

URSI Commission G - Report

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New Players in the Mesosphere: Dust and Oxygen

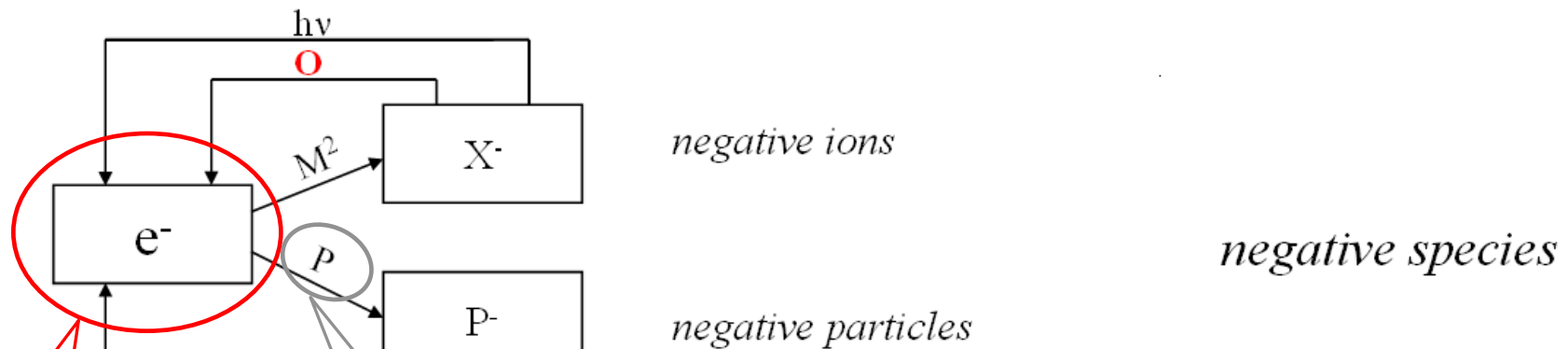
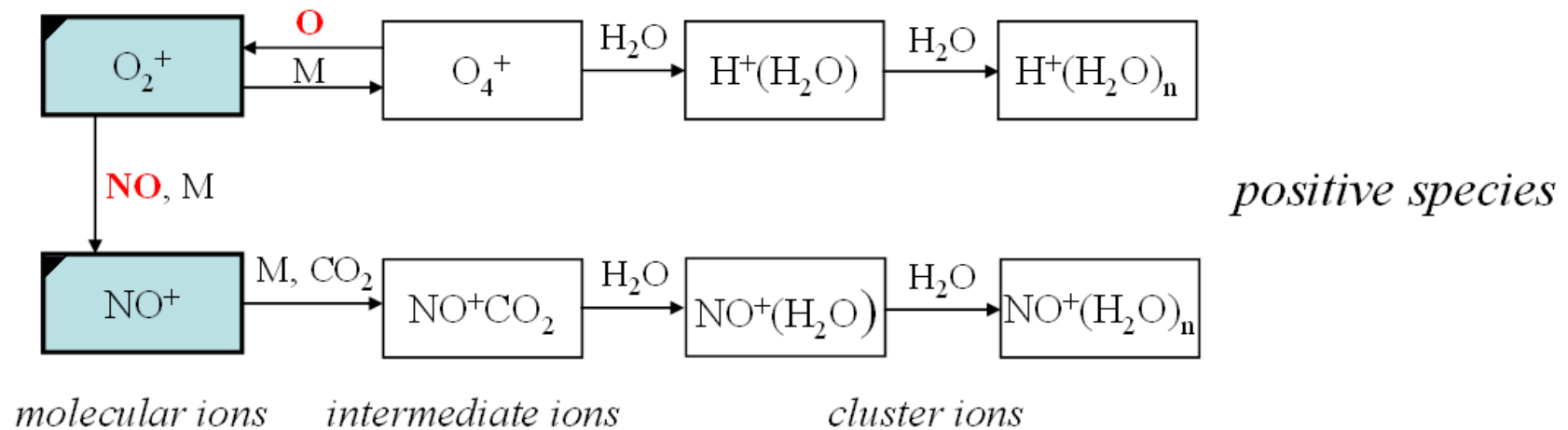
(more precisely: *Meteoric* Dust and *atomic* Oxygen)

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Theoretical investigations:

- Study the size, charge and composition of meteoric dust grains in the mesosphere (a.k.a. the *D*-Region)
- Assess the relevance of meteoric dust for the charge balance in the *D*-Region
- Investigate the role of atomic oxygen for the ion chemistry of the mesosphere and lower thermosphere (*D*- and *E*-Region)
- Investigate the role of atmospheric dynamics for atomic oxygen
- Investigate VLF propagation in view of recent [O] data

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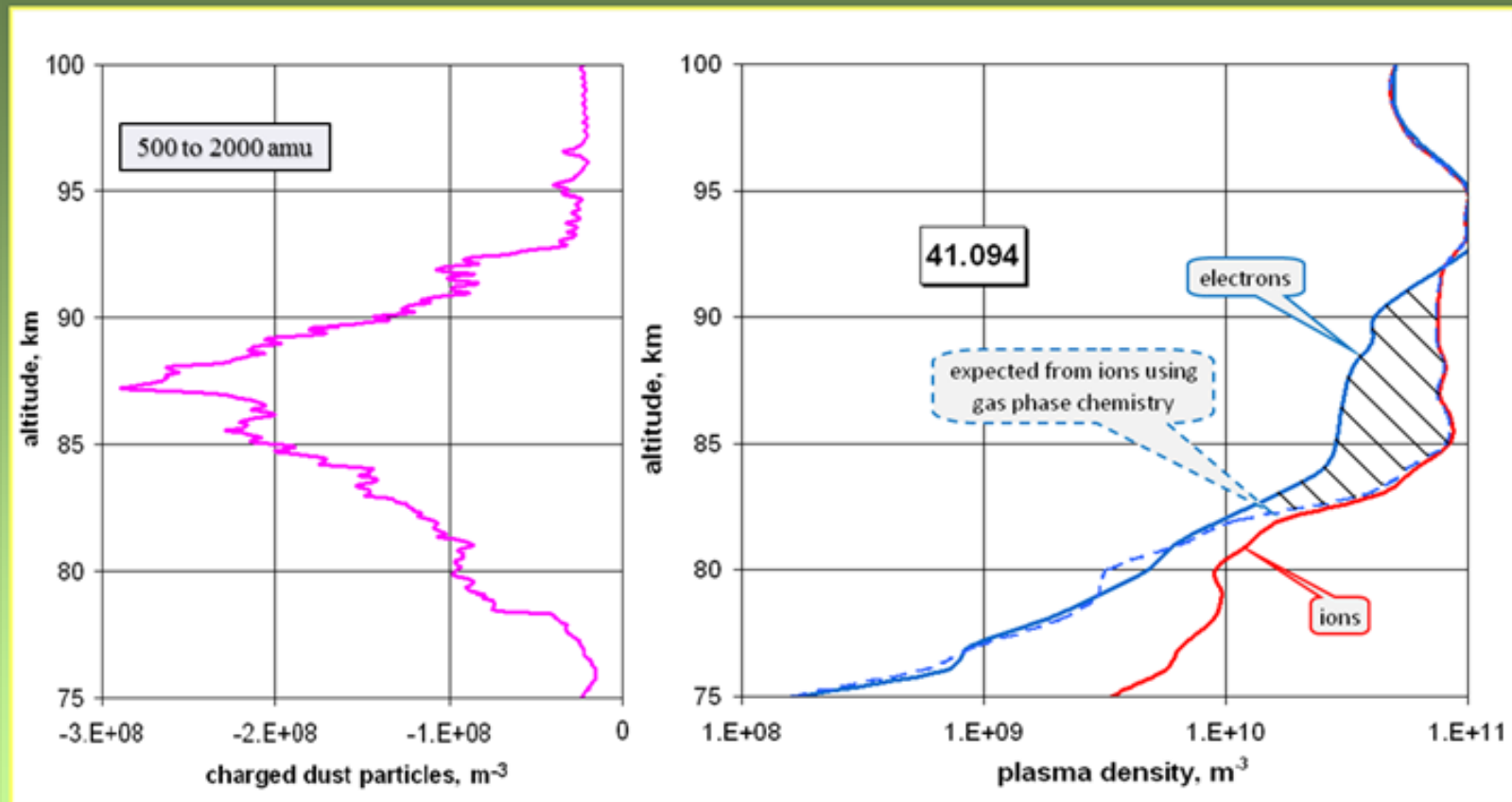


Friedrich *et al.* (2012)

this is URSI's
interest

this is the topical
parameter

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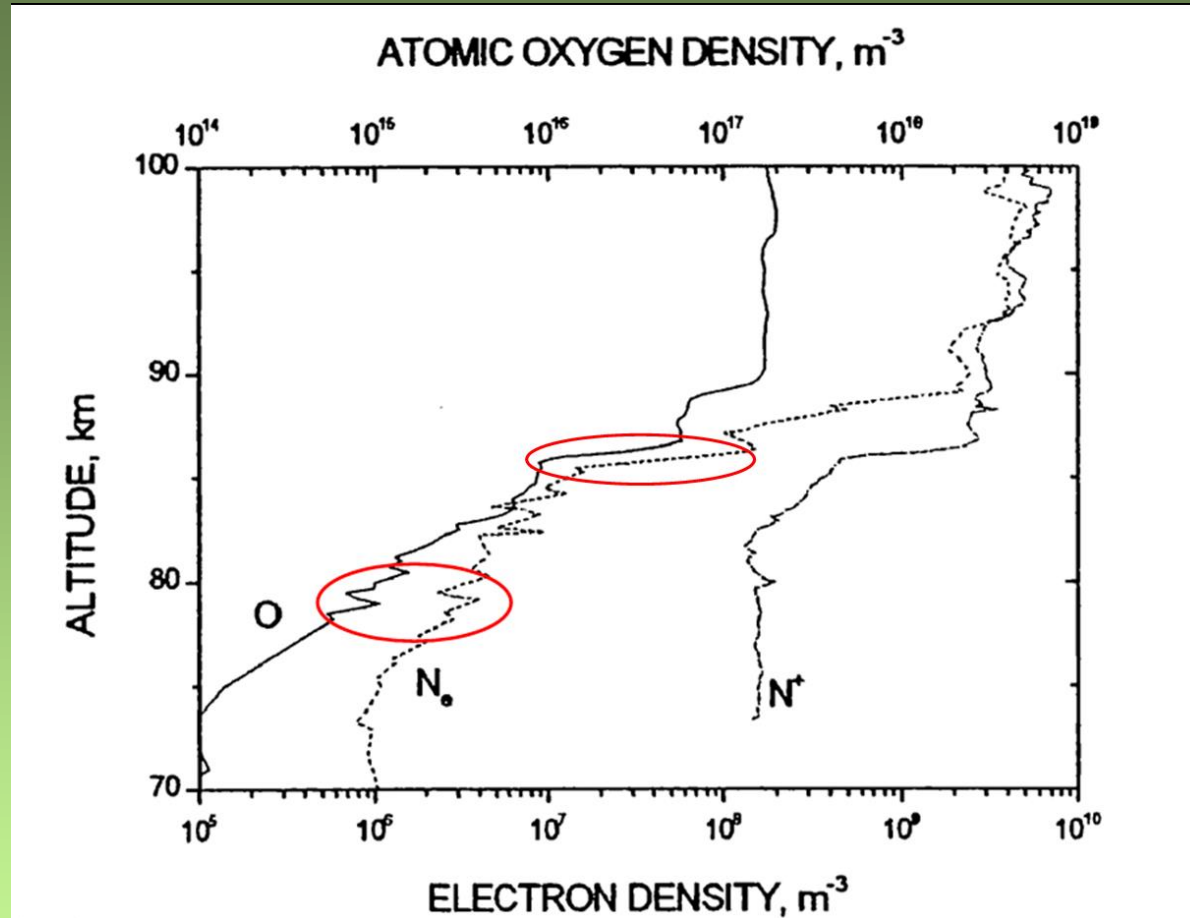


negative dust, presumably
causing the electron deficit

electron deficit in the hatched area is
presumably due to attachment on dust

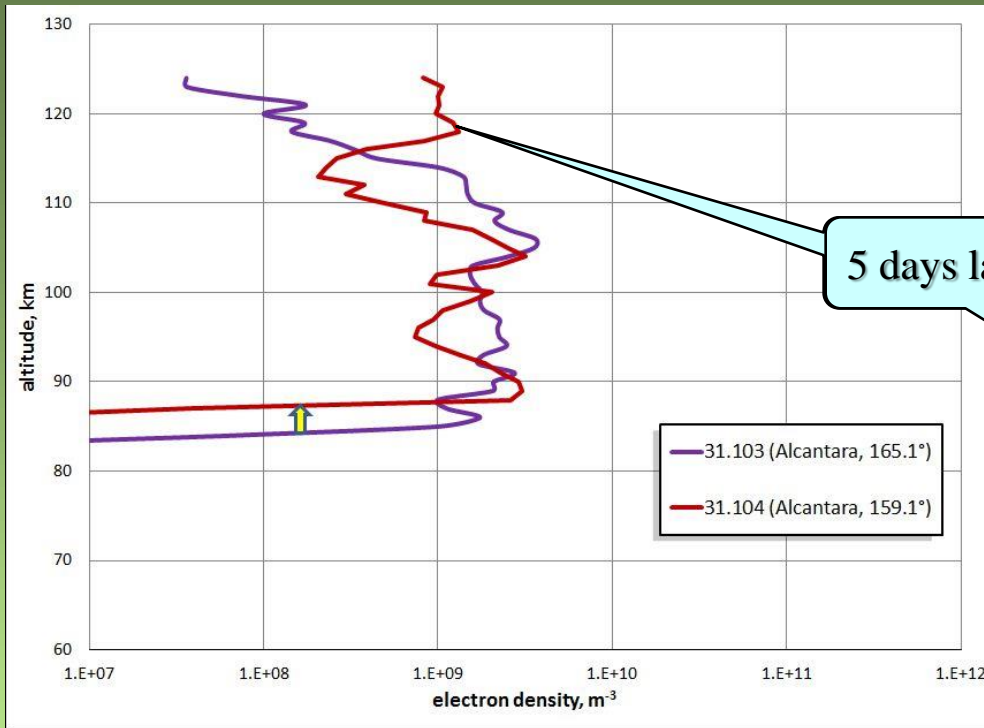
Friedrich *et al.* (2012)
(see also the report of 2013)

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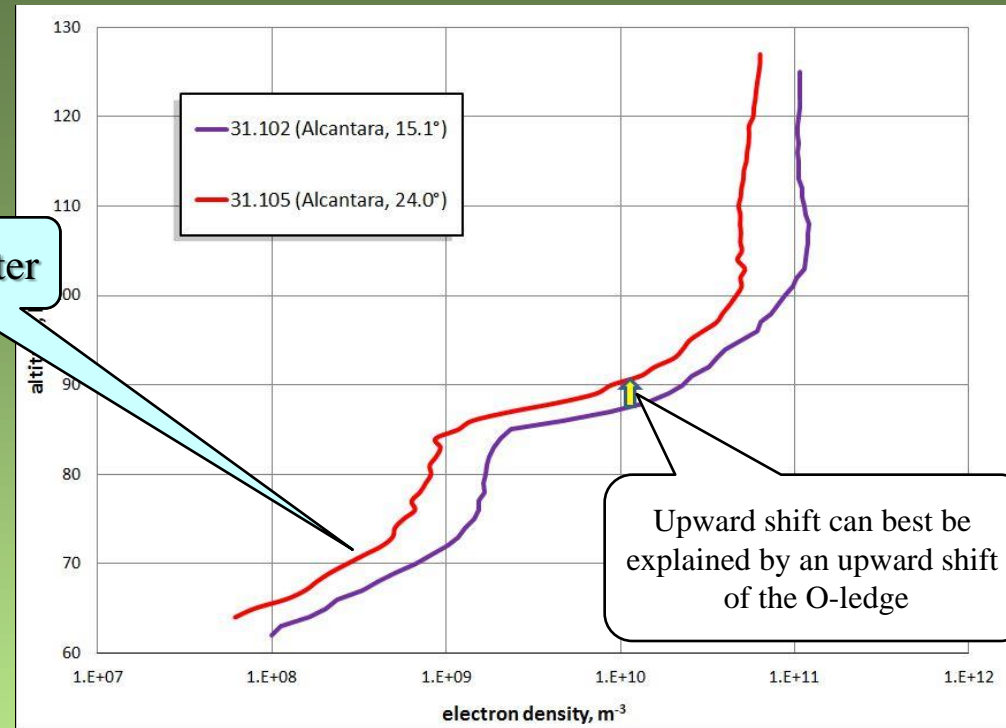


early clear relation:
(polar latitude, Friedrich *et al.*, 1999)

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night



day

5 days later

early, assumed mechanism:
(equatorial; Goldberg *et al.*, 1997)

Shift of the profiles due to a corresponding shift of [O] ? → dynamics

2 km rise

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experimental:

rocket-borne measurements of plasma parameters (by radio wave methods [Faraday rotation, absorption], electrostatic probes); various O- and particle measurements

Analyses of global O-density (satellite-) data and modelling of their impact on the *D*-region (Siskind *et al.*, 2015)

Recent participation in sounding rockets (primarily qualitative results):

PHOCUS, July 21st, 2011, ESRANGE, Sweden

WADIS-1, June 27th, 2013, Andøya, Norway

WADIS-2, March 5th, 2015, Andøya, Norway

O-States, October 2nd and 19th 2015, ESRANGE, Sweden

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relevant FWF projects:

P 23100-N23 “*Electron Scavenging in the Mesosphere*“ (completed; final report pending)

P 26932-N29 “*New Players in the Mesosphere: Assessing the Role of Meteoric Dust and Atomic Oxygen*” (2 of the 5 envisaged rocket-borne measurements performed)

forthcoming sounding rocket programmes (quantitative results):

MaxiDusty	Summer 2016, Andøya, Norway
PMWE	(= polar mesospheric Winter echoes), two flights Winter 2016/17 (presumably)