

### Technical Page

Proposal Type: Large  
 General Category: Terrestrial Aeronomy  
 Sub-Category: Radar  
 Observation Category: Thermosphere  
 Total Time Requested: 528 hours Hours  
 Minimum Useful Time: 3 hours

**Proposal Title:** The Burnside Factor Revisited: A Model-Independent Ion Momentum Balance Study

*ABSTRACT:*

Studies of momentum exchange between the thermosphere and ionosphere have been used for decades to infer discrepancies between observation and theory in terms of the Burnside factor  $F$ . The lack of independent information regarding O density, however, introduces an ambiguity regarding the physical meaning of this “correction” factor: while it is usually intended to constrain theoretical estimates of the  $O^+ - O$  momentum transfer cross section  $Q_{O^+-O}$ , it could also reflect systematic bias in the (historically required) model specification of O density. We propose to incorporate O density and  $T_\infty$  values, derived empirically as solutions to the  $H^+$  continuity balance equation, into the  $O^+$  momentum balance equation to determine  $F$  and thus  $Q_{O^+-O}$ . The project will use incoherent scatter measurements of the F-region and topside ionosphere in conjunction with passive optical observations of thermospheric winds (O 630.0 nm emission) and neutral H density (H 656.3 nm emission). This result has the potential to increase the accuracy of both future experimental studies – such as momentum or energy balance derivation of thermospheric density and temperature – as well as model calculations of thermospheric energetics or dynamics.

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### Remote Observing Request

- Observer will travel to AO
- Remote Observing
- In Absentia (instructions to operator)

### Instrument Setup

430 G                      430 CH receiver    430 CH radar

**Atmospheric Observation Instruments:**

Tilt-Photometer    Fabry-Perot

**Special Equipment or setup:**    none

**RFI Considerations**

**Frequency Ranges Planned**