Start of review
The manuscript "Cold-water corals and hydrocarbon-rich seepage in the Pompeia Province (Gulf of Cádiz) — living on the edge" by Rincón-Tomás et al. describes a study on the controls of CWC growth in an area subjected to hydrocarbon seepage. The manuscript is well written and contains interesting data. I do however find that there are some important issue that need to be addressed. The main points is that the rationale for the study design and sample analysis is not very clear until the Discussion.

Main issues:

• The authors write that the "This study aims at elucidating the linkage between the present-day formation of MDACs and CWCs development along the Pompeia Province (Fig. 1),", but it is not clear why the selected analysis is the best way to achieve this. For example, "Petrographic analysis" is described in the Methods but it is not clear why this analysis is necessary to answer the questions addressed in the manuscript.
• The suspected nutritional linkage between CWC and hydrocarbon seepage is known in the literature as the 'hydraulic theory' (see Hovland, Jensen et al. 2012 and references therein). The present study is a direct test of this theory in an area that is very suited to test this. The name "hydraulic theory" and/or related reference are however not mentioned in the manuscript (e.g. ln 50-52).

• Another major problem was description of the sampling design and the method of sampling. The authors write on line 84-86 "This study is based on collected data from the Pompeia Province, during the Subvent-2 cruise in 2014 aboard the R/V Sarmiento de Gamboa. The analysed samples were recovered from the Al Gacel MV (D10-R3, D10-R7, D11-R8) and the Northern Pompeia Coral Ridge (D03-B1) (Fig. 1)." This description is grossly inadequate. What was the sampling design? Are 'samples' collected ad random or based a preconceived plan? Why those sites? What material was sampled as 'the samples' (e.g. living coral pieces, coral rubble, sediment with rubble, carbonates)? Size/weight of the samples? Number of samples? Replication? How are the samples taken (ROV arm, push core)? How were samples stored on the ROV, how long before samples reached the surface how are samples processed/stored on-board (significant given the DNA/RNA analysis, e.g. with respect to cross contamination, microbial community shifts)?

• The authors are addressing ecological questions (see e.g. line 34-38, line 50-52 and line 75 "…present-day formation of MDACs and CWCs development…") using studies of carbonates. One of the issues that is particularly relevant for the interpretation of these data is whether the analysis was performed on carbonates with living CWC or not. From the pictures and description it seems plausible that only dead CWC carbonates were studied (although ln 348 mentions "the necrotic part of living Madrepora"), but this begs the question how representative the RNA/DNA/biomarker analysis is when only carbonates of dead CWCs are studied. To what extent do the authors think that the organic components of the carbonates still represent the CWC microbial community?

Similarly for the 13C carbonate analysis, is it known well enough whether CWCs leave a distinct isotope mark in the carbonates that is representative for feeding on surface-derived organic matter versus hydrocarbons? Targeted sampling of also living CWC pieces and comparison with the sampled carbonates would have provided a means to address this.

• The authors mention that the ROV had sensors for CO2 and CH4 data and could take NISKIN water samples for CH4. In the results section (ln 219-221 and ln 231) CH4 data are mentioned but in the M&M nothing can be found on sampling location (e.g. height above sediment), sensor calibration, samples handling, sample analyses of the water samples.

• The site description in 3.1 should be partly moved to the Materials and Methods. Only the new results from this study should stay in 3.1.

• The authors infer that "severe seepage results in lethal conditions for CWCs" (line 363 - 364 and 377-378), but I see no evidence for that in the paper. In addition, the authors concluded that CWCs can be entombed by MDAC formation, it is however not clear whether this entombment is the cause of CWC mortality or that this entombment took place after CWC demise following for example from post-glacial decrease in current strength.

Suggestions for minor edits:
ln 48-50: reduce number of refs
ln 59: reduce number of refs
ln 72-73: reduce number of refs

ln 112: Please also give the values of the VPDB used, to avoid confusion
ln 124: "have a global distribution" in stead of "globally widespread"
ln 152: replace "… solid samples were…" with "…sample material was…"
ln 230: replace "…by dead.." with "… by shells of the chemosynthetic bivalves Lucinoma…"
ln 243: What does "virtually influenced" mean?
ln 262: "… values ranging from…". From the methods it is unclear on what this range is based, replication, multiple samples?
ln 307: What does "proportions" here mean? Do you mean "rates" or "concentrations"?
ln 308: So was methane sampled upon removal of the carbonate blocks?
ln 368: The authors also mentioned the availability of a CO2 sensor on the ROV. Has this been used to measure aragonite saturation states at the different locations?
ln 755: Fig 4C. There is a black pointing to "octocorals", but I cannot see these on the picture.

Bibliography
Hovland, M., S. Jensen and T. Indreiten (2012). "Unit pockmarks associated

withLopheliacoral reefs off mid-Norway: more evidence of control by 'fertilizing' bottom currents." Geo-Marine Letters 32(5-6): 545-554.

END OF REVIEW