

Climate Change Corner

Water vapour and climate change: Hong Kong's perspective

Of the greenhouse gases, water vapour is much more abundant than carbon dioxide. It is lighter than air and is the main component of clouds. The contribution of stratospheric water vapour to decadal changes in the rate of global warming were discovered by Solomon et al (2010). A decrease in concentration by about 10% over 2000-2009 was found to slow the rate of increase in global surface temperature by about 25% compared to all other greenhouse gases.

To most people water is a harmless daily necessity. However water vapour distribution affects climate through floods and droughts, ice sheet expansion and retreat, the well-being of the planet's vegetation including food supply, and ultimately the much feared 'future sea-level rise'.

Some facts on local water vapour distribution:

- Heat generation in urban areas such as the Victoria Harbour basin is an important means of atmospheric water vapour transfer.
- Much water vapour is generated during fossil fuel consumption.
- Water supply schemes such as the import of water from Dongjiang have changed the regional natural water cycle.
- Volcanic eruptions and large nuclear explosions have been known to cause both abnormally dry and wet years.
- Destruction of natural vegetation, population growth, land use, hill fires and the consumption of water through agriculture, domestic and industrial activities have drastically changed the natural water cycle.
- The construction of dams and reservoirs, land reclamations, landfills and underground space has impact on the natural water cycle.

Soares in 2010 concluded that unlike carbon dioxide, water vapour in the atmosphere is rising in tune with temperature changes on a monthly scale.

There is therefore an underestimation of the role of water vapour in climate change.

References:

Soares, P C: "Warming power of CO₂ and H₂O: correlations with temperature changes", *International Journal of Geosciences*, 1: 102-112, 2010.

Solomon, S et al: "Contributions of stratospheric water vapour to decadal changes in the rate of global warming", *Science* 327: 1219-1223, 2010.

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