



Apogee Application Note:

MiniFCM: Marine Applications

Lakes and oceans contain a mixture of cells in suspension so flow cytometry can be used to investigate the type and quantity of cells. However, for use on board an ocean vessel, a tough machine is required. The MiniFCM's military background has proven an excellent foundation from which the stable and reliable commercial models have developed. Conventional flow cytometers do not withstand the vibration and movement on board a ship.

Aquatic single cell organisms range in size from about 0.2 μ m to >100 μ m in concentrations up to about 10⁷ per ml, and include viruses, bacteria, cyanobacteria (algae), autotrophic phytoplankton (unicellular plants), and heterotrophic zooplankton (unicellular animals).

Phytoplankton are highly autofluorescent due to the natural presence of phycoerythrin, chlorophyll or allophycocyanin. This autofluorescence may vary widely depending on environment or metabolic state, but can be exploited to distinguish between types of cell. In addition, a nucleic acid stain can be used to discriminate cells from background debris.

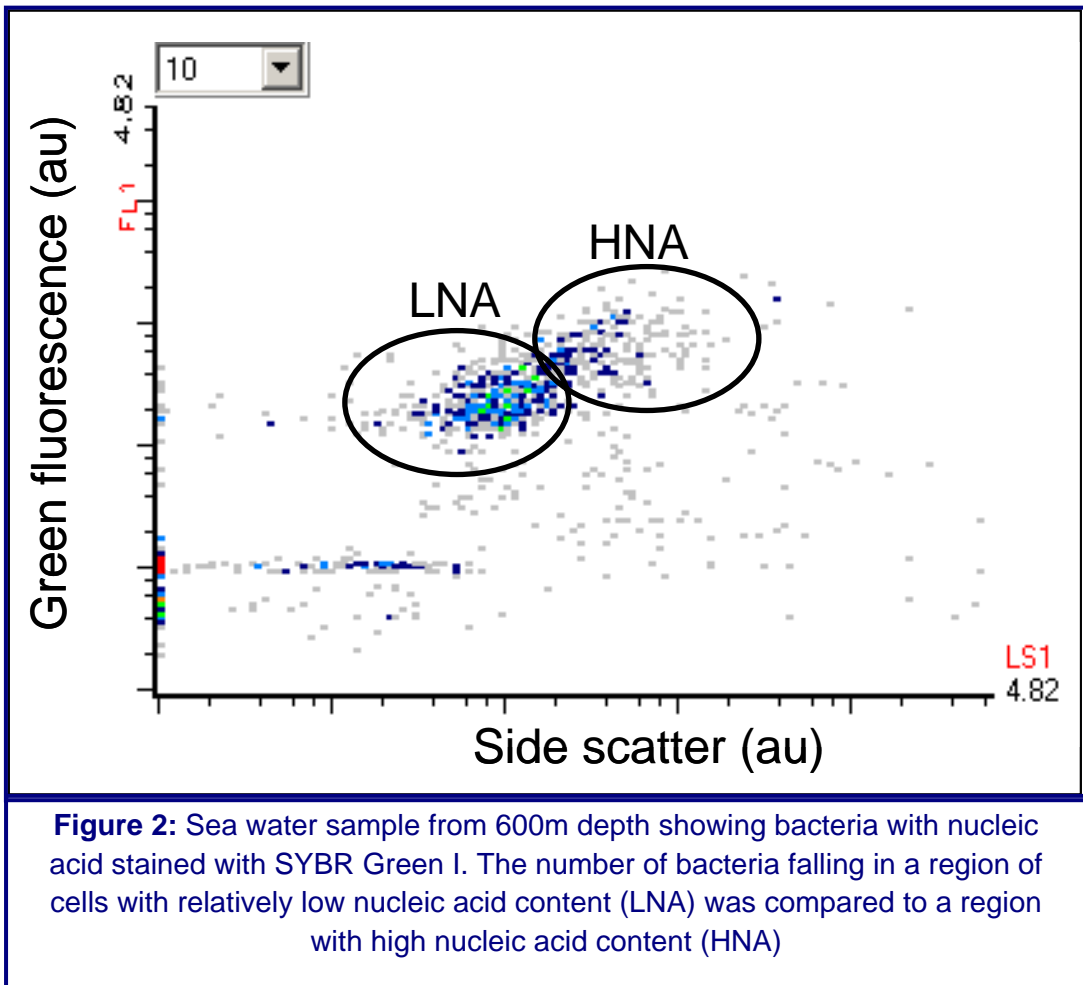
Small cells in the aquatic environment require a high sensitivity A40 or A50-MiniFCM to effectively detect them by flow cytometry – other flow cytometers simply do not have the light scatter sensitivity or resolution.



Figure 1: POTES-Mer Cruise – A study of the effects of hydrostatic pressure on marine prokaryotes

(Data & photograph provided by Dr G. Gregory, Université de la Méditerranée, Marseille)

For example, we can consider data collected on a cruise to a site in the north-west Mediterranean Sea (figures 1, 2 & 3).



Populations of bacteria, well separated from noise, can be counted and variations in their size or DNA content measured.

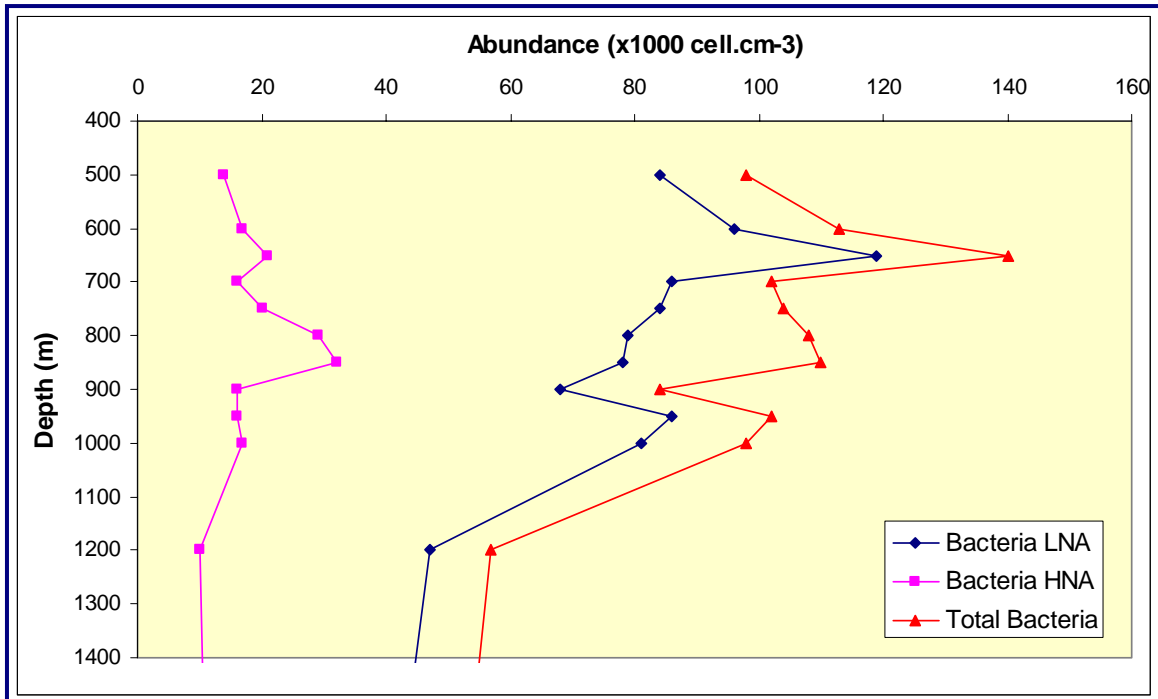


Figure 3: Bacterial abundance along a water column in the North-Western Mediterranean Sea. The number of bacteria falling in a region of cells with relatively low nucleic acid content (LNA) was compared to a region with high nucleic acid content (HNA)

In summary, Apogee manufactures a range of flow cytometer models to meet different requirements. For routine work with mammalian cells or plant nuclei, our A40-Universal model with standard sensitivity (comparable to flow cytometers from the market leader) is ideal. Other users will find applications where only the high sensitivity A40-Microbiology gives the quality data they need.