras when the animals make conspicuous movements. When they hunt for prey, for example. "We have incredible coverage of a sperm whale killing a giant squid at a depth of 600 meters," he exclaims. The systems not only record images and sound, but also gather data on light conditions, pressure, and acceleration. A compass and a gyroscope (a spinning instrument that measures rotational acceleration) provide information about animal rotation, position, and direction. Some of the data are transmitted via the GSM networks used for cell phones.

The solution for retrieving the valuable pieces of equipment is brilliant. A timed mechanism releases the camera automatically from the killer whale after a maximum of 72 hours, a propulsion system brings it up to the surface, and a signal shows its location for pick-up. However, researchers do have to calculate for the loss of these 6,000-euro high-tech units. "If the camera detaches when the animal is below a layer of ice, we'll never see it again. The same is true for bad weather, which also makes retrieval impossible," admits Kraft. These are costs that many institutes cannot afford. But producers of nature films on the BBC or Discovery Channel are now purchasing CATS equipment more often.



A 9-meter whale shark with an 80-centimeter remora. The camera captures front and rear views simultaneously, and the image shows all the data at a glance.

Individual and flexible shapes, sizes, and weights mean that equipment from CATS can be used in nearly all the elements. It works in water, on land, and in the air. The range of potential applications is virtually unlimited. The two experts are currently developing special recording technology to document the hunting behavior of alligators and large birds of prey. Two more exciting areas of exploration. ←

A member of the Max Planck Institute for Ornithology accompanies a trained greylag goose. It carries a 40-gram flight diary from CATS, which measures all relevant flight details up to 800 times a second.