УТВЕРЖДЕНО

Решение заседания кафедры

общего землеведения и гидрометеорологии

21 ноября 2024 г., № 4

Теоретические вопросы для проведения экзамена

по учебной дисциплине «Paleoclimatology»

Форма проведения – устная

1. The main objectives of Paleoclimatology. Sources of paleoclimatic information. Connection with other scientific disciplines.
2. The applied value of Paleoclimatology. Levels of paleoclimatic analysis. Modeling in Paleoclimatic Research.
3. The nature of climate and climatic variation. The climate system. Feedback mechanisms in climate system.
4. Energy balance of the Earth and its atmosphere. Timescales of climatic variation.
5. Variations of the Earth’s orbital parameters. Solar forcing. Volcanic forcing.
6. Principles of radiocarbon dating. Measurement procedures, materials, and problems. Accuracy of radiocarbon dates. Sources of error in radiocarbon dating. Causes of temporal radiocarbon variations.
7. Potassium-argon dating. Problems and usage. Uranium-series dating. Problems of U-series dating. Luminescence and thermoluminescence dating: principles and applications.
8. Paleomagnetism. The paleomagnetic timescale. Amino acid dating. Tephrochronology. Lichenometry.
9. Ice cores metods. Stable isotopes in water: measurement and standardization. 18O concentration in atmospheric precipitation. Factors affecting the stable isotope record in ice cores. Visual stratigraphy. Glaciochemistry. Electrical conductivity measurements. Radioactive fallout.
10. Ice cores metods. Volcanic sulfate and tephra. Theoretical models. chronostratigraphic correlations. Paleoclimatic reconstruction from ice cores. Ice-core records from Greenland. Ice-core records from Antarctica.
11. Marine sediments. Paleoclimatic information from biological material in ocean cores. Oxygen isotope studies of calcareous marine fauna. Isotopic composition of the oceans. Oxygen isotope stratigraphy. Orbital tuning. Orbital forcing: evidence from the marine record. Sea-level changes and 18O.
12. Paleotemperatures from relative abundance studies. Paleotemperature reconstruction from sediment geochemistry. Oceanographic Conditions at the Last Glacial Maximum (LGM)
13. Paleoclimatic information from inorganic material in marine sediments. Thermohaline circulation of the oceans Tracers in the ocean. Changes in atmospheric carbon dioxide: the role of the oceans Abrupt climate change.
14. Chronology of loess-paleosol sequences. Paleoclimatic significance of loess-paleosol sequences
15. Speleothems. Paleoclimatic information from periods of speleothem growth. Speleothems as indicators of sea-level variations.
16. Lake sediments. Sedimentology and inorganic geochemistry. Varves, pollen, macrofossils, and phytoliths, ostracods, diatoms, stable isotopes, organic biomarkers.
17. Nonmarine geologic evidence. Periglacial features. Snowlines and glaciation thresholds. The climatic and paleoclimatic interpretation of snowlines and elas. The age of former snowlines. Mountain glacier fluctuations. Evidence of glacier fluctuations. The record of glacier front positions.
18. Lake-level fluctuations. Hydrologic balance models. Hydrologic-energy balance models. Regional patterns of lake-level fluctuations. Evidence from Continental Regions.
19. Insects records. Paleoclimatic reconstructions based on fossil coleopteran. Paleoclimatic reconstruction based on aquatic insects.
20. Biological records Former vegetation distribution from plant macrofossils. Arctic tree line fluctuations. Alpine tree line fluctuations. Lower tree line fluctuations and rodent middens. Peat.
21. The basis of pollen analysis. Pollen grain characteristics. Pollen productivity and dispersal: the pollen rain. Sources of fossil pollen. Preparation of the samples. Pollen analysis of a site: the pollen diagram. Zonation of the pollen diagram.
22. Pollen rain as a representation of vegetation composition and climate. Maps of modern pollen data. Mapping vegetation change: isopolls and isochrones.
23. Quantitative paleoclimatic reconstructions based on pollen analysis. Paleoclimatic reconstruction from long quaternary pollen records.
24. Tree rings. Fundamentals of dendroclimatology. Sample selection. Cross dating. Verification of climatic reconstructions. Calibration of tree-ring data. Dendroclimatic reconstructions. Wildfires and dendroclimatology. Isotopic dendroclimatology
25. Coral records of past climate. Paleoclimate from coral growth rates. Luminescence in corals. Trace elements in corals. Fossil coral records.
26. Historical records and their interpretation. Historical weather observations. Historical records of weather dependent natural phenomena. Phenological and biological records.

Старший преподаватель кафедры \_\_\_\_\_\_\_\_\_\_\_\_\_ О. В. Давыденко