Appendix B

Datasets Available from SOI

During the course of this work, large volumes of data have been generated and many computer cycles have been consumed. This appendix is included here to assist any future researchers in retrieving the data from the archives at Stanford's Solar Oscillations Investigation (SOI).

Datasets stored by SOI are available from the SOI Science Support Center (SSSC) at Stanford. To retrieve a dataset, it must be specified by `prog`, `level`, and `series`. For the datasets which I have archived, the `prog` is generally `giles` and the `level` is generally `lev2`; some exceptions will be noted later. I have used the `series name` to distinguish between different types of datasets, and the `series number` to identify the time (and sometimes position on the disk) of observation.

Table B.1 lists the broad categories of relevant datasets which are available and archived at the SSSC. The datasets are collections of FITS[1] files. The header of each file contains important information about the input data and processing. A few more details are provided below.

[1]The Flexible Image Transport System is a particular format of binary data storage.

Dataset Name				Dates
prog	level	series	series numbers	
mdi	lev2	track_08h	3717-3899	1996.05.25 - 1996.07.23
mdi	lev2	lxcor_08h	3717-3899 13717-13899 23717-23899	
mdi	lev2	rxcor_08h	3717-3864 13717-13899 23717-23899	
giles	lev2	track_fdV97	0-2403	1997.04.13 - 1997.05.11
giles	lev2	lxcor_fdV97		
giles	lev2	rxcor_fdV97		
giles	lev2	track_fdV98	0-2403	1998.01.09 - 1998.02.06
giles	lev2	lxcor_fdV98		
giles	lev2	rxcor_fdV98		
giles	lev2	trackvw_struct trackvw_struct_more trackvw_struct_more2	810-1332	1996.05.01 - 1998.06.24
giles	lev2	lxcorvw_all lxcorvw_all_more lxcorvw_all_more2	810-1332	
giles	lev2	rxcorvw_all rxcorvw_all_more rxcorvw_all_more2	810-1332	

Table B.1: A list of datasets archived at the Stanford SSSC. Datasets with series names which begin with `track` are tracked data cubes; series names beginning with `lxcor` denote cross correlations along the north-south direction; and those beginning with `rxcor` are cross correlations along the east-west direction. The datasets can be exported from the SSSC by via the World Wide Web at `http://soi.stanford.edu/`

B.1 Tracked Data Cubes

These datasets consist of the remapped, tracked, and background-subtracted cubes of images which were used to compute the cross correlations. Section 4.1 describes this process in more detail. Important FITS header parameters for each dataset include MAPSCALE, which determines the spacing of the remapped pixels; OBS_B0 and OBS_L0, which describe the Carrington coordinates of the center of the remapped region; T_FIRST and T_LAST, which desribe the temporal span of the data; and TRACK_A0 which measures the tracking velocity. Further details of the header parameters can be found in the man pages for module `track_region`, which was used to produce them. Module man pages can be accessed from the SOI Web site at `http://soi.stanford.edu/`.

In general, each dataset consists of a single data cube. The measurements from the 1996 Dynamics period are exceptional; each dataset consists of three different cubes from three different longitudes on the disk.

B.2 Cross Correlations

These datasets consist of cross correlations computed from the different tracked cubes. Cross correlations for the meridional flow measurements are denoted by series names which begin with `lxcor`; the rotation measurements have names beginning with `rxcor`.

Each dataset consists of a number of FITS files; each file contains the cross correlations for a particular starting latitude. Important header paramters include: DMIN, the minimum travel distance; DMAX, the maximum travel distance; and SINB, which is the starting latitude for the cross correlations (unique to each file). These datasets were produced with module `xcorr`; the man pages for describe the datasets and header parameters in more detail.

Within each file, each "row" contains $2N + 4$ elements. The first element is the mean travel distance (from the latitude given by the header parameter SINB, in the northward or westward direction) in degrees. The second element is the total number of pairs of image pixels which have been used to compute the cross correltaion. The third element is the average deviation (in degrees) from the target direction for propagation between the pairs of pixels. The remaining elements in the row are the cross correlation, from time lag $-N$ to time lag $+N$ (minutes).

The following special notes apply to the different entries in table B.1.

B.2.1 Dynamics 1996

The cross correlations are slightly different in form from the rest of the datasets listed in the table, because they were produced with an older version of `xcorr`. The series numbers for the tracked cubes denote the time; each cube covers a nominal eight-hour period. The series numbers for the cross correlations denote the same time period, with the prefix 0, 1, or 2 indicating the heliocentric longitude. Note that the east-west cross correlations with series numbers 3865-3899 have been lost from the archive.

B.2.2 Dynamics 1997, 1998

Not all series numbers between 0 and 2403 are used. The series number consists of two parts. The first two digits of each series number (00-24) denote the Carrington longitude of the center of the remapped region. The last two digits (00-19) denote different time periods of observation for that particular Carrington longitude. Each dataset covers a nominal eight-hour time period.

B.2.3 Structure

Series numbers denote different time periods. Each dataset covers a nominal time period of 180 hours and follows a particular Carrington longitude during that time. A new dataset, for a trailing Carrington longitude, begins every 36 hours. Where the 180-hour observing time is interrupted by a gap, and there are useable measurements on the other side of the gap, "filler" datasets have also been created. These are the `_more` and `_more2` series; they exist only for a small subset of series numbers.