Linear discriminant analysis (LDA) is employed to classify and predict the development of tropical cyclones in the eastern Pacific basin. LDA can be used to classify tropical vortices into developing and non-developing categories based on an empirical, linear function of parameters that define the relevant aspects of the vortex and the surrounding environment (e.g. vorticity, vertical shear, environmental deformation). The function is derived to separate developing and non-developing vortices by the greatest possible amount. All vortices that formed during the peak of the eastern Pacific hurricane season (1 July - 31 September) from 2005-2008 are tracked through the earliest portion of their life cycle and grouped into one of two categories: developing (vortices declared as tropical storms) or non-developing (vortices not reaching tropical storm status). The 2005-2007 seasons are use to calibrate the algorithm, while later seasons are used to test its classification skill. The LDA algorithm is modified to produce a 24-hour probabilistic prediction of development using the linear combination of parameters that produces the highest classification skill. An in depth analysis of cases typifying high predictability and low predictably events is presented.