Faculty of Environmental Engineering
The University of Kitakyushu

Symposium on Peatland Fire 2025
18 Feb 2025

Industry-Academia-Government Collaboration for Disaster Prevention and Environmental Safety

Kazuya UEZU
The University of Kitakyushu

Industry-Academia-Government Collaboration

“Soap-based firefighting agent”

Shabondama Soap Co., Ltd.

Morita Corporation

1) For Structure Fire （2003 - 2005）

Supported by

Fire and Disaster Management Agency (FDMA)

Kitakyushu City Fire Department

2) For Forest Fire （2009 - 2012）

Supported by

Japan Science and Technology Agency (JST)

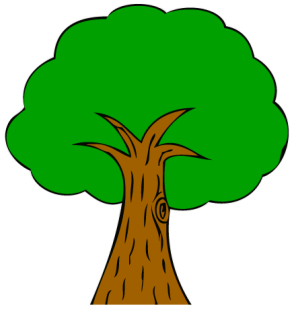
ShinMaywa Industries, Ltd.

3) For Peat Fire （2013 - ）

Supported by

Japan International Cooperation Agency (JICA)

Four elements of combustion

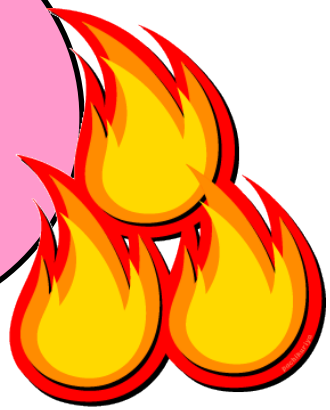


Fuel

Chain Reaction

Oxygen

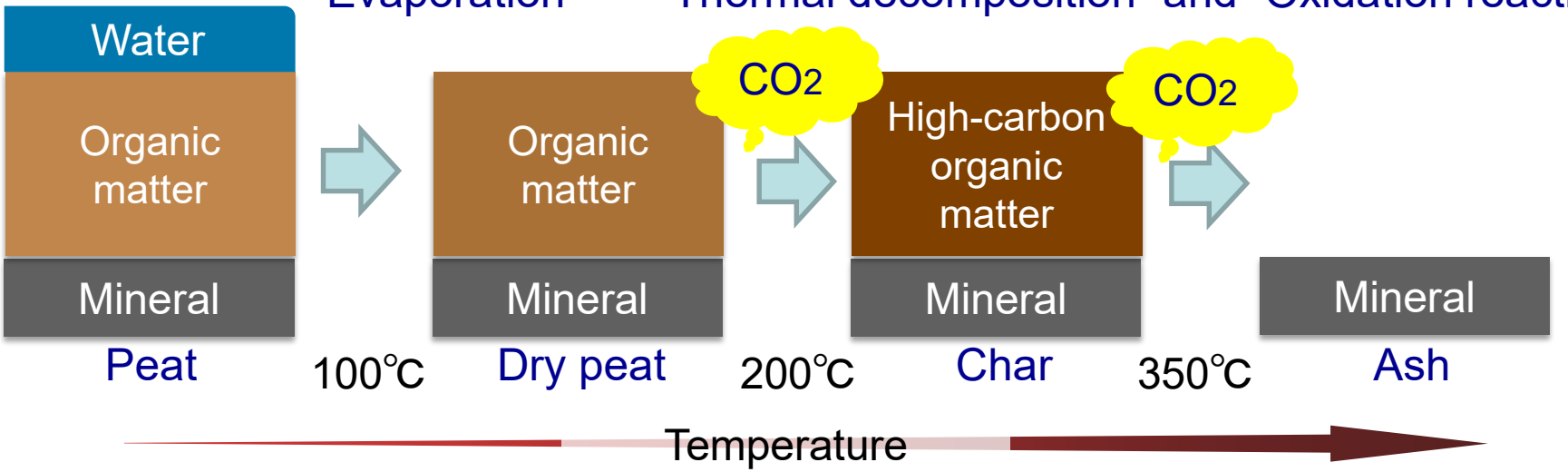
Heat

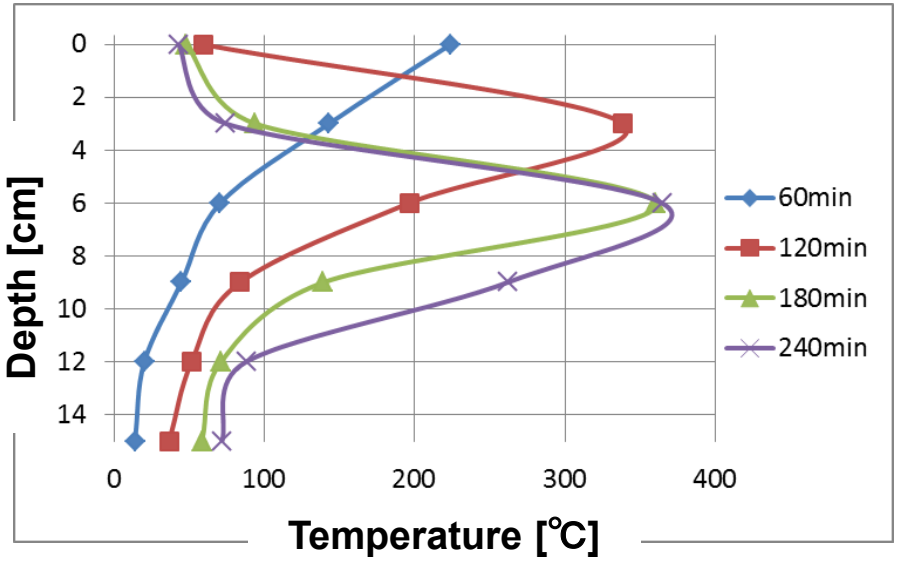


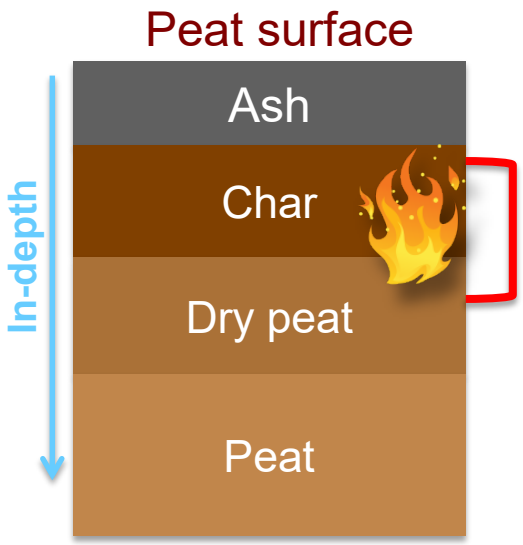
Peat combustion process

"Evaporation"

"Thermal decomposition" and "Oxidation reaction"







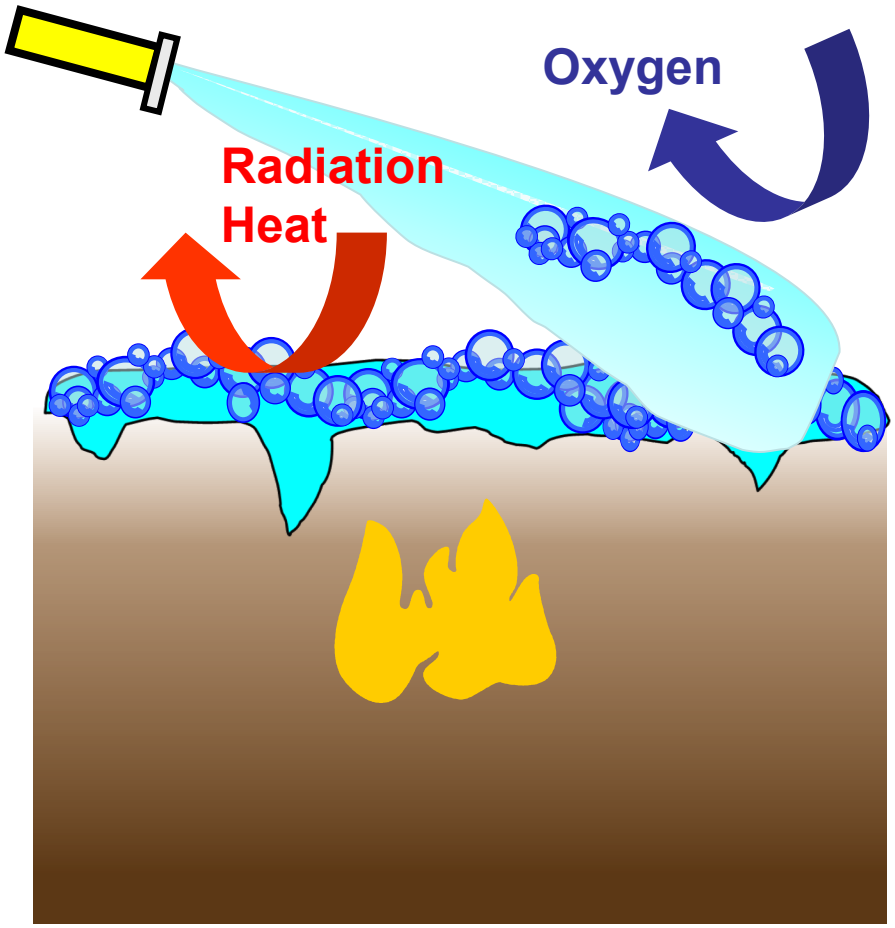
Combustion zone

> 200℃

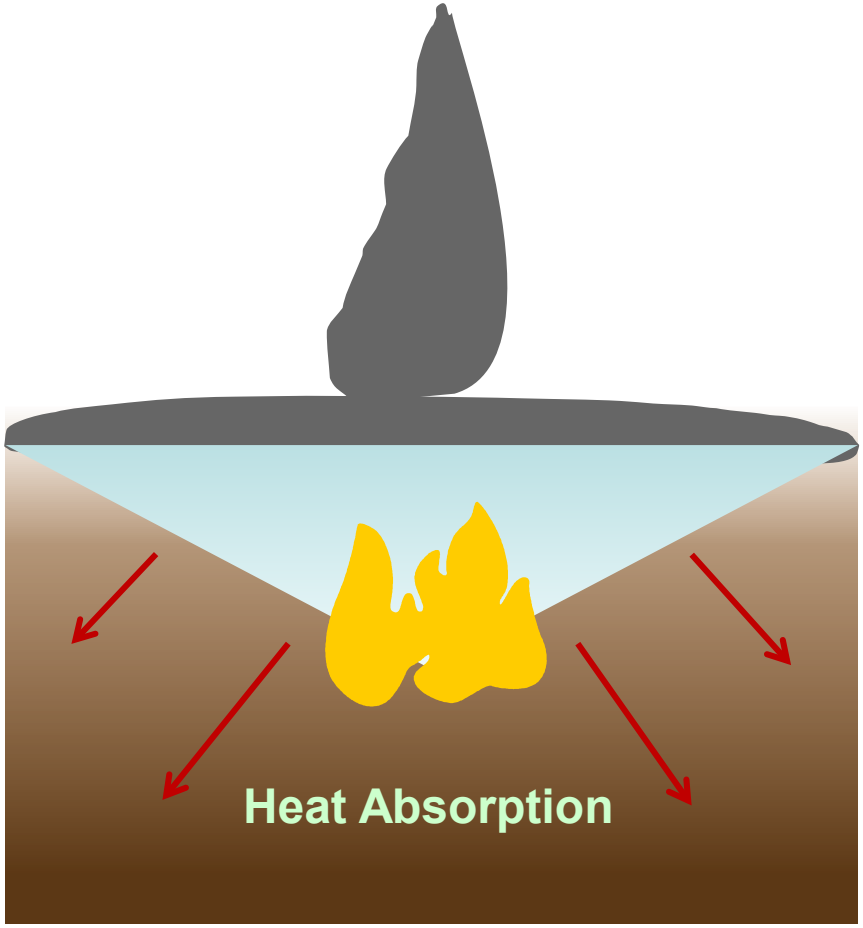
Exothermal

Expected firefighting effect for peat fire

(1) Foams physically coat the surface of peat to prevent supply of O_2 & diffusion of flammable gas.



(2) Soap-based firefighting solution spread and penetrate towards a burning surface



Role of extinguishing agent

Use water efficiently to extinguish fires

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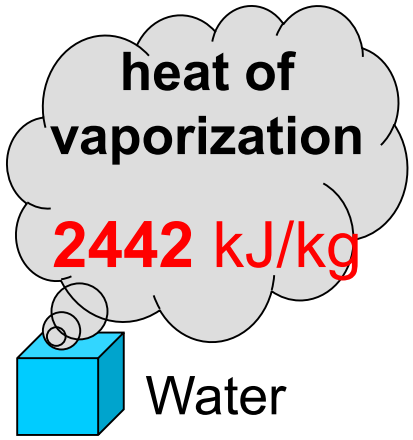
Prolong the time water stays on the burning material

Water — High cooling performance

Foam aqueous solution — High wettability



specific heat

4.2 kJ/kg·K

Wettability

Water = High surface tension (72 mN/m)

Foam aqueous solution = Low surface tension (32 mN/m)

Project by JICA Partnership Program (JPP)

Enhancing Fire Fighting Technology against Peatland and Forest Fires in Balikpapan City, Republic of Indonesia

2013-2016

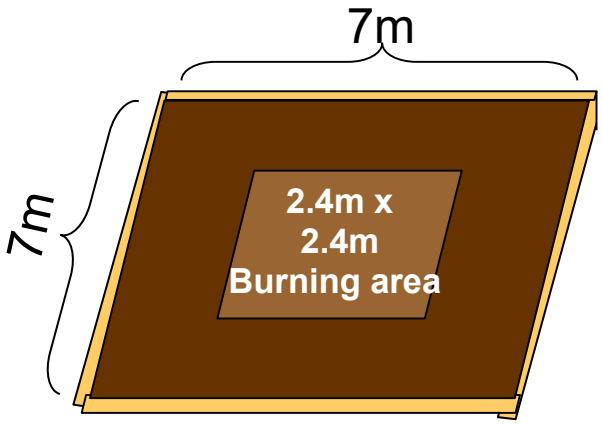
Japan International Cooperation Agency

The JICA Partnership Program (JPP) was introduced in 2002 to support and cooperate with the implementation of projects formulated by Japanese NGOs, Japanese local governments, and Japanese universities to utilize their accumulated knowledge and experience in assistance activities for developing countries.

JPP is a technical cooperation program implemented by JICA to contribute to the social and economic development of developing countries at the grass-roots level in collaboration with "Partners in Japan," such as NGOs, universities, local governments, and public corporations.

Kyushu Foundation for the Advancement of Industry, Science and Technology

Large-scale firefighting test : Under Natural Condition



September 14 – 16, 2015

Moisture content (MC) was around 60%.

MC = the mass of water /
the mass of dry peat soil

Firefighting procedure

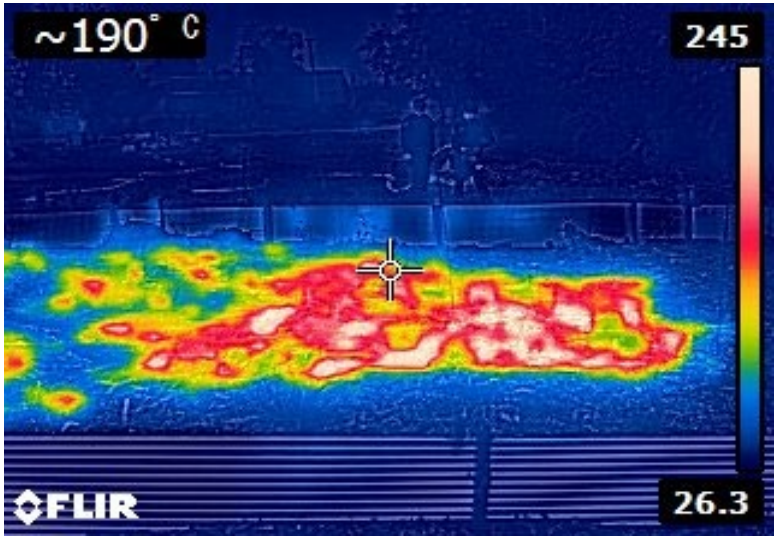
Burning for 4 hours

Spraying 3L of water per 1 m^2 of burning area

Firefighting using the backpack water tank
with the portable infrared thermal imaging camera against hot spots over 50℃.

Temperature of peat surface Water

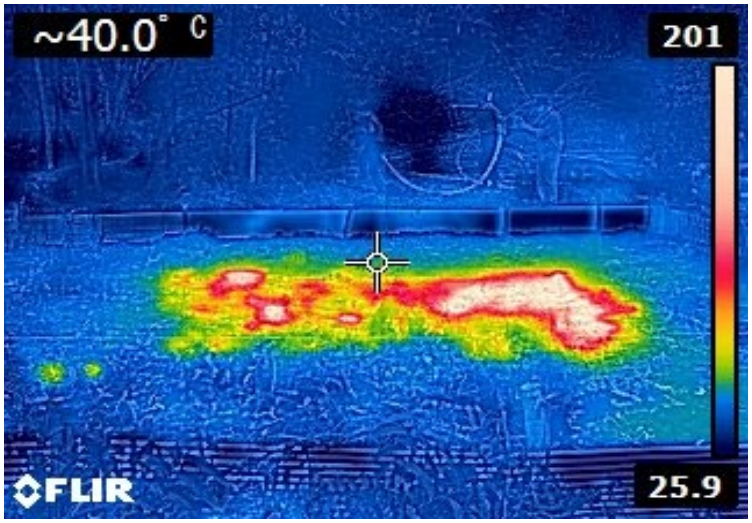
Before firefighting



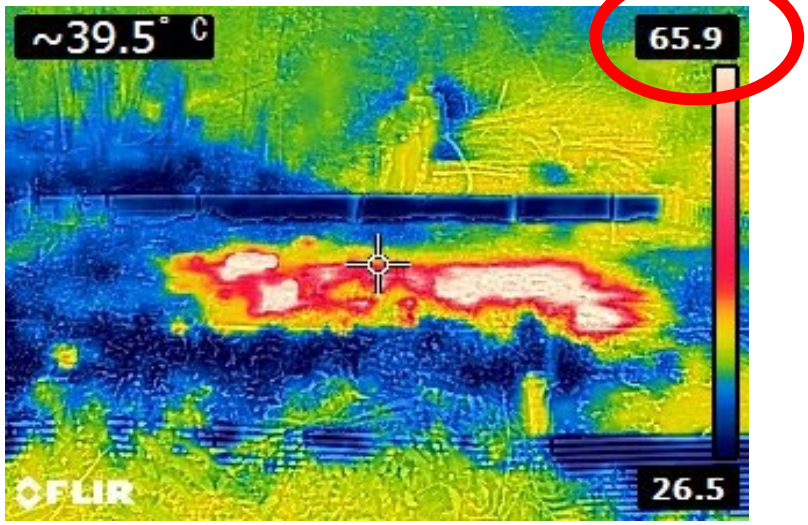
After firefighting

Temperature of peat surface Firefighting solution

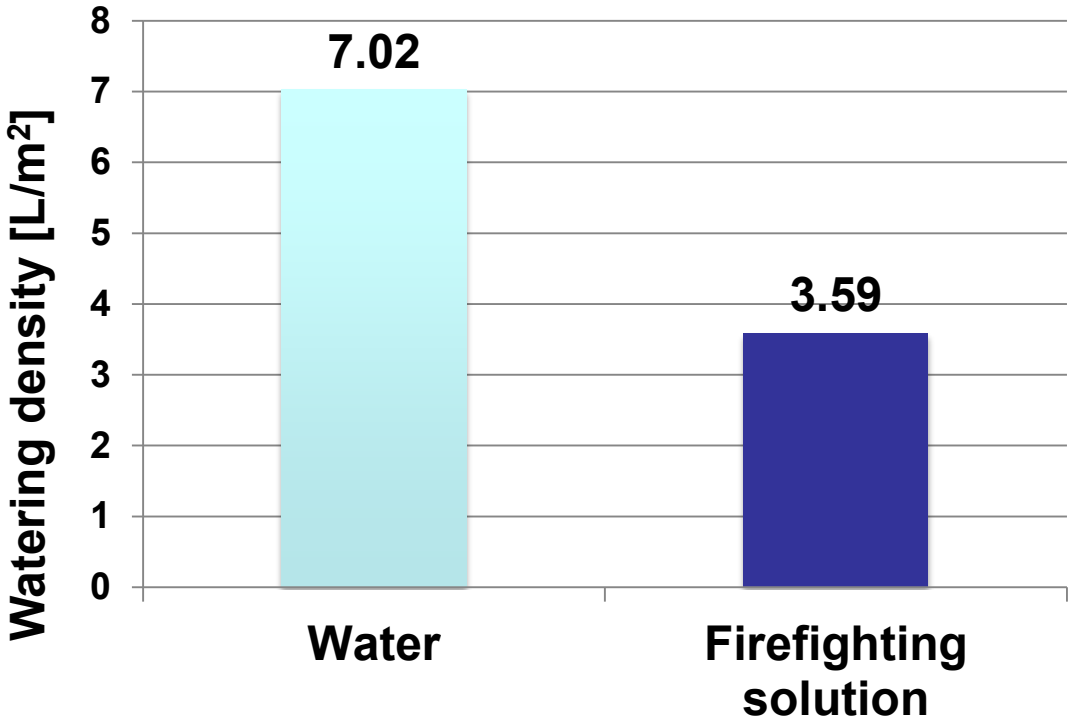
Before firefighting



After firefighting



Required water for firefighting peat fire



Watering density = Required water for firefighting peat fire / Burning area

T. Kanyama, N. Fukuda, K. Uezu, T. Kawahara*
Field Experimental Investigations on the Performance of
an Environmentally Friendly Soap-Based Firefighting Agent on Indonesian Peat Fire
Fire Technology, **59**, 1007-1025 (2023)

Thank you
for your kind attention

Project Members
at CIMTROP, Univ. Palangka Raya

at Field Test Area