A NEW ACTIVITY INDEX FOR COMETS

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An activity index, AI, is derived from observational data to measure the increase of activity in magnitudes for comets when brightest near perihelion as compared to their inactive reflective brightnesses at great solar distances. Because the observational data are still instrumentally limited in the latter case and because many comets carry particulate clouds about them at great solar distances, the application of the activity index is still limited. A tentative application is made for the comets observed by Max Beyer over a period of nearly 40 years, providing a uniform magnitude system for the near-perihelion observations. At maximum solar distance observations were mostly by H.M. Jeffers, E. Roemer, and G. van Biesbroek.

In all, AI determinations are made for 32 long-period (L-P) comets and for 14 short-period (S-P). The range of values of AI is the order of 3 to 10 magnitudes with a median about 6. An expected strong correlation with perihelion distance, q, was found to vary as $\sim q^{-2.3}$. Residuals from a least-square solution, ΔAI, were used for comparing comets of different orbital classes, the standard deviation of a single value of ΔAI was only $\pm 1^m.1$ for L-P comets and $\pm 1^m.2$ for S-P comets

Among the L-P comets, 19 of Period, P$> 10^4$ yr yielded $< \Delta AI >= -0^m.27$ compared to $+0^m.39$ for 13 of $10^4 > P > 10^2$ yr. This denies any effect of aging among the L-P comets. The 14 S-P comets yielded $< \Delta AI >$ less $0^m.3 \pm 0^m.3$ than the 32 L-P comets.

The results suggest a common activity level, nature and probably origin for comets of all orbits, sizes and ages.

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