Carbon Flux related to Peatland Use Change

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SUMMARY

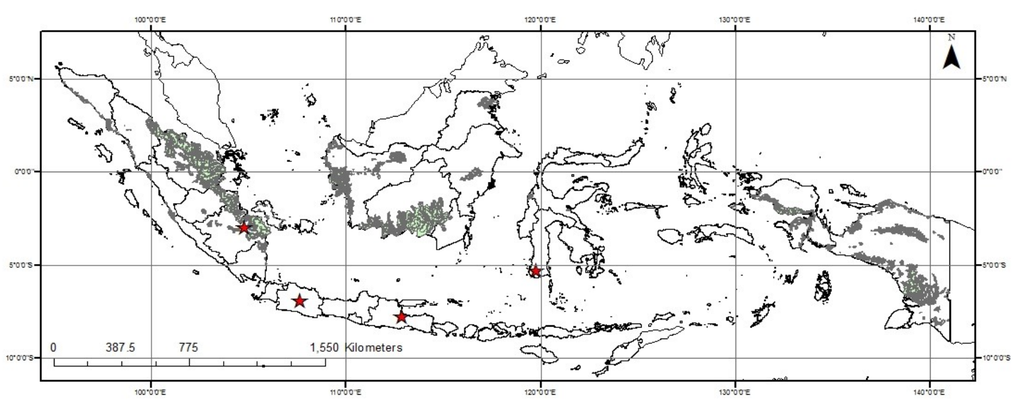
- CO_2 flux over Sumatra is relatively higher than over Kalimantan and Papua peatlands. It is probably due to different degree of peatland cover over that influence the soil water content and surface temperature. Further study relating carbon flux and peatland cover probably by using NDVI data is needed.
- Hydrological systems over most peatland in Sumatra and Southern Papua were governed by precipitation rate, probably it is the only water input. But in most peatland area in Kalimantan and little part of Papua, there are other factors that might control the peatland hydrological system. Therefore, further study is needed to investigate the cause of indifferences.

INTRODUCTION

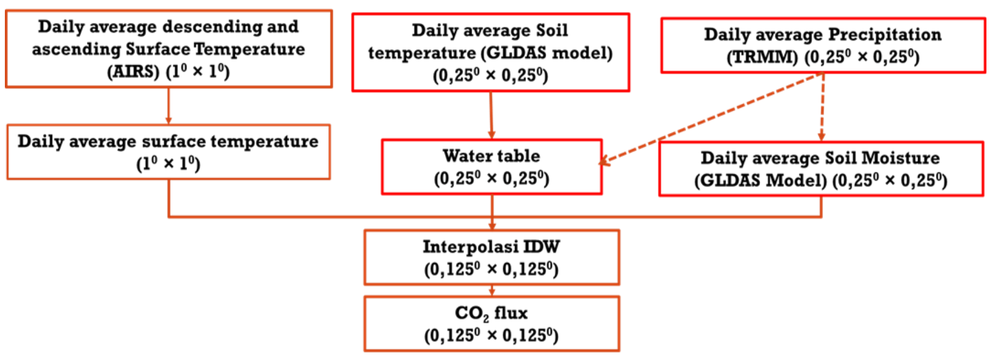
- Conversion of peatland to agricultural or plantation land have resulted in changes in the hydrological system, such as change in water level and also the peat temperature and humidity.
- Change in biological conditions from anaerobes to aerobes results in an increase in the respiration activity of microorganisms on peat land which results in an increase of CO_2 (carbon dioxide) emissions into the atmosphere.
- Precipitation as one of water input to the peatland hydrology might also influence peat water table thus carbon emission
- The study aimed to determine carbon flux from various peat water table and to find relationship between precipitation and peat water table.

METHODE

- The study focused on peatland over Sumatera, Kalimantan and Papua, Indonesia



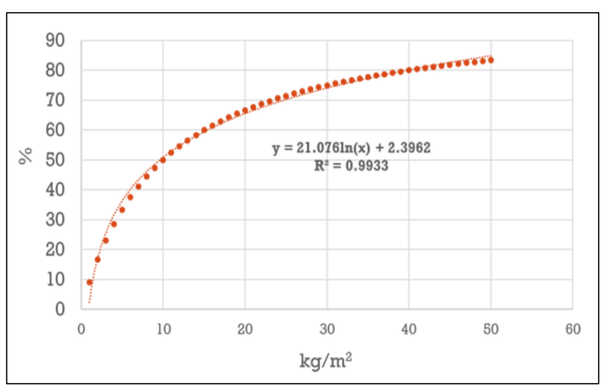
- Data processing were shown in the flowchart.



- The equation used to calculate peat water table and carbon flux (Astiani et al., 2016):

$$Soil\ T\ in\ ^0C = 35{,}99 - (0{,}105\ \times peat\ water\ table\ in\ cm)$$

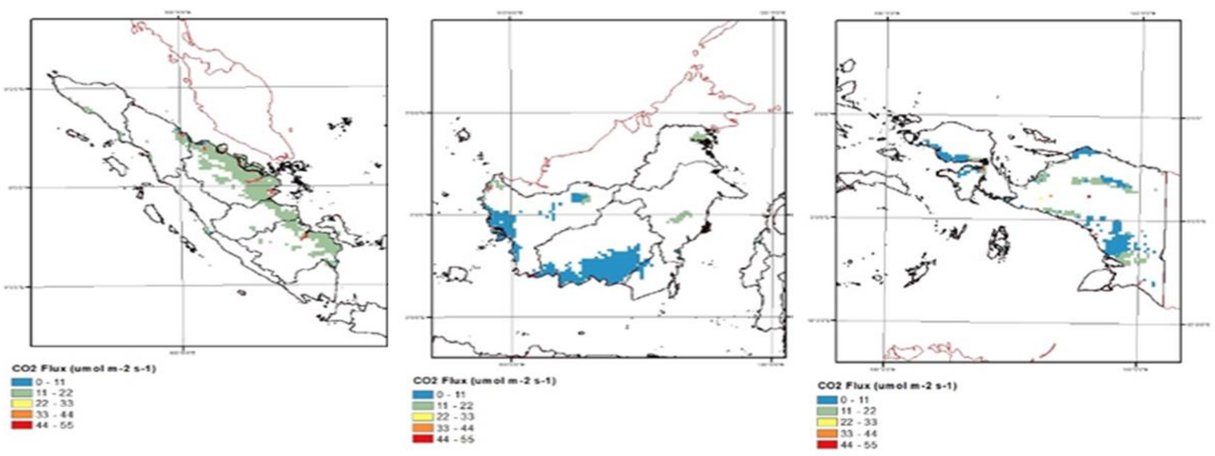
$$\sqrt[2]{\text{flux } CO_2\ in\ \mu mol/m^2s^1} = 1.756 + (0.0297\ \times peat\ water\ table) - (0.0204\ \times soil\ water\ content) + (0.0220\ \times surface\ T)$$



A graphic used to convert water moisture unit from kg/m² to water content in % wet basis for top 10 cm soil by assuming peat bulk density 0.1 g/cm³

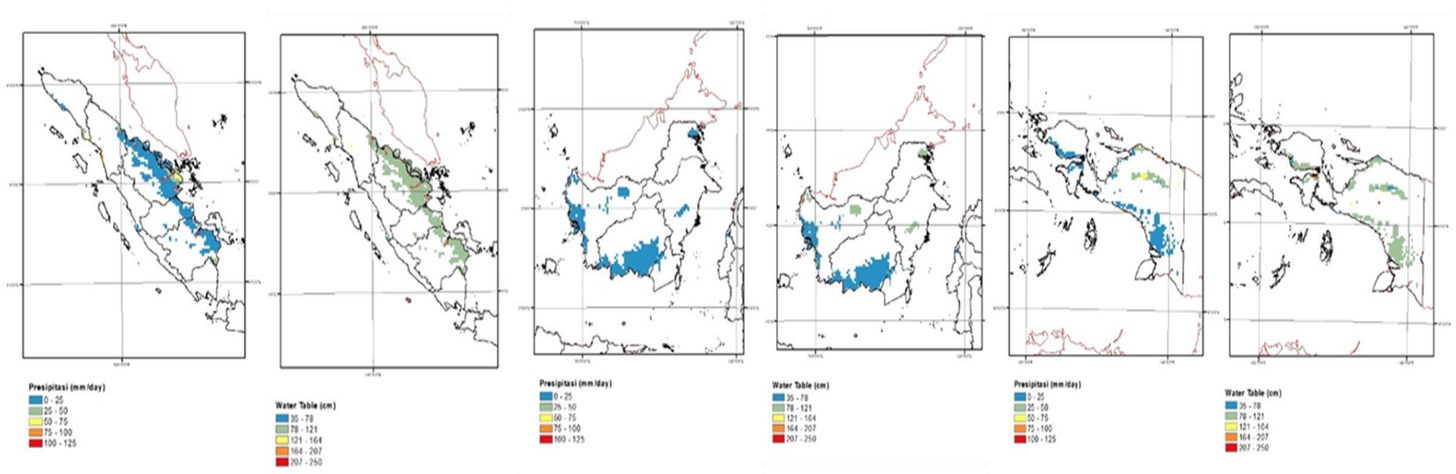
PEATLAND CO_2 FLUX

- CO_2 flux over Sumatera is relatively higher than over Kalimantan and Papua peatlands.
- It is probably due to less peatland cover over Sumatera than Kalimantan and Papua that influence the soil temperature and water content and also surface temperature.



PEAT WATER TABLE AND PRECIPITATION RATE

- Peat water tables in the North-eastern Sumatera, Southern Papua, and northern and eastern Kalimantan are inversely proportional to precipitation rates. On the contrary, peat water table in the western and southern Kalimantan is directly proportional to precipitation rate.
- It can be concluded that hydrological systems over most peatland in Sumatera and Southern Papua were governed by precipitation rate, probably the only water input. But in most peatland area in Kalimantan and little in Papua, there might be other factors that control the peatland hydrological system



FURTHER STUDY

- Further study to investigate relation between CO_2 flux and peatland cover probably by using data NDVI, and also factors that control hydrological system in Kalimantan and little part of Papua are required.
- In situ measurements of Soil T and water content, surface T, Precipitation and peat water table are needed to validate the input and output of the model used in this study.

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