

Air microbubbles sequestration: an attempt at climate geoengineering

Hitoshi Koide^{1*}

¹CC Geosystem Laboratory

As emergency measures to prevent the global warming, large-scale geoengineering technology has recently attracted attention worldwide. In the Copenhagen conference, the fossil-fuel dependent United States and the emerging economies such as China refused to assume any obligation to reduce greenhouse gas emissions. The world seems already too late to combat the global warming. The global warming prevention measures become required to have some rapid and outstanding effects. The huge umbrella covering the earth, the increase of cloud cover, the proliferation of algae by the iron-nutrients spraying over the ocean and even the stimulation of volcanic activity have been seriously discussed as the possible climate geoengineering measures.

The air microbubbles sequestration technology is to be proposed as a new method to reduce the atmospheric CO₂ level. The atmosphere contains the very thin carbon dioxide less than 0.04% in spite of the recent artificial addition. The air is not the waste and unharmed to the human health. The microbubbles of the air or the mildly carbon concentrated air through porous membranes or by adsorbents can be injected safely even into the shallow sea water or land soils. However, some mechanisms to isolate CO₂ in the long term from the atmosphere is required to reduce the atmospheric CO₂ level.

The air-microbubbles sequestration is a new but very simple efficient technology to reduce the carbon dioxide directly from the atmosphere. The air-microbubbles, smaller than several micrometers in diameter, can be easily formed in several meters deep water through the injection of pure air through filters with tiny pores. The carbon dioxide in the air-microbubbles quickly dissolve into water at the higher pressure than the atmospheric pressure while most of oxygen and nitrogen remain in bubbles to reappear at the water surface. The air-microbubbles sequestration is safe and environment-friendly injecting the pure air only without any additives into water.

The air is available everywhere on the earth's surface even in the remote ocean and chilly high latitude region far from any major carbon emission sources. As a first attempt for application, I designed the ocean-going carbon scrubber—that is a floating platform with four wind turbines. A wind turbine directly drive a air-blower to compress the air and to inject the air-microbubbles through pipes and filters into the surrounding sea water at the depths of several meters.

Keywords: atmosphere, carbon dioxide, mitigation, microbubble, natural energy, global warming