UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Geology of The Quaternary

2021-3-E3401Q052

Aims

Acquiring the capacity of survey on Quaternary continental deposits.

Contents

Methodology in Quaternary continental deposit survey; Evolution of quaternary sedimentary environments and outcrops stratigraphic descriptions.

Paleoclimatic archives and proxy data: lakes, glaciers, loess

Radiometric dating of Quaternary sequences: Radiocarbon, U/Th, optical stimulated methodologies, exposure ages, other radioisotopic methods

Quaternary Stratigraphy in continental environments, Use of litho-, magneto-, bio., Allo-, chronicles-, climate-stratigraphy. Complex stratigraphic systems, Identification of unconformity boundaries and use in the quaternary geology.

Climatic-environmental evolution of the Quaternary from Pleistocene to Holocene of continental deposits.

Detailed program

Introduction. Definition and subdivision of the Quaternary period.

Stratigraphy: lithostratigraphic, allostratigraphic, magnetostratigraphic, biostratigraphic, tephrostratigraphic,

chronostratigraphic, climatostratigraphic units.

Paleoclimatology. ?18O in the cores from the seafloor and ice. The astronomical theory of climatic variations. Cycles of precession, obliquity and glacial-interglacial cycles of greater amplitude than 100,000 years. Variations in the concentration of CO2 and CH4. Fluctuations in sea level. Cycles with high frequency and short events. Climatic characteristics of the last glacial-interglacial transition and its climatostratigraphic subdivision.

Environment and lacustrine deposits. Lake, swamp, bog and associated deposits, biogenic organic, inorganic biogenic, clastic. Genesis of the lakes. Depositional types, coastal and deep facies. Rhythmites and varves. Deformational events in lacustrine deposits. Succession in marsh river environment. Sampling techniques and coring in the lake and marsh deposits.

Environment and glacial deposits. Classification and representation of deposits glacial till and diamicton. Thermal classification of glaciers. Glacial flow. Erosion: excavation and abrasion. Transportation of subglacial sediments. Till deposition. Subglacial melting tills. Proglacial sedimentation underwater. Delta glacial contact. Erosion of a glaciated valley. Deglaciation of a glaciated valley and fluvioglacial deposition. Paraglacial deposits.

Periglacial environment and wind. Permafrost. Forms and deposits in a landscape of periglacial environment. Cryoturbation. Loess: stratigraphic importance. Recognition in the country.

Slope deposits. Mass movements, processes of erosion. Debris slopes and slope breccias. Colluvium. Identification of a landslide. The cycle of sedimentation of the shelters under.

Soils and paleosols in Quaternary Geology. Coat of alteration, alterite, regolith, saprolite. Profile of a soil profile and alteration, and their description. Some processes of pedogenesis and their environment and climate: podzolizzation, brunification, leaching of clays, fersiallitizzazione, desilicizzation. Influence of the station. Holocene human impact on soil. Soils and environments in the FAO soil map. Paleosols, vetusols. Time evolution of certain diagnostic horizons. Soil and stratigraphic discontinuities. Land use in the characterization of Quaternary geologic units.

Radiocarbon and outline other numerical dating methods. Radiocarbon: production and incorporation of 14C in the biosphere, contamination, measured by count, standard deviation, dendrochronological calibration. Selection of plants for 14C dating. Meaning of 14C dating in soils. The diagram on calibration of a radiocarbon date. Thermoluminescence, K-Ar, nods to other dating methods used in the Quaternary.

Biological and paleoclimate archives. Palynology, plant macroremains and their use in the reconstruction of palaeoenvironments continental

Prerequisites

None

Teaching form

With exception due to the COVID rules, lessons and field trips. Survey campain at the end of course (obliged)

Textbook and teaching resource

Ford D.C., Williams P.W. 1989. Karst Geomorphology and Hydrology. Umwin Hyman Ltd. London.

Bini, A., 1990. Dispense di Geologia del Quaternario. 1 Descrizione di affioramenti e sezioni stratigrafiche. Valdina Libreria Universitaria, Piazzale Gorini 10, Milano.

Castiglioni GB., 1986. Geomorfologia. UTET, Torino.

Cremaschi M., 1991. Paleosuoli: il suolo per la ricostruzione paleoambientale, la geologia del Quaternario e la ricerca archeologica. In (Cremaschi M. e Rodolfi G. eds.) - Il suolo. NIS, Roma. Pp. 283-317.

Cremaschi M., 2000. Il tempo e la sua misura (Pp. 191-216). Gli archivi privilegiati. Geoarcheologia dei depositi in ripari sottoroccia e nella parte atriale delle cavità (pp. 261-290). In: Manuale di Geoarcheologia. Laterza, Roma.

Benn D.I., Evans D.J.A. 1998. Glaciers and Glciations. Arnold.

Bradley R.S. 1999. Quaternary Paleoclimatology. Elsevier.

Orombelli G., 2000. Le glaciazioni e le variazioni climatiche. Istituto Lombardo di Scienze e Lettere, Incontro di Studio n. 18: 135-150.

Previtali F., 2001. Classificazione dei processi pedogenetici. In: Elementi di Geopedologia. Pp. 39-109.

Ravazzi C., 2003 (a cura di). Gli antichi bacini lacustri e i fossili di Leffe, Ranica e Pianico-Sèllere (Prealpi Lombarde). CNR-IDPA, Milano.

Vai G.B. (Ed.), 2004. Paleoenvironmental map of Italy during the LGM. IGC Firenze, Agosto 2004.

Bennet M.R., Glsser N.F. 2009. Glacial Geology: Ice sheet and landforms (2 edition). Wiley-Blackwell.

Knight P.G. 2009. Glacier Science and Environmental Change. Wiley-Blackwell.

Semester

Second semester

Assessment method

With exception du to the COVID rules, oral exams is 2 question on all the program and whit the discussion on the field trip/survey campaign maps. The final mark is expressed in thirtieths.

Office hours

Take an appointment at valter.maggi@unimib.it