

Summary of Discussion on the Direct Ocean Disposal of CO₂

Organized and edited by
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Summary report on the technological aspects by Ohsumi and Yamada

The concrete proposals regarding the transportation of the CO₂ into the deep ocean were presented. Confined vessel making a high density CO₂ containing seawater by Eric Adams and also the floating pipe in the bottom deposition scheme and spraying or sprinkling CO₂ in mid depths were presented. They are quite interesting proposals. And Peter Haugan explained the data needed to understand the behavior of CO₂ released into the ocean. Also some comments were made about the importance of modelling or biological impacts discussion. Through the discussion, most attendants got the understanding of the technical aspects of CO₂ sequestration methods. So many methods can be proposed and a little bit examined for technical point of view. However, at the present, we can not evaluate actual applicability of the methods within the limits of discussion or there are no such a type of work. Anyway we should focus more efforts on each proposed method. More clarification should be made. For example, some types of transportation system is proposed. But we don't know what type of the constrains or what type of the data is lacking for the actual design. So maybe of course we should know more about such a data through the experiment, but we can check the possibility of using the arbitrary values. For example, to such a confinement vessel just proposed by Adams, we can raise up the question whether it can be installed in the situation of the in-situ current of ten centimeters per second or one meter per second. Through doing so, we can get what is the real problem to devise or to develop such a concept in a real image. Anyway such a type of study should be focused in the next time for the technical point of view. We need more detailed work for what is the requisite for the performance of such a CO₂ concealing ability or efficiency or trustability.

Summary report on the physical property of CO₂ hydrate by Ohsumi

Uncertain existence of Ca(HCO₃)₂ phase was just pointed out by Dr. Wadsley, so this is a new puzzle proposed here maybe for the first time. And I think this is

the first international occasion where bottom deposition type sequestration concept is fully discussed, for the first time in these two or three years. The applicability of making liquid CO₂ lake is a problem. A more realistic way of the approach is through modelling or through laboratory experiments. Dr. Stephan Masutani and many commentators were present here. There exist, especially in Japan, many laboratories where we can put more sophisticated way of data handling. For such a laboratory work, the purpose should first be designated; all-purpose apparatus can not be built at all. So anyway each researcher should make some concept first, then some new facility of pressure apparatus can be built up. Anyway, links between conceptual modelling of the lake-type sequestration of CO₂ and the laboratory study are necessary.

Summary report on the environmental concern by Takahashi

Dr. Shirayama gave us very good overview of the characteristics of deep sea water and deep sea organisms, particularly emphasis on benthos. And now we know the current status of our knowledge on benthos and also he pointed out some possible problems or subjects we look into in relation to carbon dioxide injections. And Dr. Shirayama briefly summarized characteristics of organisms in deep ocean. And there might be other characteristics which we do not know or we have not realized yet. And to this systems, we are going to add some actions caused by CO₂ injections and I only put lowering pH and lowering oxygen or forming anoxic conditions, and I am sure there are so many other actions due to CO₂ injections. And each one of those actions will cause onto these characteristics in very various ways I think it is now the time we biologists have not realized about how CO₂ is important because CO₂ in the ocean is not, did not, has not changed so much in terms of other biological point of view. But now, we human being might introduce a large amount of carbon dioxide, so we are now hit by some hammer on the head. So we have to start looking into the possible effect of carbon dioxide injections into the variety of biological systems. That is my generalization for the environmental aspects of the discussion.