

## ***Interactive comment on “What are “ecogenomic sensors?” – a review and thoughts for the future” by C. A. Scholin***

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### General Comments

This is unique and useful review article places the genomics revolution - begun in medical research and percolating rapidly throughout biological oceanographic research - in juxtaposition with ocean observing initiatives, especially autonomous sensing systems. As the review article makes clear, application of genomic technologies to ocean observation are conceptually quite clear, but the implementation of this vision will require coordinated teams of researchers and technologists. This comprehensive review of the underlying science and technology, along with the pitfalls of data and metadata

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quality control, helps set a course toward such implementation.

### Specific Comments

The author's choice of the term "ecogenomics" (rather than environmental genomics, community metagenomics, or perhaps metagenetics) may be debatable. Certainly the clear definition of the term will move the discussion along, regardless any subsequent reconsideration of the exact terminology.

Another definitional issue is the apparent restriction to "...molecular signatures that are already known, like defined sequence of DNA or RNA" (Para 1; Page 3). Such applications will surely be useful for ocean observing, which may target particular species or groups as indicators of changes in the biota over time and space. However, there is no reason to exclude from the concept of ecogenomic sensors the rapidly-expanding use of environmental sequencing to characterize viral, microbial, protistan, and metazoan assemblages. The resultant data can yield useful information on both known and unknown fractions of the marine flora and fauna, especially in comparison with molecular databases for known taxa.

In recent ground-breaking applications that link molecular genetics and ocean engineering, the author himself has demonstrated the usefulness and practicality of microfluidics and sample homogenization (Para 3, Page 6). It does seem that this approach will be most likely of success for remote and autonomous deployments of genomic sensing systems for ocean observing. The literature review and author's assessment of both PCR-based and direct analysis of target molecules is particularly interesting and useful (Para 2; Page 7).

The author's assessment of the two ecogenomic sensors now in use (see Section 3.0) is detailed and helpful. One issue that is mentioned briefly (here and in Section 4.0) is that of the future availability and possible commercial fabrication of these instruments. If ecogenomic sensors are to be used for ocean observing, early consideration must be given to their design, as well as licensing of any patent-protected software or devices,

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to ensure that the instruments can be made in sufficient numbers and be available for purchase by individual researchers and state- or federally-funded programs.

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