



IESO 2022



15th EDITION

ITALY-AOSTA HOST COUNTRY

DATA MINING TEST N. 2

STUDENT CODE

CLIMATE CHANGE

Stephen Schneider had first predicted global warming in 1976. This made him one of the world's leading global warming experts.

In 1988, for the first time, the greenhouse effect was cited, and the Intergovernmental Panel for Climate Change (United Nations) was founded.

Imagine you are a policymaker who wants to deepen the climate change question. Your objective is to convince your stakeholders that human activities have caused global warming and we have to start NOW to reduce emissions.

THE PAST CLIMATE

1) For millennia (until 1950) atmospheric carbon dioxide levels had never been above...

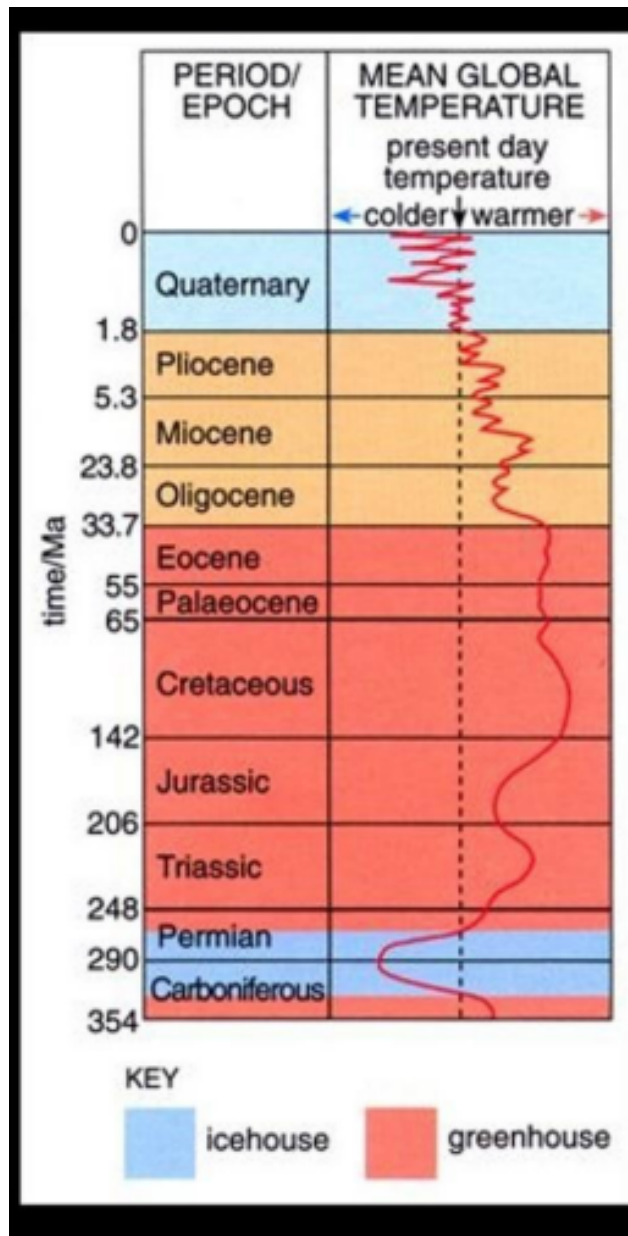
1 answer-1pt

- A. 280 parts per million
- B. 300 parts per million
- C. 320 parts per million
- D. 400 parts per million

<https://climate.nasa.gov/evidence/>

2) By consulting the graph below estimate approximately how many million years the last greenhouse period lasted. *1 answer-1pt*

- A. about 215
- B. about 230
- C. about 240
- D. about 255



3.a) A greenhouse period is characterized by: choose the right answers (more answers are possible) - 1pt

- A. Low temperature gradient between poles and equator
- B. Presence of ice caps only during the winter period
- C. Low carbon dioxide levels
- D. Explosion of life

3.b) Earth's climate is a combination between internal components related to the earth it-self such as ocean circulation and biogeochemical cycles and external output like astronomical cycles, volcanism, and solar radiations. Today, we are living in: 1 answer - 1 pt

- A. Icehouse period with an alternation between glacial and Interglacial.
- B. Greenhouse warm period characterized by high levels of carbon dioxide and other gases.
- C. Transition between Greenhouse and Icehouse
- D. Transition between Icehouse and Greenhouse

<https://www.beg.utexas.edu/sites/default/files/media/0000/0804/Greenhouse%20%E2%80%93%20Icehouse%20Earth.pdf>

4.a) When was the highest level of CO₂ concentration reached in the last 100 millions of years?

1 answer -1 pt

- A. Late Eocene, about 20-25 Ma ago
- B. Early Eocene, about 40-50 Ma ago
- C. Early Oligocene, about 35-40 Ma ago
- D. Early Eocene, about 70 Ma ago

4.b) When was the Paleocene-Eocene Thermal Maximum (PETM) (Ma)? (Put the integer number without measure unit e.g. 98) *1 answer -1 pt*

https://eprints.soton.ac.uk/444830/1/Tierney_Science_Accepted.pdf

Look at the article in the link below referring to the climate of the last millennium

http://stephenschneider.stanford.edu/Publications/PDF_Papers/Bradley.pdf

5.a.) There is a graph where different authors estimate the value of temperature with different techniques. Although there is high variability we can say that from about 1000 A.D. to about 1600 A.D. there was a trend of the temperature *1 answer -1 pt*

- A. Positive
- B. Negative

5.b) This trend was principally due to: *1 answer -1 pt*

- A. Change in the orientation of Earth axis
- B. Solar activity
- C. High volcanic activity
- D. Meteorite impact

6) Panarea islands: a window on the future

The increase of CO₂ concentration influences marine biodiversity and habitat. The Island of Panarea, in the Aeolian system, Italy, presents a natural acidified environment generated by submarine volcanoes. The article in the link presents the benthic invertebrate's distribution along sea acidification gradients. Taking in consideration the results presented in the diagrams in the second part of the article, sign the 3 observed impacts of acidification on the marine benthic habitat (more answers): *(more answers are possible) - 1pt*

- A. Greater number of smaller size individuals
- B. Fewer number of smaller size individuals
- C. Greater number of less calcified individuals
- D. Fewer number of less calcified individuals
- E. Greater number of detritivore species

<https://www.mdpi.com/2077-1312/10/4/451/htm>

RECENT CLIMATE CHANGE

7) If all ice coming from Greenland and Antarctica would melt, the global sea level would rise by:

1 answer -1 pt

- A. 20 m
- B. 60 m
- C. 195 m
- D. 228 m

<https://sealevel.nasa.gov/understanding-sea-level/global-sea-level/ice-melt>

8) If global warming will continue to increase at the current rate, it is likely to reach 1.5°C approximately between: *1 answer -1 pt*

- A. 2030 and 2052
- B. 2040 and 2062
- C. 2050 and 2072
- D. 2060 and 2082

https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SPM_version_report_HR.pdf

9) Choose the right answer. Referring to the year 2019 (Source data = CAIT) *1 answer -1 pt*

- A. The major producer of Greenhouse Gasses (GHG) / per capita in the world is China
- B. The major producer of GHG in the world is China
- C. The European Union is at the second place for the GHG / per capita emissions
- D. India has a negative trend for the global GHG emission in the last 5 years

https://www.climatewatchdata.org/ghg-emissions?end_year=2019&start_year=1990

[Population, total | Data](#)

10) What has been the rate of variation of CO₂ level in the last 30 years (ppm/year)? *1 answer -1 pt*

- A. About 1 ppm / year
- B. About 2 ppm / year
- C. About 3 ppm / year
- D. About 4 ppm / year

https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter02.pdf

11) Anthropogenic activities are estimated to have caused an increase of temperature approximately of °C: (enter a decimal place without measure unit e.g. 4.3) *1 answer -1 pt*

https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SPM_version_report_HR.pdf

12a) The decrease of the water pH-value, with respect to the preindustrial era has been approximately of: *1 answer -1 pt*

- A. 0.1 unit of pH
- B. 0.2 unit of pH
- C. 0.3 unit of pH
- D. 0.4 unit of pH

12b) The calculated global pH (CMEMS) reached the value of 8.06 approximately in the year:

1 answer -1 pt

if you need you can print the graph: <https://www.eea.europa.eu/ims/ocean-acidification>

- A. 2008
- B. 2010
- C. 2015
- D. 2019

13) Decrease of pH caused by ocean acidification will provoke *(more answers are possible) - 1pt*

- A. Eutrophication
- B. Decrease of size of marine life with calcareous skeleton
- C. Dissolution of carbonate
- D. Increase of carbonate thickness of shells

<https://www.frontiersin.org/articles/10.3389/fmars.2021.584445/full>

14) REGIONAL FACTS

Click at the following link (IPCC Interactive Regional Atlas), set the proper filters on the database, and respond to the questions:

<https://interactive-atlas.ipcc.ch/regional-information>

Note: set always: DATASET - Model projection CMIP6; SEASON annual

14a) Where is the increase of the atmospheric mean temperature (T) higher? (Baseline 1850-1900 - scenario SSP1-2.6, period: Near Term (2021-2040)) *1 answer -1 pt*

- A. Central Europe
- B. Arctic Zone
- C. Antarctic Zone
- D. Equatorial region
- E. Mean temperature difference equally distributed

14b) Where is the difference of pH at the sea surface higher? (Baseline 1850-1900 - scenario SSP1-

2.6) *1 answer -1 pt*

- A. Atlantic Ocean
- B. Mediterranean Sea
- C. Pacific Ocean
- D. Indian Ocean
- E. About the same mean difference of pH everywhere

14c) In which region will there be a higher sea level rise? (Baseline 1995-2014 - scenario SSP1-2.6, period Medium Term (2041-2060)) *1 answer -1 pt*

- A. Along the eastern coasts of Africa
- B. Along the eastern and northern coasts of North America
- C. On the Australian coasts
- D. On the Japan coasts
- E. About the same level everywhere