## Hurricane Data in NETCDF format

The Zip file *tcdata_netcdf* contains five data (.nc) files corresponding to the five ocean basins defined for TC tracking purposes. Loading one of the data files (*bb*tracks.nc, where *bb* stands for the basin) gives you access to all the tropical cyclone tracks up through the most recently available data. The Atlantic and eastern North Pacific files were obtained from NOAA's Tropical Prediction Center, and all the other data from the U.S. Navy's Joint Typhoon Warning Center. As with the other basins, the year in the southern hemisphere corresponds to the calendar year, not the old conventional southern hemisphere TC season.

Loading the .nc files yields seven two dimensional arrays and four one-dimensional vectors. The arrays have dimensions *N* X *M*, where *N* is the total number of storms in the data set. The second dimension represents the six-hour datum for the $N^{th}$ storm; for example, daym(982,42) represents the day of the month of storm 982 at the 42nd six-hour record. Note that all the arrays are padded with zeros from the last record to *M*. The arrays contain the month, day of the month, hour (GMT), latitude (degrees, with negative indicating the southern hemisphere), longitude (0-360 degrees), maximum wind speed (m/s), and central surface pressure (hPa) for each record. Missing data are indicated by zeros.

The four vectors are each of length *N* and contain the year of the storm file, the basin, the storm name, and the storm number within the year. So, for example, *nsi(982)* might be 4, meaning that that storm was the 4th of the year in which it occurred.

## Modifications to NHC and JTWC best track wind speeds (as of 2/2006)

The wind speeds reported in both the NHC (for Atlantic and eastern North Pacific) and JTWC (all other basins) data sets are regarded as 1-minute averaged sustained winds at an altitude of 10 meters. But methods of estimating the maximum 1-minute sustained surface wind have evolved over the years, introducing biases and spurious trends in the data. In an effort to minimize these, we have introduced wind speed-dependent corrections to the wind speed estimates, as follows.

Methods of estimating surface sustained wind from reconnaissance aircraft have varied since missions began in the later 1940s. Initially, wind was estimated from visual observations of the surface, but were later supplemented or replaced by dropwindsonde observations. Until dropwindsondes and Doppler radar observations became prevalent, heavy reliance was replaced on observations or estimates of minimum surface pressure. MSLP was converted to surface sustained wind using formulae that evolved in time, based on new data.

For the Atlantic, Landsea (*Mon. Wea. Rev.*, 1993) documented a significant change in the wind speed-MSLP around 1970. We fit a sine curve to the data in his Table 5 and used this to correct pre-1970 wind speeds according to

$$v' = v\left[1 - 0.14\sin\left(\frac{\pi(v-45)}{75}\right)\right],$$

where $v'$ is the adjusted velocity and $v$ is the original velocity, both in knots. This adjustment is applied ONLY for winds speeds between 45 and 120 knots.

In the western North Pacific, JTWC updated its wind speed-MSLP around 1973, according to their annual tropical cyclone reports. We adjusted pre-1973 winds to reflect the updated speed-MSLP relation. We first define and adjusted wind speed:

$$v' = 0.1884 v^{1.288}$$

where the original and adjusted wind speeds are in knots. We then define a fnal adjusted wind speed at as weighted combination of this and the original wind speed:

$$v'' = \sigma v + (1-\sigma) v',$$

where $\sigma = 0.4$ prior to 1967, and $\sigma = 0.8$ in the years 1968-1972, inclusive.

Unlike the Atlantic adjustment, this significantly affects the surface sustained wind over the whole range of reported wind speeds. We also applied this correction to the southern hemisphere and Northern Indian Ocean, though there are so few pre-1974 wind reports in those data sets, that this is not very consequential.