

The Relationship between CH₄ Emission Concentration and Vegetation Index

Jonggeol Park

Introduction

A greenhouse gas is a gas in atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the original cause of the greenhouse effect. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃). Which from four of the principal greenhouses gases are human activities results (CO₂, CH₄, N₂O, and the halocarbons). Atmospheric CH₄ is the second most important anthropogenic greenhouse gas after CO₂. CH₄'s mixing ratio has increased by a factor of 2.5 compared to preindustrial levels and reached almost 1,800 ppb today. After a decade of near stable concentrations, the growth rate of atmospheric methane has started to increase again.

Objective

we focus on CH₄ sources of global area using satellite data, vegetation map and MODIS NDVI to investigate the characteristics of this CH₄ sources.

Methane Sources

IPCC, 2007

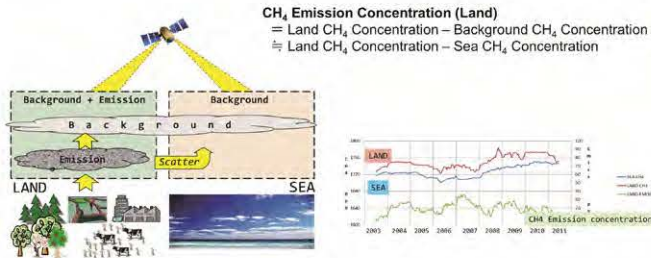
Natural sources	145-260 Tg/a
• Wetlands	100-231
• Termites	20-29
• Wild animals	15
• Oceans	4-15
Anthropogenic sources	264-428 Tg/a
• Rice agriculture	31-112
• Energy & industry (fossil fuels)	74-106
• Ruminants	76-112
Total sources	503-610 Tg/a

Methane Sinks

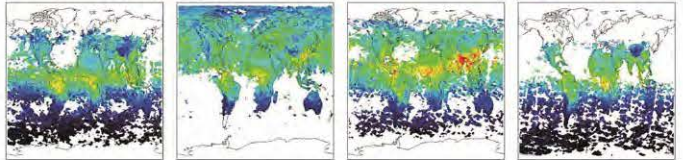
Sink	492-577 Tg/a
• Tropospheric OH	428-507
• Stratosphere (OH, Cl, O ₁ D, hv)	30-45
• Soils	26-43

Theory & Result

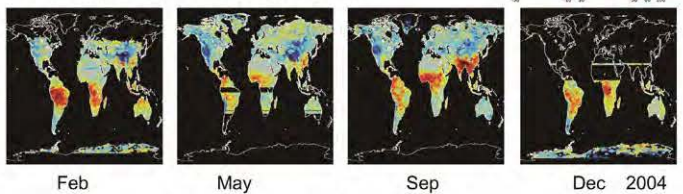
CH₄ emission concentration



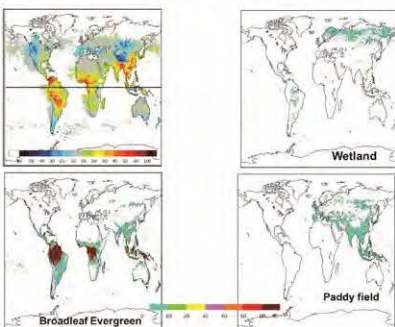
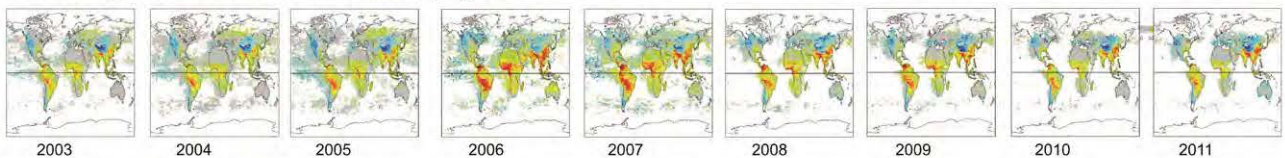
<< CH₄ concentration >>



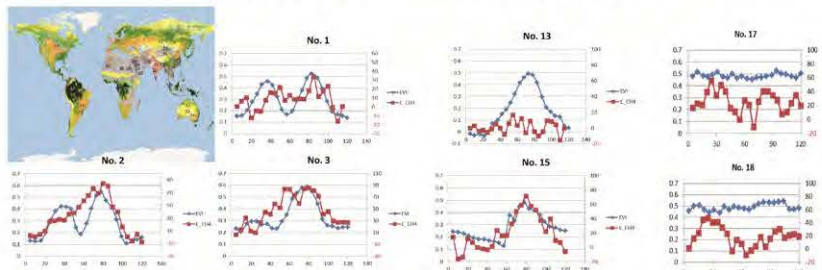
<< CH₄ emission concentration >>



<< Average CH₄ emission concentration par year >>



<< Compare Time series EVI and CH₄ emission concentration >>



Conclusion

- ◆ In order to investigate the methane sources, We used SCIAMACHY data to investigate the changes in the CH₄ concentration time series during 9 years.
- ◆ The CH₄ concentration's growth rate during 9 years is 3- 5 ppb/year
- ◆ We proposed the CH₄ emission concentration to calculate the quantitative amount of CH₄
 - ◆ CH₄ emission concentration (land) = CH₄ concentration (land) - CH₄ concentration (sea)