

supernova neutrinos, gamma rays and new accelerated cosmic rays interacting in interstellar, solar-system and terrestrial material. Comparing these estimates with the various observations, we set constraints both on the nearby supernova occurrences in the past and on the total Galactic rate of supernova occurrence.

## RELIABILITY OF RADIOCARBON DATING IN TEPHROCHRONOLOGICAL STUDIES OF KAMCHATKA AND KURILES

*S N LITASOVA*

Institute of Volcanology, Petropavlovsk-Kamchatsky, 683006 USSR

Tephrochronological studies of the Kurile-Kamchatka region are being conducted to reconstruct the history of formation and eruptive regime of volcanoes, and to identify the marker tephra beds which describe the largest explosive eruptions of the Holocene. The dating of volcanic events is based on the  $^{14}\text{C}$  age of organic materials (buried soil, peat, wood and charcoal). Buried soils are the principal material for layered dating of tephra beds. Up to 10–20 thin soil intercalations alternating with tephra beds occur in each section. When there are sufficient quantities of organic material in the buried soil, successive alkaline extracts (from the same sample) are dated. Extracts of minimum and maximum age can be considered as close to the onset and termination of a soil bed formation process which is completed by pyroclastic conservation. Thin intercalations of organic material can be found in Holocene peat bogs underlying or overlying the ash beds, their age being practically synchronous with the time of tephra fallout. Carbon samples of sufficient purity and quantity can be obtained from peat both for cellular tissue and alkaline extract dating. Maximum and minimum ages of alkaline extracts can be considered as most reliable for dating. Wood and charcoal are found underlying or distributed in tephra beds in considerably smaller amounts compared with peat, but they also present good dating material because of their small individual age and distinct positioning in the section.

## RADIOCARBON DATING IN THE 50,000- TO 65,000-YEAR RANGE WITHOUT ISOTOPIC ENRICHMENT

*AUSTIN LONG and ROBERT M KALIN*

Environmental Radioisotope Center, Department of Geosciences, The University of Arizona 85721 USA

In principle, it is possible to detect  $^{14}\text{C}$  levels in natural materials in the 10–11 half-life range ( $^{14}\text{C}/^{12}\text{C} \approx 10^{-15}$ ) using commercially available liquid scintillation (LS) detectors. In practice, defensible finite age determinations involve careful consideration of several critical elements in the analysis in addition to the final radioactive measurement stage. These critical elements are: 1) the integrity of the sample itself, in terms of contaminating younger material and of *in situ*-produced  $^{14}\text{C}$ ; 2) the availability of “dead” background material; 3) chemical blank in laboratory preparation of, in this case, benzene; and 4) stability of background and efficiency of the LS counting system.

Our results so far, determined by LS on LKB-Wallac “Quantulus” measurement systems in an underground counting chamber, show comparability among benzene produced in the lab from anthracite and marble, benzene from cellulose extracted from suspected 125,000-year-old wood, and benzene produced commercially from petroleum. We conclude that the technical barriers to LS dating of samples in the 50,000- to 65,000-year range are less restrictive than the availability of suitable sample material.