minerals have been treated in Albania in order to address issues related to the sustainable development. However, the intervention of the government to minimize the adversity left behind from the former industry in the form of resource conservation subsidies or depletion taxes for new investors, might improve the present environmental situation. The use of cost benefit analysis to evaluate the development in conjunction with sustainable use of natural resources might minimize the adversary effects of the past. Since other factors, such as the financial constrains, play an important role in the equation, the aid of the foreign investors or international institutions shall also be supported and assisted by the Albanian authorities.

A characterization of human erythemal and vitamin D exposure from UV radiation measurements at Rome station

Siani A.M.[1,3], Casale G.R.[1], Modesti S.[1] and Colosimo A.[2,3]

[1]Department of Physycs, Sapienza Università di Roma, p.le A.Moro 2, I-00185, Rome, Italy, annamaria.siani@uniroma1.it, giuseppe.casale@uniroma1.it, sarah.modesti@uniroma1.it
[2]Department of Human Physiology and Pharmacology, Sapienza University of Rome,
[3]CISB Interdepartmental Research Centre for Models and Information Analysis in Biomedical Systems, Sapienza Università di Roma, p.le A.Moro 2, Italy I-00185, Rome, Italy, a.colosimo@caspur.it

Solar ultraviolet (UV) radiation covers the wavelength range 200-400 nm and is responsible for many physical, chemical and radiative processes in the atmosphere. The spectral atmospheric attenuation of solar ultraviolet radiation depends mainly on stratospheric ozone absorption, Rayleigh scattering by air gases and Mie scattering by aerosols. Surface albedo, altitude, solar zenith angle (depending on latitude and time of day) and local atmospheric composition (troposheric gas, cloud cover and particulate) are responsible of large seasonal and geographical surface UV variability.

Despite the fact that the amount of solar ultraviolet radiation reaching the Earth's surface comprises only a small fraction of the global radiation, approximately 6-7% in the UVA (320-400 nm) region and less than 1% in the UVB band (280-320 nm), current evidence suggests that it is the major causative factor in several short and long term skin and eye diseases. Nothwithstanding the adverse effects, solar UV radiation is responsible of vitamin D_3 synthesis required for skeletal health and appropriate vitamin D levels have been suggested as beneficial factor against breast, prostate and colon cancers. Exposure to solar UV radiation during occupational and leisure activities is therefore a significant public health issue. A scientific debate is still ongoing regarding the health duality of solar ultraviolet radiation and seeking for the optimal UV exposure.

In the present study surface high-quality UV irradiance measurements recorded in the period 1996-2009 at Rome station by means of Brewer spectrophotometry are taken into account. The Solar Radiometry Observatory of Sapienza University of Rome (41.,9° N, 12.5° E, 75 m a.s.l) is operational with the Brewer spectrophotometer #067 since 1992 and the YES broadband UV radiometer since 2000. The spectral UV data are used to retrieve the ambient (i.e on horizontal surface), biologically effective UV quantities. The action spectrum for the synthesis of pre-vitamin D (CIE 2006) and of erythema (CIE 1998) were employed to determine the vitamin D and erythemal dose rates. The seasonal and diurnal variability of both biologically effective UV irradiances at this mid-latitude urban site under clear and all sky conditions are provided in order to identify the periods of UV overexposure as well as the periods in which the minimum effective dose rate is needed for pro-vitamin D_3 photoconversion. An investigation on both biological quantities as a function of total ozone and solar zenith angle is also performed. In addition, climatological erythemal and vitamin D doses are determined and compared to standard vitamin D and erythemal doses for different skin types.

Finally, a methodology to convert CIE erythemal dose rates values in vitamin D dose rates is proposed and the polysulphone dosimetry, usually employed in order to quantify the erythemal dose, is discussed as a potential approach to pre-vitamin D_3 dosimetry. The results will be tested using data obtained by in vivo field campaigns.