Magnus Force in the Venus Ionosphere

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The low altitude retrograde super-rotation motion of the Venus ionosphere and the trans-terminator flow observed in the high altitude ionosphere are examined in a fluid-dynamic interpretation of their interaction. It is argued that they produce a fluid dynamic force (Magnus Force) that leads to a ($\sim 10^{o}$) dawn-ward deflection of the trans-terminator flow which is comparable to that implied from the PVO observations. The Magnus force results from a pressure difference that is set across the planet by the difference in the speed of the plasma when both the rotation motion and the trans-terminator flow are in the same sense (dusk side terminator) to that where both motions are opposite to each other (dawn side terminator). The dawn-ward directed deflection of the ionospheric plasma in the trans-terminator flow also deviates the plasma channels that extend downstream from the magnetic polar regions, and is responsible as well for the position of the electron density profiles with an upper ionospheric plateau that are seen near the midnight plane. The effects of the Magnus force are also related to the strong difference in the ionopause altitude observed between the dusk and the dawn side terminator (with higher altitudes seen in the dawn side) and to the larger ionospheric trans-terminator flow speeds measured by the dawn side.