# Appendix G THE COBE SKYCUBE

COBE data is pixelized using a variation of a quadrilateralized spherical projection that was originally developed for Earth science databases. In this scheme, the sky is projected onto a cube (also called a *skycube*), with faces numbered 0 through 5. Face 0 contains the North Ecliptic Pole and face 5 contains the South Ecliptic Pole. The Ecliptic plane spans the remaining faces. (See Figures G-1 and G-2.) The reference frame for the cube is defined by axes normal to faces 1 and 0. In Geocentric Ecliptic coordinates, these directions correspond to the vernal equinox and the North Ecliptic Pole. Additional details of the quad-sphere projection, including coordinate transformations, are found in the references.

The terminology used to indicate the level of resolution is resolution $n$, where $n-1$ is the number of subdivisions that were made to the face. For instance, a face with resolution 6 was subdivided 5 times, has $2^5 = 32$ pixels on a side, and has $4^5 = 1024$ total pixels.

The standard DIRBE pixel resolution is 256 × 256 per cube face (resolution 9), with a pixel size of approximately 0.32 × 0.32 degrees. For DMR and FIRAS, the standard resolution is 32 × 32 per cube face (resolution 6), corresponding to a pixel size of about 2.6 × 2.6 degrees. Figures G-3 and G-4 illustrate the pixel numbering for both DIRBE and FIRAS/DMR resolutions.

## References

Chan, F. K. and O'Neill, E. M. *Feasibility Study of a Quadrilateralized Spherical Cube Earth Data Base*, EPRF Technical Report 2-75 (CSC), March 1975.

O'Neill, E. M. and Laubscher, R. E. *Extended Studies of a Quadrilateralized Spherical Cube Earth Data Base*, NEPRF Technical Report 3-76 (CSC), May 1976.

White, R. A. and Stemwedel, S. W. 1992, ''The Quadrilateralized Spherical Cube and Quad-Tree for All Sky Data,'' in *Astronomical Data Analysis Software and Systems I*, eds. D. M. Worrall, C. Biemesderfer, and J. Barnes (San Francisco: ASP), pp. 379-381.

Figure G-1. COBE skycube, ecliptic coordinates.

Figure G-2. COBE skycube, galactic coordinates.

Figure G-3. COBE skycube, resolution 6 pixel numbering.

Figure G-4. COBE skycube, resolution 9 pixel numbering.