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Moist convection in the 24degree N jet: modelling the convective plume formation with the EPIC model

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Observations of the jovian atmosphere over the last few decades have revealed a plethora of planetary scale disturbances which lead to a disruption of the chromophoric and dynamical structure of the atmosphere at the latitude that form in. These outbreaks occur every few years, forming from small localized plumes, and result in the generation of unique cloud features that persist for a short while after the plume formation (Sanchez-Lavega et al 2017, Fletcher et al 2017). The initial plumes are thought to be driven by latent heat release from the deep water layer, making these outbreaks an important feature in the study of the deep jovian atmosphere.

Since it is difficult to directly observe and study the dynamics of the deeper layer, due to the presence of upper level clouds, we use the Explicit Planetary hybrid-Isentropic Coordinate (EPIC) General Circulation Model (GCM) (Dowling et al 2006) to study the dynamics of these plumes. We vary the abundance of the water in the deep layers, and investigate its effects on the plume formation and the subsequent cloud features. With the addition of a new sub-grid scale moist convective scheme (Sankar et al 2020), we investigate the resulting convective storm intensity and upwelling mass flux, in an effort to constrain the dynamics and volatile structure of the water cloud layer. We present our results from the addition of this scheme as well as applications to the 24deg N jet region.