

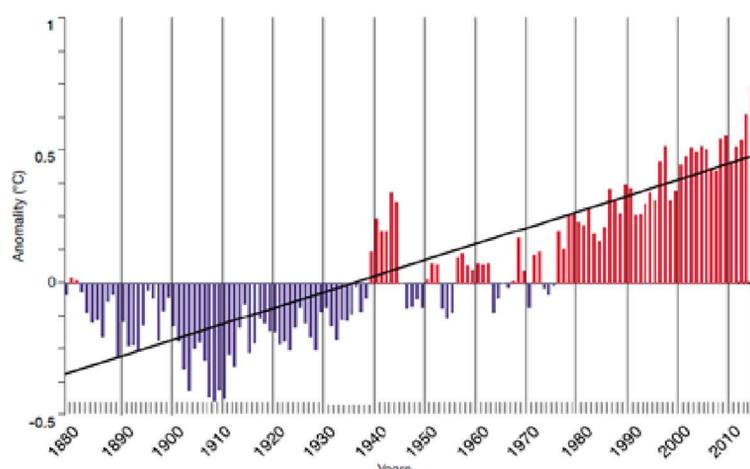
2026 年度 酪農学研究科 博士課程 第 1 期入学試験問題

(必修： 英語) 受験番号： _____

I. 次の英文を読み、以下の問①～④に答えよ

OCEAN WARMING

The ocean absorbs vast quantities of heat as a result of increased concentrations of greenhouse gases in the atmosphere, mainly from fossil fuel consumption. The Fifth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC) in 2013 revealed that the ocean had absorbed more than 93% of the excess heat from greenhouse gas emissions since the 1970s. This is causing ocean temperatures to rise (1).



Annual global sea surface temperature anomalies from 1880 to 2015 with superimposed linear trend (Base period 1951–1980), red positive, blue negative. From: <http://www.ncdc.noaa.gov/cag/time-series/global/globe/ocean/yttd/12/1880-2016>.

Data from the US National Oceanic and Atmospheric Administration (NOAA) shows that the average global sea surface temperature – the temperature of the upper few metres of the ocean – has increased by approximately 0.13°C per decade over the past 100 years. A 2012 paper published in the journal *Geophysical Research Letters* revealed that the deep ocean is also affected, with one third of the excess heat absorbed 700 m below the sea surface. Modelling studies published in IPCC’s 2013 Report predict that there is likely to be an increase in mean global ocean temperature of 1-4°C by 2100.

The distribution of excess heat in the ocean is not uniform, with the greatest ocean warming occurring in the Southern Hemisphere and contributing to the subsurface melting of Antarctic ice shelves.

The ocean’s ability to absorb excess heat has shielded humans from even more rapid changes in climate. Without this oceanic buffer, global temperatures would have risen much more than they have done to date (2). IPCC’s Fourth Assessment Report published in 2007 estimated that the Earth had experienced a warming of 0.55°C since the 1970s. According to an analysis by the Grantham Institute, if the same amount of heat that has gone into the top 2,000 m of the ocean between 1955 and 2010 had gone into the lower 10 km of the atmosphere, the Earth would have seen a warming of 36°C.

Ocean warming leads to deoxygenation – a reduction in the amount of oxygen dissolved in the ocean – and sea-level rise – resulting from the thermal expansion of sea water and continental ice melting. The rising temperatures, coupled with ocean acidification (the decrease in pH of the ocean due to its uptake of CO₂), affect marine species and ecosystems and, consequently, the fundamental benefits humans derive from the ocean (3).

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① 下線部(1)について、この段落では海洋の水温上昇の原因は何によると説明されているか、述べなさい[20 点]

② 下線部(2)を和訳せよ [10 点]

③ 下線部(3)を和訳せよ [20 点]

II. 受験者の修士研究の要旨あるいは博士課程における研究計画のいずれかについて、
40 語以上の単語を用いて英文にて示せ [50 点]