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# Geostatistical modelling of the long-term (historical) spatial distribution and abundance of the deep sea shrimp *Heterocarpus reedi* off Central - Southern Chile

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## Résumé

Three of the most studied benthic crustacean marine resources off Central – Southern Chile (25° - 37°S) are the red squat lobster *Pleuroncodes monodon*, the yellow squat lobster *Cervimunida johni* and the deep sea shrimp *Heterocarpus reedi*, which are subject of a multispecies bottom trawl fishery over the continental shelf and its upper slope. *H. reedi* is an endemic pandalid shrimp of the Chilean demersal community, and historically was the first species of this community harvested since the 1950's in this area. The objective here is to estimate the abundance of *H. reedi* over the upper continental slope (200 – 500 m) based on a dedicated research survey series at sea. The data are density of *H. reedi* (kg m<sup>-2</sup>) at trawled stations, for 13 years since 2001. *H. reedi* habitats are related to bottom depth, with the maximum abundance centered on the 380 m isobath. The continental shelf is narrow in the longitude dimension and the inter-sample distance is coarse in comparison to the spatial gradients of bottom depth. Thus for mapping *H. reedi* distribution, controlling the geometry is key. For that, the following strategy was used. First, presence/absence of *H. reedi* was kriged using the data from all years and including the relationship with bottom depth as external drift. This provided an average map of the habitats, valid in any given year. Then in each year, the habitat variable was used as a covariate and the *H. reedi* abundance was co-kriged to ensure that its mapping was guided by the habitat. Estimates of abundance were derived with their precision. Results were compared with ordinary kriging to evaluate the interest in incorporating habitat geometry in the mapping as well as with the traditional method in use in Chile for direct assessment surveys. Results confirmed the importance of considering bottom depth when modelling the spatial distribution and abundance of *H. reedi* off Chile.

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