

THE 1992-2000 ANOMALOUS COSMIC RAY RECOVERY PERIOD IN THE OUTER HELIOSPHERE

M.E. Hill¹, D.C. Hamilton¹, and S.M. Krimigis²

¹ Department of Physics, University of Maryland, College Park, Maryland, USA

² Applied Physics Laboratory, Johns Hopkins University, Laurel, Maryland, USA
hill@umdsp.umd.edu / FAX: (301) 314-9547

Although 1-AU measurements of anomalous cosmic ray (ACR) intensities since 1998 have shown increasing solar modulation, clearly indicating the approach to solar maximum conditions, it was not until 2000 that the analogous significant decrease of ACR intensities in the distant heliosphere was observed. The 2000 observations establish 1992 to 2000 -- the years following the modulation associated with the global merged interaction region of 1991 up to the large ACR decrease in 2000 -- as the first thoroughly observed ACR recovery period in the outer heliosphere with positive heliomagnetic polarity. Throughout this period, the Low Energy Charged Particle instruments aboard Voyager 1 and Voyager 2 (sampling the region 36 to 79 AU from the Sun, at 5 to 34 degrees of absolute heliolatitude) have returned composition measurements very well-suited to the study of ACR phenomena. We have composed annually-averaged energy spectra with an energy range from ~0.5 to 30 MeV/nucleon. This energy coverage includes both the oxygen and helium ACR intensity peaks, and extends nearly to the anomalous proton peak. In addition ~1-MeV/nucleon interplanetary-accelerated particles are included, providing a useful monitor of interplanetary activity. The three ACR species mentioned all have spectral peaks at roughly the same total energy, near ~27 MeV, and have shown intensity increases during 1992 to 2000 of up to two orders of magnitude. Twenty-six-day averaged intensity-time profiles at various ACR-dominated energies for H, He and O show that the rate of recovery is better organized by rigidity than by total energy. We will explore the implications these observations have for ACR transport during this unique, nearly nine year recovery period.