

Interactive comment on “Environmental response of living benthic foraminifera in Kiel Fjord, SW Baltic Sea” by A. Nikulina et al.

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General comments:

This paper addresses an interesting topic, contains some enigmatic data, and presents some tentative explanations. The applied scientific methods are correct, but should be described in much more detail (see below). The authors properly cite earlier work, but should give summaries of the results of these earlier studies. The title is incorrect (see below). The abstract is informative. The text is easy to understand, but language has still to be improved. Below, I suggest a number of corrections. More references about forams and pollution are needed. There is no supplementary material. The authors should add all their census data, and also those of the 6 samples studied by Lutze (1965).

Overall quality before review: 65/100.

More specific comments:

The title is incorrect. Normally the environment responds to something. A correct title could be: "Foraminiferal response to environmental changes in Kiel Fjord";

The main message of this paper is that tremendous faunal changes (in faunal density as well as in species composition) have taken place in this area since 1965. I admit that I have difficulties to believe the story (which of course does not mean it is not true!!). I have the feeling that part of the differences may be due to different sampling and observational protocols. In order to take this doubt away, the authors should present an extremely detailed description of the methods followed in both studies. Next, they should discuss the possible impact of these methodological differences in the discussion!! They say the 1965 samples were re-inspected (on page 202), but don't tell what was the result of this re-examination!

Introduction: The authors mention several earlier studies in the same area. They should give a short description of the main results of these studies

The authors mention a (very limited) number of papers on the foraminiferal response to environmental parameters and contamination. They say that "no clear relationships" were recognized in heavily polluted environments. This is a the personal point of view of the authors. I think that many scientist will not agree! The authors have to increase significantly the number of references of studies dealing with pollution, and give a serious summary of the main conclusions of these papers!

On page 195, many studies about previous pollution surveys are mentioned. The authors should add a summary of the principal results of these summaries!

The comparison of the present results with those of Lutze (1965) form an essential part of this paper. The authors should therefore be extremely precise in their description of

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the sample preparation protocols used in both studies (see the many points below, this has all to be described in detail, for the 2 studies!!) In case these are not exactly the same (Rose Bengal staining procedure? Wet or dry picking of forams? Sampling season? How many cm were sampled? What sampling gear? How long the samples were preserved before washing and counting? etc,etc) they should discuss the possible consequences! This is particularly necessary, since different size fractions were used: $>63 \mu\text{m}$ in this study and $> 100 \mu\text{m}$ by Lutze. To what extent the faunal differences can be explained by these different methodologies???

P 199 discusses C/N ratio's, but the results are not presented! The authors should add C/N ratios to their figure 2.

The faunal reference list should give at least one good recent reference (containing a good picture!) for every taxon!

As I already told the first author previously, I would be very surprised to find *Ammonia beccarii*, a fully marine species in the Adriatic Sea (its type area), in this brackish water environments. The taxon which is meant here may be the ornamented form previously described as *Ammonia batavus*, or the completely unornamented *A tepida/parkinsoniana* group. It is essential that the authors describe this dominant faunal element somewhat better. They should especially describe its intraspecific variability. Some SEM pictures would be very useful!!

Typo's and linguistic corrections:

P192L1: were à have been L2: accomplished by à compared with L9: showed à show L11: revealed à reveals L14-15 “possibly due to low salinity 15 years ago” à This is not logical. You can not explain the appearance of a species and the disappearance of another one by the salinity 15 years ago! This salinity explains why previously you had another species. The faunal changes may be explained by changes in the salinity with respect to its values 15 years ago! L16: enforced à intensified p. 22: In the following à Next p. 25: as à since

P193L5: “in the same area” à not clear: open Kiel Bight or Kiel Fjord??
L8: “comes into focus of investigation” à strange sentence! L20: The aim

P194L6: debouching in à supplying fresh water to L8: temperature à a temperature L9: a salinity L10: and temperature may be as low as L12: I don’t understand what is said! The Pleistocene…. L17: at shallow areas à in shallow areas L20: by à from L22: leads à has led L24: causes à has caused

P195L11: in the fjord P20: Latter à The latter P20: Ruhmorcorer à The Ruhmor corer

P196L5: superstanding à overlying L10: in the outer L26: 1were à 1 were

P197L25: 8°8C???

P198L1: 2.3°8C?? 6.6°8C???? L4: in Schwentine à in the L18: “it apparently provided relatively good oxygen conditions”. “Good oxygen conditions” doesn’t mean anything! L21 à rather give R2 L24: seasonal increase in march à I don’t see it in fig. 2! I see very comaprable values everywhere on the 2 maps!

P199L2: depicted à depict L3: increased à increases L23: “was clearly apart” à was not found in the vicinity of

P200L12: which depicted flux à suggesting a flux L25: infers à suggests

Table 1: Give R2 !! Add a unit for the trace metal concentrations!!

P201L1 à exceptionally L4 à delete “given” L5 “are an integral over” à present an average value for L7 were à are L10 during à for, delete “however” L14 à a maximum L19: shipyard (without s) L21: while à keeping in mind that L21: sources à source Increased Sn concentrations: are you sure the same methods have been used?? Is it not possible that the difference is due to different methodologies?

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P202L9: substitute each other; à You have to explain exactly what you mean by this, and what are your arguments for this statement! L10: to à at L19: than in 1963, found à find L27: underpins à underlines P203L4: ratio à ration A/E-index: the authors should cite den Gupta, who was the first to use this index L12: bounded à bound L14: and were swept away à make a new sentence: As a consequence, they were swept away. L15: outstanding à remarkable (outstanding = excellent!) L17: in the presence L18: insult à impact L27: reckoned à suggested

P204,L1 29-fold increase. However, on p. 202 the authors say that density was about 100 times higher à correct!! L4: a ubiquitous, showed à show, the central fjord L15: it well might be à it may well be L24: à isolated specimens in some places

P205,L7: prevailed à were observed L9 were à was L10 delete and dedicated; L12: delete the; L19: were à are

P206L1: ones à those L4: for à during L5: showed à shows Re-sponse à res-pose L8: scaled à attributed, the increase à an increase L15: diminution à disappearance L21: periannual???

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