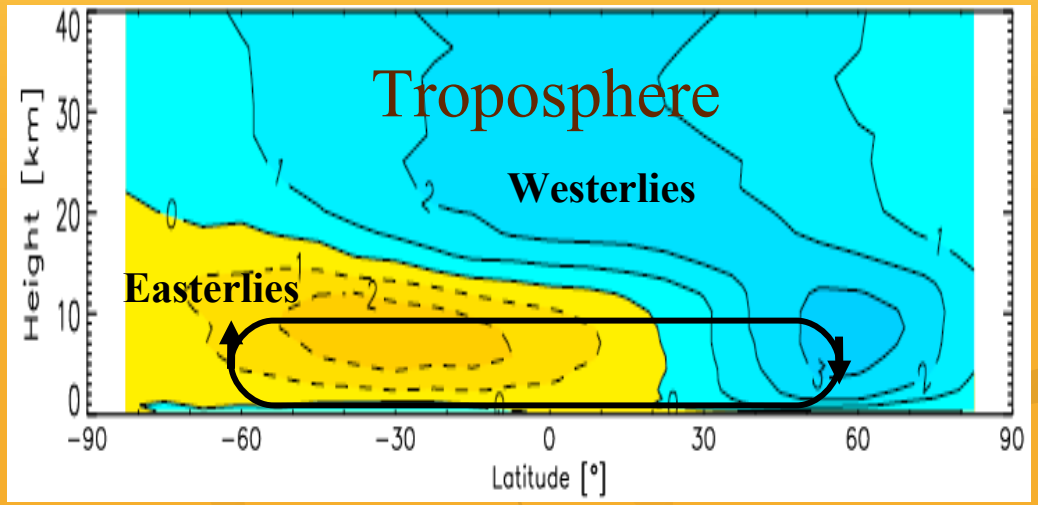
Summary of Titan's circulation

•Atmosphere superrotates (westerlies only) above 40km

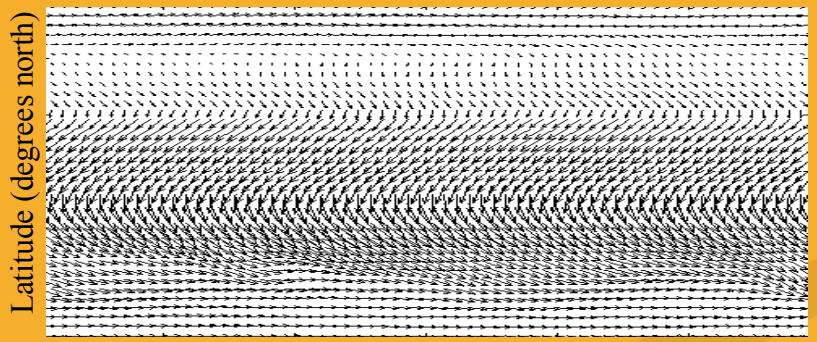
Stratosphere



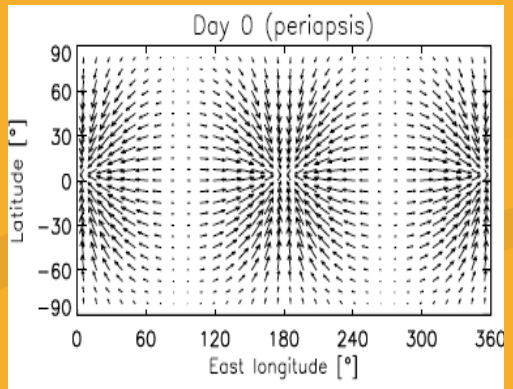
• Below 40km the zonal mean wind direction varies depending on height, latitude and season

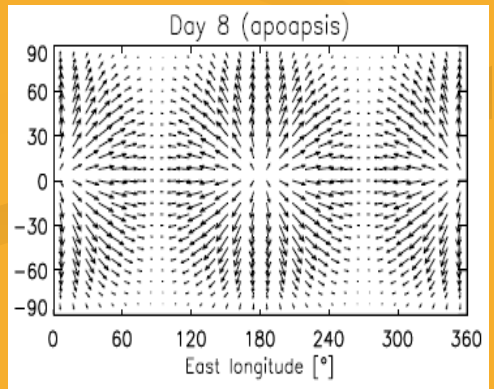
• This figure shows only **one** season

• Wind maps would be *fairly* simple...

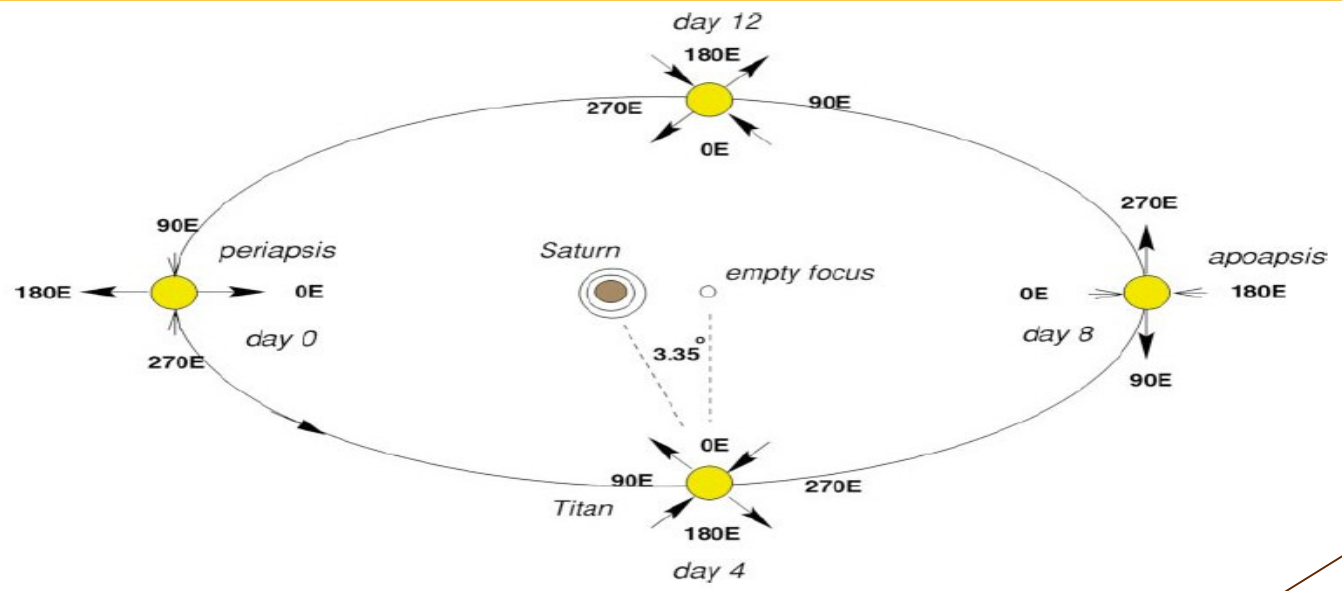


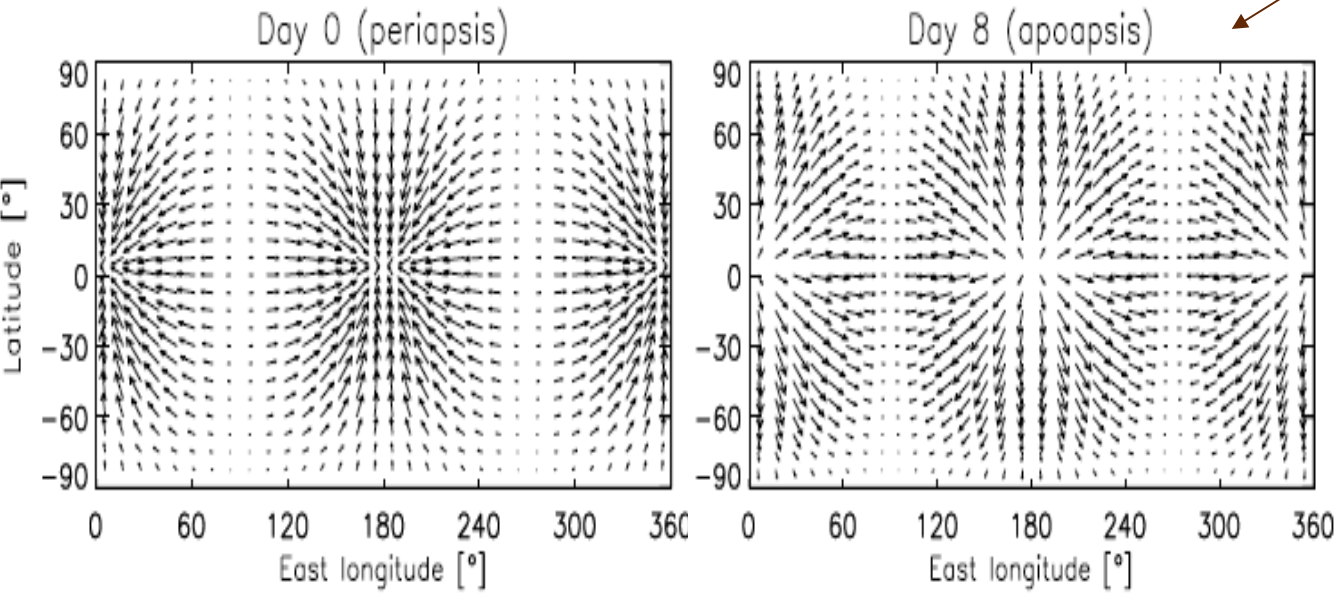
...if not for the gravitational tides:





Tidal forcing





Eccentric orbit around Saturn => time-varying gravity field ('tides')

Tidal accelerations repeat every orbit, which is 1 Titan day (~16 Earth days) as Titan tidally locked

Tides primarily affect tropospheric winds

Things to remember about atmospheric data

- Nothing is static - an atmosphere is time varying
- Titan has strong seasonal changes affecting in particular:
    - The positioning of Hadley cells (meridional transport)
    - The range of heights and latitudes over which near-surface easterlies can occur (facilitating changes in wind direction)
- Tidal effects can also hugely affect the outcome of a tracer experiment (will it 'surf' its way out of a region, or stay put?)
- **LCS method is powerful way to investigate this complex system**