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Universidad Nacional de Ingenieria (Peru) TL Dates-1983 (I)

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The dates which we report in this paper, the first work of our TL laboratory, were measured in 1979-1980. The "fine-grains" technique of Zimmerman (1971) was utilized. Our TL equipment is from the Littlemore Scientific Engineering Co., Oxford (LSECO), type 711, provided with a photomultiplier tube type EMI 9635QA. Pure argon at a rate of 5 litres/min. was introduced into the evacuated oven for TL measurements. For alpha and beta source calibrations the chamber was filled with a mixture of commercial nitrogen and hydrogen in a proportion of 4/1 after passing a deoxo purifier. The gas pressure inside was maintained at just below atmospheric to keep the oven closed. Beta irradiations were carried out with a Sr-90 source (40 mCi (nominal) SIP 13), calibrated following the method proposed by E. Pernicka and G. A. Wagner (1979). Alpha irradiations were performed with a Cm-242 source (5 mCi), calibrated using essentially the Zimmerman method (1971). Equivalent dose and supralinearity, corrections were obtained by extrapolating first-and second-glow growth curves. Data for the first curve were taken as the average of the measurements on four discs while the second curve points averaged the results of two discs. All TL data was taken at 375°C.

For the sherd coming from the mountain valley the alpha efficiency (a) of 0.15 was determined. For the other sherds, coming from the deserted coast, "a" was assumed to be 0.15 with an overall uncertainty of 20%. The intrinsic radioactivity was determined by measuring the gross alpha particle emission rate (U and Th) with an alpha counter from the LSECO and using flame photometry (K). For the intrinsic dose-rate calculations, the conversion factors of Bell (1976, 1977) were used, for equal activities of uranium and thorium series. Unsealed (α_0) and sealed (α_1) alpha counts were compared. When α_1/α_0 was greater than 1.05 the value $(\alpha_0+\alpha_1)/2$ was used. In other cases α_0 was taken. Saturation water content was assumed for the sherd of the mountain valley and no moisture content was considered for the other sherds. 15 mrad/yr was used as the cosmic radiation dose-rate. For the sherd of the mountain valley, the burial environmental dosage was calculated from radioactive analysis of the soil (stone-free) and taking a saturation water content. 77 mrads/yr was assumed as the environmental dosage for the other sherds. Anomalous fading was not studied in any case. The error assessment system proposed by Aitken and Alldred (1972) and Aitken (1976) was used assuming zero for the uncertainties σ_3 (stone content of soil), σ_7 (radon emanation) and σ_8 (wetness estimate). The dates are in years before A.D. 1980 and the errors appear within parentheses.

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ARCHAEOLOGIC SAMPLES

A. BAYOVAR (Department of Piura, 05°50'S, 81°03'W, in the Sechura desert) Peru.

These sherds were collected by the archaeological group of M. Cárdenas (1979) from the Seminario de Arqueologia, Pontificia Universidad Católica del Perú, Lima.

UNI-TL-1 Mochica culture (?) 1020 (±60, ±120), A.D. 960

Pottery: 2.198, P-11. Well A, layer 29, depth 2.70-2.95 m. Sample comes from a sand desert.

Comments- Natural dose: 690 rads (I = 20), δQ = 12%, plateau ≃ 70C. Annual dose: 0.68 rads/yr., α_1/α_0 = 1.0, sherd water ≃ 0, a= 0.15, δa = 20%. ^{14}C date on associated charcoal is 940 ± 110 years (Catholic University, Lima).

UNI-TL-2 Chimú culture (?) 630 (± 40, ± 80), A.D. 1350

Pottery: 2.169, P-7. Well A, layer 3, depth 0.30 m. Sample comes from a sand desert.

Comments- Natural dose: 380 rads (I = 50), δQ = 15%, plateau ≃70C. Annual dose: 0.60 rads/yr, α_1/α_0 = 1.0, sherd water ≃0, a = 0.15, δa = 20%. ^{14}C date on associated charcoal is 630 ± 90 years (Catholic University, Lima).

B. PACHACAMAC (Department of Lima, 12°14'S, 76°52'W, 29 km from Lima) Peru.

The sample was collected by L. Langouet and E. López Carranza. Description of the site is given by Engel (1976).

UNI-TL-3 Inca culture (?) 500 (±30, ±60), A.D. 1480

Pottery: Pach-1, Depth 0.30 m.

Comments- Natural dose: 380 rads (I = 50), δQ = 7%, plateau ≃ 80C. Annual dose: 0.75 rads/yr, α_1/α_0 = 1.0, sherd water ≃0, a = 0.15, δa = 20%.

C. HUARMEY (Department of Ancash, 10°03'S, 78°09'W, on the coast) Peru.

Buried fired stones were collected by D. Bonavia from the Universidad Cayetano Heredia, Lima. Datation of some of these stones are reported by j-F-Rouanet (1976).

UNI-TL-4 Chavín de Huantar (?) 2070 (±120, ±210), 90 B.C.

Fired stone: PV 35-1, B-10. Depth 1.50 m.

Comments- Natural dose: 1370 rads (I = 190), δQ = 5%, Plateau ± 70C. Annual dose: 0.66 rads/yr, α_1/α_0 = 1.0, sherd water ≃ 0, a = 0.15, δa = 20%.

D. MARCAVALLE (Department of Cuzco, 13°31'S, 71°57'W, on a mountain valley) Peru.

The sherd was collected by L. Barreda from the Universidad Nacional San Antonio Abad del Cuzco. Datations on this site are given by K. M. de Chaves (1977).

UNI-TL-5 Chanapata sherd (?) 2380 (±150, ±170), 400 B.C.

Pottery: Marc-1. Depth 1.50 m.

Comments- Natural dose: 840 rads (I = 10), δQ = 9%, plateau ≃ 70C. Annual dose: 0.35 rad/yr using $(\alpha_0+\alpha_1))/2$, α_1/α_0 = 1.07, sherd wt. sat/dry = 1.0, sherd burial water = saturation, a= 0.17, δ = 9%.

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