Can the Weddell Sea anomaly and related phenomena be explained by conjugate effects?

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Weddell Sea Anomaly (1958)

Bellchambers and Piggott (1958)

December 6, 1958

Fig. 1. Monthly median $f_{p}F2$ at Halley Bay. ●●●●, July (winter); +---+, September (equinox); ×--×, December (summer).
COSMIC NmF2

17-18 LST

18-19 LST

19-20 LST

20-21 LST

Burns et al. J. Geophysics, 2008
NmF2 for 0 UT

Terminator

Geomagnetic Conjugate Terminator

Magnetic Equator
hmF2 for 0 UT
NmF2 December Solstice

NmF2 2006-2008 Southern Summer UT 13

Latitudinal and longitudinal maps showing the distribution ofNmF2 during the Southern Summer UT 13.
NmF2 June Solstice
hmF2 June Solstice
Slow Increase of NmF2 After Dawn in Summer
Conclusions

• There are distinct enhancements of $NmF2$ and increases in $hmF2$ when the terminator and conjugate terminator are sufficiently separated at dusk.

• This effect occurs in both the northern and southern summers.

• An $hmF2$ increase occurs between the two terminators even at locations where there is no increase in $NmF2$.

• A similar, but reversed, effect occurs in $hmF2$ near dawn.

• In summer, $NmF2$ does not increase much after dawn until the conjugate terminator has passed.

• The $NmF2$ enhancement starts at the poleward boundary of the equatorial anomaly and occurs further from it as local times get later.