Marine Cloud Brightening (MCB)

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Context:

Scientists are testing a geoengineering technique called marine cloud brightening that involves using machines to inject tiny saltwater particles into marine stratocumulus clouds, aiming to increase their reflectivity and cool the Earth.

Background:

The Brightening clouds is one of several ideas to push solar energy back into space — sometimes called solar radiation modification, solar geoengineering, or climate intervention.

Marine Cloud Brightening (MCB):

1. It is a scientific initiative that explores how altering atmospheric particles (aerosols) can impact cloud reflectivity.
2. By releasing tiny aerosol particles into the atmosphere, researchers aim to enhance cloud brightness, leading to increased sunlight reflection.
3. Aerosols of the right size and concentration could significantly increase the reflectivity of specific types of clouds.
4. This phenomenon is visible in satellite images of clouds brightened by ship emissions (known as “ship tracks”).

Goals of the Marine Cloud Brightening Program:

1. It helps in better understanding of the present-day effects of pollution aerosols on clouds.
2. Investigate whether aerosol particles made from sea salt could be used to intentionally reduce near-term climate warming while greenhouse gas concentrations are brought down to safer levels.
3. It aims to understand the benefits, risks, and efficacy of the intentional use of aerosols to reduce warming through different implementations of marine cloud brightening.

Concerns/Challenges associated with Marine Cloud Brightening (MCB):

1. MCB involves the large-scale spraying of seawater into the atmosphere at significant altitudes, which presents engineering complexities in terms of design, cost, maintenance, and operation of the spraying devices.
2. Alterations in cloud patterns and precipitation due to MCB could affect regional climate and hydrological cycles, potentially causing unintended consequences like droughts or floods. Changes in clouds over broad regions affect the circulation of the atmosphere, weather, and precipitation. Both marine cloud brightening (MCB) and pollution aerosols can change clouds, which in turn affects regions both nearby and far from where the brightening occurs.
3. MCB raises ethical dilemmas about human intervention in natural processes and the

governance and decision-making processes surrounding its implementation.

4. MCB might lead to complacency among policymakers and the public, diminishing their commitment to reducing greenhouse gas emissions and adapting to climate change.