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Oiled Penguins In South Atlantic: Source Identification of an Unknown Remote Spill Using Fingerprinting Techniques by GC-MS

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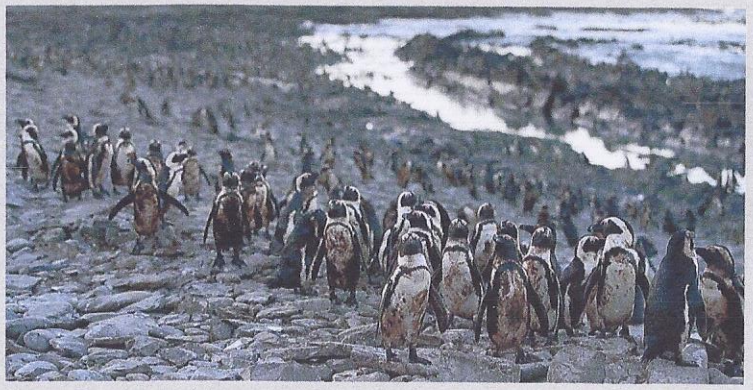


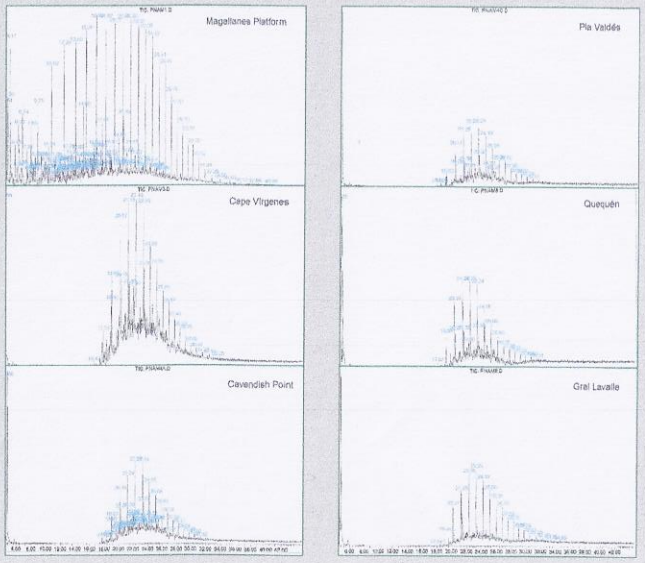
INTRODUCTION

Background Petroleum pollution is a problem for seabirds along the Southwest Atlantic coast. Penguins migrate between Argentina and Brazil in the Atlantic Ocean on routes that can overlap with heavy maritime traffic and petroleum development. Magellanic (*Spheniscus magellanicus*) and Rockhopper (*Eudyptes chrysocome*) penguins are the most affected by oil pollution.

Objective This work was conducted to determine the liability for the release of an unknown petroleum product into the coasts. Petroleum of an offshore platform was analyzed as suspected source of the spill and different petroleum products were used as comparison profiles against oiled penguin feathers.

⟶ Samples of oiled feathers were collected alongshore from Beagle Channel to Gral Lavalle district (distance 2000km).

CHROMATOGRAPHY



SAMPLE ANALYSIS AND RESULTS

	n-Alcanes	Pr/Pt	C_{17}/Pr	C_{18}/Pt
Magallanes Platform	C_7 -C_{35}	2,17	3,42	7,02
Penguins Cape Vírgenes	C_{15} -C_{29}	1,20	1,95	2,92
Penguins Río Gallegos	C_{15} -C_{29}	1,16	1,79	2,81
Penguins Cavendish Point	C_{15} –C_{29}	1,15	1,67	2,95
A – Penguins Local Sound	C_{15} –C_{29}	1,02	1,83	2,59
B – Penguins Station Point	C_{15} –C_{29}	1,02	2,00	2,65
Penguins Pla Valdés	C_{15} -C_{29}	0,95	1,86	2,54
Penguins Quequén	C_{15} -C_{29}	0,87	1,53	2,23
Penguins Gral Lavalle	C_{15} -C_{29}	1,09	1,69	1,81

The aliphatic series ratio (pristane/phytane) is one of the most useful parameters it is independent of biodegradation for a very long period after the spillage.

CONCLUSIONS

- The spilled oil was weathered significally since its release to the environment evidenced by low ratio values of the resolved peaks to the total GC area.
- The reference material collected from the pumping station shows significantly different chemical composition and has no relation to the spilled oil that affected the penguins.
- The feather samples show nearly identical chromatographic behaviour among them, discarding complex hydrocarbon mixtures allocated to multiple sources.
- The method described is a flexible, tiered analytical approach that facilitate the unambigously identification sources of oil release to the environment. Nevertheless new legislation combined with effective enforcement could reduce petroleum pollution.