

# Seafarers can help track effects of climate change



Seafarers are being encouraged to take part in a unique global study, using a mobile phone app to record the effects of climate change.

The marine phytoplankton account for approximately 50% of all photosynthesis on Earth and, through the plankton food web that they support, they both underpin the marine food chain and play a central role in the global carbon cycle strongly influencing the Earth's climate.

Living at the surface of the sea the phytoplankton are particularly sensitive to changes in sea surface temperature. A recent study of global phytoplankton abundance over the last century concluded that global phytoplankton concentrations have declined due to rising sea surface temperatures as a consequence of current climate change.

We need to know much more about these changes and you can help by making a simple piece of scientific equipment called a Secchi Disk and using the Secchi App. The public science project will measure the amount of phytoplankton, minute organisms at the very start of the marine food chain, currently residing in the world's oceans. Scientists fear the population of the microscopic beings is in decline due to rising sea temperatures and, if true, that could have consequences for every aspect of marine life. The project is being spearheaded by Plymouth University's Marine Institute, which hopes to build a map of the oceans that charts the seasonal and annual changes of phytoplankton from now and into the future.

Plankton biologist Dr Richard Kirby, who is leading the study, said: "As the phytoplankton live at the surface of the sea they are being affected by rising sea temperatures due to climate change. A scientific paper published last year suggested the ocean's plankton population had declined by as much as 40 per cent since 1950 as sea temperatures had warmed due to climate change. The scientists suggested that a warming of the ocean surface may have reduced vertical mixing of the water column thereby reducing the supply of nutrients from deeper waters – in effect the input of fertiliser to the surface had lessened with effects upon phytoplankton growth. Their results provoked debate among marine scientists however, some who thought they saw no change, or even an increase in phytoplankton in some places. Since the phytoplankton begin the marine food chain, we need to know more about if, how, and why they are changing in order to understand the effects on the ocean's biology."

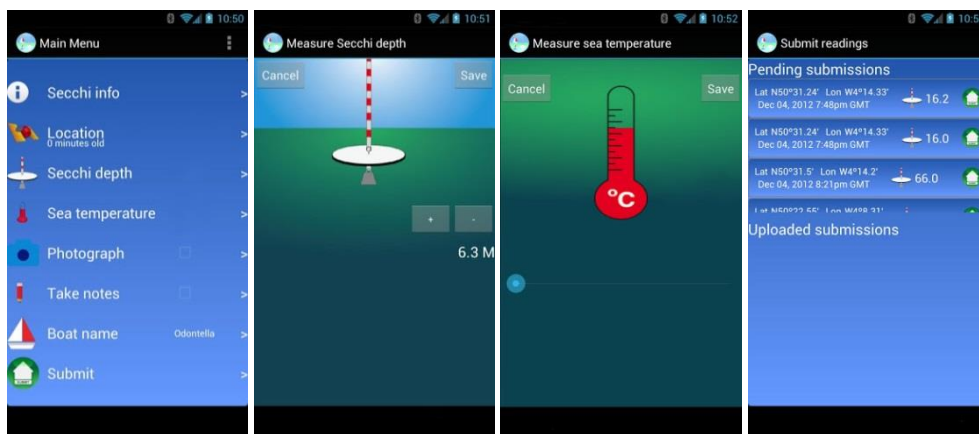
To check the levels of phytoplankton in our oceans, marine experts have developed a free smart phone app for sailors and fishermen to use wherever they are in the world. Because the phytoplankton – each thinner than a strand of human hair – exist at the sea's surface, mariners can carry out a simple experiment using an easy to make 'Secchi Disk'.



Attached to a measuring tape, the Secchi Disk is lowered over the side of a boat and the depth at which it disappears from sight estimates the amount of phytoplankton in the sea. This depth can then be uploaded to a database using the Secchi app.

Dr Kirby added: "The Secchi Disks are still used by marine scientists to study phytoplankton but there are too few scientists to survey the world's oceans as well as we would wish. This app enables seafarers around the world to take part in a science project and if we can just get a small percentage of the global population of sailors involved, we can generate a database that will help us understand how life in the oceans is changing. It would help us learn much more about these important organisms at a crucial time when their habitat is altering due to climate change."

The Secchi app has been developed by Dr Nicholas Outram and Dr Nigel Barlow, from Plymouth University's School of Computing and Mathematics, and the database will be maintained by Pixalytics Ltd, a company founded by Dr Sam Lavender, an Honorary Reader at the University.



A major design consideration of the apps is that they have to be able to operate in places where the phone has no Internet connection. Participants record as many Secchi readings as they like, and these are stored as "pending readings" on the phone. Exactly how many pending readings can be stored depends on the capabilities of the phone, but the number is very large. These pending readings can be uploaded at a later date when an Internet connection is available.

In addition, the app has an easy to follow workflow to minimise errors. The participant's location is taken from the phone's GPS, eliminating transcription errors. The user interface has been designed to be clean, intuitive and uncluttered, and in particular to be a UI that works on a boat at sea. Small

and fussy layouts are not used, and the “depth disk” uses a logarithmic scale to enable shallow depths to be entered quickly and accurately.

The free app is called Secchi after Father Pietro Angelo Secchi, an astronomer who invented the disk device in 1865 to measure water turbidity in the Mediterranean. You can find out more about the project at [www.secchidisk.org](http://www.secchidisk.org).

