

## Recent Peat Fire Occurrence Trend in Kalimantan, Indonesia

Hiroshi Hayasaka<sup>1\*</sup>, Erianto Indra Putra<sup>1</sup>, Aswin Usup<sup>2</sup>, Yulianti Nina<sup>2</sup>

<sup>1</sup>Graduate School of Hokkaido University, <sup>2</sup>Palangka Raya University

Forest fire in Indonesia is not a new phenomenon, but recent fires in logged forest, peatland, and plantation should be classified into one of human-made disasters. New fires of Indonesia occurred in peatland is becoming one of international serious issues due to not only haze but also CO<sub>2</sub> emission closely related to global warming. Fires in Indonesia are known to be pronounced in El-Nino years due to low precipitation or drought. But we still don't know the reason why recent fires in Indonesia could be active even in non-El Nino years.

The authors are trying to find the answer for the severe fire condition in Kalimantan now. Firstly, the Mega Rice Project (MRP) area, Central Kalimantan where large-scale development of tropical peat swamp forest on peatland has been carried out since 1996, was selected as the study area to identify trend of the recent frequent severe peat fires. Then, various available data to assess fire occurrences in the MRP area such as weather data (measured at the Palangkaraya Airport), fire (hotspot) data captured by NOAA and MODIS, and ground water level (GWL) data in the MRP area were collected and analyzed not only to clear reasons for frequent large fire occurrences in the MRP area, but also to obtain trends of precipitation, fire and GWL. The monthly sea surface temperature (SST) anomaly data was also used to explain precipitation trend in detail.

The analysis results based on various relationships among SST anomaly, precipitation, GWL, and fire, could allow us to make the following process that could clearly explain frequent severe peat fires in the MRP area. Severe peat fire in Kalimantan may now occur under the following process.

### 1. Decrease of Precipitation:

Rainfall in Kalimantan usually tends to decrease when sea surface temperature in the Pacific Ocean exceeds normal temperature, or in other words, SST anomaly become positive.

### 2. Lowered GWL:

The above mentioned light rainfall condition could make minus GWL or below the soil surface.

### 3. Formation of Dried Peat:

Under weak rainfall and low GWL condition, water content of peat will be changed from high (peat with high water content) to low (peat with low water content). This change makes dried peat and peat becomes more burnable.

### 4. Occurrence of Severe Peat Fire:

Severe peat fire will occur when well dried peat is made by drought and low GWL condition.

The above-mentioned process could be explained by using the analysis results. Finally, a detailed hotspot distribution map shows that many places in the Blocks A and C of MRP area on deep peatland still have high fire densities due to ongoing human disturbance. Severe fire areas in MRP are in open area, supporting that fires were mainly human-caused fires due to intentional and careless use of fires. Severe peat fire in 1997, 2002, and 2006 decreased air quality in Palangkaraya greatly to hazardous level and emitted large amount of carbon emission at the same time. Although the MRP land area (14,754 km<sup>2</sup>) occupies only 0.77% of whole land area of Indonesia (1,890,000 km<sup>2</sup>), CO<sub>2</sub> emission from fires in the MRP area are estimated to be responsible for 12.4%(0.32Gt) and 11.6%(0.22Gt) of Indonesian CO<sub>2</sub> emission in 1997 and 2006, respectively. Please note that small area of peatland in Indonesia could emit a large amount of CO<sub>2</sub>. Namely, we should call "peat fires" instead of "forest fires" for recent fires in Indonesia.

Keywords: peat fire, mega rice project, carbon dioxide, sea surface temperature (SST) anomaly, precipitation, drought