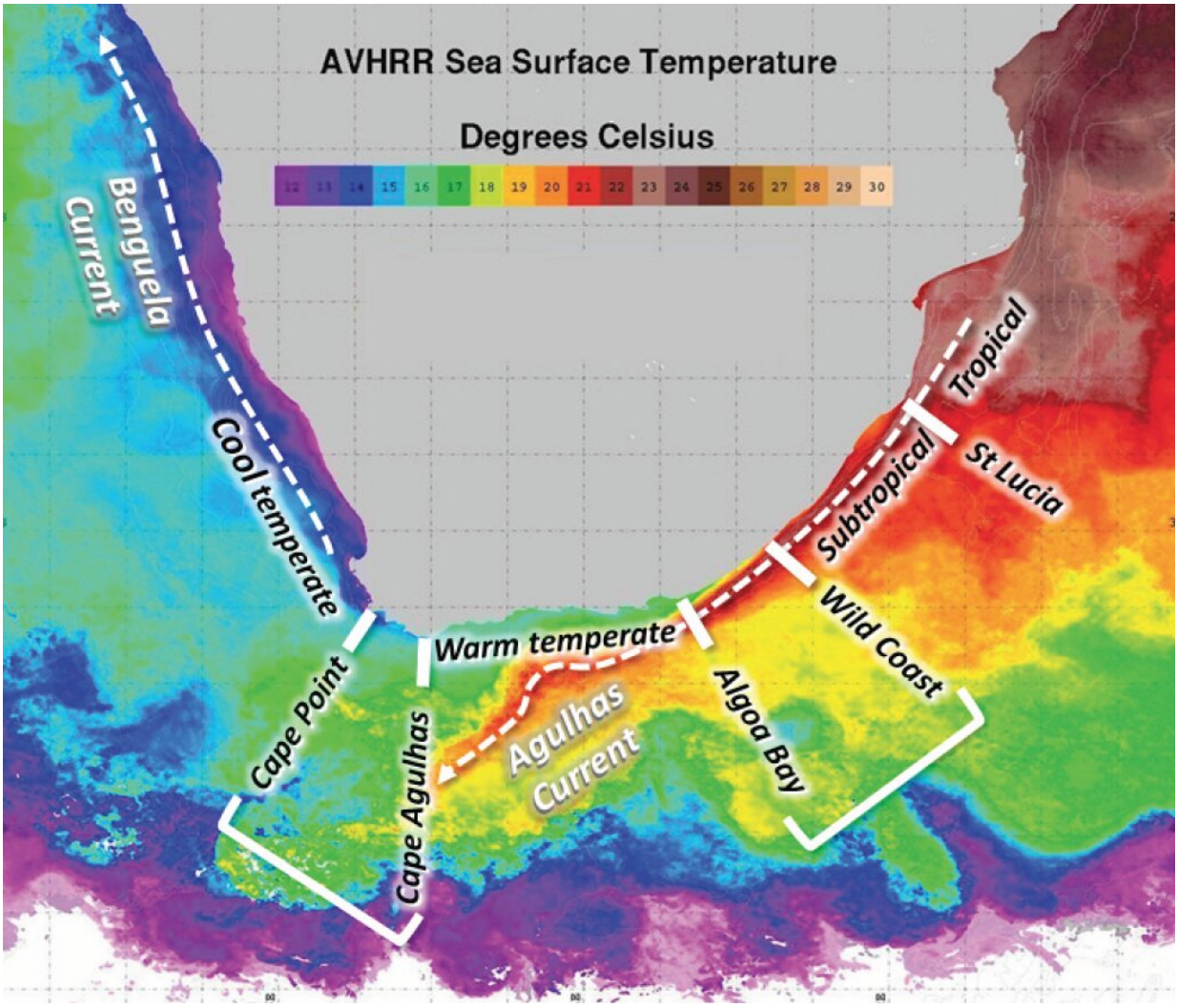
Differences in water temperature can create new marine species

February 5 2019



Marine currents along the Southern African coastline. Credit: Marine Research Institute, University of Cape Town

Warm and cool water temperatures over a long stretch of coastline cause new species of marine fish to evolve without being isolated from similar types of fish nearby, according to a new international study.

The findings challenge the long held belief that new marine species can only evolve in isolated environments and provides a glimpse into the early stages of species formation in the sea.

The research also suggests that currents with different temperatures, which are known to influence the distribution of species in the sea, might also drive the evolution of new species.

A research team from South Africa and Australia, led by Professor Peter Teske from the University of Johannesburg and Professor Luciano Beheregaray from Flinders University, used information from DNA to test how regional populations of a coastal species of goby are influenced by currents with different temperatures.

This goby is found along the South African coastline which is divided into temperature-defined regions, including cool-temperate, warm-temperate, subtropical and tropical.

The team discovered that while the goby's regional populations are similar, they showed differences only in the genes impacted by water temperature.

"Each regional goby population is already adapted to its preferred thermal habitat, and migrants that disperse into nearby regions that are too warm or too cold will not do as well as the locals," says Professor Teske.

Knysna sand goby found near South African Coast. Credit: Guido Zsilavecz

In contrast, the remainder of the genes show no identifiable differences yet.

"Over time, the remainder of the genome will "catch up" with the temperature-selected genes, and even later, the new species will also change morphologically. Only then will they be recognisable without the help of genetic methods."

The results have important implications for the management of threatened or exploited species, and fish stocks around the world.

"When several very young species that already cannot live in each others' habitats are all treated as a single species, this can result in the over

fishing of locally adapted stocks, or the extinction of a rare species that has been mistaken for its more abundant neighbour", says Flinders University Professor Beheregaray.

The work has been published in the scientific journal *Proceedings of the Royal Society B* and also includes marine scientists from Stellenbosch University and Dr. Jonathan Sandoval-Castillo from Flinders University.

More information: Thermal selection as a driver of marine ecological speciation, *Proceedings of the Royal Society B*, rspb.royalsocietypublishing.or … .1098/rspb.2018.2023

Provided by Flinders University