Predictors, Iteration 2

All predictors are created from the operational (v. 2018) HWRF model, using the outermost grid and the innermost grid (with 1.5-km grid spacing). In the majority of cases, the Inner-core type predictors focus on the innermost grid, while environmental-type predictors are defined on the outer grid.

Predictors are currently produced from 0-126 h per forecast per storm, although the data below in the one example we have to work with is only shown out to 30 h since there was no forecast data beyond 30 h in this particular example. The data are currently output to ASCII format.

Description of data and predictors below

TIME : Forecast time in h
LAT : Latitude of storm center (deg N)
LON : Longitude of storm center (deg E)
MAXWIND : Storm intensity (surface-wind speed) (kt) (IC)
RMW : Radius of maximum surface wind speed (km) (IC)
MIN_SLP : Minimum sea level pressure (hPa) (IC)
SHR_MAG : 850-200 hPa vertical wind shear magnitude (kt) (r = 0 – 500 km) (EN, IC)
SHR_HDG : 850-200 hPa vertical wind shear heading (deg) (EN, IC)
STM_SPD : Estimated storm speed (kt) (EN, IC)
STM_HDG : Estimated storm motion direction (deg) (EN, IC)
SST : Sea-surface temperature (10^0C) (r = 0 – 50 km) (EN)
OHC : Not available (Ocean heat content)
TPW : Total precipitable water (mm) (r = 0 – 200 km) (IC, EN)
LAND : Distance of storm from land (km)
850TANG : Average 850-hPa tangential wind (10 m s^{-1}) (r = 0 – 600 km) (IC, EN)
850VORT : Average 850-hPa relative vorticity (10^{-7} s^{-1}) (r = 0 – 1000 km) (IC, EN)
200DVRG : Average 200-hPa divergence (10^{-7} s^{-1}) (r = 0 – 1000 km) (IC, EN)
RHLO : Relative humidity 850-700 hPa (10%) (r = 200 – 800 km) (EN, IC)
RHMD : Relative humidity 700-500 hPa (10%) (r = 200 – 800 km) (EN, IC)
RHHI : Relative humidity 500-300 hPa (10%) (r = 200 – 800 km) (EN, IC)
CAPE1 : Convective Available Potential Energy (J kg^{-1}) (r = 0 – 100 km) (EN, IC)
CAPE2 : Convective Available Potential Energy (J kg^{-1}) (r = 100 – 200 km) (EN, IC)
CAPE3 : Convective Available Potential Energy (J kg^{-1}) (r = 200 – 500 km) (EN, IC)
LHTFL1 : Surface turbulent latent heat flux (W m^{-2}) (r = 0 – 100 km) (IC, EN)
LHTFL2 : Surface turbulent latent heat flux (W m^{-2}) (r = 100 – 200 km) (IC, EN)
LHTFL3 : Surface turbulent latent heat flux (W m^{-2}) (r = 200 – 500 km) (IC, EN)
SHTFL1 : Surface turbulent sensible heat flux (W m^{-2}) (r = 0 – 100 km) (IC, EN)
SHTFL2 : Surface turbulent sensible heat flux (W m^{-2}) (r = 100 – 200 km) (IC, EN)
SHTFL3 : Surface turbulent sensible heat flux (W m^{-2}) (r = 200 – 500 km) (IC, EN)
VMAXMPI : Emanuel MPI calculation (kt) (r = 0 – 50 km) (EN, IC)
POT : VMAXMPI – MAXWIND (kt) (IC, EN)

TGRD : 850-700 hPa temperature gradient (r = 200 – 800 km) (EN)
IKE1 : Integrated tangential wind kinetic energy at 850 hPa (10^{12} kg m s^{-2}) (r = 0 – 500 km) (IC)

$$\int_0^{2\pi}\int_0^{500}\frac{1}{2}\rho_{850}v_{850}^2 r\,dr\,d\theta$$

IKE2 : Integrated tangential wind kinetic energy at 850 hPa (10^{12} kg m s^{-2}) (r = 0 – 1000 km) (IC)
TCOND7001 : Average 700-hPa total condensate (10 g kg^{-1}) (r = 0 – 50 km) (IC)
TCOND7002 : Average 700-hPa total condensate (10 g kg^{-1}) (r = 0 – 100 km) (IC)
TCOND7003 : Average 700-hPa total condensate (10 g kg^{-1}) (r = 100 – 250 km) (IC)
TCONDALL1 : Average 850-500 hPa total condensate (10 g kg^{-1}) (r = 0 – 50 km) (IC)
TCONDALL2 : Average 850-500 hPa total condensate (10 g kg^{-1}) (r = 0 – 100 km) (IC)
TCONDALL3 : Average 850-500 hPa total condensate (10 g kg^{-1}) (r = 100 – 250 km) (IC)
INST1 : 850-500 hPa inertial stability parameter (10^{-4} s^{-2}) (r = 0 – 50 km) (IC)

$$I^2 = \left(f + \frac{2v}{r}\right)(f + \zeta)$$

INST2 : 850-500 hPa inertial stability parameter (10^{-4} s^{-2}) (r = 0 – 100 km) (IC)
INST3 : 850-500 hPa inertial stability parameter (10^{-4} s^{-2}) (r = 100 – 250 km) (IC)
CP1 : 850-500 hPa inert. stab. + pos. vert. mot. coupling parameter (10^{-4} Pa s^{-3}) (r = 0 – 50 km) (IC)

$$\mathrm{CP1} = \begin{cases} -I^2\,\mathrm{w} & \text{if} \quad \mathrm{w} < \text{-}0.5\ \mathrm{Pa\ s^{-1}} \\ 0 & \text{otherwise} \end{cases}$$

CP2 : 850-500 hPa inert. stab. + pos. vert. mot. coupling parameter (10^{-4} Pa s^{-3}) (r = 0 – 100 km) (IC)
CP3 : 850-500 hPa inert. stab. + vert. mot. coupling parameter (10^{-4} Pa s^{-3}) (r = 100 – 250 km) (IC)
TCONDSYM1 : 850-500 hPa TCOND symmetry parameter s (10%) (r = 0 – 50 km) (IC)

$$s = \frac{\overline{\mathrm{TCOND}}^2}{\overline{\mathrm{TCOND}}^2 + \frac{1}{2\pi}\int_0^{2\pi}(\overline{\mathrm{TCOND}} - \mathrm{TCOND})^2\,\mathrm{d}\theta}$$

where the overbar represents an azimuthal average. Adapted from Miyamoto and Takemi (2014; *J. Atmos. Sci.*)

TCONDSYM2 : 850-500 hPa TCOND symmetry parameter (10%) (r = 0 – 100 km) (IC)
TCONDSYM3 : 850-500 hPa TCOND symmetry parameter (10%) (r = 100 – 250 km) (IC)
INERTSYM1 : 850-500 hPa inert. stab. symmetry parameter (10%) (r = 0 – 50 km) (IC)
INERTSYM2 : 850-500 hPa inert. stab. symmetry parameter (10%) (r = 0 – 100 km) (IC)
INERTSYM3 : 850-500 hPa inert. stab. symmetry parameter (10%) (r = 100 – 250 km) (IC)
COUPLSYM1 : 850-500 hPa coupling CP1 parameter (10%) (r = 0 – 50 km) (IC)

COUPLSYM2 : 850-500 hPa coupling CP2 parameter (10%) (r = 0 – 100 km) (IC)
COUPLSYM3 : 850-500 hPa coupling CP3 parameter (10%) (r = 100 – 250 km) (IC)
WALLA1 : Average 850-500 hPa upward motion (Pa s^{-1}) (r = 0 – 50 km) (IC)
WALLA2 : Average 850-500 hPa upward motion (Pa s^{-1}) (r = 0 – 100 km) (IC)
WALLA3 : Average 850-500 hPa upward motion (Pa s^{-1}) (r = 100 – 250 km) (IC)
USFC1 : Radial flow @ surface (m s^{-1}) (r = 0 – 50 km) (IC)
USFC2 : Radial flow @ surface (m s^{-1}) (r = 0 – 100 km) (IC)
USFC3 : Radial flow @ surface (m s^{-1}) (r = 100 – 250 km) (IC)
WSYM1 : 850-500 hPa vertical motion symmetry parameter (10%) (r = 0 – 50 km) (IC)
WSYM2 : 850-500 hPa vertical motion symmetry parameter (10%) (r = 0 – 100 km) (IC)
WSYM3 : 850-500 hPa vertical motion symmetry parameter (10%) (r = 100 – 250 km) (IC)
USFCSYM1 : Surface Radial flow symmetry parameter (10%) (r = 0 – 50 km) (IC)
USFCSYM2 : Surface Radial flow symmetry parameter (10%) (r = 0 – 100 km) (IC)
USFCSYM3 : Surface Radial flow symmetry parameter (10%) (r = 100 – 250 km) (IC)
vmax_bt_new: best track observation of VMAX

Notes:
IC refers to inner-core-type predictors
EN refers to environment-type predictors