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# CARBON DIOXIDE (CO2) AND METHANE (CH4) CONCENTRATIONS IN PERMAFROST REGIONS, MONGOLIA

Adiya Saruulzaya (Ph.D)

Head of Permafrost Department, Institute of Geography and Geoecology,

Mongolian Academy of Sciences

saruulzayaa@mas.ac.mn

+976 99290816

# Why is study on Greenhouse gas emissions from permafrost important?



Permafrost is one of the major sink of terrestrial Greenhouse gases (GHG as CO2 and CH4)

GHGs emissions from permafrost play an important role in driving global warming

Permafrost contains GHG (CO2 and CH4) 1450-1600 Pg

This feedback can accelerate climate change

But the magnitude of the CO2 and CH4 concentrations in different permafrost zones in Mongolia and their impact on climate change remain uncertain.

## Background: Mongolia's permafrost degradation



This study (1) examined the permafrost conditions from 2010 to 2017; (2) analyzed the CO2 and CH4 concentrations based on GOSAT satellite data; and (3) explored the possible relationships between permafrost conditions and GHG concentrations.

#### Permafrost temperature changes at study sites



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Permafrost degradation

### Data and Method: GOSAT satellite and station datasets



The near-surface CO2 & CH4 concentrations, MAAT and their changing rates from 2010 to 2017.



- Air temperature showed significant warming trend in Mongolia during 2010 – 2017.
- Permafrost exhibited rapid degradation, and the active layer is increasing fast.
- Near-surface CO2 and CH4 concentrations in Mongolia increased remarkedly.
- Greenhouse gases concentrations showed different changing.

### Seasonal variations of CO2 and CH4



Highlights & results : CO2 and CH4 concentrations between 2010 - 2017

# Changes in the active layer of permafrost 2010 – 2017



Changes in the ALT at seven borehole sites from 2010 to 2017: (a) Doghole, (b) Numrug, (c) Terkh, (d) Bayanbulag, (e) Khongor Ulun, (f) Tsengel, and (g) Erdene.