

based on the climatic tolerances and requirements of each plant identified by its pollen grain. The CARAIB model has been adapted to simulate the distribution of BAGs, as well as their net primary productivities and biomasses. The BAG distributions in France reconstructed from pollen data and CARAIB simulations will be presented. We have elaborated a comparison method aiming: i) to quantify the discrepancies between the distributions of observed vegetation and of modern pollen percentages, and ii) to validate CARAIB model simulations with BAGs reconstructions from palynological data. Actually, the reconstruction of vegetation boundaries using pollen percentages is remarkably effective when considering large areas like Europe (Prentice et al. 1996). It is yet essential to quantify pollen-vegetation relationships at this finer scale. The comparison method, the data and the results of the CARAIB model will be discussed. Prentice I. C., Guiot J., Huntley B., Jolly D. & Cheddadi R. 1996. Reconstructing biomes from palaeocological data: a general method and its application to European pollen data at 0 and 6 ka. *Climate Dynamics* 12: 185-194. Otto D., Rasse D., Kaplan J., Warrnant P. & François L., 2002. Biospheric carbon stocks reconstructed at the Last Glacial Maximum: comparison between general circulation models using prescribed and computed sea surface temperatures. *Global Planet. Change* 33: 117-138.

156-6 Invited Ryskov, Yaroslav Georgievich

TEMPORAL DYNAMICS OF PEDOGENIC CARBONATES AND FORECAST OF ITS BEHAVIOR

RYSKOV Yaroslav Georgievich¹, DEMKIN Vitaliy¹, OLEJNIK Sergey¹, RYSKOVA Elena¹

1 - Institute of Physico-Chemical and Biological Problem in Soil Science RAS

Keywords: carbon cycle; carbon isotope composition; carbon dioxide; pedogenic carbonate; temporal dynamics

In the scope of carbon cycle it is not clear the role played by carbonates as a buffer reservoir for atmospheric CO₂ and the forecast of its their behavior under different climatic conditions is not obvious. As was shown by recent investigations (Ryskov et al. 1993; 1999; Glasovskaya, 1996; Nordt et al. 1998), the formation of pedogenic carbonates can serve as one of the possible sinks of CO₂. The temporal dynamics of pedogenic carbonate store over the last 5000 years was studied in paleosoils buried under barrows having different ages, using isotopic methods. The study of the carbon isotope composition shows, that in all studied soils the carbonates are represented either by lithogenic fragments and by pedogenic ones. The content of pedogenic carbonates depends on soil type, soil age and parent material. During the historical time two carbonate accumulation periods are observed, around 4000-3500 and 2300 years ago respectively. As was shown by our investigation (Ryskov et al. 1997), the common (bulk) carbonates are leached from the profile and enter the carbon cycle as bicarbonate. The dissolving lithogenic fragments served as a source of calcium ion for formation of pedogenic carbonates. As was shown by V.A. Demkin (1977; 1994) during the last 3500 years a lot of gypsum was leached from the soils of south-eastern Russia. Their calcium ions can serve as a source for pedogenic carbonate formation. Thus, pedogenic carbonate accumulate during the soil formation, in spite of dissolving and leaching of common carbonate, that during the last 3500 years reached in chernozems 15 kg C/m²; in dark-chestnut soils 19 kg C/m² and in light-chestnut soils 25.6 kg C/m². In the same time accumulation of pedogenic carbonate reached only 2.2; 1.13; è 0.86 kg C/m². So, the dissolution and leaching of common carbonate was much higher than accumulation of pedogenic carbonates. Thus, as a whole, Russian soils served as an additional source of CO₂, contributing by about 2.6% to the common CO₂ emission from the soils, instead of binding of CO₂ into pedogenic carbonates. We compare accumulation and leaching of carbonate during the different climatic epochs. An accumulative processes prevailed during the arid epochs. But, on the contrary, during humid periods carbonate leaching from the soil profile is observed. This conclusion is supported by Demkin&Borisov (2003) and Eltsov (2003).

156-7 Oral Puste, Anandamoy

WETLAND ECOSYSTEM - A GEOLOGICAL DIVERGENCE STUDY ON SOIL AND WATER CHARACTERIZATION IN INDIAN SUB-CONTINENT

PUSTE Anandamoy¹, SARKAR Pranab Kumar¹, DAS Dilip Kumar¹

1 - BIDHAN CHANDRA KRISHI VISWAVIDYALAYA (AGRI. UNIVERSITY)

Keywords: Aquatic ecosystem; Geomorphology; Soil and water characteristics
Soil and water are integral part of global natural resources determined greatly wetlands and its diversity, habitats of thousands aquatic flora and fauna. The north-eastern Indian subcontinent has chains of rivers, intersected with so many tributaries and canals, which created varied geomorphic situations (permanent, semi-permanent and temporary wet bodies). Categorically, this divergence saucer-shaped wetland ecosystem developed naturally associated with biotic & abiotic factors, transitional between dry terrestrial and permanent aquatic system in global soil genesis including morphological modifications over years. These are certainly important for many of the functions (regulation, production, carrier, habitats of millions of flora & fauna, preserved fossil fuels, information functions). Survival of human civilization inextricably linked with wetlands which sustained economic stability of hundreds million of people. Studies made on wetland ecosystem based on geological conceptual in wide range of diverse situations of climatic variations (terrac, old & new alluvial, red & lateritic and saline coastal) in coasts and northeastern plains of Indian sub-continent. It reveals from studies on changing environment, which influenced greatly soil physico-chemical characteristics (geomorphic situation, depth & durability of submergence, pH, mineral matters compositions) are significantly important and changed considerably due to climatic variations in the processes of biochemical weathering, - a natural entity. Analysis of such diverse water bodies situated in different agro-climatic zones represented the characteristics like pH, EC, BOD, COD, mineral constituents which varied greatly. These wet situations are important for improvement of soil-water health, which may greatly relate with the economical viability and adaptability through the cultivation of so many aquatic food, non-food commercial crops, ornamental cum food crops and so many beneficial aquatic medicinal plants, which have immense value and favourable for effective utilization of the vast waste wetlands for the mankind's safety. Besides, wetlands are continuously enriched by the addition of large quantities of biomass and the soil is enriched in consequence.

156-8 Oral Santisteban-Navarro, Juan Ignacio

CARBON FIXATION ON WETLAND ENVIRONMENTS DURING RECENT TIMES

SANTISTEBAN-NAVARRO Juan Ignacio¹, LÓPEZ-PAMO Enrique², MEDIAVILLA-LÓPEZ Rosa M³, RUIZ-ZAPATA M³ Blanca⁴, GIL-GARCÍA M³ José⁴, DABRIO Cristino J.¹

1 - Dpto. Estratigrafía, Fac. CC. Geológicas, Universidad Complutense de Madrid

2 - Dir. Recursos Minerales y Geomambiente, Instituto Geológico y Minero de España

3 - Dir. de Geología y Geofísica, Instituto Geológico y Minero de España

4 - Dpto. Geología, Universidad de Alcalá

Keywords: carbon sequestration; wetland; aquatic environment; riparian environment

A core segment (50-100 cm in depth, 535 to 2780 yr cal BP in age) from Las Tablas de Daimiel National Park fluvial wetland/open lake allows us to study carbon sequestration in two different environments: the island/riparian and the aquatic. The lower layer is peat to organic mud deposited in island environments. It starts by a sharp increase in organic C and a fall in S, as compared with the underlying clay interval. The content in clay-derived Al is very high and inorganic C, derived from charophytes and gastropods, is very low. The top of this layer is an 8 cm-thick transition interval bounded by the highest value of Al (bottom) that decreases upwards with increasing inorganic C that peaks at the upper limit of the interval. Low contents of N, S, U, and Mo reflect emergent, but wet, environments able to preserve the organic C. The reverse correlation between Al and inorganic C indicates sedimentation in areas intermediate between open (clay deposition) and sheltered (inorganic C production). The abundance of prairie and riparian taxa and the scarce aquatic taxa requires emergence, but also very shallow water table. The upper level consists of charophyte remains that form carbonate muds accumulated in aquatic settings. Contents of inorganic C correlate reversely with organic C contents. The content of organic C is variable but is correlated to N, S, Na, U, and Mo. The content of U reveals episodic reducing aquatic conditions. N is related to a vegetation rich in nitrrophyte taxa and algae. S is related to precipitation of gypsum. The content of Al is the lowest of the core, implying a sheltered area. Abundant nitrrophyte taxa and spores, and low content in riparian taxa and herbs (Asteraceae, indicative of arid conditions), reflect higher water levels. The landscape where carbon sinks includes open areas with settling of clays during floods, more restricted areas where aquatic vegetation fixes C, N and S, and vegetated islands that shelter the aquatic vegetation from major floods. The topographically higher islands offer less water to vegetation and, consequently, less supply of N and S. Acknowledgements: financial support from the Spanish Ministry of Science and Technology (MCYT) projects REN2002-04433-CO2/01 and REN2002-04433-CO2/02.

156-9 Oral Etiope, Giuseppe

GEM, GEOLOGIC EMISSIONS OF METHANE: THE MISSING SOURCE OF THE ATMOSPHERIC METHANE BUDGET

ETIOPE Giuseppe¹

1 - Istituto Nazionale di Geofisica e Vulcanologia, Roma

Keywords: methane; greenhouse gas; emissions; geologic sources

Central to any study of climate change is the development of an inventory that identifies and quantifies natural and anthropogenic sources and sinks of greenhouse gases (GHG). Following new studies published in the last two years, this communication outlines that the geologic emissions of methane (GEM) represent a major global source of methane, unaccounted so far in the atmospheric sources/sinks budgets. A fair number of data, from direct field measurements and statistical analyses of natural fluxes of methane from petrolierous (mainly from mud volcanoes and soil microseepage) and geothermal areas, allowed to estimate a global emission of methane to the atmosphere in the order of 40-60 Tg y⁻¹. This would represent the "missing source" of fossil (radiocarbon free) methane suggested by isotopic analyses and by the methane budget imbalance derived by bottom-up models. Although GEM is comparable with other anthropogenic sources, it has never been considered by the Intergovernmental Panel on Climate Change. This forgotten source must be included in the next IPCC tables of the atmospheric methane budget.

156-10 Oral Turcq, Bruno

CHARCOAL DEPOSITION RELATED TO PALEOENVIRONMENTAL CHANGES AND LAND USE CHANGES EVENTS

TURCO Bruno¹, CORDEIRO Renato Campello², ALBUQUERQUE Ana Luiza³, SIMOES FILHO Francisco Fernando³, SIFEDDINE Abdelfettah¹, LIMA DA COSTA Renata⁴, MENDES Leonardo Guarniere³, GIANELLI Andre Nogueira³, NILSSON Luiz Felipe Kneip²

1 - Institute de Recherche pour Le Development - IRD

2 - Programa de Geoquímica - UFF

3 - Instituto de Dosimetria e Protecao

Keywords: Charcoal; Amazonia; Paleoenvironmental Change; Land Use Change

Fires records were obtained through the charcoal particles flux analyses in lacustrine sediments (Lagoa da Pata, São Gabriel da Cachoeira (AM); Carajás N4, (PA); Dom Helvecio Lake (MG) and Caracaraná (RO); reservoir sediment (Alta Floresta, MT), and an annual cycle of atmospheric deposition (Porto Velho, RO). The charcoal analyses could have also a great importance in evaluating the impact of dry climates and anthropogenic actions in different ecosystems. Determination of fire frequencies and dimensions in key areas of South America, during the Holocene, is a first step to understand the global carbon transference between terrestrial and atmospheric systems. The deposition of charcoals in the sediments results from local or regional burns associated or not to anthropogenic action. The highest charcoal fluxes values were obtained in the period of intense land use change in Alta Floresta and in sediments that represent the medium Holocene in Serra Sul Carajás region. The lowest values were found in Lagoa da Pata in São Gabriel da Cachoeira, a humid region in Amazon and in Porto Velho region from atmospheric deposition during wet season. We observed from the D. Helvecio record, which is located in a region covered with semi-deciduous forests, fire occurrences from 8,400 to 6,400 cal years BP. For Carajás lake, surrounded by tropical rain forest, we had identified fires during the period between 8,000 and 5,300 cal years BP. Finally, the lake Caracaraná, which is surrounded by grass savanna, showed a record of main fire occurrence phase at 9,750 cal yrs BP and a second phase marked by charcoal peaks at 7,680, 6,990 and 6,460 cal yrs BP. In the Lagoa da Pata record an increase in charcoal fluxes were observed at Last Glacial Maximum. The synchronism among the fires occurrences showed a good relation with the middle Holocene dry climate phase in Brazil (Turcq, 1998). Discrepancy in the flux values could be attributed to differences in biomass availability provided by these ecosystems and paleofire intensity. A high resolution record of CO₂ in ice core, during the last 11,000 years (Intermühle et al. 1999), shows that from 7,000 to 1,000 years BP occurred an increase in CO₂ concentration by 25 p.p.m.v., that are probably due to carbon release in amount of 260 Gt, associated to changes in terrestrial biomass.

156-11 Oral Cordeiro, Renato Campello

BIOGEOCHEMICAL INDICATORS AND CHARCOAL DEPOSITION RELATED TO PALEOENVIRONMENTAL CHANGES IN RIO NEGRO REGION (BRAZILIAN AMAZONIA)

CORDEIRO Renato Campello¹, MENDES Leonardo Guarniere¹, BARBOSA Josias Azeredo¹, LIMA DA COSTA Renata¹, TURCO Bruno², SIFEDDINE Abdelfettah¹, GIANELLI Andre Nogueira¹, NILSSON Luiz Felipe Kneip¹

1 - Programa de Geoquímica - Universidade Federal Fluminense

2 - Institute de Recherche Pour Le Development - IRD