



What controls the development of extratropical cyclones?

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Explosively intensifying North Atlantic cyclones can lead to flooding and severe wind damage in the UK and Western Europe, particularly those originating in the northeast Atlantic. These northeast Atlantic cyclones can be hard to forecast owing to their small scales and the wide range of processes controlling their rapid development. This study uses linear regression analysis to quantitatively evaluate the sensitivity of extratropical cyclone intensity to atmospheric precursor fields, specifically frontal gradient and potential vorticity at the genesis time. Enhanced cyclone intensity two days after genesis is found to be associated with deeper upper-level troughs upstream of the cyclone centre at the genesis time in both west and east Atlantic cyclones. However, whilst west Atlantic cyclones are also enhanced by the presence of strong fronts, east Atlantic cyclones are not. Instead, east Atlantic cyclones exhibit an enhancement when diabatically generated mid-level potential vorticity is present. This is consistent with the paradigm of latent heat release in the warm conveyor belt region playing an important role in the development of east Atlantic cyclones.