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TitanWRF - a new numerical model of Titan's atmosphere

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We are interested in simulating Titan's atmosphere in general, and the methane cycle (and cloud formation) in particular, using numerical models. TitanWRF is a new three-dimensional model of Titan's atmosphere, with numerous features that make it ideal for our goals. For example, it is highly efficient (and designed to be run in parallel on supercomputers) so can perform the lengthy simulations required for Titan's weakly forced, thick, slowly rotating atmosphere in reasonable amounts of time. TitanWRF can also be run with high resolution regions embedded within a low resolution global domain, so processes such as cloud formation can be better dealt with in areas of particular interest.

We are concerned initially with producing and validating the modelled atmosphere and its seasonal changes, first with a constant haze distribution (varying with height only) then with advection of radiatively-active haze within the atmosphere. In particular, we are interested in whether we can obtain (and identify the origin of) the equatorial superrotation evident in observations. The model atmosphere takes tens of Titan years (which currently equates to several months of computing time) to spin up from rest (due to exchange of angular momentum with the surface), so results are still quite preliminary, but we will present our work to date and discuss future plans.