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Characterisation of PCE to *trans*-DCE dechlorinating bacterial populations in Wadden Sea sediments by RNA-based stable isotope probing

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Perchloroethene (PCE) is known as a persistent contaminant in aquifers, soils, and sediments that can be reductively dechlorinated by anaerobically halorespiring microorganisms. Naturally, PCE is produced in small amounts by certain marine algae. However, diversity and distribution of halorespiring microorganisms especially in marine habitats is still largely unexplored. Here, we identified PCE-respiring populations by RNA-based stable isotope probing (SIP), a technique that allows to directly link structure and function of yet uncultivated microbial populations.

Tidal flat sediments, Dangast, Germany, were incubated with PCE at low aqueous concentration at 20˚C. Dehalogenation of PCE to trichloroethene was detected after 3 weeks, and further transformation to 85% *trans*- and 15% *cis*-dichloroethene (830 nmol and 140 nmol day^{-1} incubation^{-1}, respectively) occurred after 4 weeks of preincubation. The microbial community was probed with ^{13}C-labelled acetate (0.5 mM) as electron donor and carbon source. „Heavy“ ^{13}C-rRNA and „light“ ^{12}C-rRNA were separated by isopycnic centrifugation, and Bacteria-related populations in gradient fractions were characterised by T-RFLP analysis. In heavy gradient fractions of the microcosm with PCE, we detected two prominent terminal restriction fragments (T-RFs) of 143 and 513 bp. Cloning and sequencing of heavy RNA revealed the predominance of two different populations: a population, 98% related to the isolated *trans*-DCE producing marine bacterium *Dehalobium chlorocoercia* (T-RF 143 bp) and a population showing only 92% sequence identity to known halorespiring *Dehalococcoides* spp. (T-RF 513 bp). We suggest that these highly abundant populations were involved in the formation of DCE at high *trans*:*cis* ratio of 6:1 in our PCE-dechlorinating micro-

cosms.