Uppermost Inner Core Attenuation From PKP Data Observed at Some South American Seismological Stations

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More than 200 digital recordings form the online archive maintained by the Incorporated Research Institutions for Seismology (IRIS) have been examined for clear PKP phases. Q_P factor at the top of the inner core has been derived using the amplitude spectral ratio (PKPbc versus PKPdf) method (e.g. Cormier, 1981; Bhattacharyya et al., 1993; Souriau & Roudil, 1995; Tseng et al., 2001; Helffrich et al., 2002) applied to the waveforms of suitable, strong (magnitude > 6.0) intermediate depth and deep (h > 150 km) earthquakes recorded at some selected South American stations. In most cases, the sampled volume of the inner core is centered beneath the Pacific Ocean, but some Q_P values correspond to volumes under South Africa and under the Northern Atlantic. The obtained average value of Q_P is 323 ± 16 (at 95% confidence level), close to a normal (Gaussian) distribution. The maximum depth of penetration of the PKPdf phase into the inner core is roughly 333 km, suggesting a possible increase of Q_P with depth, but no definite geographical variation.

location of permanent stations and epicenters. Dotted lines show surface projections of the PKPdf rays. Piercing points to the inner core boundary are indicated by rectangles. Individual Q values are displayed in the proximity of the bouncing point surface projection.

Q_p values versus radius of the bouncing point of the PKPdf wave.