DEVELOPMENT OF *ON-SITE* BIOREMEDIATION STRATEGIES FOR THE CLEAN-UP OF HYDROCARBON-CONTAMINATED SOILS IN COLD REGIONS. EXPERIENCIES IN POTTER PENINSULA, SOUTH SHETALNDS ISLANDS, ANTARCTICA

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The use of crude oil and its derivatives as energy source resulted in contamination events all around the world. As a consequence, water, soil and sediments were affected. Cold regions are not an exception. This problem arouses special concern in Antarctica, where ecosystems are protected by international agreement and legislation. There, oil-derivated fuels are use for the generation of electrical power, heating and vehicles. For these reasons, large amounts of these fuels are transported, stored and manipulated in Antarctica. All these operations imply a high risk of large contamination events and, at the same time, may produce chronic small contamination problems.

Biological systems seem to be adequate tools for the clean-up of soils, due to it low-cost and environmental friendship. However, because of being biological processes, they are strongly conditioned by physical factors such as temperature. For this reason, bioremediation tools for cold regions must be specifically developed.

During Antarctic summer air temperature can rise above 0°C, allowing biological activity. In sunny days, soil temperature climbs up to values around 15°C, providing excellent conditions for the activity of psychrotolerant microorganisms. During the last 20 years, the Microbiology group belonging to the Instituto Antártico Argentino has carried-out experiments aiming to the development of soil bioremediation strategies to be applied in Argentinean stations, especially in Carlini station and Potter peninsula, where ASPA132 (Antarctic Specially Protected Area) is placed.

Results showed that significant hydrocarbon removal from Antarctic soils is possible using on-site bioremediation, avoiding the expensive transport of the soil out of Antarctica to be treated. According to the situation, biostimulation, bioaugmentation and the use of surfactants can be appropriate strategies for the biologic removal of hydrocarbons from contaminated soils. Regarding to bioaugmentation, our work was focused in the use of a bacterial consortium (instead of strains or associations) showing degrading activity at low temperature. The consortium showed to be composed mainly by members of the *Pseudomonadaceae* family, which are k strategist and for this reason they tend to develop when large amounts of substrate are present, a desired characteristic to clean-up a contaminated soil.

Nowadays, a sequential bioremediation process (biostimulation followed by bioaugmentation) is under development.