Draft of an IAMAS/IUGG resolution concerning weather and climate engineering based on the addition of aerosol particles

Considering

Greenhouse gas (GHG) emissions as a result of human activity are increasing, leading to multi-decadal increases in global average temperature. This is driving widespread melting of snow, sea ice and glaciers, as well as intense drying episodes and more extreme precipitation events.
The drastic reduction of the atmospheric burden of both long- and short-lived warming agents to limit global average temperature increase is not advancing as necessary, and more and more regions and countries are suffering from damage from higher storm surges, heavier precipitation events, rising sea level, more intense heat waves, fires and droughts, detrimental to humanity and to the Earth's biodiversity and its provision of ecosystem services.

Recognizing that

i) progress has been made in the understanding of the role of aerosol particles in Earth's weather and climate, through field experiments, laboratory studies of key physical, chemical and biological processes and/or regional and global modelling;
ii) Approaches to counteract the climate change of anthropogenic origin involving the interaction of aerosol particles (AP) with the atmosphere have been suggested;
iii) Solar radiation management (SRM) concepts have been discussed e.g. increasing the AP in the stratosphere to reflect more sunlight back to space and increasing AP in marine stratocumulus decks which increase droplet concentration and, thus, their albedo. These concepts have become part of the discussion of weather and climate intervention (WCI or geoengineering), which is defined as the deliberate intervention in the regional and large-scale planetary environment of a nature and scale intended to counteract anthropogenic climate change and its impacts.

Acknowledging that

i) Given the current state of understanding, AP-based WCI is not yet sufficiently understood to be considered a complement to or replacement for other mitigation approaches.
ii) Scientific research on detailed techniques is relatively new and the current level of scientific knowledge about the feasibility of such techniques is still considered inadequately understood
iii) There is a lack of confidence that the benefits of AP-based WCI would outweigh the risks. For example,
a) stratospheric approaches may well endanger the stratospheric ozone layer, or at least significantly slow its recovery.

b) Tropospheric approaches focusing on anthropogenic GHGs, ozone and absorbing aerosols may all play roles in changing the waviness of the jet stream, the latitude of storm tracks and the location of the intertropical convergence zone.

iv) The extent to which regional to global-scale adjustments caused by AP-based WCI would lead to regional precipitation changes and either counter-balance or amplify the effects caused by GHGs is not yet well enough understood to evaluate the degrees of risk and benefits. The induced spatial and temporal precipitation modifications may worsen conditions in some areas.

Noting that

i) In addition to the involved fundamental science questions, any attempt at AP-based WCI gives rise to several societal, ethical, legal and governmental issues:
The 1st point of the 2nd article of the UN charter confirming the sovereign equality of all its Members is a general principle of international law, forming the basis of state immunity (Par in parem non habet imperium). This implies also that no one state has the right to change weather or climate in another state.

ii) Variations in the hydrological cycle in some regions are beyond normal statistical variability. Water shortages have already led to conflict, and a real or perceived threat to water resources through AP-based WCI could trigger further conflicts when considered as an aggression.

iii) Certain particulate products (e.g. AgI) used in weather modification can be toxic to the environment when introduced in high quantities.

iv) As the lifetimes of aerosol particles in the atmosphere is limited, any SRM started on a large scale needs to be continued for decades to maintain its effect, preferably until GHG have regained pre-industrial levels. Any earlier discontinuation would most likely force the climate into a state in accordance with the prevailing GHG within only a few years. The resulting shock to the eco-system and Earth's diversity has not been assessed yet but might devastate entire continents.

recommends

Further research to understand much better the fundamental science and possible efficacy of AP-based WCI schemes.
That WCI research is conducted in an open and independent manner that engages public participation and is used to assess properly the potential risks of regional and global climate change both with and without AP-based WCI.
That research activities include studies of societal, ethical, legal and governmental impacts of geoengineering.

urges

The nations and individuals of the world refrain from AP-based WCIs that can potentially damage agricultural production, ecological services for society and sustainable development inside as well as outside target regions; the research community and policymakers to consider and address the ethical implications of AP-based WCI globally and fully engage communities in the decision-making process; and the development of effective and inclusive national and global governance frameworks that can address and manage all these considerations, prior to any geoengineering activity.

Resolves that

Given the limited state of current knowledge on AP-based WCI and resultant interactions with and modifications of, for example, processes affecting weather and climate, currently AP-based WCI cannot be considered an acceptable complement to a) the rapid implementation of required large reductions in GHG and short-lived climate pollutants and b) greatly enhanced resilience to mitigate the increasingly serious problem of global warming.