Comment

Exposure to seismic survey alters blue whale acoustic communication

In a recently published paper, Di Iorio & Clark (2010) investigate the relationship between the calling behaviour of blue whales (*Balaenoptera musculus*) and a seismic reflection survey conducted in the St Lawrence Estuary (Canada). The seismic survey was carried out jointly by the Geological Survey of Canada and by the Institut National de la Recherche Scientifique—Eau-Terre-Environnement. The purpose of the survey was to document the thickness and facies architecture of the Quaternary sedimentary succession by using a low-energy sparker source for generating sound waves.

In their study, Di Iorio & Clark recorded sounds in the water column using five Marine Acoustic Recording Units (MARUs). During the course of the data acquisition, the noise in the water column varied with time and the authors stated that seismic pulses were either: (i) clearly recorded on all the MARUs (their 'seismic' day), (ii) not recorded (their 'no-seismic' day), or (iii) detectable on only some MARU units (their 'yes/no' days in the supplementary data). With this classification in hand, the methodology used in the paper is straightforward and is based on a comparison of whale call rates during periods (either days, hours or 10 minutes intervals) with and without seismic operation.

We argue that the definition of a 'seismic period' is not accurate enough and thus that the relationship between seismic activity and calling behaviour is not clearly demonstrated nor is it as strongly supported as they claim. This scientific rebuttal of their thesis is based on the following facts: (i) seismic pulses have

been detected on some MARU units during the survey 'Day 11' which puts in doubt on what sounds have been really recorded as during this day, the survey vessel was not in operation and docked at the Quebec City harbour some 200 km upstream of the MARU units deployment site, (ii) Classification of 'Day 8' as a no-seismic day is also highly surprising, given the fact that seismic data was acquired closer to the recording area than 'Day 4' (a seismic day), (iii) Contrary to the authors' opinion, the noise associated with cargo-boats and whale-watching cruise vessels are not regularly present and significant daily variations exist, (iv) the comparison of the calling activity during adjacent 1 h seismic and 1 h no-seismic blocks (fig. 2c, Di Iorio & Clark 2010) leads to a somewhat misleading black and white classification that does not correspond to the real progressive decrease in seismic sounds during a continuous survey.

As noted by the authors, there is limited knowledge on the acoustic responses of baleen whales to seismic sounds. These responses may vary depending on several parameters, including the seismic source used during the survey (sparker source being obsolete for modern hydrocarbon exploration; Sherriff & Geldart 1995), the physiographic setting of the area (seismic signal being more complex if significant sound reflections occur against steep escarpments) and the ambient human-generated noise (busy traffic corridors versus more open seas). A detailed knowledge of the location of the vessel during the seismic survey is obviously a prerequisite for investigating all these parameters in future studies.

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