

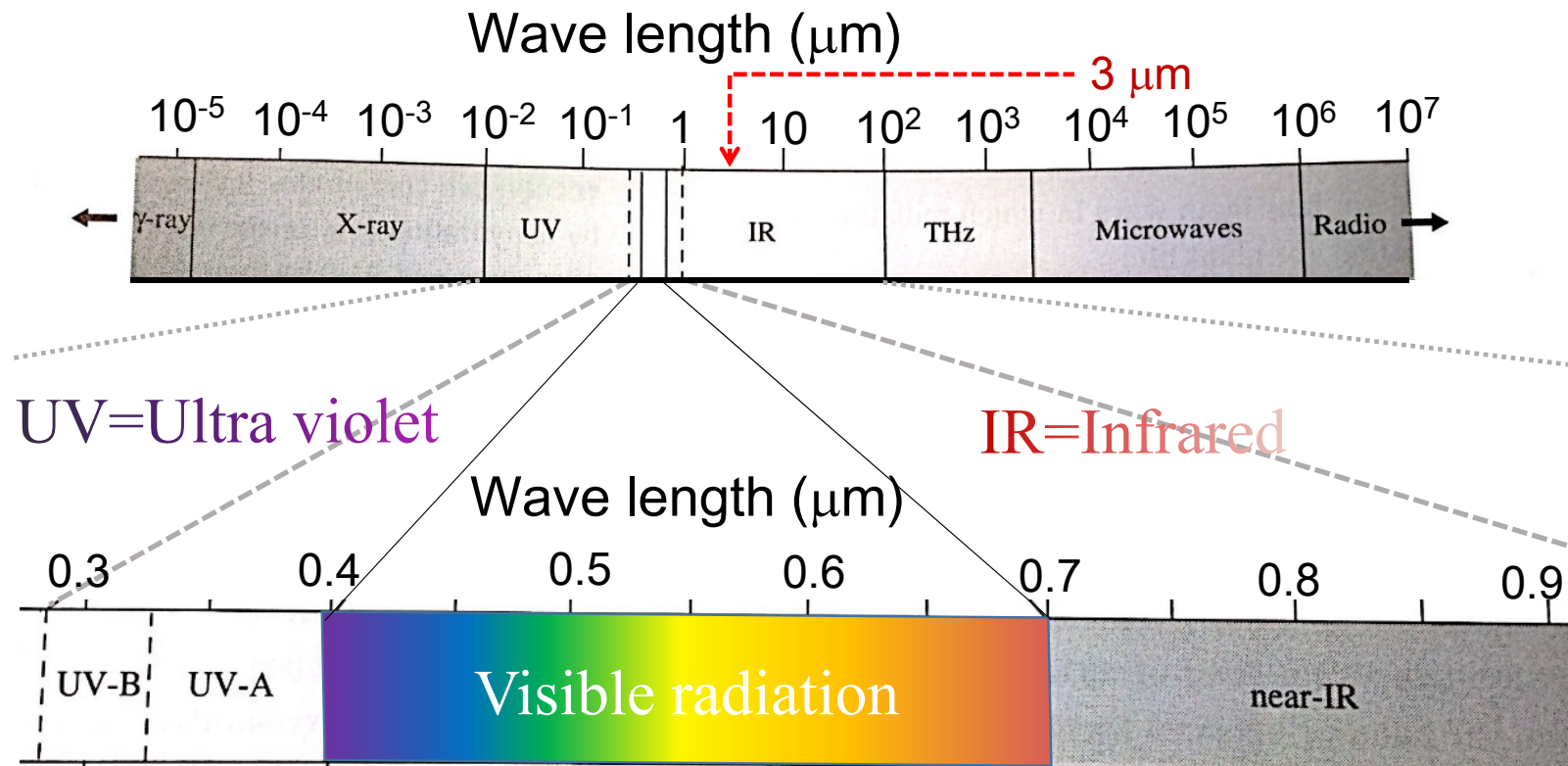
Introduction to Agricultural Meteorology

By

Kazuhiko KOBAYASHI

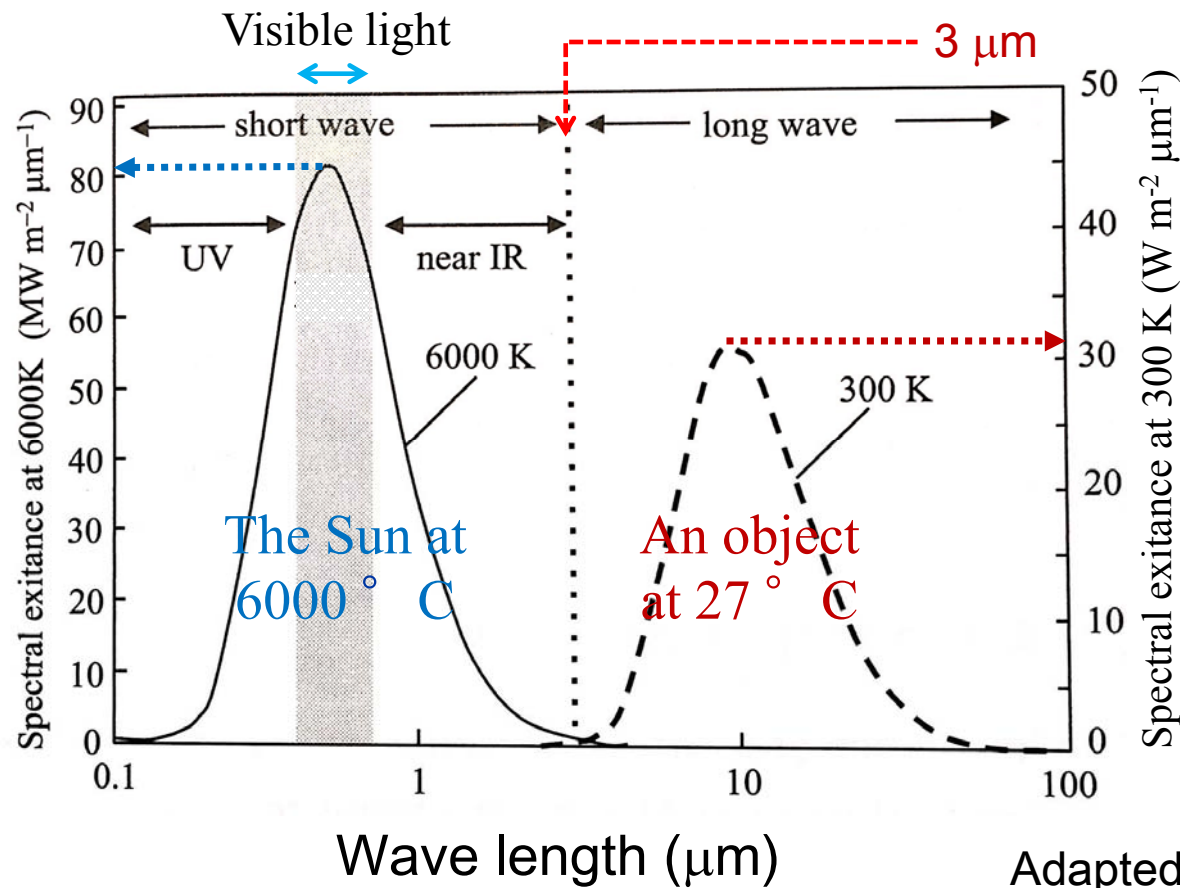
aclasman@mail.ecc.u-Tokyo.ac.jp

Radiation at various wave length



Adapted from Jones (2014)

Radiation is split between short wave and long wave radiations at around $3 \mu\text{m}$.



Note: Scale of the left y-axis for short wave radiation is 10^6 times that of the right y-axis for long wave radiation.

Adapted from Jones (2014)

Fig. 1. Basic principle of energy balance

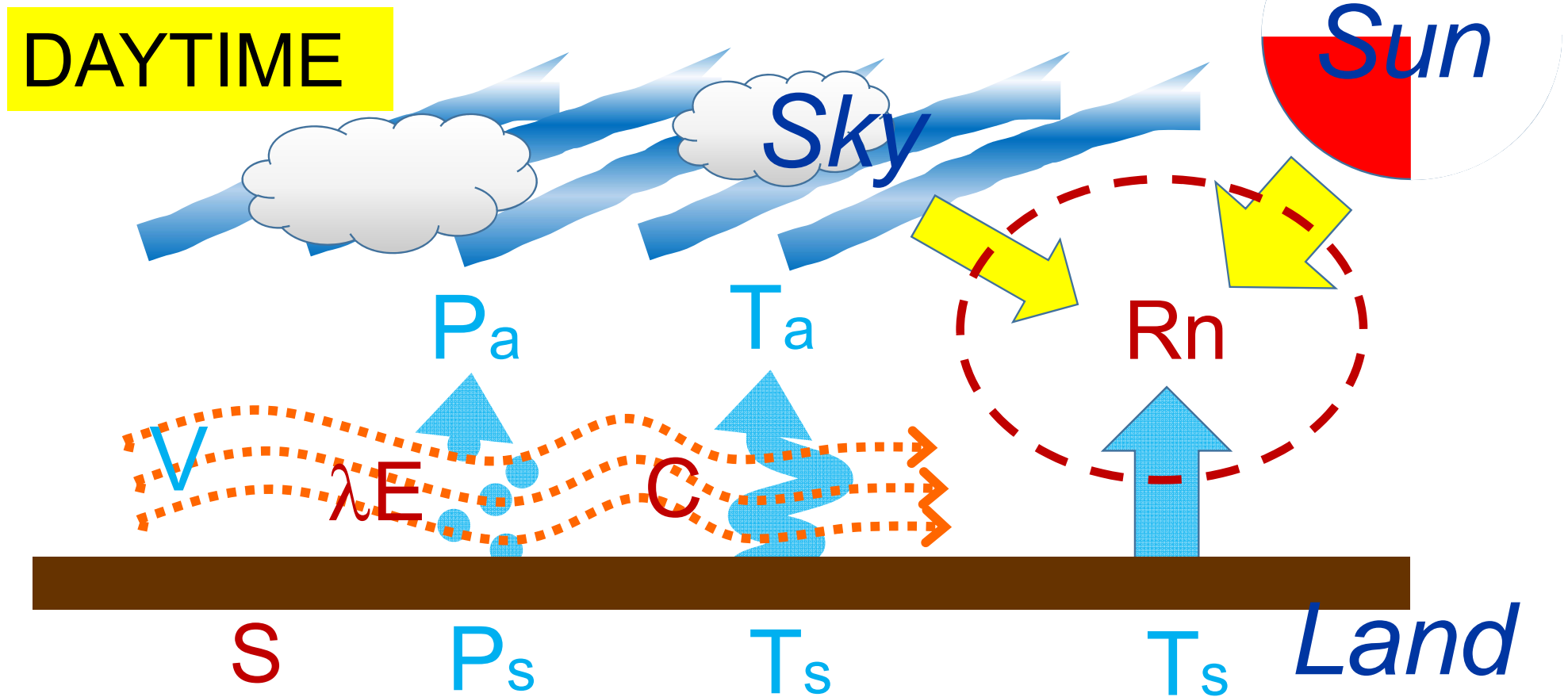


Fig. 1. Basic principle of energy balance

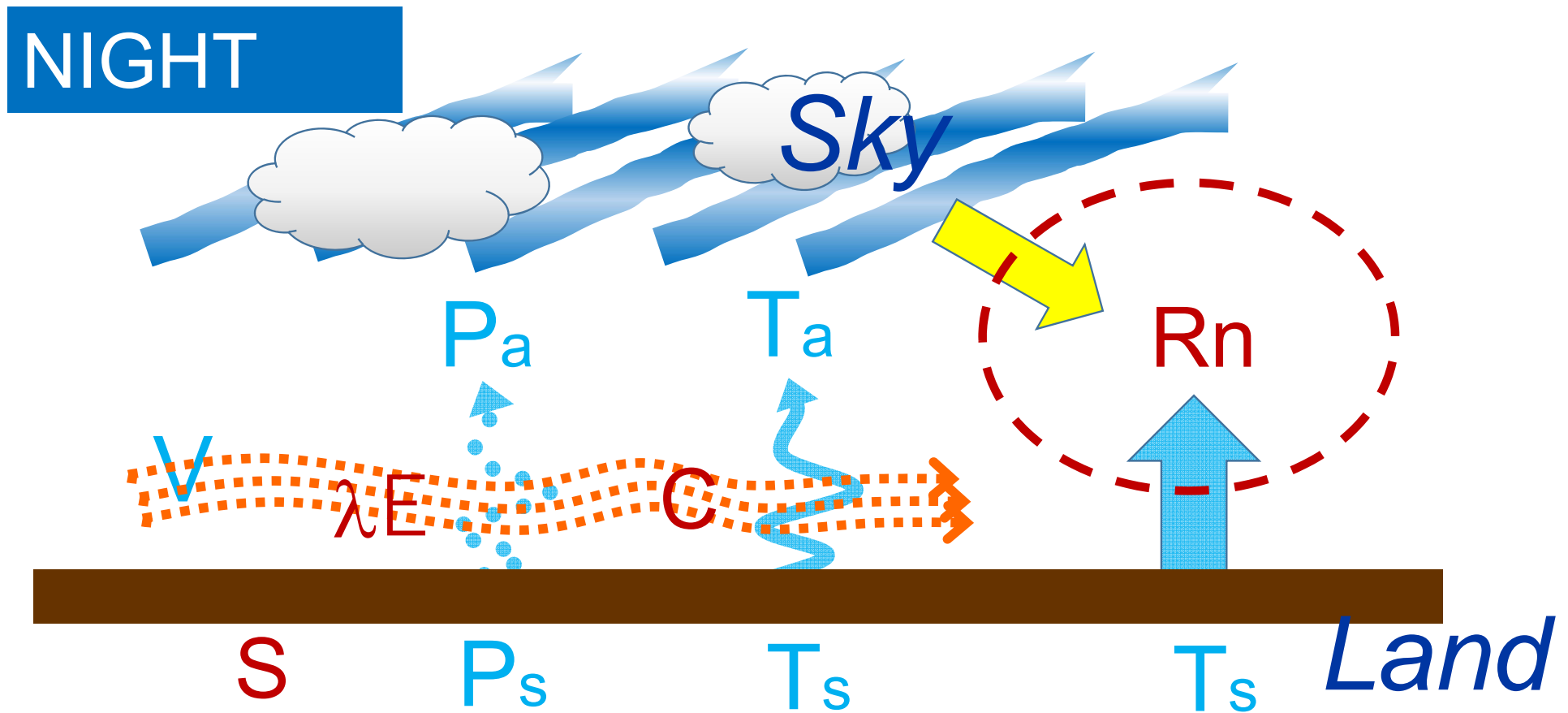
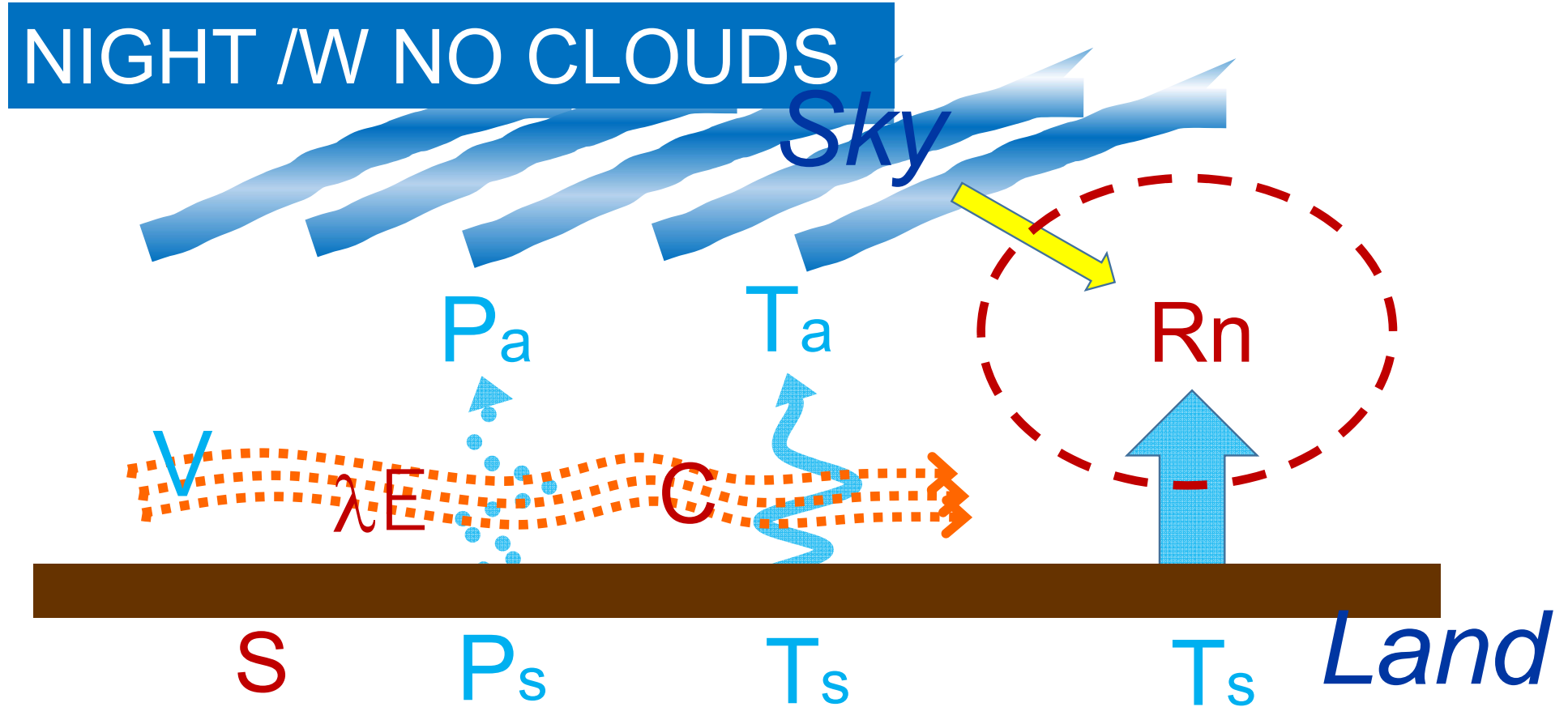


Fig. 1. Basic principle of energy balance



Climate and Agriculture in Hokkaido

Hokkaido Branch of the
Society of Agricultural
Meteorology of Japan
(2012). Hokkaido
Shinbun-sha.

北海道の気象と農業

日本
農業気象学会
北海道支部 [編著]

北海道でいま、何が起きているのか

北海道の気象・気候と自然

寒冷気候の克服

北海道農業のいまと新しい技術

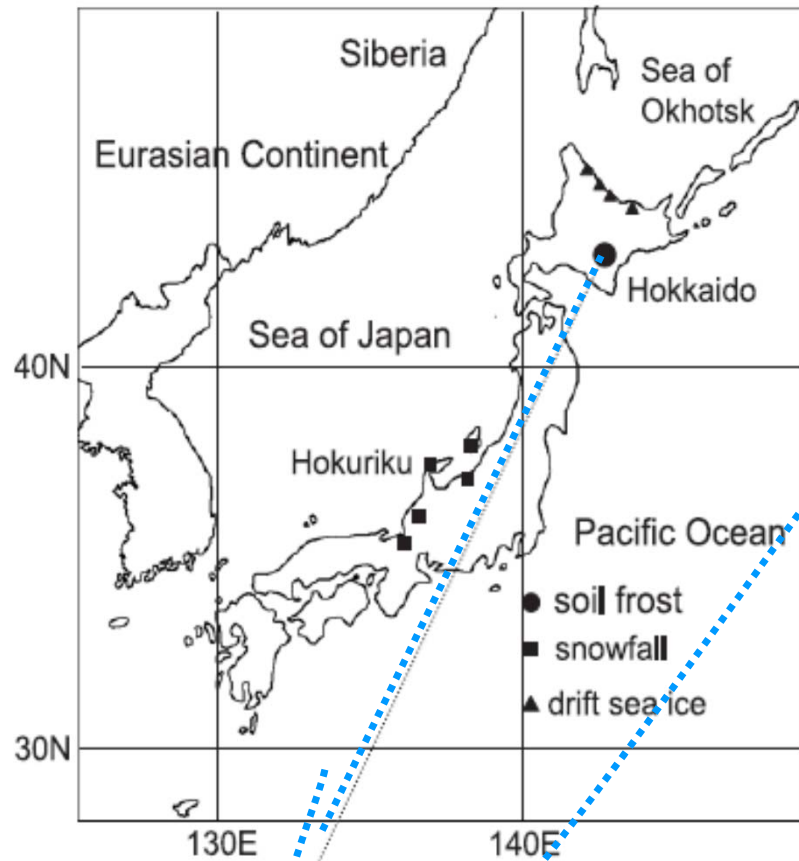
気候資源のエネルギー利用

将来の北海道の気象と農業

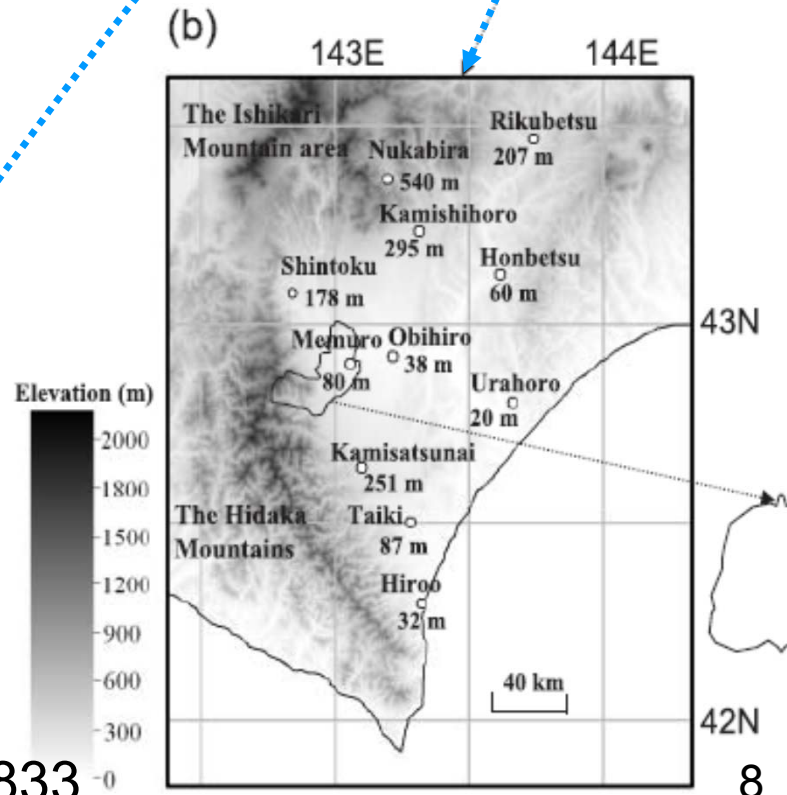


北海道新聞社

2.1. Snow plowing to accelerate soil freezing



Tokachi, Hokkaido

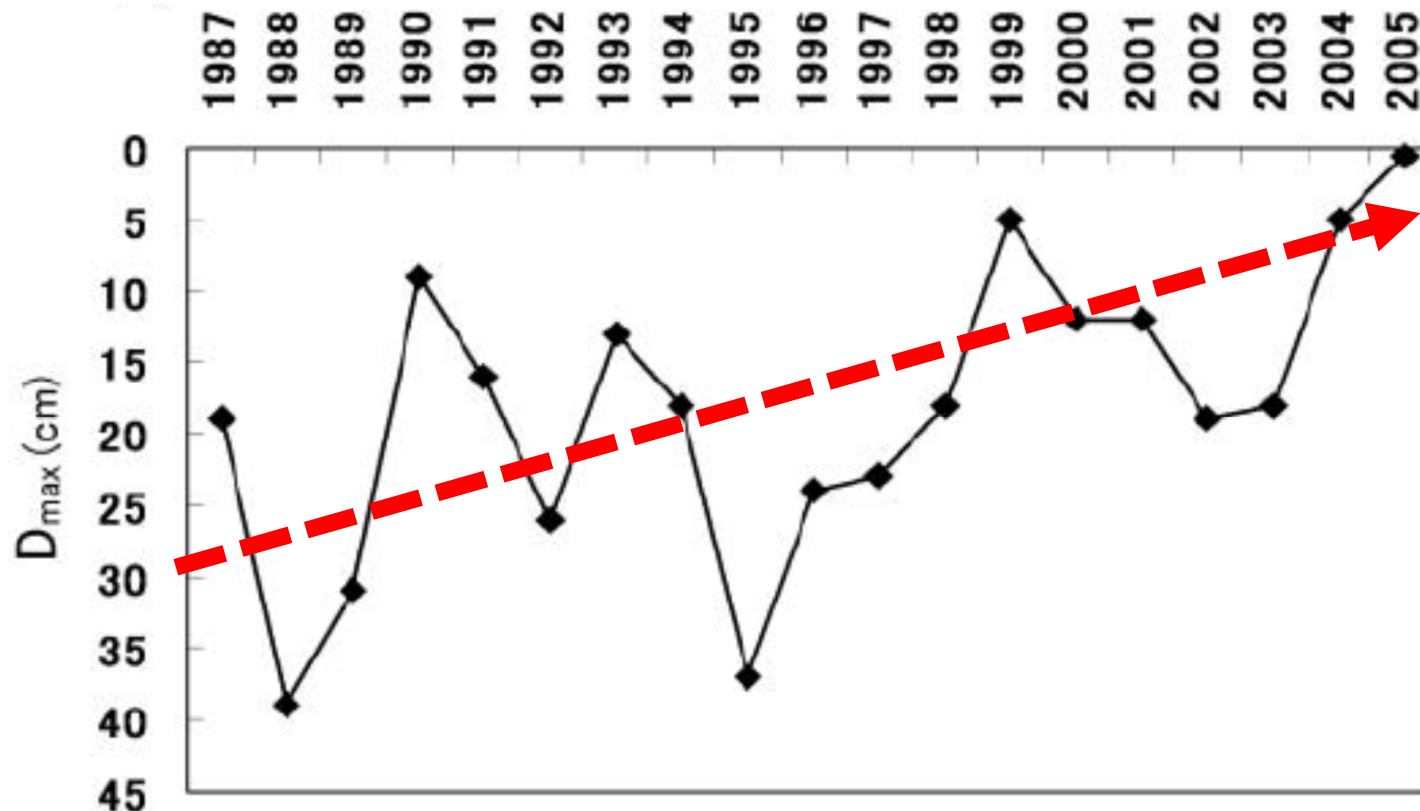


Hirota et al. (2006). JMSJ 84, 821-833

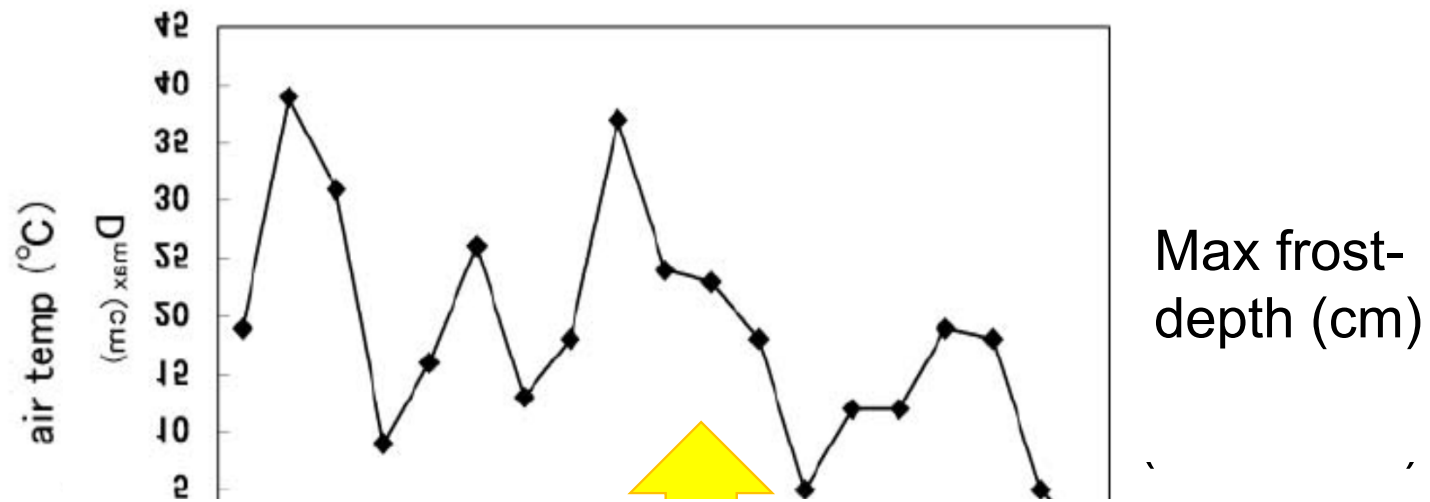
An aerial view over Tokachi, Hokkaido in winter...



Soil-freezing depth has become shallower, why?



Hirota T et al. (2006). Jour. Meteorol. Soc. Jpn. 84, 821-833



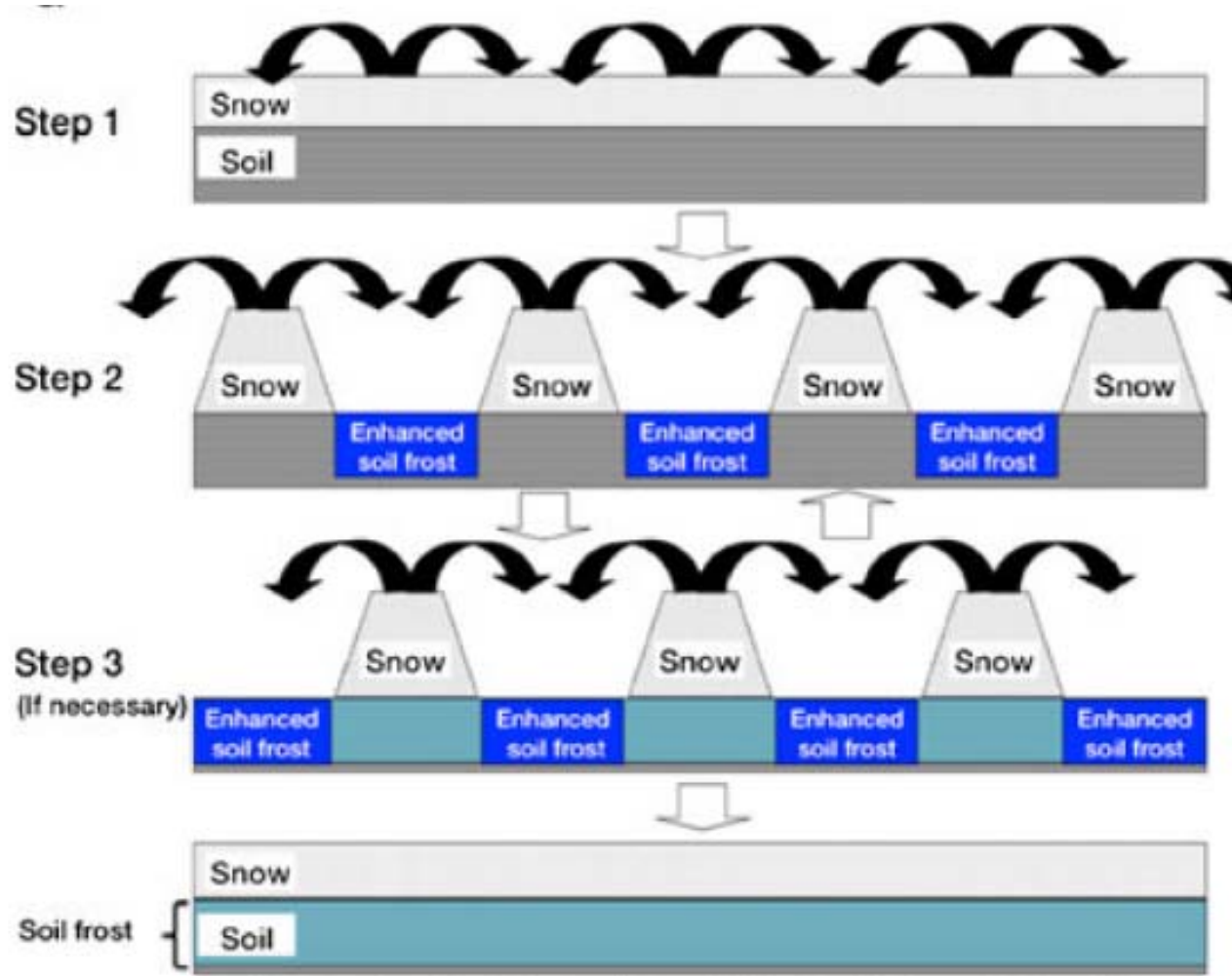
Hirota et al. (2006). JMSJ 84, 821-833

Left-over potato tubers now overwinter to become a weed



The farmers started plowing snow in the middle of winter...

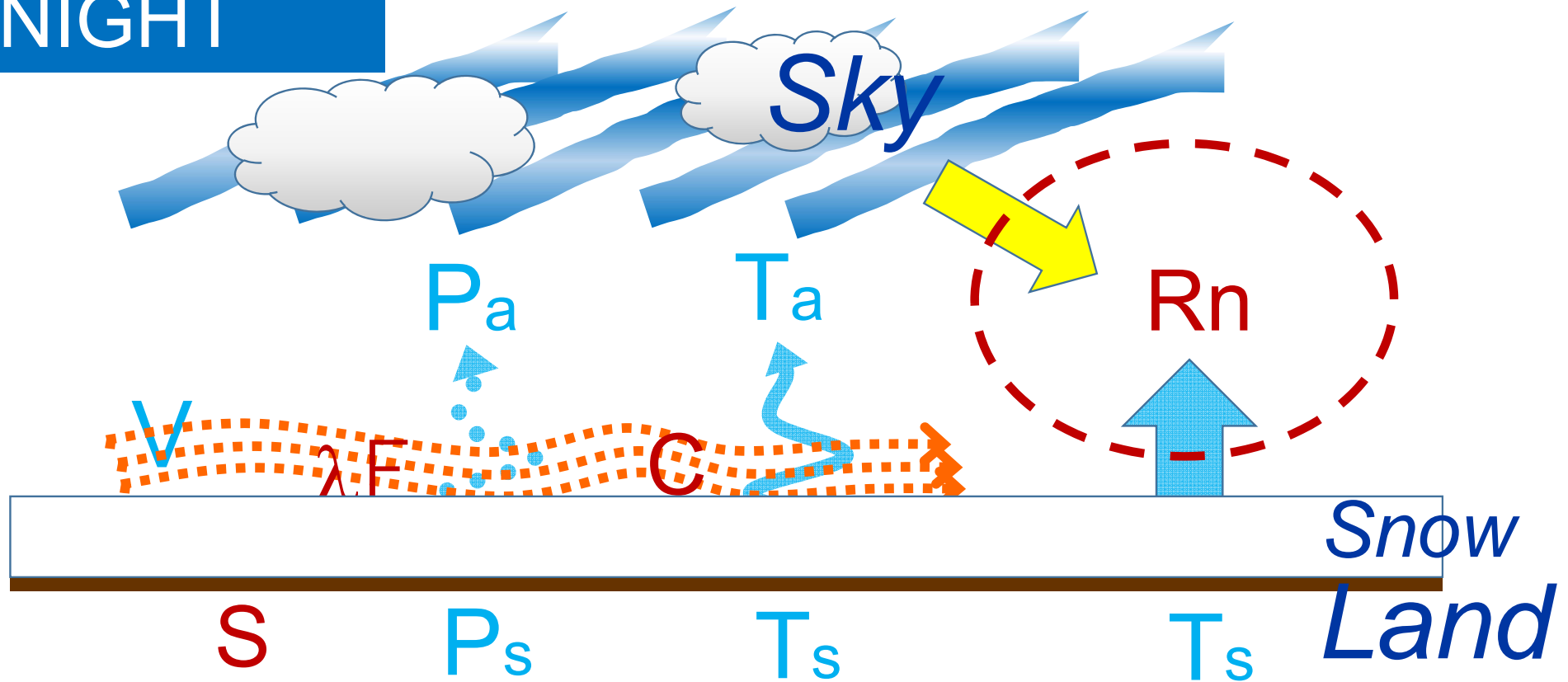




Hirota T et al. (2011). Mitig Adapt Strateg Glob Change.
 DOI 10.1007/s11027-011-9296-8

My question for you: why the snow layer prevents the soil from freezing?

NIGHT



Now, the practice is diffusing to another region of Hokkaido along with a *reinvention: snow pressing*.



Hirota (2016)

Your home work:

- Why does the snow pressing help the soil freezing?
Explain in plain words in English.

Fig.2. Historical records of rice yield in Hokkaido and that in the whole country

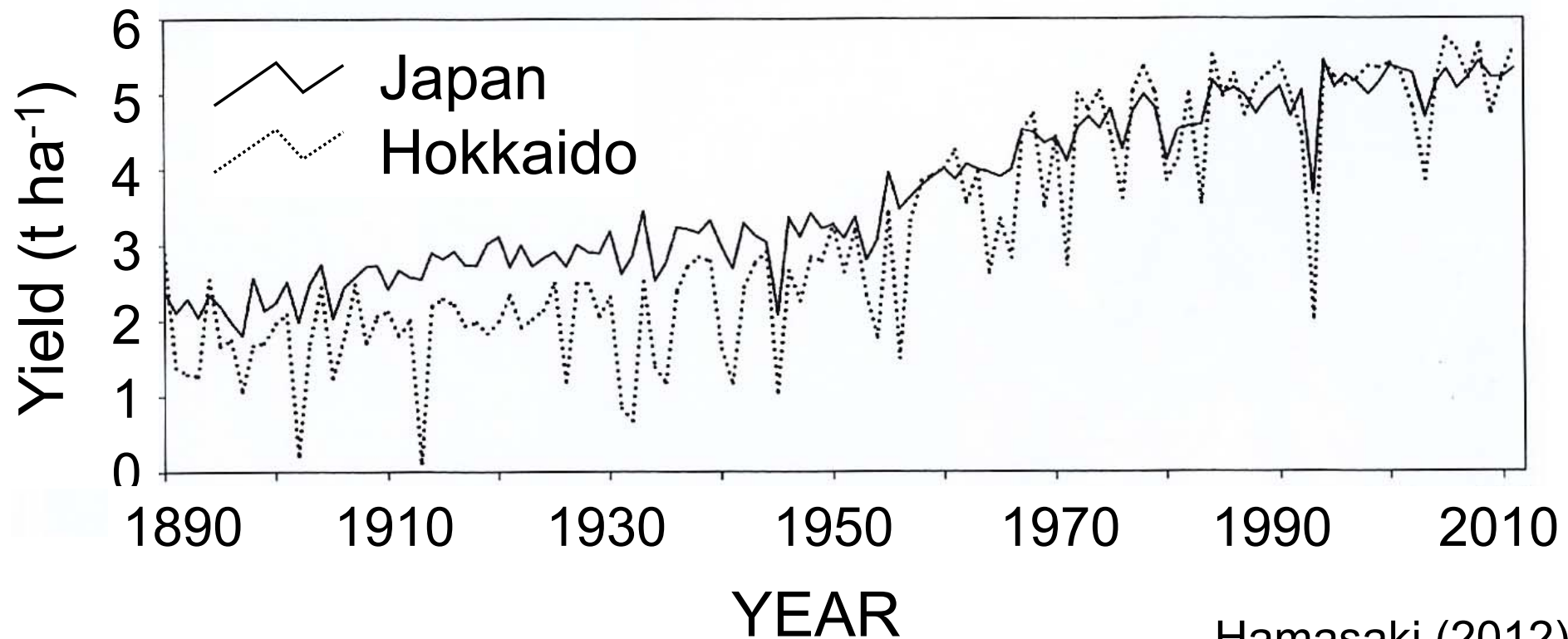
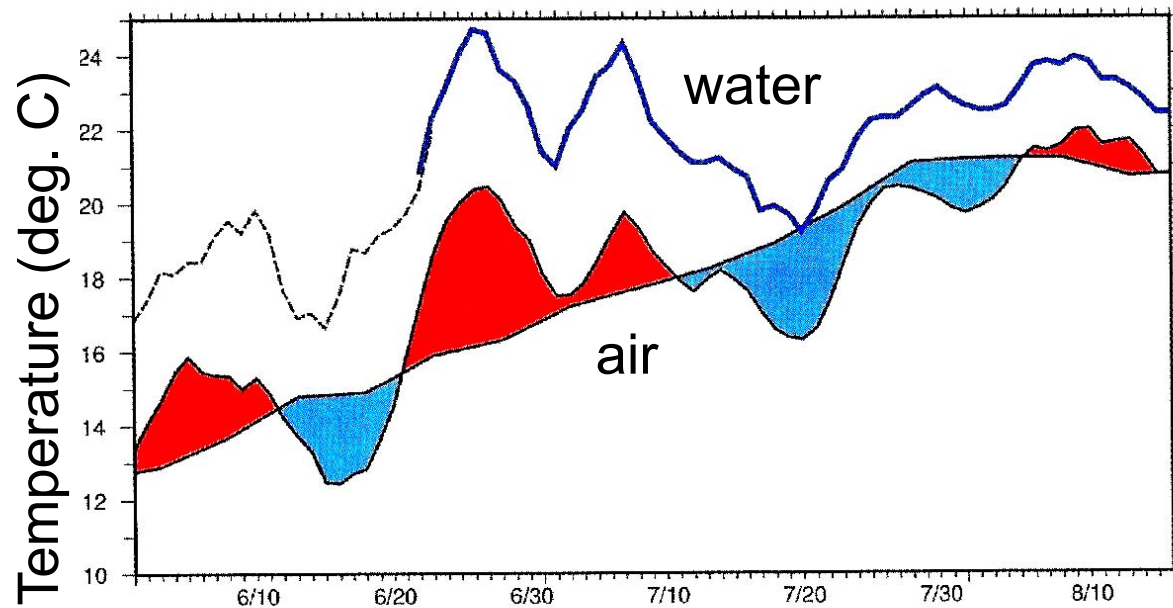
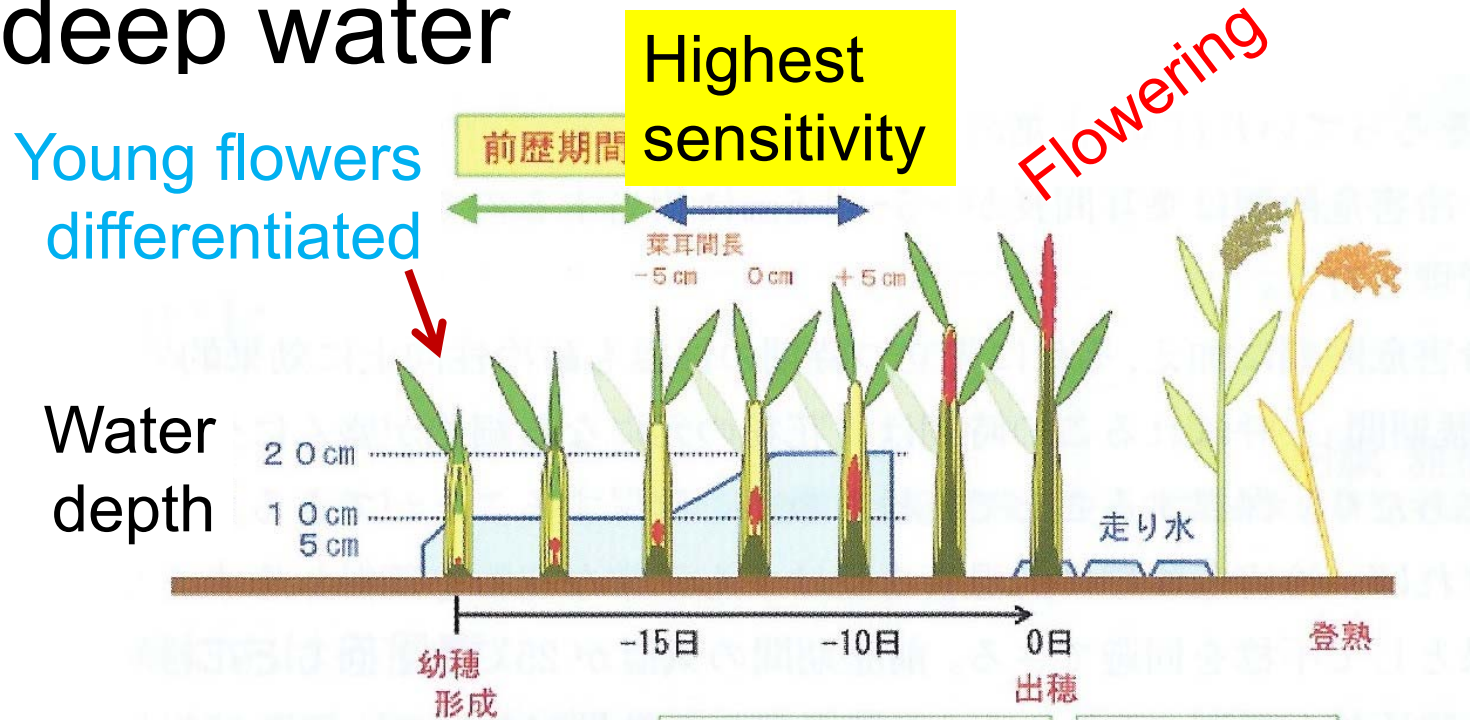


Fig. 3. Protecting rice from cooling damage by deep water



Air and water temperature in Hitsujigaoka, Hokkaido.

Fig. 4. Protecting rice from cooling damage by deep water



Development of a young flowers in rice and the deep-water treatment for protecting them from cooling damages.

My question for you: why water layer is warmer than air?

DAYTIME

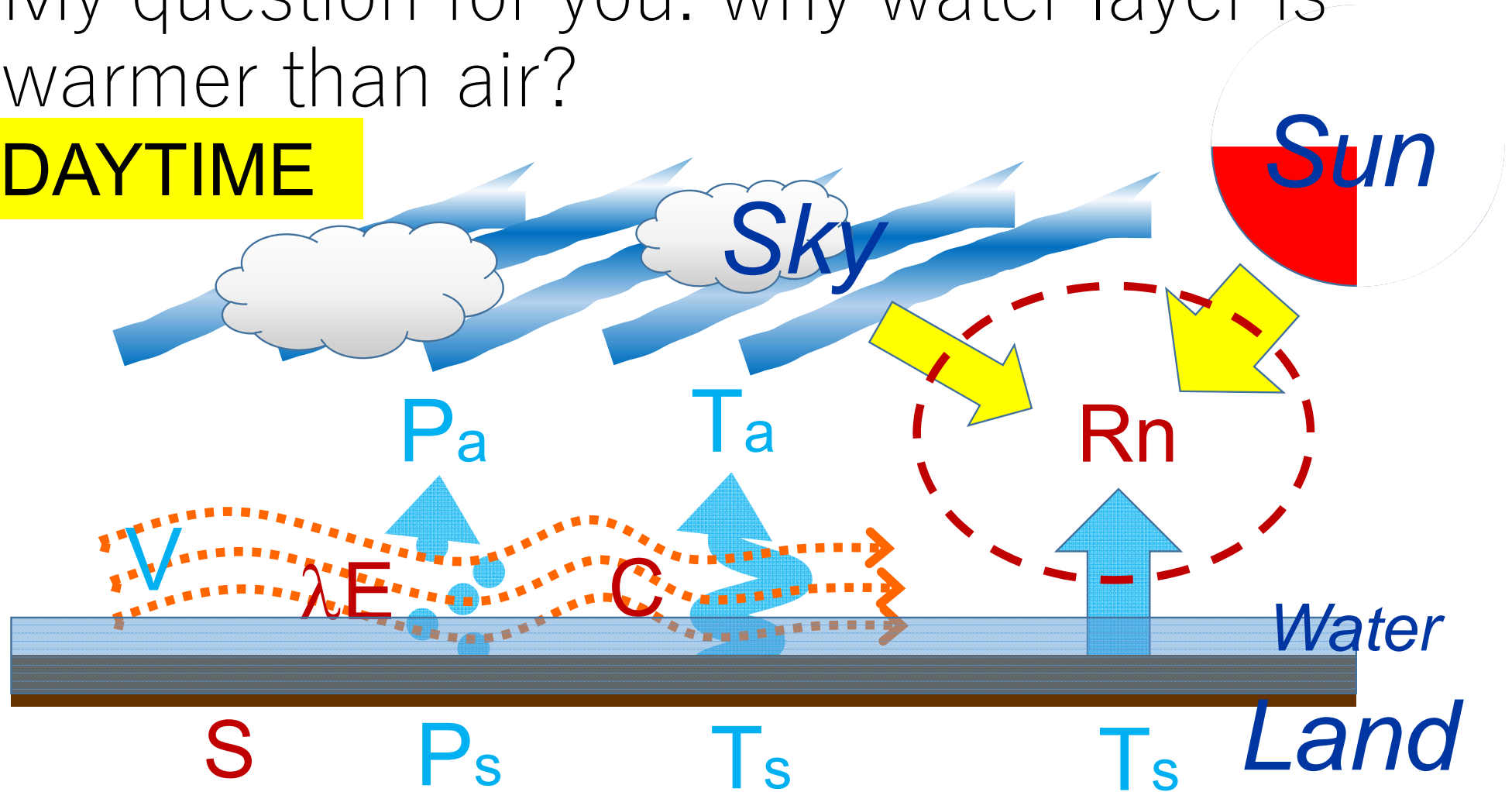


Fig. 5. Greenhouse is warmer than the field

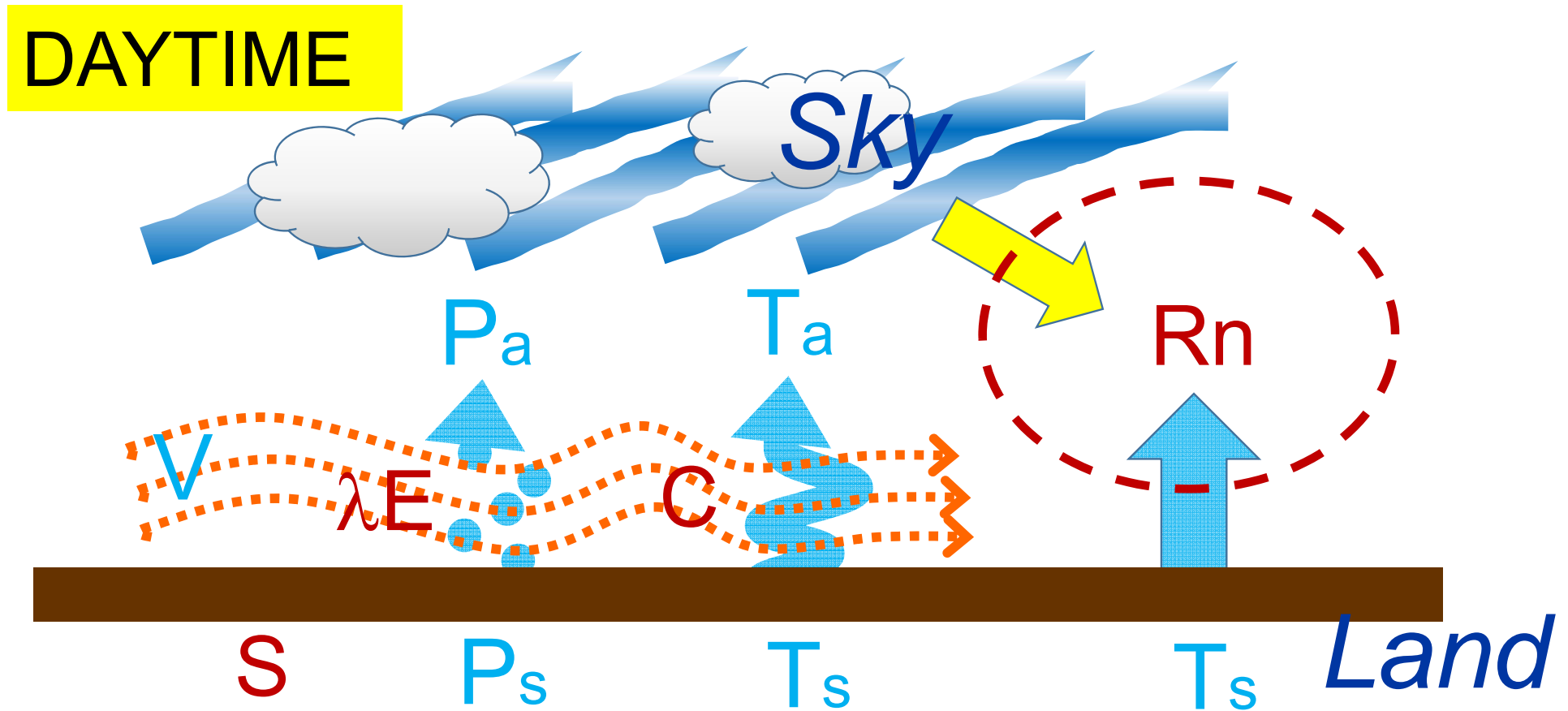


Fig. 5. Greenhouse is warmer than the field
NOT because of the greenhouse effects.

DAYTIME

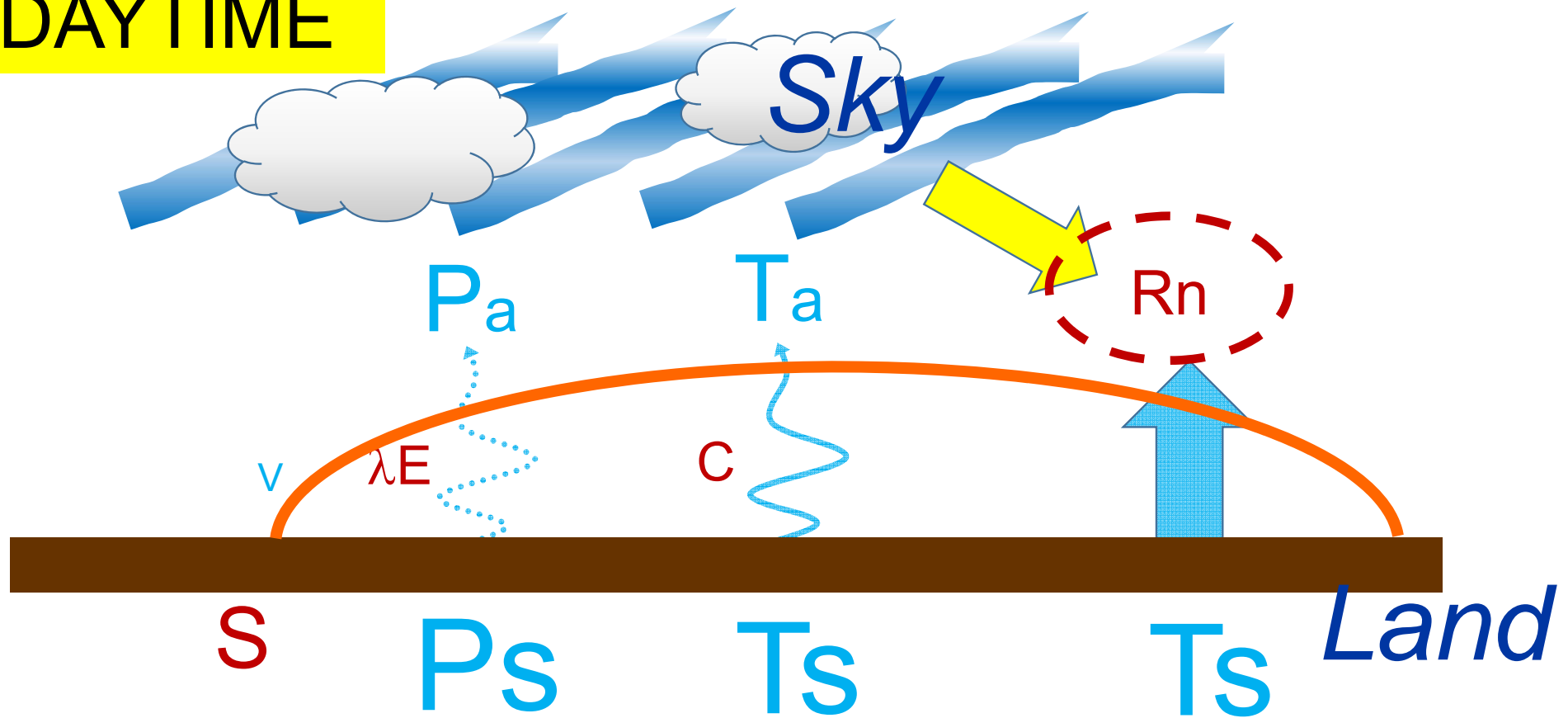
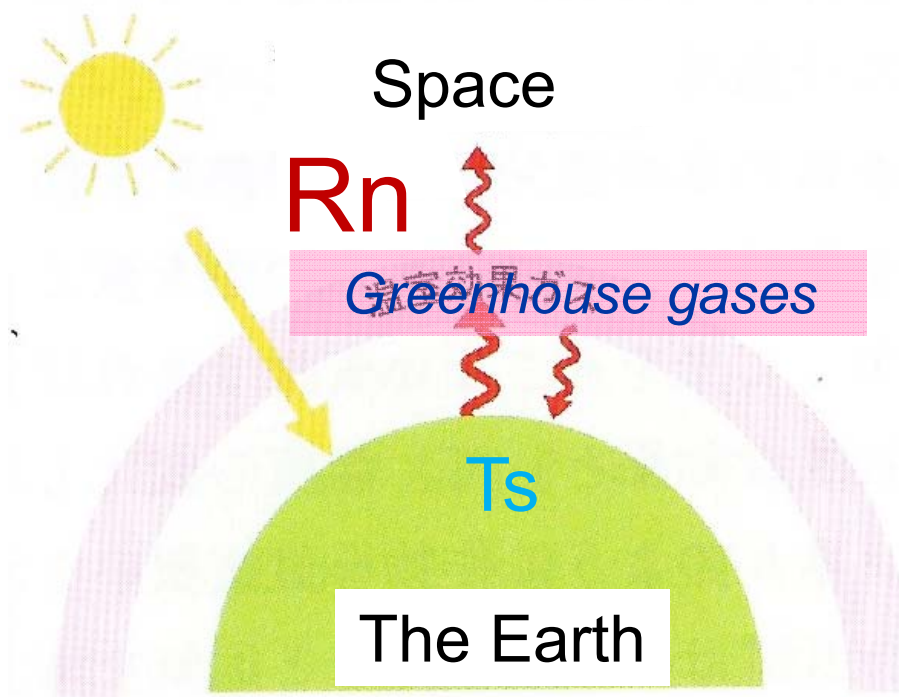


Fig. 6. The greenhouse effect may have to be renamed as the atmospheric effect.



Energy balance of the earth.

Hirota (2012)