

Fig. 7. Correlation of linear crater count ages (calculated age) to areal crater ages (observed age) for arbitrary line segments on specified plains units. The dashed line represents a 1:1 correlation. The two values are well correlated although the calculated linear values have a slightly larger level of uncertainty.

canic and tectonic activity inside the massif rings of both Hellas and Isidis are largely masked by later, heavily reworked friable deposits [Grizzaffi and Schultz, 1989].

#### MODELS FOR BASIN MODIFICATION

Four stages of basin evolution can thus be distinguished by both age and structural expression: distant Hellas-concentric canyon (HC) formation, radial trough formation, graben formation in the massif ring, and the localization of volcanism into the rim plana. We now consider the formation of each of these feature classes in plausible, theoretical stress fields. The stress fields to be considered are first-order models of mechanisms previously proposed for regional deformation about impact basins on other planets: elastic flexure under a basin load [Solomon and Head, 1980], elastic flexure during isostatic uplift [Melosh, 1976], and impact-generated lithospheric fracture [McKinnon and Melosh, 1980]. In addition, certain observations have prompted consideration of a new mechanism related to "lithospheric reorientation" in the basin region [Wichman and Schultz, 1987, 1988a].

#### Flexure Around Basin Fill Loads

The massif ring graben of the I-NF and I-AF systems broadly resemble the lunar arcuate rilles that Solomon and Head [1979, 1980] identified with flexural deformation under basin mare loads, and Solomon *et al.* [1979] inverted the I-AF, I-NF structures to determine a lithospheric thickness for

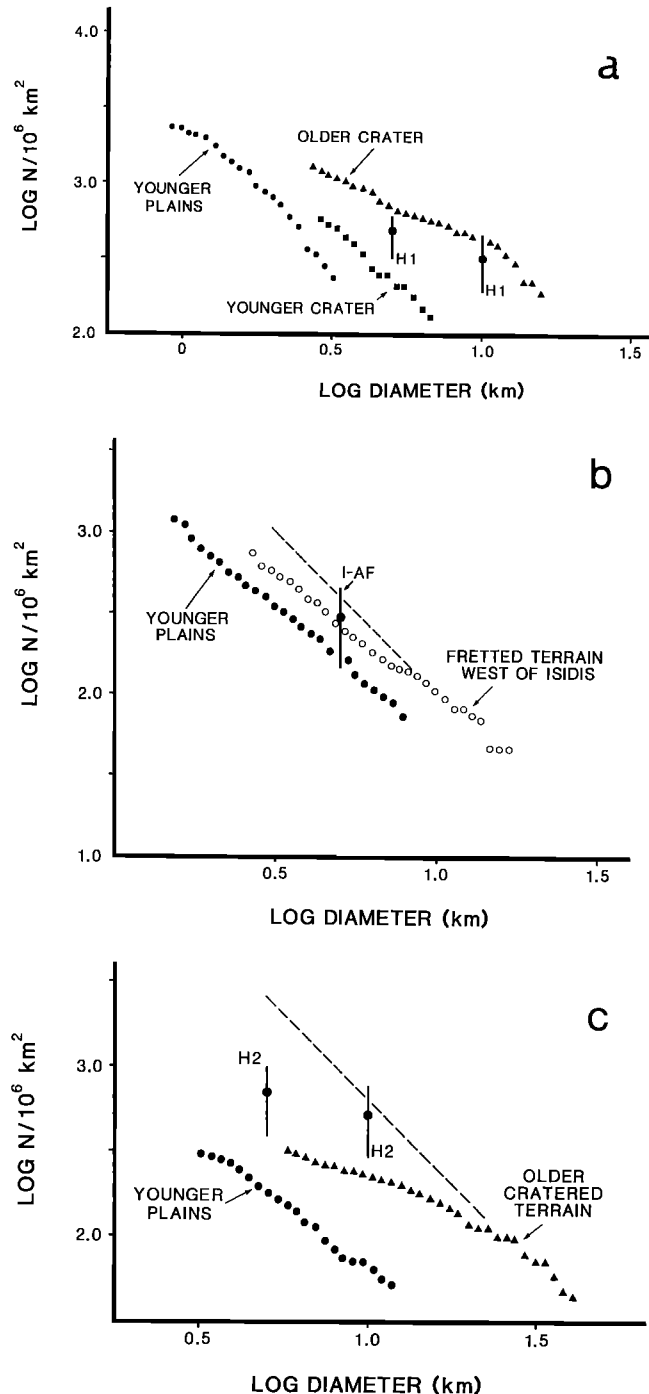


Fig. 8. Comparison of linear crater count ages with areal crater ages of units stratigraphically bracketing dated tectonic structures. (a) Linear ages for the H1 system at diameters greater than 5 and 10 km compared to crater curves on the older crater Flaugergues, the younger crater Bakhuyzen and a plains unit embaying both H1 and Bakhuyzen ejecta. (b) Comparison of linear age for I-AF with reference diameter 5 km to the ages of the fretted terrain cut by the system and younger plains in the AR trough which bury I-AF structures. Dashed line represents an extension along a  $-2$  equilibrium slope from values at larger sizes less affected by crater removal processes. (c) Comparison of linear count ages for the H2 system at diameters greater than 5 and 10 km to areal crater ages of the underlying cratered terrain and plains flooding the canyon system. Dashed line represents an extension of the preserved  $-2$  slope at larger crater sizes.