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MTR 3400 Assignment #3

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Coriolis parameter

$$f = 2\Omega \sin(\Phi)$$

geostrophic adjustment time

$$GAT = 1/4(2\pi / f)$$

Part 1 Earth

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 15.041084443619141 Geostrophic Adjustment Time 30° : 5.983611111111113 hrs

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 17.254423228052453 Geostrophic Adjustment Time 35° : 5.216053808954732 hrs

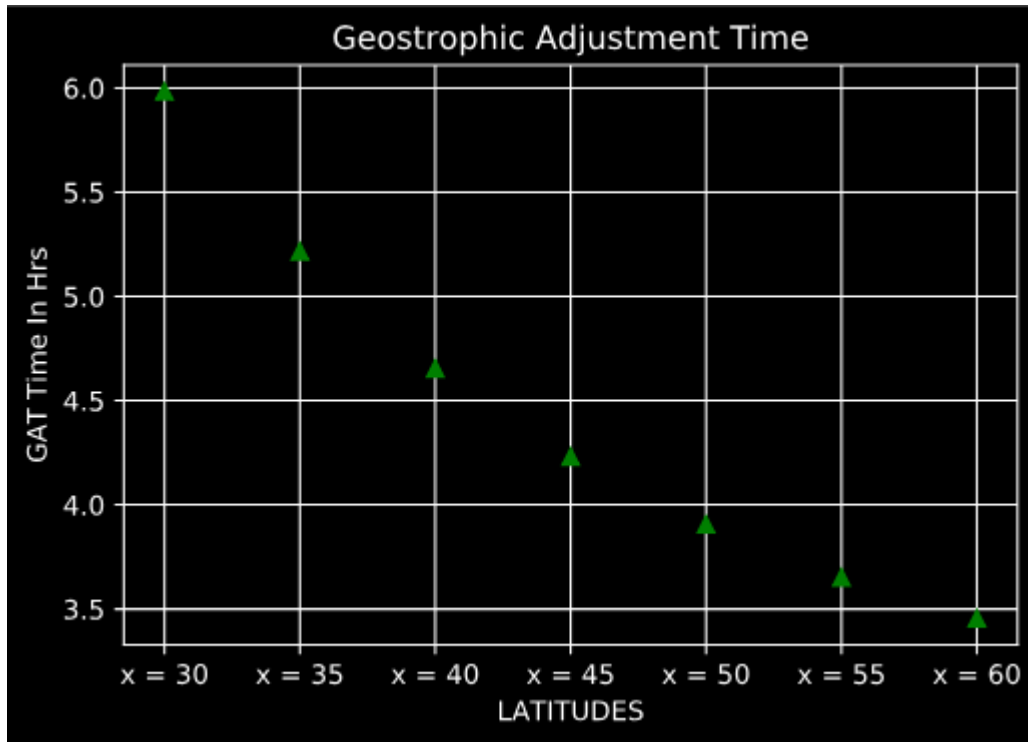
Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 19.336445433214678 Geostrophic Adjustment Time 40° : 4.654423188111132 hrs

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 21.271305612965172 Geostrophic Adjustment Time 45° : 4.2310519926498396 hrs

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 23.044278313035502 Geostrophic Adjustment Time 50° : 3.90552478048703 hrs

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 24.641870140627947 Geostrophic Adjustment Time 55° : 3.6523201967375734 hrs

Earth angular velocity: 0.004178079012116429 f_coriolis parameter: 26.051922457282213 Geostrophic Adjustment Time 60° : 3.454639485726036 hrs



Part 2

Saturn almost have 1/2 the hours of an earth day

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 33.74999999999999 Geostrophic Adjustment Time 30° : 2.6666666666666674 hrs

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 38.716409453695604 Geostrophic Adjustment Time 35° : 2.3245957274947977 hrs

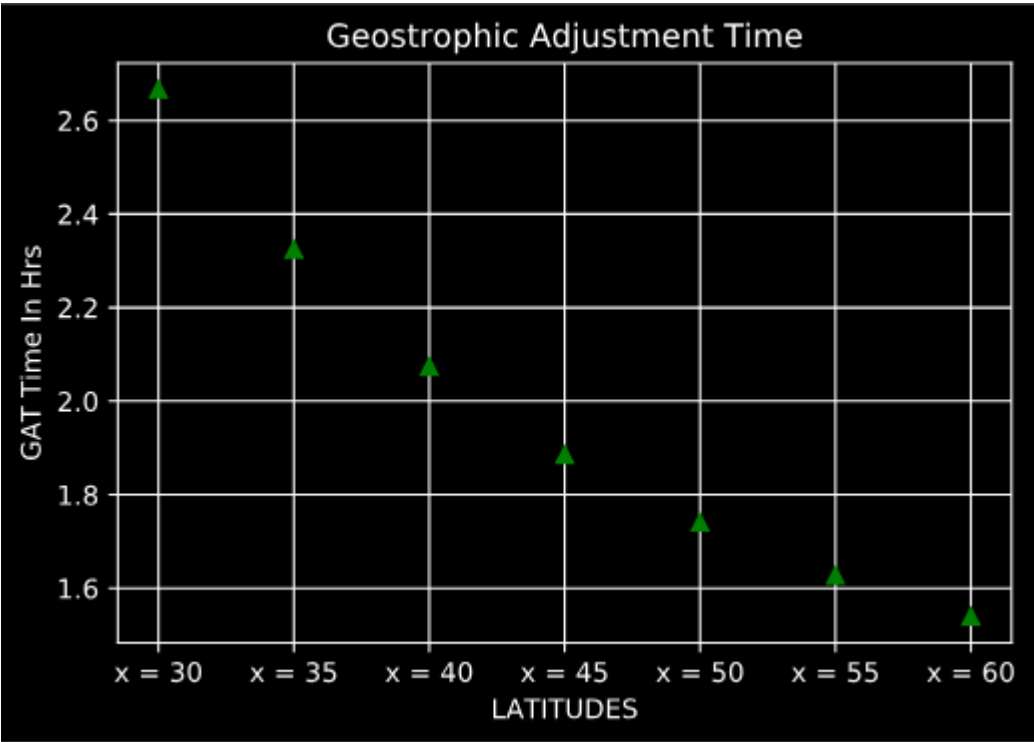
Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 43.3881636538414 Geostrophic Adjustment Time 40° : 2.074298435813883 hrs

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 47.72970773009196 Geostrophic Adjustment Time 45° : 1.8856180831641267 hrs

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 51.707999910531015 Geostrophic Adjustment Time 50° : 1.7405430524430383 hrs

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 55.29276298950694 Geostrophic Adjustment Time 55° : 1.6276994516819416 hrs

Saturn angular velocity in degrees: 0.009375 f_coriolis parameter: 58.4567147554496 Geostrophic Adjustment Time 60° : 1.539600717839002



Part 3

Mercury has 1,408 hours which is more that 2 times the hrs of an Earth day

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.2557711322017039
Geostrophic Adjustment Time 30°: 351.8770833333334

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.2934085890594513
Geostrophic Adjustment Time 35°: 306.7394866949991

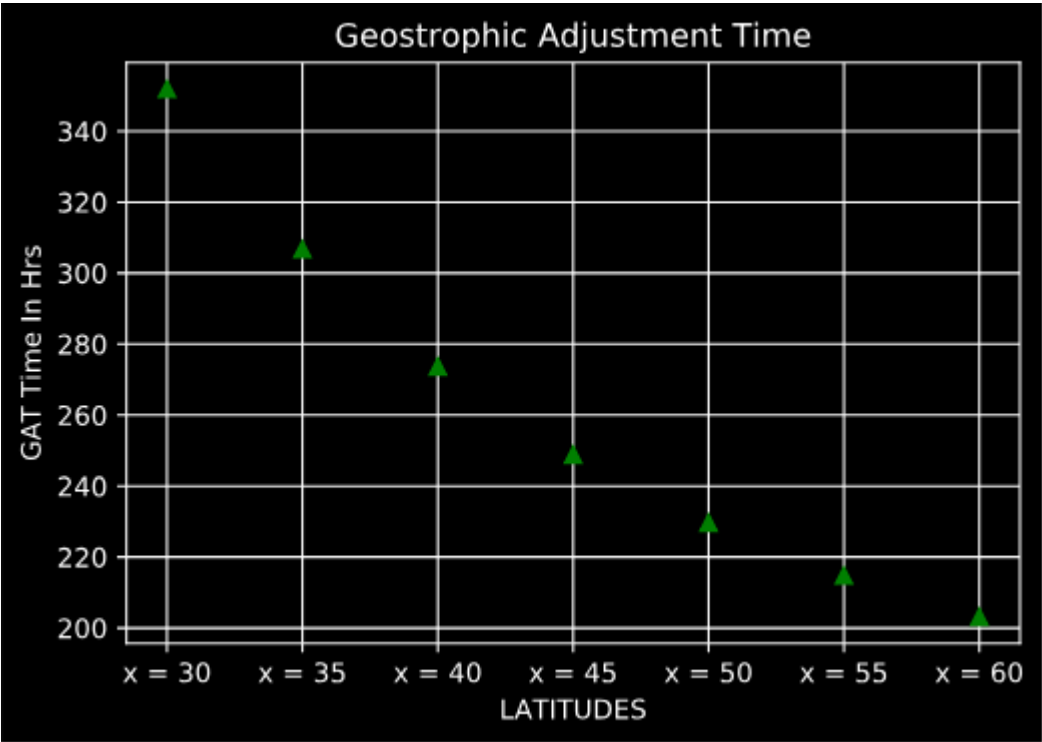
Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.32881302938950624
Geostrophic Adjustment Time 40°: 273.7117813339068

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.36171500402317164
Geostrophic Adjustment Time 45°: 248.81467176914384

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.3918641090667296
Geostrophic Adjustment Time 50°: 229.67145476615752

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.4190308916262715
Geostrophic Adjustment Time 55°: 214.78130085041533

Mercury angular velocity in degrees: 7.104753672269554e-05 f_coriolis parameter: 0.4430085960827674
Geostrophic Adjustment Time 60°: 203.1563287841604



Findings

This analysis was created using python with matplotlib library as well as Markdown. Based on these findings, there is a difference between the graphs. The previous graphs are analysis about the geostrophic adjustment period from 30° to 60° N. at every 5° interval and results are in hr unit. The first one shows a adjustment starting from 3.5 to 6 hrs. The second graph represents a geostrophic adjustment period of Saturn. On this one, the adjustment is from 1.6 to 2.6 hrs. Finally, the third graph shows a huge difference among the last two. The adjustment is from 200 to 340 hr. In conclusion, the biggest geostrophic adjustment time is found on the last graph (Mercury).