Role of heavier-than-proton nuclei in the neutron monitor response

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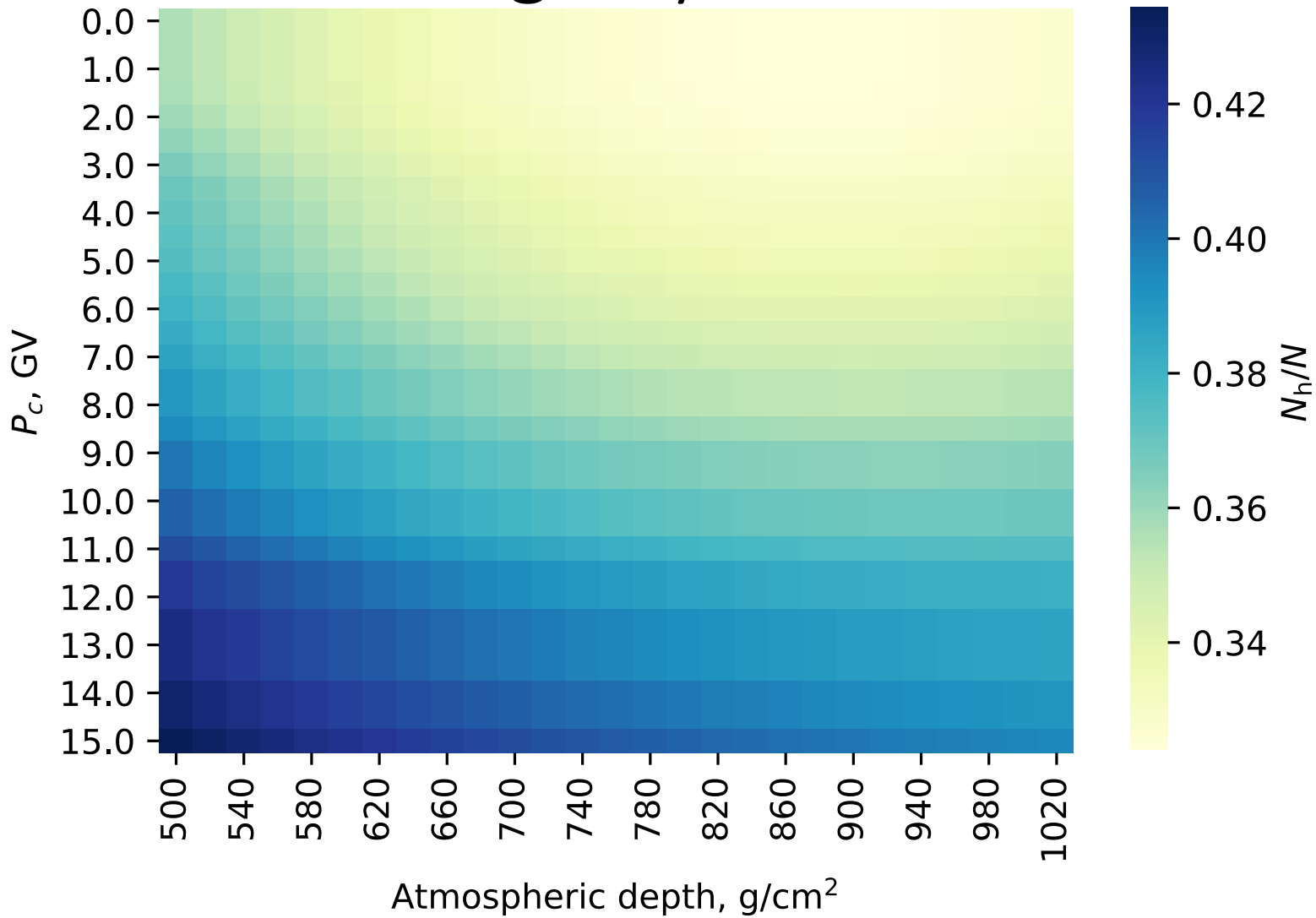
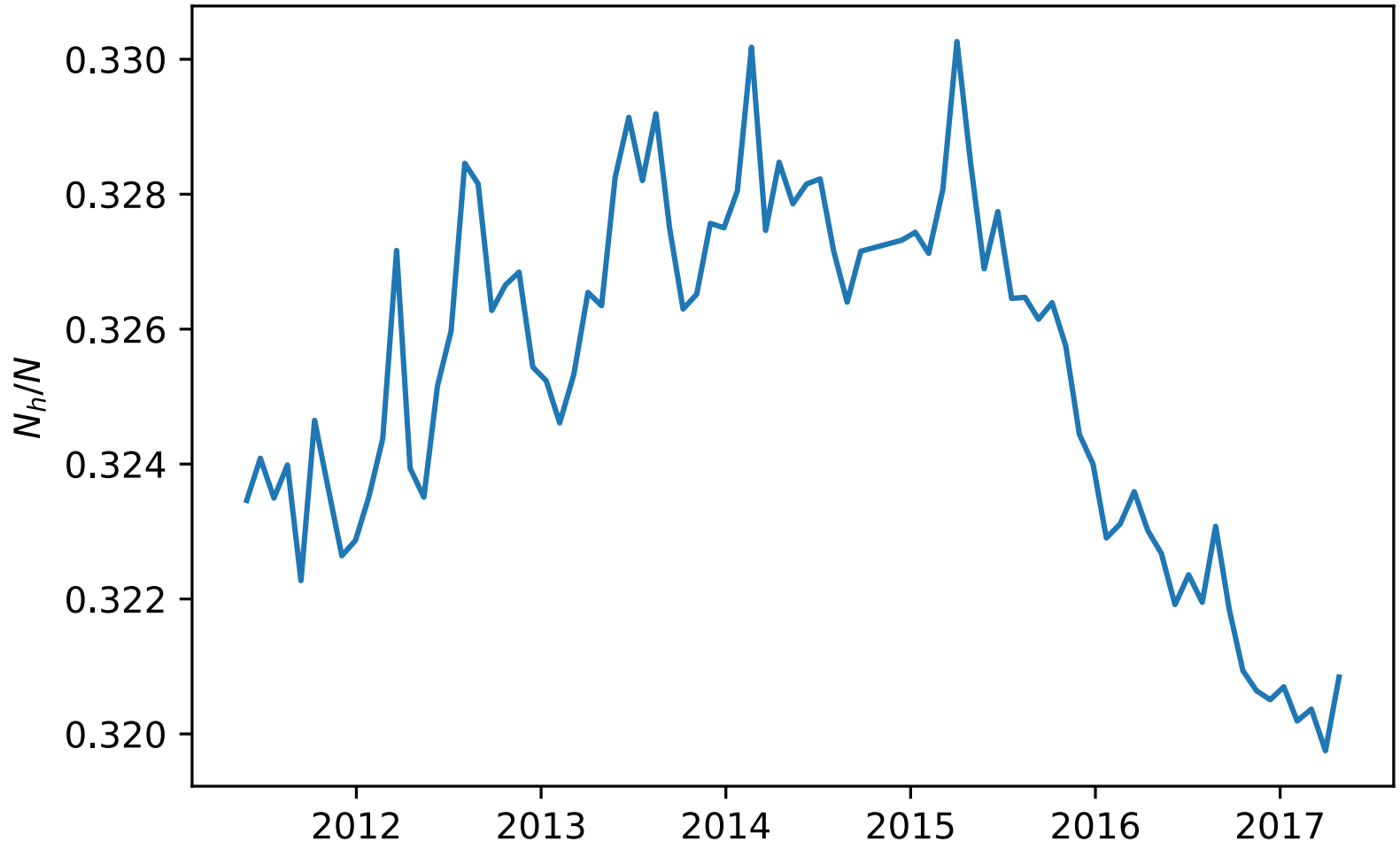
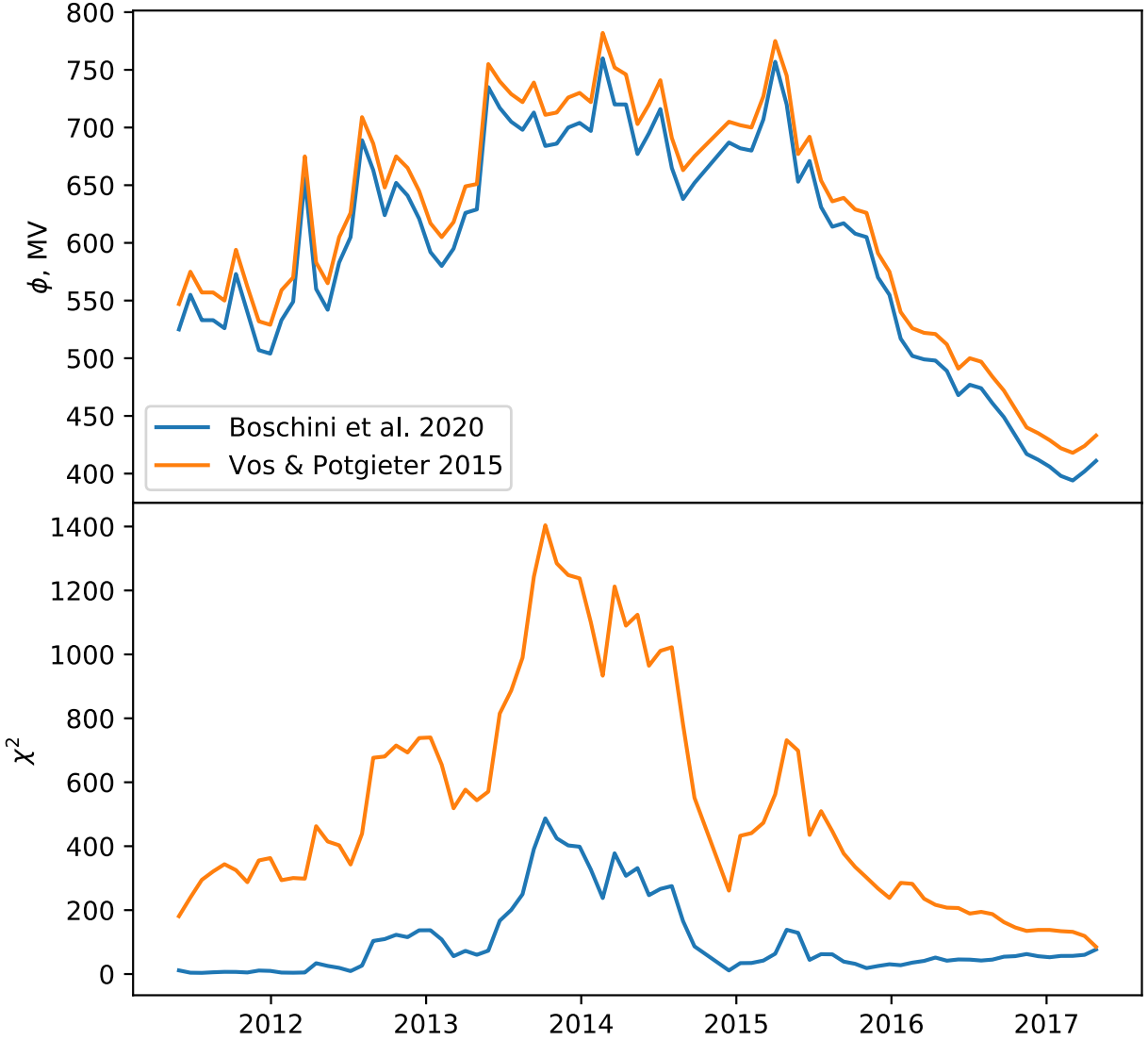
Role of heavy nuclei in neutron monitor response: atmospheric depth and cutoff rigidity



Role of heavy nuclei in neutron monitor response: solar cycle dependence

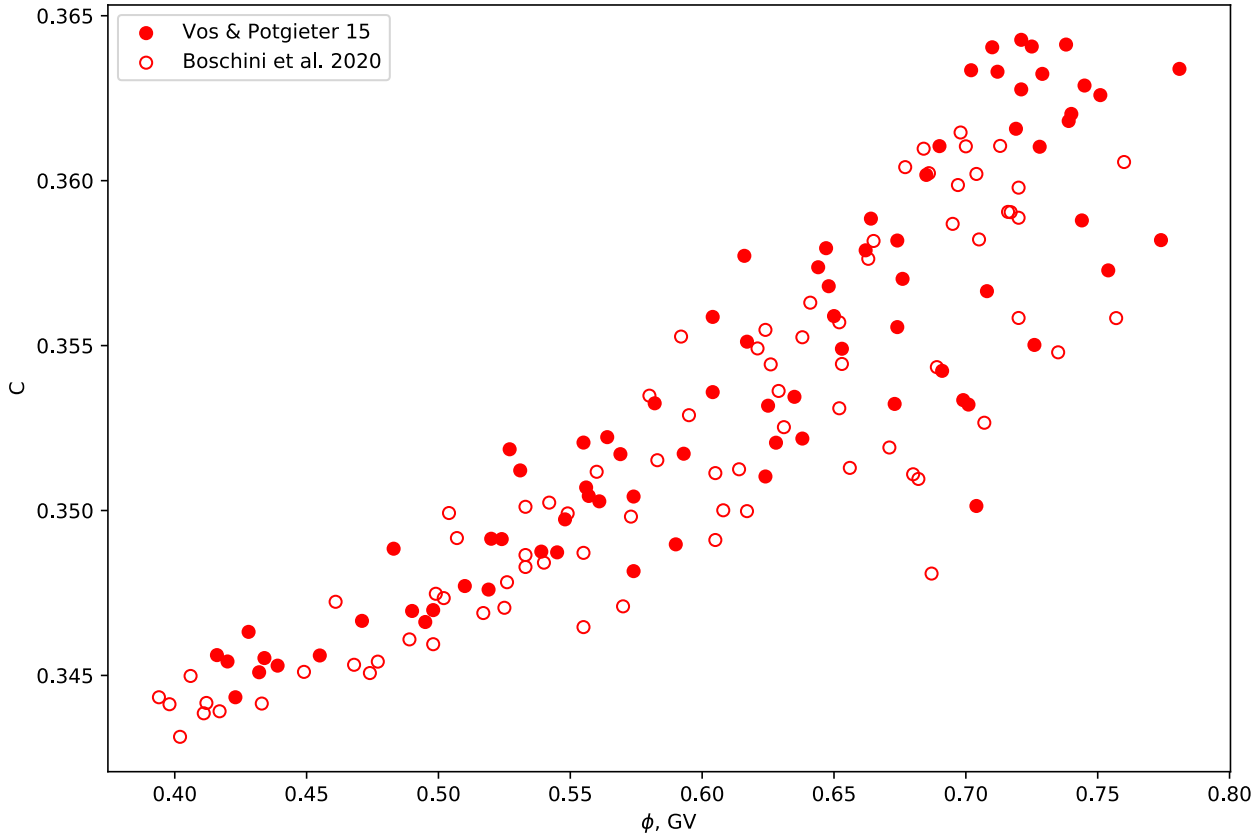


Heavy nuclei in LIS + force-field combination



$$N(P_c, h, t) = \sum_i \int_{E_{c,i}}^{\infty} Y_i(E, h) \quad J_i(E, t) \quad dE,$$

$$C(\phi) = N_{\mathrm{h,\,AMS}}(\phi)/N_{\mathrm{h,\,mod}}(\phi)$$



Conclusion

- Heavy nuclei are responsible for 33% – 44% of neutron monitor (NM) response depending on Pc and atmospheric depth;
- For sea-level polar NM, heavy nuclei are responsible for 32 – 33% of NM response depending on the solar activity (for the period of AMS-02 direct observations);
- In broad historical context, the combination of LIS+FF solar modulation model is typically used. In the framework of this model, heavier-than-proton nuclei are represented with proton LIS with special multiplier. We find the value of this multiplier and moreover assessed its dependence on the solar modulation potential for two different LIS models.