Titolo dell'abstract
TOXIC METALS DISTRIBUTION, NATURAL RADIOACTIVITY AND EPIDEMIOLOGY IN THE CAMPANIA REGION (ITALY).

Autori
DE VIVO BENEDETTO [1], LIMA ANNAMARIA [1], ALBANESE STEFANO [1], DE LUCA MARIA LUISA [1]

presenter's e-mail: bdevivo@unina.it

1 - Università degli Studi di Napoli "Federico II"

Parole chiave
Geochemistry
Epidemiology
Geochemical mapping
Natural radioactivity
Geochemical backgrounds

Abstract
In the Campania region (southern Italy), studies on the distribution of metallic harmful elements and radioactivity have been carried out, both on stream sediments, at a regional scale, and on soils, at a local scale (urban areas). Lima et al. (Appl. Geochem., 20, 611-625, 2005) demonstrated that high U, Th and K values in stream sediments correspond well with the occurrence of volcanic rocks in the central-western part of the region, whereas low values characterize sedimentary deposits in the rest of the region. Gamma-ray spectrometry maps produced for ^{40}K, more useful than ^{238}U and ^{232}Th, show particularly high radioactivity levels which corresponds with all the eruptive centers (Roccamonfina, Campi Flegrei and Somma–Vesuvius, including the fissure sources of Campania Ignimbrites). In these areas, concentrations of harmful elements, such as Pb, Zn, Cd, Cu, etc., are generally above the regional average, as well (Albanese et al., J. of Geochem. Expl., 93, 21–34, 2007).
The atlas of cancer mortality for the Campania residents during the period 1982–2001 shows that especially in the north-western sector of the region, the standardized mortality ratio (SMR) on the overall regional population for all neoplasms, expressed as a percentage, is always above 110 (Pizzuti et al., Reg. Camp. – Oss. Epid. Reg., 119 pp., 2006). These higher risk areas roughly correspond to the zones where radioactivity and harmful element concentrations are higher than the rest of the regional territory, implying that the naturally occurring radioelements and the intense anthropogenic pressure on the environment could be possible causes of increased cancer risk. Since SMR is higher mostly in the provincial area of Naples, where a detailed geochemical soil survey has been carried out (Cicchella et al., Geochem.: Explor., Environ., Analysis 5, 29–40, 2005), further studies are in progress to relate SMR to harmful element distribution in the soils of the area. Knowledge of the epidemiology integrated with a detailed elemental study of soil will be important to assess the risks related to various potential causes.

Modalita di presentazione
Invitato

.

Titolo dell'abstract
GEOLOGY & HEALTH: MAN, AN IMPORTANT GEOLOGICAL FACTOR

Autori
CORTECCI GIANNI [1]

presenter's e-mail: g.cortecci@igg.cnr.it

1 - Institute of Geosciences and Earth Resources-CNR - Pisa

Parole chiave
Geology

Health

Androsphere

Abstract
Geology & Health is an emerging science dealing with the relations between geological environment and health, disease, pathology and death of humans, animals and plants. It is focused on geology and its interdisciplinary relationship to medicine, biology, chemistry and other sciences. Geology & Health is substantially different from Medical Geology and Environmental Medicine. The former investigates the influence of natural geological factors on health of man and animals, and the latter the health risks posed by contaminants in the home, workplace and outside ambient. Geology & Health addresses all living beings (man, animals, plants), investigating both the natural and anthropogenic hazards, but also the therapeutic properties of geological materials. All three sciences contribute in different ways to health issues, and thus to the development of public health policy, with the result that this interdisciplinary field is expected to assume an increasingly greater role in education and to society at large. The "International Year of Planet Earth 2007-2009" (a triennium, subtitled Earth Sciences for Society), proclaimed by the IUGS, and the UN Year of Planet Earth in 2008, declared by the General Assembly of the United Nations, testify to an acclaimed awareness that is time for the scientific community to focus on the relationship between mankind and Planet Earth, thereby acknowledging that geoscientists are key players in creating a local, national, and international sustainable future for both. Ultimately, the initiative was promoted to sensitize the politicians, decision-makers, media and general public to the Earth sciences and their influence on many aspects of the everyday life.
In this presentation I would like to emphasize the impact of man as a geological element (like a rock, water, volcanic eruption) on planet health. Human activity (androsphere), among other things, redistributes metals, contributes exotic compounds and promotes unnatural geologic processes, usually with negative results. As with nature, man can cause flooding, landslides and shore erosion. Metals (essential, non-essential, and toxic) are redistributed from fairly harmless sites to places where they can have a detrimental effect on human, animal and plant health. Even essential trace elements (such as F, Si, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Se, Mo, I, W) can be detrimental if ingested in abnormal quantities. Acidification of rocks and soils by acid rains from a contaminated atmosphere will accelerate the metal distribution process, thus making it more easy for toxic metals (As, Cd, Hg, Pb) to enter the food chain. Hg, Cd and Pb are harmful to plants, animals and man alike.
The goitre caused by iodine deficiency, the dental caries caused by a deficiency, or dental and skeletal fluorosis by an excess of fluoride, anaemia due to iron deficiency, and muscular dystrophy due to selenium deficiency are all classic examples of diseases related to natural geological factors. On the other hand, acid rains, the greenhouse effect and the hole in the ozone are basically the by-products of the human "volcanic" activity, which introduces huge amounts of gases and particulate matter into the atmosphere. The fine to ultra-fine particulates emitted by vehicular traffic and heating systems represent another serious health problem, particularly in densely populated cities, as particles retain heavy metals and polycyclic aromatic hydrocarbons (PAH), the latter being almost exclusively anthropogenic. The carcinogenic and atherogenic properties of PAHs are well documented.
I'd like to recommend a book that highlights the importance of geology in health problems. The title is "Essentials of Medical Geology-Impacts of the Natural Environment on Public Health" (ISBN: 0-12-636341-2), which was published in 2005 by Elsevier Academic Press.

Modalita' di presentazione
Invitato

☐

.

Titolo dell'abstract

RELATIONSHIPS BETWEEN HEAVY METALS AND HEALTH IN SARDINIA: A PRELIMINARY STUDY

Autori

MUNTONI ELISABETTA [1], VALERA PAOLO [1], DEIANA ANDREA [1], MUNTONI SANDRO [2]

presenter's e-mail: pvalera@unica.it

1 - DIGITA – Department of Geoengineering and Environmental Technologies - Faculty of Engineering - Cagliari University, Italy
2 - Department of Toxicology – Oncology and Molecular Pathology Unit – Cagliari University, Italy

Parole chiave

Geochemical Data

Health

Stream sediment

GIS

Risk Index

Abstract

In 1948, the World Health Organization (WHO) defined "health" as "a condition of complete mental, social physical well-being, not only determined from the absence of diseases". Genetic and environmental factors (mainly economic and social) contribute to this condition. Thus, a multidisciplinary approach to study human health is suggested. Such an approach, requires the involvement of various disciplines and experties, in order to investigate human health and quality of life interactions.
The "Geomedicine", defined as the relationship between the geological environment, and human health, is acquiring important meanings in the development of medical and epidemiological information. The Department of Geoengineering and Environmental Technologies (DIGITA), of the Faculty of Engineering - Cagliari University - since several years, is involved in sampling of several environmental matrix supports (rocks, soils, stream sediments) and their geochemical analysis.
Up to now, the sampling and analytic surveying is accomplished, and a new geochemical mapping is starting up, at 1:100.000 scale of all Sardinia, which is based on the stream sediment database.
In a preliminary analysis of this database we found high values of well known dangerous elements, such as Cd, As, Pb, Hg. These unexpected findings suggest us to set up a study on possible correlations between geochemical data and some chronic diseases existing in Sardinia, through spatial distribution of chemical elements, their migration mechanisms, geochemical background in the lithologies and biodisponibility of heavy metals.
The study involves a team of environmental engineers, GIS (Geographic Information System) experts, geologists from the Engineering Faculty - Department of Geoengineering and Environmental Technologies, and medical researchers from the Medicine Faculty – Department of Toxicology, both from Cagliari University.
This study, is being carried out through the following steps:
- Regional mortality data collection, georeferring and digitalizing (just started);
- GIS development, expectably open source, like GRASS, where medical, geochemical and lithological data, will be analysed;
- Choice of a pilot area with high mortality for pathologies connected with heavy metals exposure;
- Morbidity and mortality data analysis of the pilot area population (hospitals, regional health agencies);
- A detailed geochemical prospection and geostatistical study of the area;
- Speciation and biodisponibility analysis of some elements;
- Investigate the presence of the heavy metals in other matrices, like soil, vegetables or insects like bees and/or their products;
- Organization and insertion of all the informations into the GIS
- Data processing analysis;
- Statistical analysis of correlations between morbility /mortality and geochemical data, in order to identify reliable coefficients and to obtain a Risk Index for the human health;
In conclusion, this model can be considered not only an important source of information regarding gene-environment interactions in Sardinia, but also a validated method for further geochemical/medical analysis and territorial planning worldwide.

Modalita' di presentazione

Orale

.

Titolo dell'abstract

SIMULATION OF HEAVY METAL AND SULPHATE TRANSPORT IN GROUNDWATER FROM FLY-ASH DEPOSIT IN THE AREA OF THE "NIKOLA TESLA B" THERMO-POWERPLANT, (OBRENOVAC, SERBIA)

Autori

CIOTOLI GIANCARLO [1], CELIKOVIC IGOR [2], LOMBARDI SALVATORE [1], MORONI MONICA [3], ZUNIC ZORA [2]

presenter's e-mail: giancarlo.ciotoli@uniroma1.it

1 - Dipartimento di Scienze della Terra, Università di Roma "La Sapienza"
2 - VINÈA Institute of Nuclear Sciences, Belgrade, Serbia
3 - Dipartimento di Idraulica, Università di Roma "La Sapienza"

Parole chiave

fly-ash

heavy metal

groundwater

transport simulation

Abstract

The seepage of solutes from waste disposal industry is an important environmental concern; examples include seepage from fly-ash deposits derived from coal burning power plant. The dominant focus of studies on these sites, generally, regards physical movements of the solute and their chemical behavior in groundwater. The investigation of transport behavior in groundwaters provides useful information for both groundwater protection and remediation of coal-ash repository sites. In particular, dispersion, diffusion, recharge to the aquifer, and chemical reactions as well as radioactive decay, should be taken into account to obtain reliable prediction on transport of radionuclides and of inorganic pollutants.

Emission and deposition of coal ash represent major environmental problems, due to the large amount of ash obtained. During coal combustion, the organic component becomes oxidized, while inorganic components mostly remain in the ash. The variability of inorganic constituents is influenced by biological, hydrological and geochemical factors and their association forms govern their behavior and their technological and environmental impact. The environmental impact of ash is due to the leaching of microelements (including heavy metals such as Pb, Cr, Cd, Co, Cu, Zn, As, V), but also major cations (Ca) and anions (SO4) from ash by atmospheric and surface waters. The presence of metals in groundwater and soils can pose a significant threat to human health and ecological systems. The chemical form of the metal contaminant influences its solubility, mobility, and toxicity in ground-water systems. Typically metals are relatively immobile in subsurface systems as a result of precipitation or adsorption reactions.

This work presents 3D reactive and non-reactive transport models of contaminants in groundwaters employing MODFLOW and MT3D codes. This simulation was carried out by using literature and field data collected in the area of the "Nikola Tesla B" thermo-power plant (TENT B), (Obrenovac, Serbia) in the framework of INTAILRISK CE project.

The TENT B area is located on the bank of the Sava river, near the Obrenovac village, about 40 km upstream from the Belgrade city (Serbia & Montenegro). This plant is producing about 4.5 x 10^9 kg of coal-ash per year. Ash is transported to the dump after being suspended in the water taken from the Sava river, in the approximate ratio 1:10. The dump of the power plant "Nikola Tesla B" has an area of about 6 km2.

The primary environmental concern associated with this disposal site is the potential groundwater contamination. Hydrochemical data of waters from wells collected during the field surveys highlights high mineralization (i.e. 1200 mg/l) and a high content of SO42- (up to 450 mg/l) and Cl- (up to 70 mg/l) contributing to the hypothesis of a potential pollution from the fly ash deposit. The transport model was built by solving in 3D the Advection-Dispersion Equation in the shallow aquifer.

In order to build the model, geological, hydrogeological and hydrochemical data from wells located both in the source area (fly ash deposit) and in the surrounding agricultural land were employed, as well as mineral springs located at the boundary of a fluvial terrace about 2 km south. In particular, the transport model was implemented by using reactive, soluble sulphates, as well as heavy metals as contaminant. The main goal of the study was: (i) to model the groundwater flow in the TENT B area; (ii) to build a conceptual model describing transport of heavy metals within the groundwater assuming precipitation or adsorption reactions; (iii) to understand the transient impact of soluble compounds (sulphates) derived from fly ashes on the quality of groundwater assuming retardation due to interaction with the soil.

Modalita di presentazione

Orale

.

Titolo dell'abstract

BASILICATA (ITALY) EPIDEMIOLOGICAL NEPHROLITHIASIS PROJECT AND STONE ANALYSIS:CORRELATION TO ENVIRONMENTAL RISKS FACTORS (PRELIMINARY DATA)

Autori

GIANNOSSI MARIA LUIGIA [1], SUMMA VITO [1], TATEO FABIO [2], MONGELLI GIOVANNI [3]

presenter's e-mail: giannossi@imaa.cnr.it

1 - Istituto di Metodologie per l'Analisi Ambientale – CNR - Italy
2 - Istituto di Geoscienze e Georisorse – CNR, c/o Dip. Geoscienze- Italy
3 - Dipartimento di Scienze Geologiche - Università degli studi della Basilicata - Italy

Parole chiave

epidemiology

kidney stone

environmental factors

Abstract

Epidemiological data on the occurrence of nephrolithiasis appears to be gradually increasing but it remains poorly defined. Precise data on the epidemiology of this disease can only be determined if geographical position, race, age and sex, climate, nutrition and other environmental factors are also taken in consideration.
There are no population based data on the incidence or prevalence of kidney stones in Italy and in particular in Basilicata (southern Italy). Previous studies show that kidney stones are uncommon before the age of 20 years, their incidence rises between the age of 20 and 30 years and then remains relatively constant until the age of 70 years, after which the incidence falls again. Men are at greatest risk of developing kidney stones with incidence and prevalence rates between two and four times that of women. Men were at greater risk of producing calcium oxalate stones and uric acid stones. Women were at greater risk of infection stones. The frequency of some type of stone vary significantly throughout the year, with an increase during summer and autumn (uric acid stones), instead for other stone the frequency did not vary.
The main purpose of our study is to acquire useful information on nephrolithiasis in Basilicata and to perform the chemical and mineralogical analysis of stone, to examine regional variation in the incidence rate of kidney stones, to know the pattern of chemical and mineralogical composition of stone and to determine epidemiological and environmental risk factors for stone formation in Basilicata. We must assume that hospital discharge rates reflect stone incidence rates.
Study has been carried out in collaboration with doctors of Potenza (Italy) Hospital, for multidisciplinary character of the research. The epidemiological analysis was based on data from regional institution of the Basilicata resident population (≈ 597000) that was hospitalized for nephrolithiasis in regional and external hospital structures. Additional data have been obtained from interviews of patients. Questionnaires include personal details (gender, age, marital status, address, educational level) and socio-economic (type of work, etc.) and medical history data (weight, height, personal and family anamnesis, eating habits, etc.).
In particular for eating habits, all respondents were asked how much liter of water-based beverage they consumed per day, and how much of their water was consumed from municipal or commercial supply. Patients were asked how often they had consumed some kind of food (as vegetable rich in oxalate) and where they were cultivated, to evaluate possible chemical elements in the soil promoting kidney stones. Dietary habits, life-style, climate and socio-economic status, and also water chemistry, soil geochemistry and mineralogy, are peculiar epidemiological characteristics of renal stone formers, and probably may explain the geographic distribution of calcium nephrolithiasis. All the information has been stored in a data base available for consultation during research.
An high prevalence of the disease from 9.2 to 15.1 out of 1,000 inhabitants has been observed in some regional area; most patients are men and the peak age for the development of stones is between 40 and 60 years. The incidence rate is significantly greater in the northern Apennine Basilicata zone and tend to decrease in the southern Basilicata Bradanic Foredeep. In view of the correlation between composition of patients stone and environmental factors (as water chemistry, average annual temperature, and soil geochemistry and mineralogy), careful morphologic and constitutional analysis of stone should not be neglected.
Understanding the epidemiology of stones disease is important to determine the significance of the disease at a community level, the associations and risk factors for individuals and the likelihood of stone recurrence.

Modalita' di presentazione

Orale

.

Titolo dell'abstract
DNA CONDENSATION, ORDERING AND SPONTANEOUS CONFORMATIONAL CHANGES ONTO LAYER SILICATES

Autori
VALDRÈ GIOVANNI [1]

presenter's e-mail: giovanni.valdre@unibo.it

1 - UNIVERSITA' di BOLOGNA, ITALY

Parole chiave
Phyllosilicates

DNA

Biosurfaces

Biomineralogy

Abstract
The main purpose of this project is to characterize the surface potentials of various layered minerals for the control of DNA, nucleotides and cells adsorption. A critical aspect of imaging biomolecules and biomolecular processes is the nature of the substrate on which the molecules are adsorbed.
In the past the underlying assumption, derived from current models of biomolecules' adsorption, is that the substrate surface plays a "passive" role in the process and functionalization is required during the deposition. Several techniques have been developed to tailor the adsorption of biomolecules according to different experimental requirements. These include the functionalization of the surface with self-assembled monolayers, the use of ligand-receptor complexes and the regulation of the buffer conditions.
Following our experiments it became immediately clear that the above assumption is not completely correct for layer silicates because very similar atomic flat crystals, as in the case of muscovite and biotite, showed very different affinity to DNA adsorption.
Furthermore, it was found that chlorites have the ability to nanoconfine the deposition of DNA molecules in particular areas (brucite-like) of the surface. This effect became even more interesting when it was noted that some DNA strands could be stretched between two brucite areas. The stretching was shown to be produced by the anisotropy of the surface potential and it is therefore an active process induced by the surface. The molecules were also shown to be "suspended" between the two brucite areas with very small interaction with the underlying surface.
The possibility to manipulate DNA molecules on a flat surface, as in the case of chlorite, has great potential, in biological, medical and health sciences, for example to exploit its use (and that of similar layer silicates) to study DNA-enzyme complexes, cellular behaviour and biochemical assays.

Modalita' di presentazione
Invitato

Scelta della sessione
T07 - Geologia e salute

.

Titolo dell'abstract
MUDS FOR PELO-THERAPY

Autori
SETTI MASSIMO [1]

presenter's e-mail: setti@crystal.unipv.it

1 - Dipartimento Scienze della Terra Università di Pavia

Parole chiave
peloid muds

clay minerals

maturation treatments

mineral water effects

Abstract
There is a long tradition in using clays as empirical medicine, also noticed by legends, beliefs, rituals and ethnological records. Clay minerals (kaolinite, smectite, sepiolite and palygoskite) are used in the preparation of pharmaceutical products and animal feed, as active chemo-sorbents for protective coatings of stomach, intestine and skin (cosmetics, dermatology, burns treatment, etc.) and as adsborbents of toxins, bacteries and even viruses. "Pelo-therapy" is the local or generalized application of thermal muds (hot cataphlasmas called "peloids") for recovering rheumatism, arthritis and bone-muscle traumatic damages. SPA centres in northern Italy use clayey admixtures for the formulation of muds to be used in pelo-therapy. The basic ingredient, "virgin" clay, is a dressed bentonitic geomaterial. The peloid muds are obtained by maturation of the virgin clay with mineral waters gushing out in-situ which have different geochemistry: sulphureous, Ca-sulphate, Ca-Mg-sulphate and Br-I-salty. The maturation treatment is varying with respect to mixing procedure and lasting time. Many parameters (physico-chemical and rheological behaviour) can change during the maturation treatments with respect to virgin clay: mineralogical composition, clay fraction, CEC, pH, soluble salts, water retention, swelling index, activity, consistency parameters (WL, WP and PI), thermal behaviour and cooling kinetics.
A need of regulation (standard procedures) is suggest to certificate the clay geomaterials suitable for pelotherapy, and also for drugs formulation.

Modalita' di presentazione
Invitato

Scelta della sessione
T07 - Geologia e salute

.

Titolo dell'abstract
DILTIAZEM.HCL - BENTONITE COMPLEX FOR HEALING APPLICATIONS

Autori
TATEO FABIO [1], GIARETTA AURELIO [1], MEDICI LUCA [2], SUMMA VITO [2]

presenter's e-mail: tateo@igg.cnr.it

1 - IGG-CNR
2 - IMAA-CNR

Parole chiave
bentonite

drug delivery system

clay mineralogy

Abstract
Geologic materials have been widely used for pharmaceutical preparations and clay minerals in particular experienced a prolonged commercial success in this field because they have been used both as excipient and as active principle (Carretero, 2002 and references therein). These two different purposes are obviously in contrast each other because the inert behaviour of an excipient is hardly compatible with the biological effect of a pharmacological active principle. The recent feeling about this topic is much more based on the mineralogical considerations than in the past, because the different behaviour of different clays minerals is taken into account (Droy-Lefaix & Tateo, 2006, Carretero et al., 2006; Aguzzi et al., 2007; Viseras et al., 2007).
Smectite minerals are highly suitable for sustained release of cationic drugs because of their high cation exchange capacity (CEC), but also low CEC minerals, such as halloysite, have been used to this purpose, owing to the microtubular habit of the crystals and multiple layering of different substance to provide adequate ligands to the drug (Levis & Deasy, 2003).
Diltiazem.HCl is a cationic drug with good solubility in water. These features of the drug and its therapeutic value in the treatments of different pathologies such as hypertension and angina, make it an interesting opportunity for test advanced uses of clay minerals for healing uses.
Two natural bentonites, one composed mainly of dioctahedral smectite (with some illite), and the other by trioctahedral smectite have been used for drug interaction. An amount of the drug equivalent to about 4 times the nominal CEC of smectite (1 meq/g) has been dissolved in water with 1 g of bentonite. After 2 hours the suspension was washed 3 times by centrifuge.
The water interaction between diltiazem.HCl and the analysed smectites caused a clear expansion of the interlayer space from about 1.5 to about 1.9 nm indicating that the organic molecule entered into the interlayer space, expanding it. Such an arrangement represent a nano-holder of the drug, that may prevent the rapid degradation of the active principle.
The amount of diltiazem sorbed was evaluated by CNS measures, ranging from about 19.5% (dioctahedral sample) to 19.9% (trioctahedral sample). The entrance of the drug into interlayer spaces, decrease the water content of the mixtures, from about 18% to 12% (dioctahedral sample) and from about 17% to 11% (trioctahedral sample).
The significant concentration of the drug into the bentonite matrix makes the smectite-diltiazem complex a valuable carrier of the drug.

Aguzzi C., Cerezo P., Viseras C., Caramella C., 2007. Use of clays as drug delivery systems: Possibilities and limitations. Applied Clay Science, 36: 22-36.
Carretero M.I., Gomes C.S.F. and Tateo F., 2006. Clays and human health. In: F. Bergaya, B.K.G. Theng and G. Lagaly (eds) Handbook of Clay Science, Developments in Clay Science, Vol. 1, Chapter 11.5: 717-741.
Droy-lefaix M.T. and Tateo F., 2006. Clays and clay minerals as drugs. In: F. Bergaya, B.K.G. Theng and G. Lagaly (eds) Handbook of Clay Science, Developments in Clay Science, Vol. 1, Chapter 11.5: 743-752.
Levis S.R. & Deasy P.B., 2003. - Use of coated microtubular halloysite for the sustained release of diltiazem hydrochloride and propranolol hydrochloride. International Journal of Pharmaceutics, 253: 145-157
Viseras C., Aguzzi C., Cerezo P. and Lopez-Galindo A., 2007. Uses of clay minerals in semisolid health care and therapeutic products. Applied Clay Science, 36: 37-50

Modalita' di presentazione
Orale

□

.

Titolo dell'abstract

SILICON IN THE HUMAN BODY AND THE ODD OCCURRENCE OF MICROCRYSTALLINE QUARTZ IN PATHOLOGICAL SYNOVIAL FLUIDS

Autori

PERUZZO LUCA [1], OLIVIERO FRANCESCA [2], FRALLONARDO PAOLA [2], TAURO LEONARDO [3], SFRISO PAOLO [2], SCANU ANNA [2], RAMONDA ROBERTA [2], PUNZI LEONARDO [2]

presenter's e-mail: peruzzo@igg.cnr.it

1 - Istituto di Geoscienze e Georisorse - CNR Padova
2 - Divisione di Reumatologia, Dipartimento di Medicina Clinica e Sperimentale - Università di Padova
3 - Dipartimento di Geoscienze - Università di Padova

Parole chiave

silica

quartz

synovial fluid

arthritis

Abstract

In the course of our research on pathogenic crystals in the synovial fluid (SF), unexpected SiO_2 particles have been detected.

Many crystal species are common in SF of patients affected by rheumatic disorders, osteoarthritis (OA) in the specific instance.
Under the polarized light optical microscope the search for crystals like monosodium urate (MSU) and calcium pyrophosphate dihydrate (CPPD) is the main object of the early laboratory investigations, but other particles may be seen including basic calcium phosphate (BCP) and other crystals (cholesterol, oxalate, corticosteroid, lipid), different types of cells, hemoglobin, hematoidin, starch from gloves, dust, etc.
MSU, CPPD and BCP crystals, are certainly related to specific diseases (respectively: gouty arthritis; pseudogout, articular chondrocalcinosis, polyarthritis; calcific periarthritis, inflammatory osteoarthritis, soft tissue inflammation). Although the exact significance of their presence in osteoarthritic SF is still unclear, it has been observed that they correlate with disease severity and higher radiographic grades. Therefore, the detection and correct identification of crystals represent an important step in patient management.
In clinical practice, however, analysis of SF based on optical microscopy frequently leads to the finding of other types of crystals that cannot be identified with complete certainty, often because of their small size. Scanning electron microscopy was used in this study to better characterize all the types of crystals and look for their possible clinical significance in the setting of OA.
The identification of SiO_2 in 10 out of 24 samples drove us to deepen the investigation on these particles, consisting of sharp-edged micron size grains.

Silicon-containing particles in SF have been previously described only two times and ascribed to artifacts produced by technical procedures.
The best care taken of avoiding pollution during any step of our experiment, together with the use of disposable materials in total absence of glass and the analysis of blank samples, tend to exclude any form of external contamination.
Furthermore, X-ray powder diffraction obtained from some selected samples displayed unequivocally the spectrum of a crystalline phase corresponding to quartz.
At this point, agreed that those particles reasonably can be microcrystalline quartz, the question is: where does it come from?
If the hypothesis of sample contamination is to be discarded, it's nearly but not completely excluded the possibility of an external origin, for example by inhalation (dusts), ingestion (drugs, food) or other form of introduction (drugs, prostheses). Nevertheless, it is more challenging to explore the alternative possibility that the crystals formed within the articular capsule (synovial fluid, synovial tissue, cartilage or bone).
Silicon, after iron and zinc, is the third most abundant trace element in the human body and is especially associated with connective tissues such as in bone, tendon, cartilage, skin and blood vessels. Several ex vivo and in vitro studies reported the beneficial effects of silicon supplementation on bone and cartilage development, even if the mechanisms are not completely understood.
On the other hand, it's common knowledge that in the biological world many organisms (sponges, diatoms, radiolaria, plants and mollusks) are able to produce silica-based structures also from undersaturated solution, peri-neutral pH and low temperature and pressure.
Supporting the hypothesis of microcrystalline quartz formed in the SF it's of interest to consider that silica exhibiting crystalline texture has been prepared by some researchers from aqueous solution at room temperature and pH 7, in the presence of biomolecules.
The research currently in progress aims to establish if and how SiO_2 crystals form in the synovial environment and whether they may have long-term consequences with respect to OA progression.

Modalità di presentazione

Orale

Titolo dell'abstract
INTERACTION OF CLAY MINERALS AND ORGANIC ACIDS: GEOCHEMICAL, ENVIRONMENTAL AND HEALTH IMPLICATIONS

Autori
HUERTAS F. JAVIER [1], FIORE SAVERIO [2]

presenter's e-mail: javier.huertas@eez.csic.es

1 - Estacion Experimental del Zaidin - CSIC Granada, Spain
2 - Istituto di Metodologie per l'Analisi Ambientale - CNR Tito Scalo (PZ), Italy

Parole chiave
Environments
Lung deseases
Dissolutions
Adsorption
Organic acids

Abstract
Organic matter plays a key role in a number of geochemical and environmental processes in the biosphere, as soil formation, plant nutrition, groundwater chemistry, transport of solutes and pollutants, weathering of minerals, etc. Soils and groundwaters contain low molecular organic acids, as acetate, oxalate, formiate, salicylate, citrate, etc., in concentrations that vary between tens to thousands of micromole per liter. They may interact in-situ with minerals interface or may be transported and react elsewhere.
Vertebrates, as a part of the global environment, constitute a particular case of the mineral/ligand interactions. They, especially humans, are continuously exposed to minerals through the skin and respiratory and digestive systems. Fluids containing a great number of organic molecules are released in response to a foreign object. Organic molecules react with the mineral surface in order to neutralize (encapsulate or dissolve) it and to prevent diseases and pathologies. For example, asbestos and quartz have been recognized as hazardous if the can reach the alveolar cavities. However, World Health Organization has alerted that many other materials in the airborne dust can be potentially dangerous under certain conditions of exposure. Few things are known about the possible effect of the minerals added to food or used in healing treatment and natural medicine. Although many treatments with "healing minerals" have made for long in many cultures, their use in modern medicine should be investigated to asses the benefits and potential risks.
It is has been demonstrated that organic acids enhance dissolution of (hydr)oxides and silicates. The organic acids may modify the rate of alteration and weathering processes by several mechanisms, such as production of acidity, alternative reaction paths and reduction of the solution saturation by complex formation and transport of cations. This study concerns the role of low molecular weight organic acids on the dissolution rate of smectite, by surface adsorption and scomplexation in solution. Clays are one of the main components of fine fraction of soils, sediments and airborne dust. Organic acids as oxalic, salicylic, citric or lactic contains phenol and carboxylic functional groups that can interact with the clay surface and form soluble complexes. These acids are common in ground water and body interstitial fluids.
K-montmorillonite was treated in flow-through reactors with solutions containig organic acids, in background electrolite solutions at 25°C and in synthetic lung fluids at 37°C. The pH was adjusted at ~3-4 and 6-7.5. The output solution was collected every 24 h to monitor pH and concentrations of organic acids, Si, Al, Mg and Fe. The smectite dissolution rates were derived from Si concentrations at steady state conditions. Batch adorption experiments were perform to quantify the adsorption of the organic acids on the smectite surface.
The results indicate that the presence of organic acids may contribute to degradation of the smectite by dissolution and complexation reactions at pH~7 (interstitial fluids). However, at pH 3 (lysosomal fluids) organic acids contribute to dissolution reaction producing acidic conditions (proton promoted mechanism). Further investigation will be required in order to deepen our understanding of the mechanism of organic matter interactions with mineral surfaces under earth surface and human body conditions.

Modalita' di presentazione
Invitato

Titolo dell'abstract
ASBESTOS HAZARD: IMPACT, DIMENSION AND IMPLICATIONS IN THE AOSTA VALLEY (ITALY)

Autori
GULLO MARIA [1]

presenter's e-mail: ma.gullo@inail.it

1 - INAIL Direzione Regionale Piemonte - CONTARP

Parole chiave
asbestos

work

diseases

environmental

hazard

Abstract
The asbestos mineral is common in the territory of the Aosta Valley as result of the industrial production as well as the geologic and petrographic setting of this region. The mineral is present in several outcrops and has been object of ore exploitation.
Based on the above considerations the study of the asbestos-connected occupational diseases on the Valle d'Aosta district has been carried out tacking into consideration the ten year period 1994-2003. Aim of the study was a better understanding of the impact factors in different working cycles in order to estimate the expected amount of charge for diseases, to evaluate the evolutionary trend and the relationships between environmental context and asbestos-related occupational diseases.
The dataset has been provided by the INAIL data bank, by enquiry carried out by the Consulenza Tecnica Accertamento Rischi e Prevenzione, by the Dipartimento Prevenzione – SPRESAL USL (Aosta) and by previous works.
Preliminary results of this study suggest a positive (increasing) trend of the asbestos-related diseases in the Aosta Valley. Among the neoplasias the pleural mesothelioma prevail. On the base of the mesothelioma lengths we hypotesize that the incidence peak has not been recorded till now. Moreover the comparison of our data with those available from the Aosta USL, support a gap between certified and expected occupational diseases. The latter, so called "lost diseases", are extimated on the base of statistic-epidemiologic evaluations (Annual Report 2002 INAIL).
The comparative analyses between workers reporting occupational asbestos-related diseases and the curricula of workers asking for a declaration on asbestos exposure in conformity to the Law n. 257/92 (and subsequent modification) support the increase of these diseases among the steelworkers, one of the most prominent job opportunity in the district.
The asbestos hazard concern also the domestic environment as well as the housing. A number of 354 reclamation works have been carried out in the 1993-2004 decade.
Moreover an increase of the environmental hazard in the Aosta Valley is provided by the geologic-petrographic features. For example in the Emarèse area asbestos exploitation was carried out as from1872 and ceased on 1939. However the regulations concerning the reclamation work for this area were lay down recently (Decreto Ministero dell'Ambiente 2611/2002).
In conclusion the dataset analysis indicate that the asbestos-related diseases mainly depends on working exposure. We cannot exclude the impact of different sources considering the lost diseases.

Modalita di presentazione
Orale

Titolo dell'abstract

MINERALOGICAL RISK EVALUATION INDUCED BY NATURALLY OCCURRING ASBESTOS IN BASILICATA (SOUTHERN ITALY)

Autori

FIORE SAVERIO [1], BELVISO CLAUDIA [1], BOCHICCHIO ANDREA [1], BONELLI GIOVANNI [1], CAVALCANTE FRANCESCO [1], GIANCRISTIANO FRANCHINO [1], LETTINO ANTONIO [1], MEDICI LUCA [1], PERNIOLA DONATO [1], RAGONE PIETRO [1]

presenter's e-mail: perniola@imaa.cnr.it

1 - CNR - Istituto di Metodologie per l'Analisi Ambientale - Tito Scalo (PZ)

Parole chiave

asbestos

loose rocks

massive rocks

air

water

Abstract

In order to identify risk areas in which residents in Basilicata (Italy) are potentially exposed to outcropping rocks containing asbestos, a study has been carried out on the environmental systems (stony and loose rocks, the air and surface waters).
The area of investigation, situated along the Calabria-Basilicata border, covers 750 km2 and includes many towns and villages in the Pollino National Park.
The study was carried out according to the following phases of investigation:
- Geological mapping, with the support of a MIVIS observations, integrated with geomorphologic mapping and land use;
- Petrographic characterization of massive rocks (by optical microscopy and microXRD) and their weathered surface (by SEM/EDS);
- Mineralogical characterization of the loose rocks (XRD and SEM/EDS) and microXRD);
- Environmental analyses relative to asbestos in the air (SEM/EDS) and in water (XRD, SEM/EDS);
- Evaluation of the capacity of stony rocks to release asbestos fibres.
The results of the geologic/petrographic investigations show that in the studied area there outcrop 36.8 Km2 asbestos-containing rocks. The most abundant asbestos mineral is tremolite; chrysotile occurs subordinately.
Analytical investigations have allowed to ascertain the presence of asbestos fibres in friable rocks, on the surface of stony rocks, in the air and in river water. In some cases, it has been measured amounts to 10% wt.
The high-risk areas are those object of human activity (building and agriculture) and to changes in the natural order (landslides or surface alterations) which are capable of moving the materials.
The results have been implemented in a GIS which is able to gather, link, elaborate and share analytical and geographic data.
This system allows us to relate the state of contamination of the environmental matrixes to the demographic and epidemiologic data.
The algorithm to evaluate the mineralogical risk indicated by the Italian law is manifestly useless.

Modalita' di presentazione

Orale

.

Titolo dell'abstract

NEW FINDINGS ON THE REAL RISK OF EXPOSURE TO AIRBORNE MINERAL FIBERS IN OUTDOOR LIFE AND PROFESSIONAL ENVIRONMENT IN ITALY

Autori

TORRI GIORGIA [1], GUALTIERI ALESSANDRO [1], MANGANO DARIO [1], RICCHI ANNA [2], FORESTI ELISABETTA [3], LESCI GIORGIO [3], ROVERI NORBERTO [3], MARIOTTI MAURO [4], PECCHINI GIOVANNI [5]

presenter's e-mail: giorgia.torri@libero.it

1 - Dipartimento di Scienze della Terra, Università degli Studi di Modena e Reggio Emilia
2 - Dipartimento di Sanità Pubblica, Azienda USL Modena Città
3 - Dipartimento di Chimica "G. Ciamician" Alma Mater Studiorum, Università di Bologna
4 - Dipartimento di Sanità Pubblica, Azienda USL Bologna Città
5 - ARPA, Sezione Provinciale Reggio Emilia

Parole chiave

Asbestos

Monitoring

Outdoor

Abstract

Air-dispersed particulate material, and especially asbestos fibres represent a hazard for the human health. It is of paramount importance to monitor the presence of particulate not only in air but also in other media such as water and soils (the so called fall-out particulate) to carefully assess the real levels of exposure risk in life and work environments.
The long term project granted by the Fondazione Cassa di Risparmio di Modena (Modena, Italy) which involves the University of Modena and Reggio Emilia, ARPA Reggio Emilia, ARPA Bologna, University of Bologna deals with the monitoring of asbestos and other inorganic mineral fibre particulate (with a special care to PM10 particulate) in life and professional environments of selected Italian sites.
Work and life environments with different characteristics were selected within the Bologna, Modena and Reggio Emilia Provinces (Italy) and kept monitored for about one year to investigate the activity of the asbestos fibres and other inorganic particulate during different seasons and environmental/climate conditions. For each monitoring site selected for its potentiality to be a source of particulate dispersion in air, a corresponding blank (presumably with zero or low probability of particulate dispersion) site has been monitored in order to collect also the background dispersion values.
Monitoring was conducted in continuous mode for 1 week and is repeated 4 times a year (spring, summer, autumn, and winter time). The monitoring of the airborne dispersed particulate was possible using an especially modified high flux volumetric (ca. 1 m3 per min) area air sampler and large cellulose filters (A4 paper size). The fall out particulate is collected in a 1 m2 wide collector filled with water which simulate a water source. Samples of the surface soil are also collected in the proximity of the monitoring sites to assess the nature and concentration of the particulate deposited in a long term. The analysis of the collected samples was possible using bulk (the Rietveld method and FTIR) and microscopic techniques (optical microscopy, SEM, and TEM) in the attempt to determine the nature, meso-microstructure and density of the inorganic particles. Only the specimens that have shown the presence of asbestos fibres were further investigated with SEM, for the quantitative evaluation of the asbestos fibres in bulk and filters following the instructions suggested by DM 6/09/1994.
The nature of the crystalline phases present in the various media and relative origin during the four monitoring shifts has been revealed. Some of these phases are considered carcinogenic (i.e. quartz), others have clearly a fibrous habit (i.e. anatase) although their are not considered hazardous. As a matter of fact, a number of fibrous phases other than asbestos have been discovered in the airborne particulate and other media.
Despite the nature of the collected sample, the outcome of this study points to a very low concentration of asbestos fibres in the outdoor environment. Considering the literature data on the dispersion of asbestos fibres in air in urban and industrial areas, the results are quite surprising because the calculated amount of asbestos fibres in air from our study is negligible. On the other hand, although not fully consistent, literature data seems to point to a generalized high concentrations of airborne asbestos fibres. Although outdoor working and life sites have been investigated, the comparison with the allowed concentration of asbestos fibres in working environment (100 ff/l according to the recent law Decreto 257/2006) indicates that the concentration found in this work are by far much lower than the concentration limits imposed by the law. In view of this finding, the alarming scenario of a diffuse asbestos exposition in outdoor environment should be reconsidered.

Modalita' di presentazione

Orale

.

Titolo dell'abstract
RECENT DEVELOPMENTS ON OCCUPATIONAL QUARTZ HAZARD: THE ITALIAN SITUATION

Autori
BEVILACQUA ROSANNA [1], COCCHIONI MARIO [2]

presenter's e-mail: rosanna.bevilacqua@unicam.it

1 - INAIL - DIREZIONE REGIONALE MARCHE
2 - UNIVERSITA' DI CAMERINO

Parole chiave
SILICA
SILICOSIS
DUST
CANCER
HAZARD

Abstract
Recent studies show epidemiological evidence of a relationship between exposure to airborne silica dusts, silicosis and lung cancer. The causal agent of the disease is free crystalline silica breathed through inhalation of airborne dusts, usually at work. Silica dusts are generated and dispersed in air during operations like the cracking, moving and grinding of rocks, sand, cement and of some minerals. Dust concentrations today, when measured, still show high levels during many industrial activities and expose workers to the risk of silicosis, which is only an initial stage of the disease that may evolve into lung cancer and autoimmune pathologies. Silica is a chemical compound widely diffused in nature, both amorphous and crystalline. In 1997 IARC, on the basis of a large number of epidemiological survey results, evaluated as sufficiently evident the carcinogenicity for crystalline silica (quartz and crystobalite). Both toxicity of free crystalline silica and cellular response depend on the character, origin and state of the particulate minerals and their surface properties and on the contamination with other substances that may activate the cancer process. The only way to prevent the negative health effects of silica is to limit air diffusion of dusts and their inhalation, reducing air concentration of respirable dust. In 2000 the American Conference of Governmental Industrial Hygienists fixed 0,05 mg/m3 of quartz in respirable dust as the Threshold Limit Value – TWA for crystalline silica. This is also the limit for compulsory insurance against silicosis for all Italian workers. In this paper recent developments on silica risk assessment and on the reliability of measurements of silica in air are discussed and analyzed, as well as epidemiological aspects of silicosis in the various regions of Italy, comparing the present and past century. The results of analytical surveys on occupational exposure to airborne respirable silica dusts both in the Marche region and throughout Italy, conducted among workmen in factories using air sampling instruments, show a great variety of occupational exposure levels; high concentrations of airborne respirable silica dusts were observed in some factories, such as cast iron foundries and the ceramic industry.

Modalita' di presentazione
Orale

.

Titolo dell'abstract
GEOLOGICAL VS ANTHROPOGENIC INPUTS OF PARTICULATE POLLUTANTS IN DIFFERENT URBAN CONTEXTS IN UMBRIA

Autori
MORONI BEATRICE [1], BARCHERINI LUCA [2], SCARDAZZA FRANCESCO [2], CAPPELLETTI DAVID [2]

presenter's e-mail: b.moroni@tiscali.it

1 - Dipartimento di Scienze della Terra - Università di Perugia
2 - Dipartimento di Ingegneria Civile ed Ambientale - Università di Perugia

Parole chiave
PM_{10}-$PM_{2.5}$
ICP-AOS
UV-VIS
SEM-EDS
image analysis

Abstract
This work is focussed on the characterization of atmospheric particulate matter from different sites in Umbria with final aim to evaluate the impact of natural and anthropogenic sources on the composition of the fine aerosol. PM_{10} and $PM_{2.5}$ samples on PTFE filters were collected in Perugia and Terni by low volume air sampler coupled with PM_{10} and $PM_{2.5}$ selective-inlet head impactors. Nearly 200 samples were collected, spanning a time period from May 2006 to April 2007 and analyzed using different analytical techniques. Bulk chemical analyses were performed by means of ICP-AOS, IC and UV-VIS techniques, whereas single particle morphological and chemical analyses were achieved by SEM-EDS coupled with image analysis techniques. Morphological and chemical data were elaborated in order to find out possible correlations between size and composition of the particles. Bulk and single particle chemical compositions were compared in order to establish branching ratios of chemical elements in the different classes of particles.
Considerable morphological and compositional differences among the samples from Perugia and Terni were evidenced. These differences delineate two different emissive contexts in Perugia and Terni, the former being strongly influenced by motor traffic and the latter resulting from a mixing of natural, roadside and industrial inputs. In addition, potential sources and modes of distribution of fine aerosol in the environment were outlined. These results gave a significant contribution to the evaluation of the effectiveness of local abatement strategies of particulate pollutant emissions.

Modalita' di presentazione
Orale

.

Geoitalia 2007

Titolo dell'abstract

A GEOLOGIC ITINERARY FOR THE CALVANA MOUNTS (PRATO, ITALY)

Autori

CANESSA ANNA [1], BASTOGI MARCO [2], GEI FIORENZO [2], MAETZKE FEDERICO [3]

presenter's e-mail: a.canessa@flashnet.it

1 - Sigea, GISland.it
2 - Club Alpino Italiano
3 - Università di Palermo

Parole chiave

Geosites

Environment

Geological Heritage

Abstract

Characterisation of Geosites is in the aims of Sigea (Environment & Geology Italian Society): in this framework, the volume is dedicated to the environmental safeguard of the Calvana Relief, where 8 different Geosites were individuate along the 10 km itinerary.
Mapping and boarding were carried out (the 8 boards are documented in the Italian Geosites Census) in order to emphasize the importance of the Calvana Relief in the geologic heritage. Natural calcareous caves were detailed and described in the contest of the carsic zone of the Central Appennine Geology. The zone is covered by an anomaly of radon gas content: sampling the radon ratio in the geochemistry laboratory of "Forra Lucia" cave, the provenience of radon was correlated at the volcanic substrate (Ofioliti), carried to the surface by the deep cave system.
In the contest of several geological educational training courses, field investigations were carried out by GPS techniques so that geosites position is in geographical coordinates; the volume also includes GIS cartography, photos, sampling - tests and a comprehensive bibliography.

Modalita' di presentazione

Poster

.

Titolo dell'abstract
IMPROVING RISK ASSESSMENT AT A TPHS CONTAMINATED SITE BY USING HDPE AND CONCRETE SLAB LINERS

Autori
CANTELLI ALESSANDRO [1], PUPPINI UMBERTO [1], REMONTI MICHELE [1], RAINERO ALBERTO [1]

presenter's e-mail: alessandrocantelli@esinternational.it

1 - ESI Italia srl

Parole chiave
Contamination

TPHs

Indoor vapour

HDPE features

Abstract
The contaminated site is in Milan. Many different soil and groundwater monitoring samples were collated during site investigation to achieve site specific information on the contamination, aimed for a human health and groundwater risk assessment for industrial land use.
Soil investigations were run through many years (from 1993 up to April 2006), looking for TPH C<12 and C>12 occurrence while the groundwater sampling was carried out in past two years. High TPHs (C<12 and C>12) concentrations exceeding standard values affect both unsaturated and saturated soil. The risk assessment was run with Giuditta 3.1 and RISC 4.0, based on RBCA and CONCAVE protocols. According to APAT Guide Lines the contaminated soil source size is considered to be 50 x 50 meters wide and 20 meters thick (0-20 m b.g.l). Groundwater contamination was recognised and the source size was even defined 50 x 50 meters wide starting from 10 meters depth.
These conditions lead to recognise risks for all of the receptors. To improve the performance of the risk assessment it was assumed to realise a surface containment of the site, made by using HDPE liners coupled with a reinforced-concrete slab. Through a comprehensive literature research, life cycle features (size, weathering, durability etc.) of the HDPE layer were defined.
Both HDPE liner and reinforced-concrete slab thicknesses were changed testing different solutions to achieve a 'no-risk' condition for workers. A reduction of the indoor vapours risk was reached eventually with a conservative hazard index value HI= 0,818.

Modalita' di presentazione
Poster

Titolo dell'abstract
TERRITORY, NATURAL RADIOACTIVITY AND HEALTH IN SOME PLACES OF SARDINIA

Autori
LUMBAU AUREA [1], GINESU SERGIO [2], CARBONI DONATELLA [3], CHESSA GIACOMO [1]

presenter's e-mail: ginesu@uniss.it

1 - Dipartimento di Odontostomatologia - Università di Sassari
2 - Istituto Scienze Geologico Mineralogiche - Università di Sassari
3 - Dip. Teorie e Ricerche dei Sistemi Culturali - Università di Sassari

Parole chiave
Uranium

Radiometric anomalies

Human theet

Man and territory

Abstract
The radioactive pollution in Sardinia, has been in the recent years matter of a considerable debat in the scientific literature. At the present time however, the complex problem of possible interaction between environmental and human activity in a long suitable period is still awaiting a adequate interpretation. At the end of 70' years, the Italian Nuclear AGIP survey has been carried out detailed researches on U ore deposits linked to the fast sedimentation processes in lacustrine environments associated to the post-collisional events during the paenipleining process of Sardinia chain. Particularly, researches focused on siltites and sandstones levels belonging to the post-collisional covers referred to the Permian-Carboniferous time span outcropping in several areas of Sardinia island. Collected data indicate important radioactive anomalies localized in Ogliastra and Sarcidano regions in the central and southern Sardinia. These areas are characterized by a high natural background radioactive values; suitable knowledge elements are offered by the comparison between data collected in the present work in the Escalaplano and Perdasdefogu areas with those of Nuclear AGIP during the 70' years.
Further relationships between human activity and environment will be indicated by data collected on dental apparates because they record the interaction of the organism with pollutant substances. As a consequence, it is expected the possibility to reconstruct history and length of interaction processes with pollutant substances, because during the formation of dental germs the vascularisation favoured the mobility of chemical elements which successively are fixed in the mineral fraction of teeths.
The scenario has reconstructed on account of a precise evaluation of human pollution and linked to the recent complex socio-economical history of investigated areas. Moreover, will be studied the human impact on environment to and the possible radioactive anomalies in the investigated areas.

Modalita' di presentazione
Poster

.

Titolo dell'abstract
HUMAN HEALTH RISKS RELATED TO WATER RESOURCES MANAGEMENT AND URBAN POLLUTION (SALENTO, SOUTHERN ITALY).

Autori
DELLE ROSE MARCO [1]

presenter's e-mail: m.dellerose@ba.irpi.cnr.it

1 - Consiglio Nazionale delle Ricerche, IRPI, Bari

Parole chiave
organic pollution

gastroenteritis exposure

urinary bladder cancer

hypo-chlorination

Abstract
Recent epidemiological studies focused that the Salento people have an higher exposure to gastroenteritis in comparison to Italian population and the exposure to urinary bladder cancer is particularly high. This paper supports the hypothesis that the aforementioned health risks can be related to the present water resources management and urban pollution.
The Salento peninsula, where Quaternary calcarenites and clays overlie Tertiary and Cretaceous carbonates, is characterized by karst morphologies. It hosts discontinuous shallow aquifers, locally used for irrigation, and a huge deep coastal karst aquifer intensively exploited for human purposes. Since the first settlements, landscapes were modified to drain the surface waters and discharge floods. The oldest wells excavated to draw groundwater go back even to the Bronze Age and testify archaic know-how about the water supplying. The Salento is presently crossed by a number of network of artificial and fluvial karst channels strongly modified owing to the urbanisation of territory. The main channels system, the Asso network, was joined to the Parlatano water sink and to other five minor karst sinks about 75 years ago, to solve the secular malaria scourge. To start from the 1991, this man-made fluvial-karst system have been used to discharge municipal and industrial wastewater from treatment plants. This use was encouraged by the necessity to restore the poor reserve of the deep aquifer. Actually, the terminal sinks of the Asso fluvial-karst system absolved the functions of: storm water drainage wells, aquifer remediation-related wells and underground injection regulated wastewater disposal systems.
Urbanisation profoundly affects groundwater recharge and groundwater quality and, as revealed a recent literature, the depth and the rate at which contamination penetrate urban aquifer remain poorly understood.
Physic-chemical and bacteriological features of flowing water through the Parlatano water sink and groundwater drain by the Guardati hydraulic structure of Lecce were monitored during the last two years. At the same time, the tectono-stratigraphic arrangement of the sites was studied.
About the Parlatano, the analysed waters presented high bacterial amount with Escherichia coli MPN/100 mL higher than the value established by law. High nitrate concentrations and significative nitrite and ammonia concentrations are also detected. A geological survey of the water sink, allowed the recognition of a fault dissecting the pre Quaternary substratum that can determine direct injections of wastewater in the deep aquifer.
Concerning the waters sampled at the Guardati structure, variable amount of fecal pollution as well as nitrate concentration were measured. Occasionally, nitrites had detected too. Comparing this data with the rain heights recorded by the university meteorological station, a clear direct correlation is established. A pervasive network of kastified fractures inside the local Miocene calcarenites, recognized during the geological survey, allow fast infiltrations, namely in order of few hours or at most some days. So, the pollutants dispelled through sewer conduits can contaminated the groundwater also in occasion of usual rainfalls.
To reduce the risks of the human health due to the high amount of organic pollutant systematically injected into the Salento aquifers, hypo-chlorination procedures of the water are ponderously realized. However, the impossibility of the total inactivation of some pathogenic virus by hypo-chlorination is largely exposed by a specific literature, whereas other researches stressed the elevate risk to urinary bladder cancer of the peoples drinking such treated waters. So, the water resources management is an hard task, being both the discharges into karst sinks and the escapes through sewers of wastewater, at enmity with the safeguard aquifers by pollutant displacements and the need to protect the public health.

Modalita' di presentazione
Poster

Titolo dell'abstract

EXPERIMENTAL PREPARATION OF MUDS FOR PELOTHERAPY: PRELIMINARY GRAIN-SIZE AND CHEMICAL DATA

Autori

SUMMA VITO [1], TATEO FABIO [2], GIANNOSSI MARIA LUIGIA [1], MEDICI LUCA [1]

presenter's e-mail: giannossi@imaa.cnr.it

1 - Istituto di Metodologie per l'Analisi Ambientale – CNR - Italy
2 - Istituto di Geoscienze e Georisorse – CNR, c/o Dip. Geoscienze - Italy

Parole chiave

clay material

mud preparation

maturation process

grain size data

chemical data

Abstract

Mud therapy (or pelotherapy, or lutotherapy) is one of the oldest examples of healing use of clays and the main concept of mud preparation has not changed much after Roman times: it involves mixing a natural clay with saline water for a sufficiently long time (months) as to acquire special characteristics. Such a time of prolonged interaction is called "maturation". Following this procedure, three critical parameters can affect the compositional features of the therapeutic mud: the initial composition of the clay, the composition and temperature of water and the maturation procedures that enable a biologic community of micro- and macro-organisms to develop, according to environmental conditions in the maturation pond. Nevertheless, the reasons for such a long time success of pelotherapy are still under debate and both chemical and physical processes have been mentioned, as well as biologically-mediated features developed in the mud before rubbing on patients. For a very long time the increase of local and systemic body temperature was considered the most important factor produced by pelotherapy, with well-known effects. However, the most suitable clay type for delaying heat dispersion (smectite) is sporadically used in spa centers, mainly when smectite raw materials are easy available. Such a consideration supports the idea that other parameters are involved in the clinic success of pelotherapy.
A different approach to establish the optimum maturation parameter is based on the occurrence of organic substances produced by micro-organisms living near the mud-water interface. They are mainly diatoms and cyanobacteria that bring different types of organics, part of which have well known anti-inflammatory effects.
An other effect of mud rubbing deals with the chemical exchange between the mud and the skin, because the increase of temperature and sweating enhance the opening of cutaneous barrier. This exchanging feature is mostly unknown, but the experience of other previous studies indicate that skin is permeable to inorganic cations during pelotherapy.
In order to evaluate the effects of the mud composition on the maturation process, 8 little ponds have been placed in the maturing area of a spa centre (southern Apennines, Italy) and filled with different clay materials and the with mineral water used by the spa (alkaline-sulphate mineral water). The ponds have been sampled monthly, and preliminary data are reported (3 months).
To gain insights of the peculiar properties of peloid muds prepared, the following analyses will be carried out: granulometry, mineralogy, chemistry, and physicochemistry (pH, exchange capacity and exchangeble ions). The obtained data concerning the maturated muds will be compared with those of the ''virgin'' clay geomaterials and mineral water.
Six raw materials have been selected because are very rich in clay minerals as smectites and kaolinite, although illite. Calcite, quartz, feldspars, sometimes are present as minor minerals. Two clays are polymineralic and are from Basilicata (southern Italy), represent Plio-Pleistocene deposits; one of them is used in the same spa centre.
Preliminary granulometrical data indicate that maturation induces significant grain size variations. The crumbling and stirring in the basins of maturation and the prolonged rock–water interaction produce an increase of the fraction < 8 μm (with the exception of polymineralic clays) and a decrease of 8-32μm components. The decrease of grain size in bentonites is coupled with the increase of exchengebla Na of muds, mainly related to smectite minerals, whose 001 distance shorten to about 1.25nm in air-dryed smectites. The increse of Na as solvating cation in smectites likely produce an expansion of the diffuse double layer arount clay particle.

Modalita' di presentazione

Poster

.

Titolo dell'abstract

DICLOFENAC-BEARING HYDROTALCITE AS EXTENDED-RELEASE SYSTEM AND SUN ERYTHEMAS INHIBITOR

Autori

BONINA FRANCESCO PAOLO [1], GIANNOSSI MARIA LUIGIA [2], MEDICI LUCA [2], PUGLIA CARMELO [1], SUMMA VITO [2], TATEO FABIO [3]

presenter's e-mail: medici@imaa.cnr.it

1 - Università di Catania
2 - CNR - IMAA
3 - CNR - IGG

Parole chiave

diclofenac

hydrotalcite

release experiments

Abstract

During the last decades, the extensive use of pharmaceuticals has highlighted the need to reduce their wastefulness and extend through the time their efficiency by slow reactions between drug and human organism. Recently a lot of studies have used cationic and anionic clays for pharmaceutical preparations, moving the role of clays from just an inert matrix, to more active functions aimed to protect the active principle or to achieve special goals. The aim of this work is to test different mineral substrate in order to improve the extended-release system available for widespread anti-inflammatory drug such as diclofenac and to compare its local efficiency as sun erythemas inhibitor alone and in anionic-clay form.
Alcoholic and hydroalcoholic solutions of the anti-inflammatory drug diclofenac were prepared and mixed with two anionic-clay hydrotalcite phases, untreated and heated at 500°C. Hydrotalcite pretreated at 500°C showed more adsorption capacity of diclofenac. Diclofenac-bearing clay samples were used for in vitro release experiments to evaluate the percutaneous absorption of diclofenac, using sets of eight Franz cells with membranes of stratum corneum epidermis obtained from human skin; a 2% diclofenac-bearing hydroalcoholic gel was used as comparison sample. The results highlighted that hydrotalcite pretreated at 500°C is less suitable for release procedures, despite its higher uptaking capacity, whereas diclofenac adsorbed from alcoholic solution by untreated hydrotalcite forms the most efficient sample and shows the best permeation profiles: this sample was selected for the in vivo experiments.
Ten healthy volunteers were informed and used for the in vivo experiments. Cutaneous erythemas were produced by a UV lamp. Six cutaneous sites on the center of the forearm were marked and irradiated; two skin sites were not further treated and used as control, three ones were treated by 300 mg of clay samples and one was treated by the 2% diclofenac-bearing gel; the erythemas were supervised by a X-Rite 968 reflectance spectrophotometer; the spectra obtained for each cutaneous site have permitted to calculate the values of erythema index (EI), and the efficiency of the diclofenac-bearing samples was assessed by the percentage of inhibition of the erythema (PIE). The diclofenac-bearing clay sample appeared to be useful for an efficient application on human skin as inhibitor of the UV-induced erythemas, also better than comparison gel sample. The meaningfulness of the more efficiency of drug-clay formulation is confirmed by statistical analysis.

Modalita' di presentazione

Poster

.

Titolo dell'abstract
INDOOR AIR QUALITY IN AN ARCHEOLOGICAL SITE: THE VILLA TORLONIA JEWISH CATACOMBS (ROME, ITALY)

Autori
ANNUNZIATELLIS ALDO [1], BACCANI ANNA [1], BARBERA MARIA ROSARIA [2], BEAUBIEN STANLEY EUGENE [1], CIANCETTI MAGNANI MARINA [2], CIOTOLI GIANCARLO [1], LOMBARDI SALVATORE [1]

presenter's e-mail: giancarlo.ciotoli@uniroma1.it

1 - Dipartimento di Scienze della Terra, Università di Roma "La Sapienza"
2 - Soprintendenza Archeologica di Roma

Parole chiave
radon
carbon dioxide
catacombs
remediation

Abstract
Some measurements of indoor radon and carbon dioxide concentrations were conducted in the Jewish catacomb in Villa Torlonia (Rome, Italy), excavated in the volcanic sequence (tuffs and pozzolana) linked to the Sabatini Volcanoes activity. Before this study the Soprintendenza Archeologica of Rome sent notice that it was not possible to visit the Villa Torlonia Catacombs, even for research purposes, because of the presence of noxious gases (CO_2 and Rn). Furthermore, a project to open the catacombs to the public was delayed because the poor air quality prevented the possibility to work for the conservation of paintings and other artifacts.
This study was carried out to evaluate the possibility of opening this interesting archaeological site, both for restoration of the historically important paintings and for public visits. A preliminary survey, conducted in 1998, confirmed the presence of CO_2 concentrations above the OSHA workplace limit (0.5% for prolonged exposure) and very high radon activity (average of 36000 Bq m-3) contributing to a very high dose rate. According to the D.Lgs. n. 241 26/05/2000, in Italy two action levels are considered for radon in the workplace:
• 500 Bq m^{-3} per year (average value);
• Above this level the limit is defined as absorbed dose rate in 3 mSv/y.
This level corresponds to an average of 500 Bq m^{-3} for 2000 hours of exposure per year. Due to this scenario, a ventilation chimney was opened in the catacomb to reduce Rn concentrations. In 2003 two further surveys, conducted before and after the opening of the chimney, highlighted a strong decrease (about 50%) of the concentrations of both gases, supporting the hypothesis that the opening of more chimneys and/or other suitable types of mitigation could reduce gas concentrations below the legal limits allowing the presence of workers and/or visitors. The good results obtained using this type of remediation are highly relevant because it has not modified the micro-climate in the catacombs that contributes to the preservation of the rare paintings in some of the major tombs. Furthermore, the application of discrete and/or continuous monitoring surveys using portable devices at this site shows that these methods can be used as post-mitigation tests of the effectiveness of the remediation system, and to control the air quality both during public visits and after long period of closure. Moreover, with an automatic radon monitoring system the time remaining to reach the maximum annual dose recommended could be automatically updated.

Modalita' di presentazione
Poster

.

Titolo dell'abstract

MORPHOCHEMICAL CHARACTERIZATION OF FINE PARTICULATE MATTER USING ELECTRON MICROSCOPY TECHNIQUES: SOME INDUSTRIAL HYGIENE APPLICATIONS

Autori

DELLA PENDA EMMA [1], MORONI BEATRICE [2]

presenter's e-mail: b.moroni@tiscali.it

1 - INAIL - Direzione Regionale Umbria - Consulenza Tecnica Accertamento Rischi e Prevenzione
2 - Dipartimento di Scienze della Terra - Università di Perugia

Parole chiave

SEM

TEM

image analysis

EDS

industrial hygiene

Abstract

Investigation of the morphochemical characteristics of fine particulate matter involves a large number of industrial activities where the production and/or the manipulation of different, sometimes not well identified materials expose workers to the risk of occupational diseases. The mode of interaction and the degree of toxicity of the particles mostly depend on the chemistry and the surface reactivity which, on turn, are the result of the structure and texture of materials.
Electron microscopy techniques offer a wide range of applications to micro and nanostructural investigations of particulate matter. SEM and TEM imaging coupled with image analysis supply a wide range of morphological parameters on a statistical population of particles. SEM-EDS elemental mapping is a simple tool to distinguish chemical phases within a complex matrix, whereas SEM- and TEM-EDS spot microanalysis allow a detailed investigation of single phases at different analytical resolution. Cathodoluminescence microscopy and/or spectroscopy can successfully evidence chemical inhomogeneities and structural defects within the particles. Electron diffraction by TEM provides information on the structural state (defects and dislocations, amorphous and crystalline fields) of the particles. In all cases the small grain size prevents complex manipulation of the particles with great advantage in sample preparation.
In this paper some applications of SEM and TEM techniques to the study of a variety of industrial materials including welding fumes, crystalline silica dust and refractory ceramic fibers are reported and discussed.

Modalita' di presentazione

Poster

.