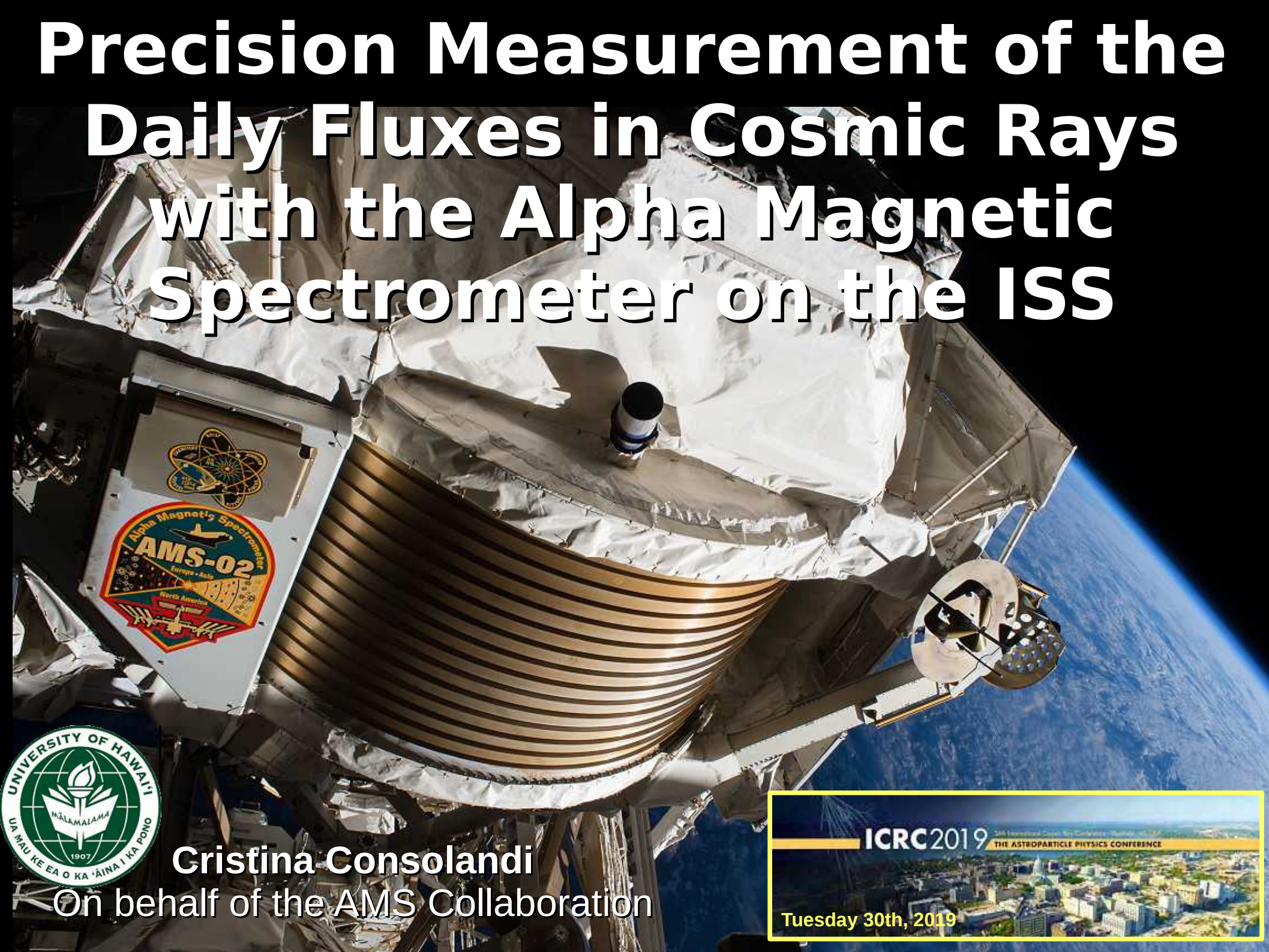
Precision Measurement of the Daily Fluxes in Cosmic Rays with the Alpha Magnetic Spectrometer on the ISS



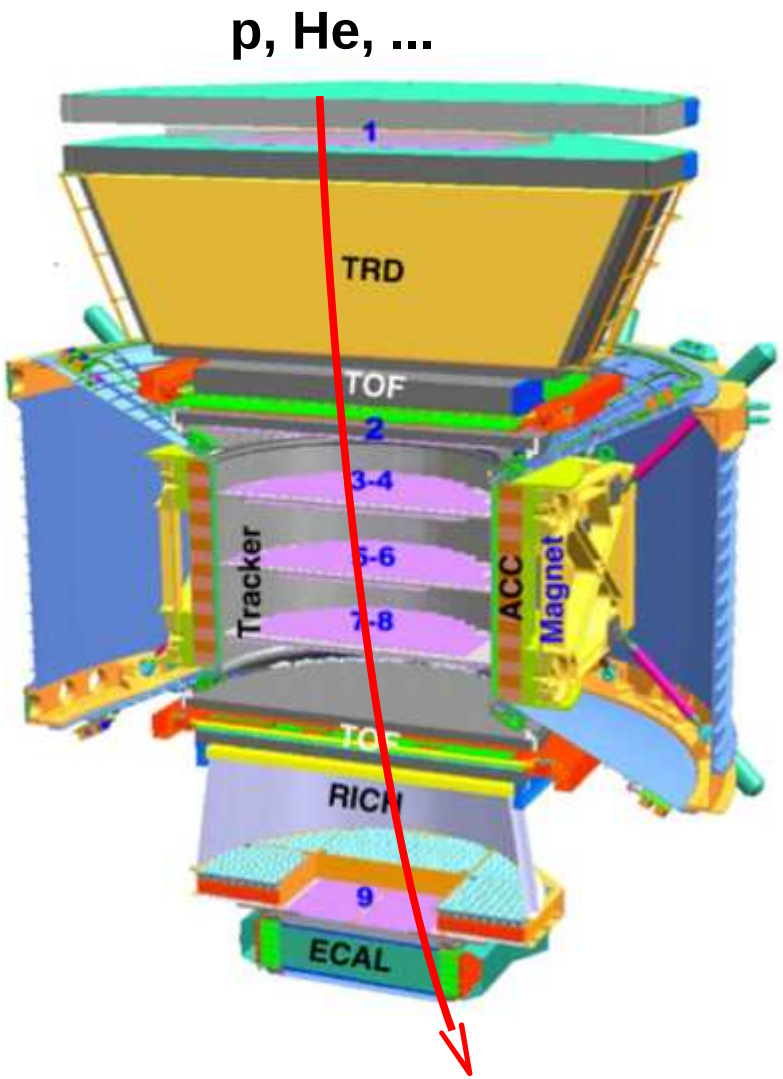
Cristina Consolandi
On behalf of the AMS Collaboration

AMS Period of Observation

AMS is a GeV-TeV precision, multipurpose, magnetic spectrometer, on the ISS since May 2011.

Among the physics goals of AMS are measuring GCR fluxes and their time variation, to study solar modulation effect and short-term solar activity in the present and next solar cycle (24th-25th)

AMS Detector and Proton and Helium Identification



Transition Radiation Detector
- e+ e- identification

Time-of-Flight counter
- Trigger
- Velocity
- Particle flight direction
- Charge

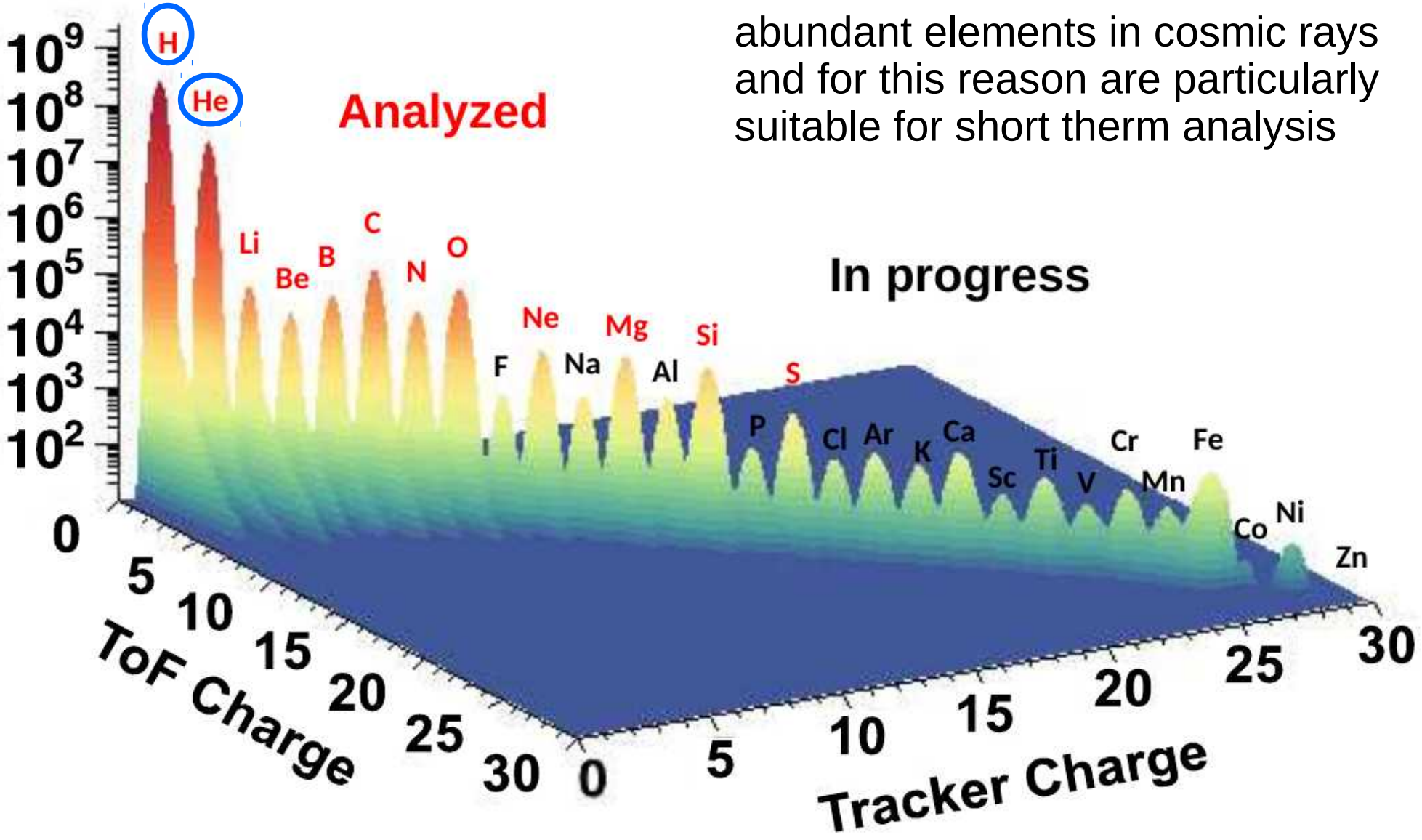
Silicon Tracker + Magnet
- Rigidity
- Charge & sign

Ring Imaging Cherenkov detector
- Velocity
- Charge

Electromagnetic Calorimeter
- e+ e- identification
- e+ e- Energy

AMS Proton, Helium & other Nuclei

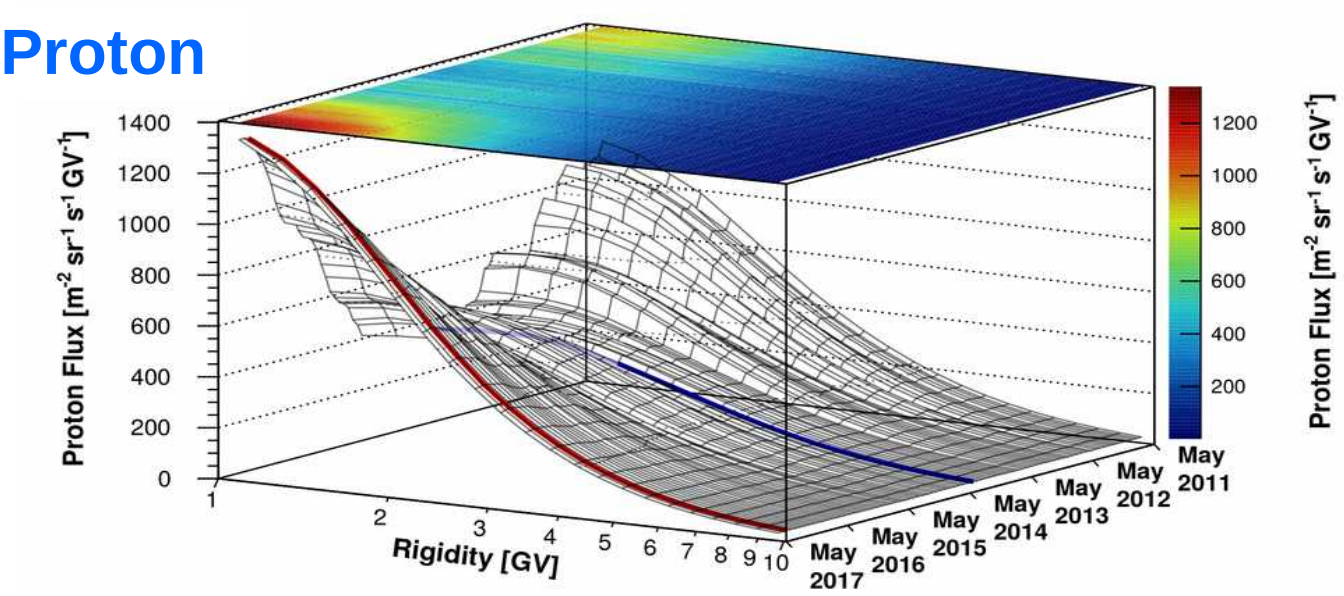
Proton and **Helium** are the most abundant elements in cosmic rays and for this reason are particularly suitable for short therm analysis



AMS Proton and Helium Monthly Fluxes

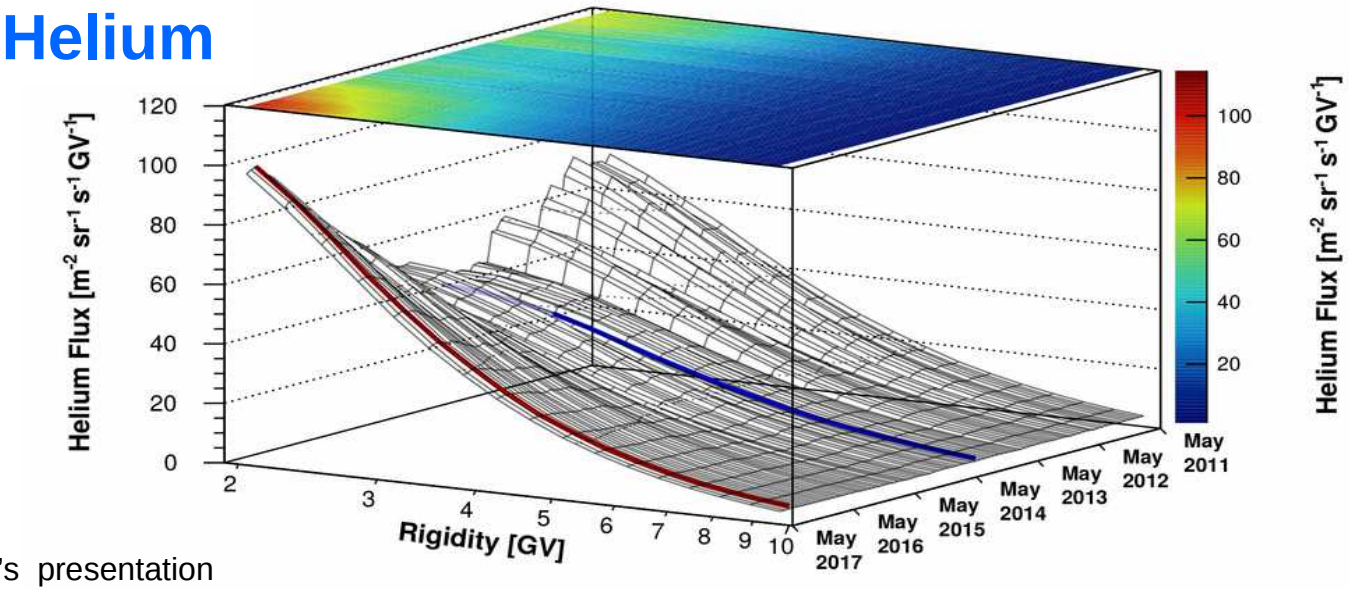
PHYSICAL REVIEW LETTERS **121,** 051101 (2018)

Proton



May 2011- May 2017

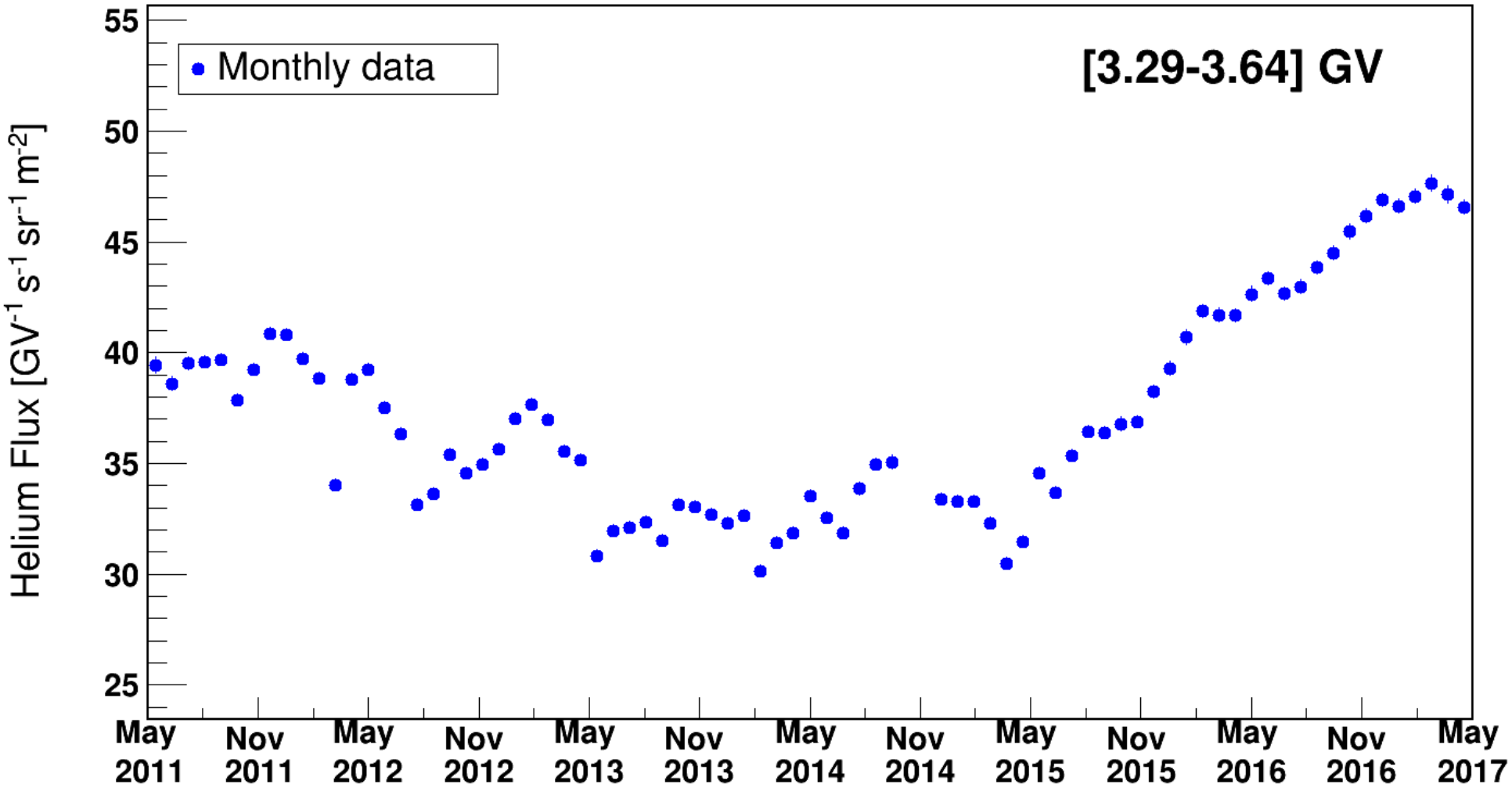
Helium



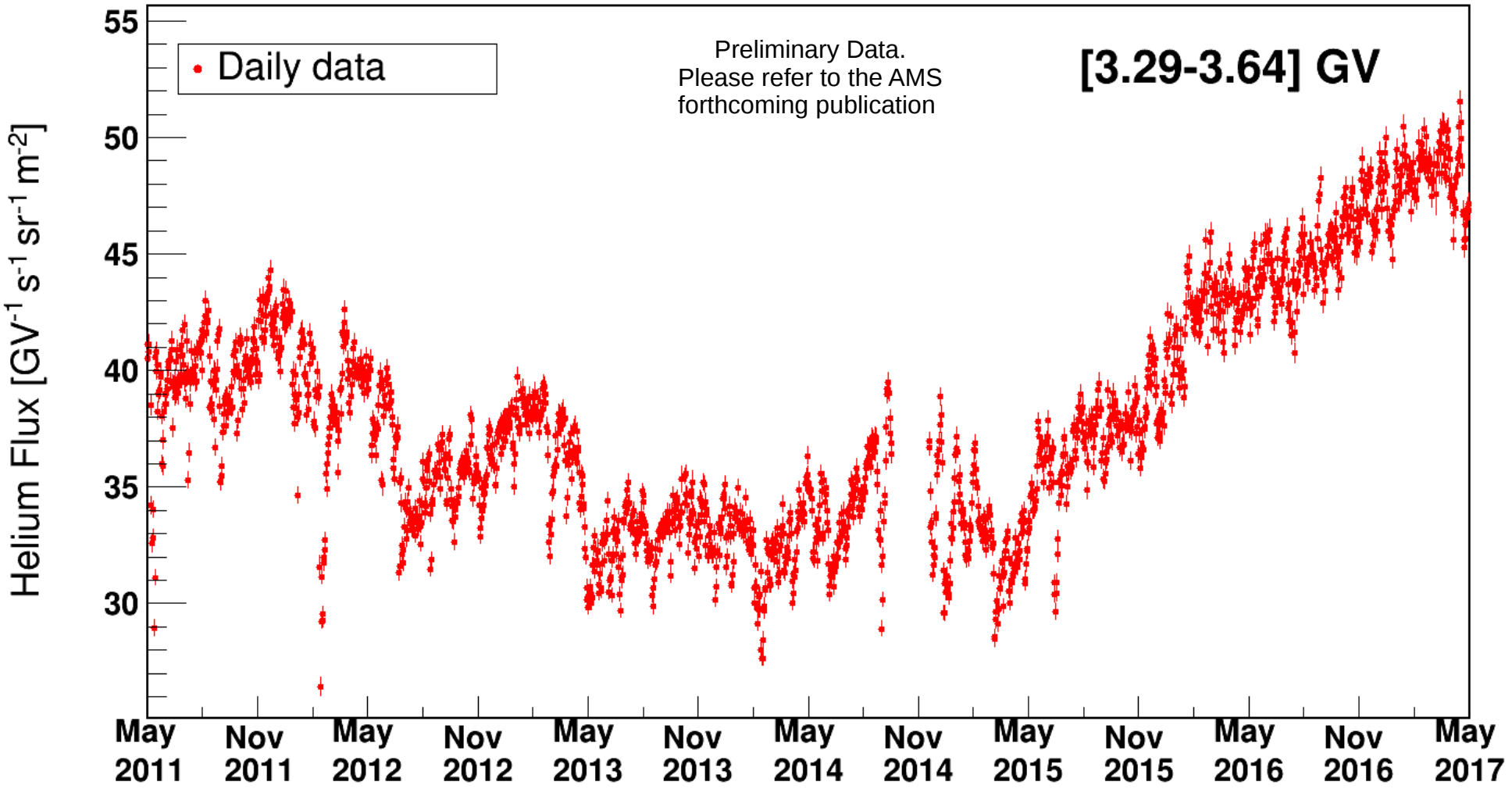
See Nicola Tomassetti's presentation
(parallel session Cosmic Ray Direct) Tuesday 30th, 2019

Helium Monthly Fluxes
May 2011-May 2017

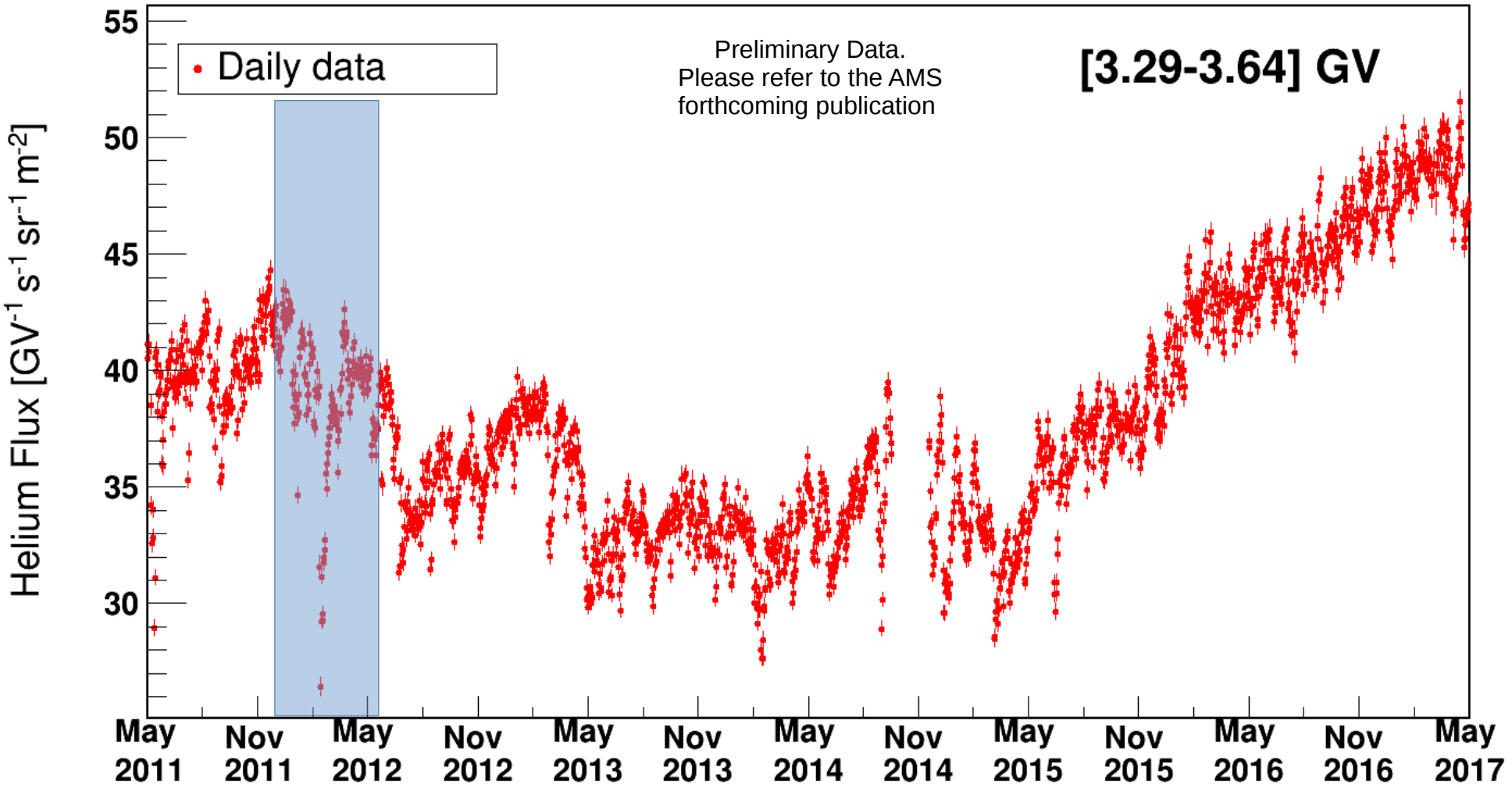
PHYSICAL REVIEW LETTERS **121,** 051101 (2018)



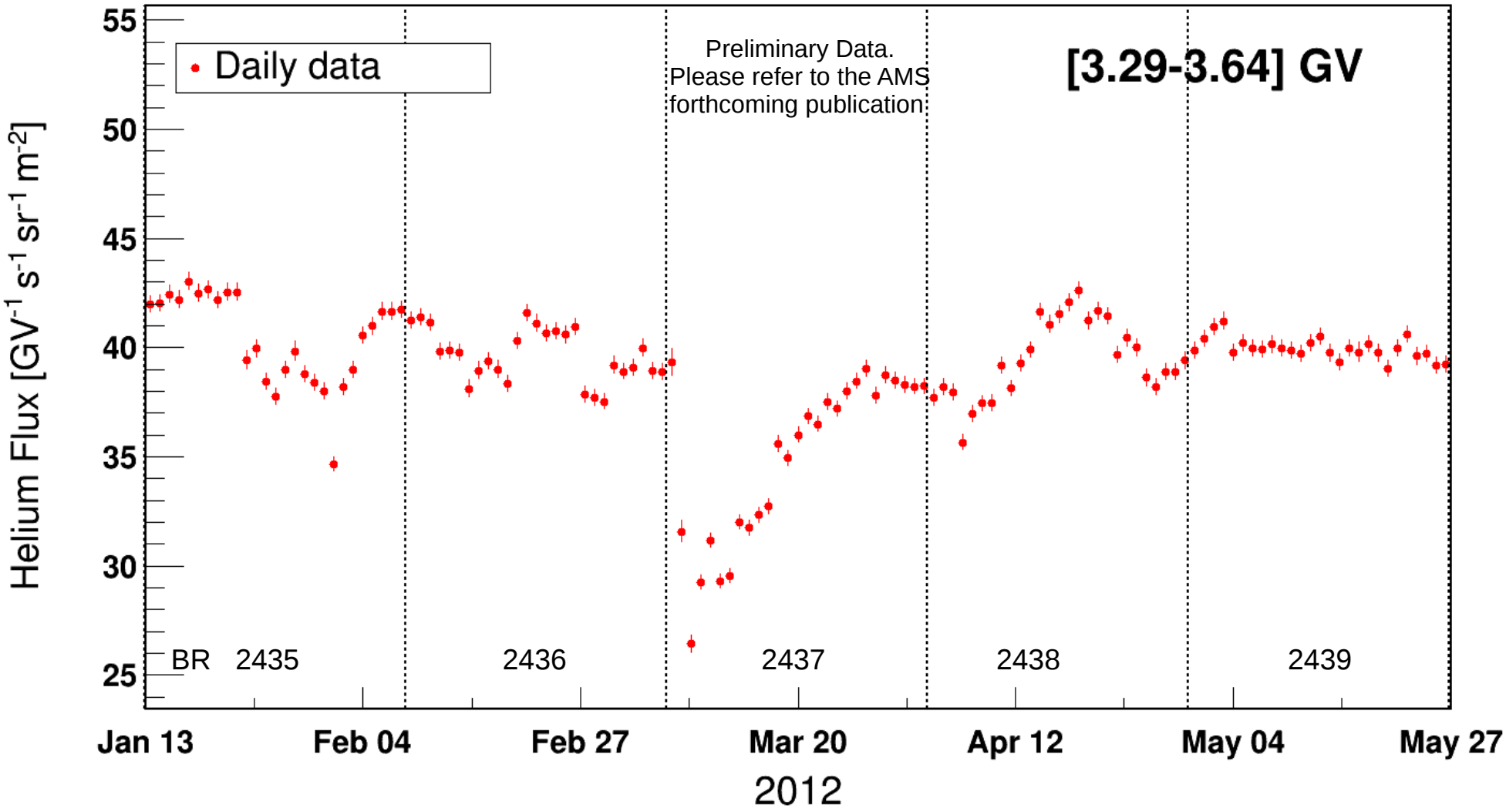
Helium Daily Fluxes
May 2011-May 2018



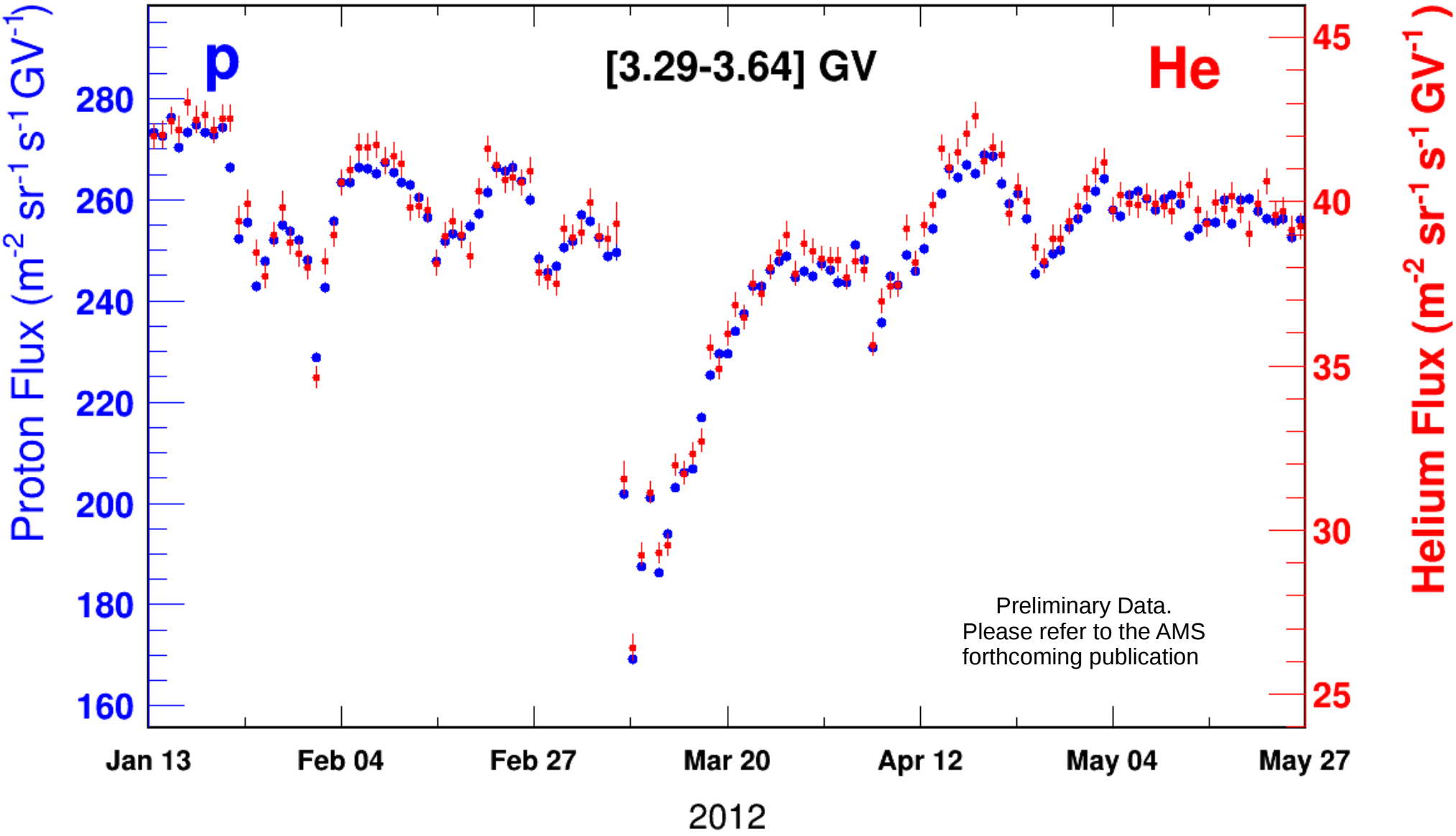
Helium Daily Fluxes
May 2011-May 2018



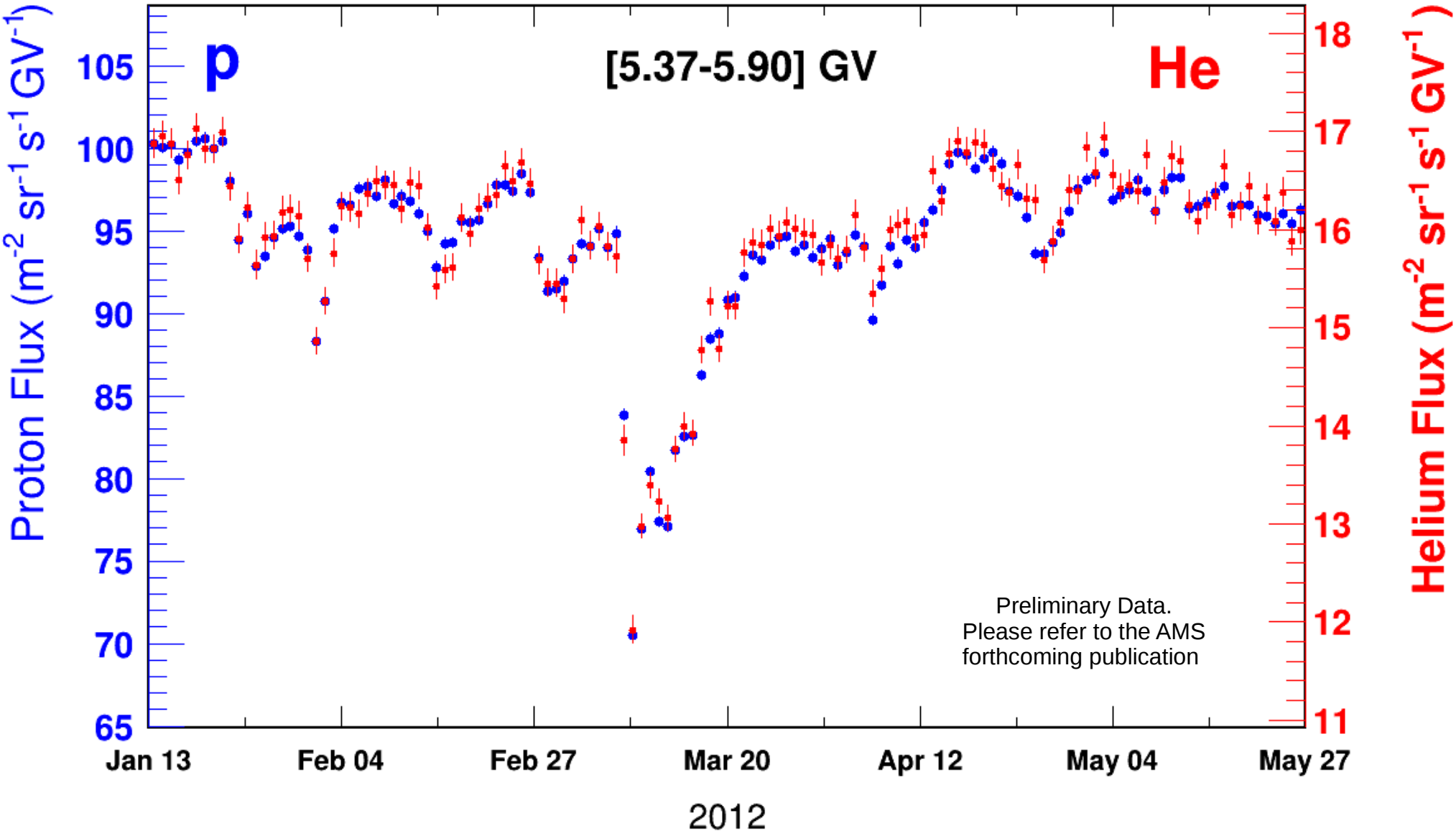
Helium Daily Fluxes
Forbush Decrease



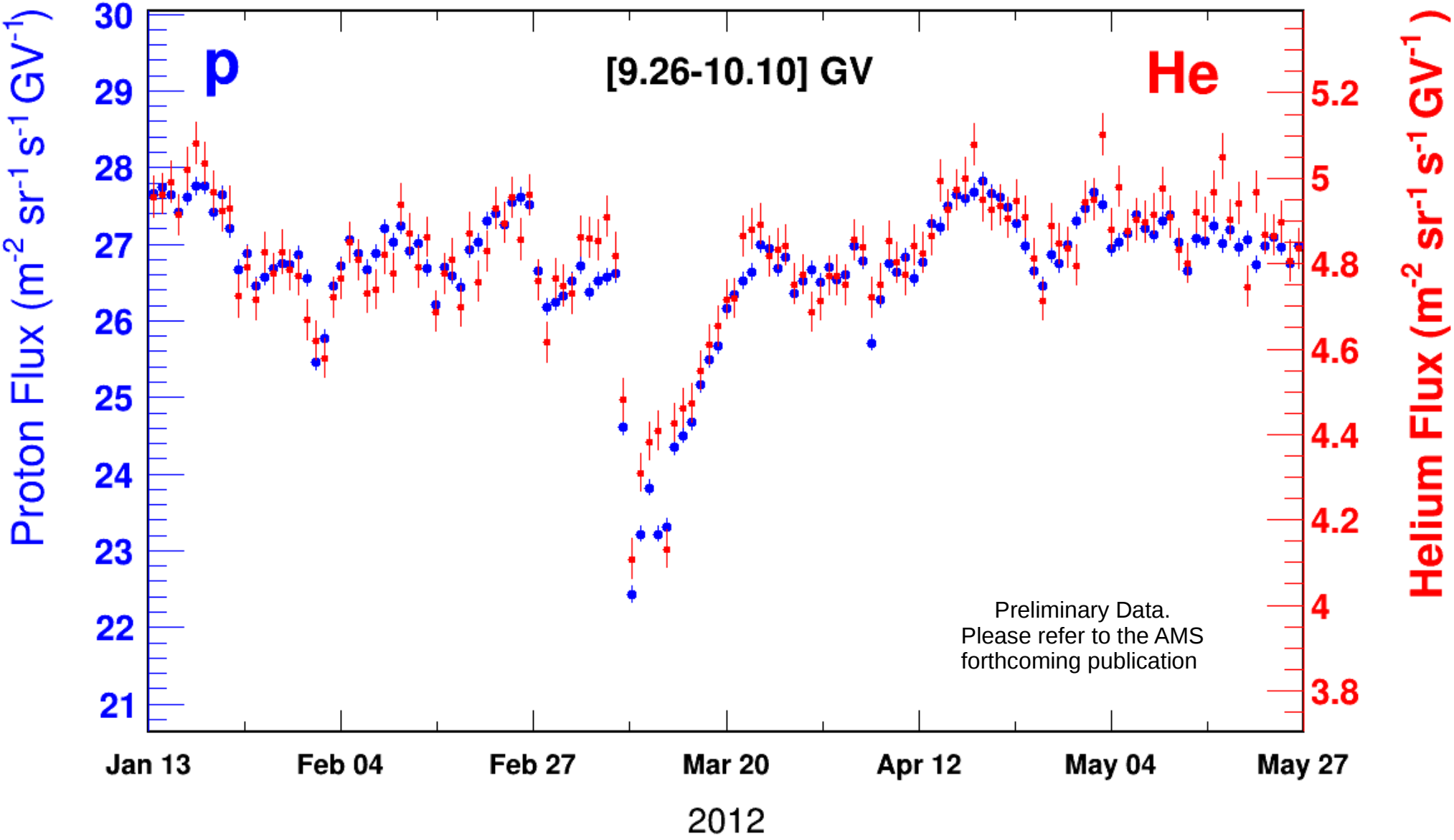
Proton & Helium Daily Fluxes



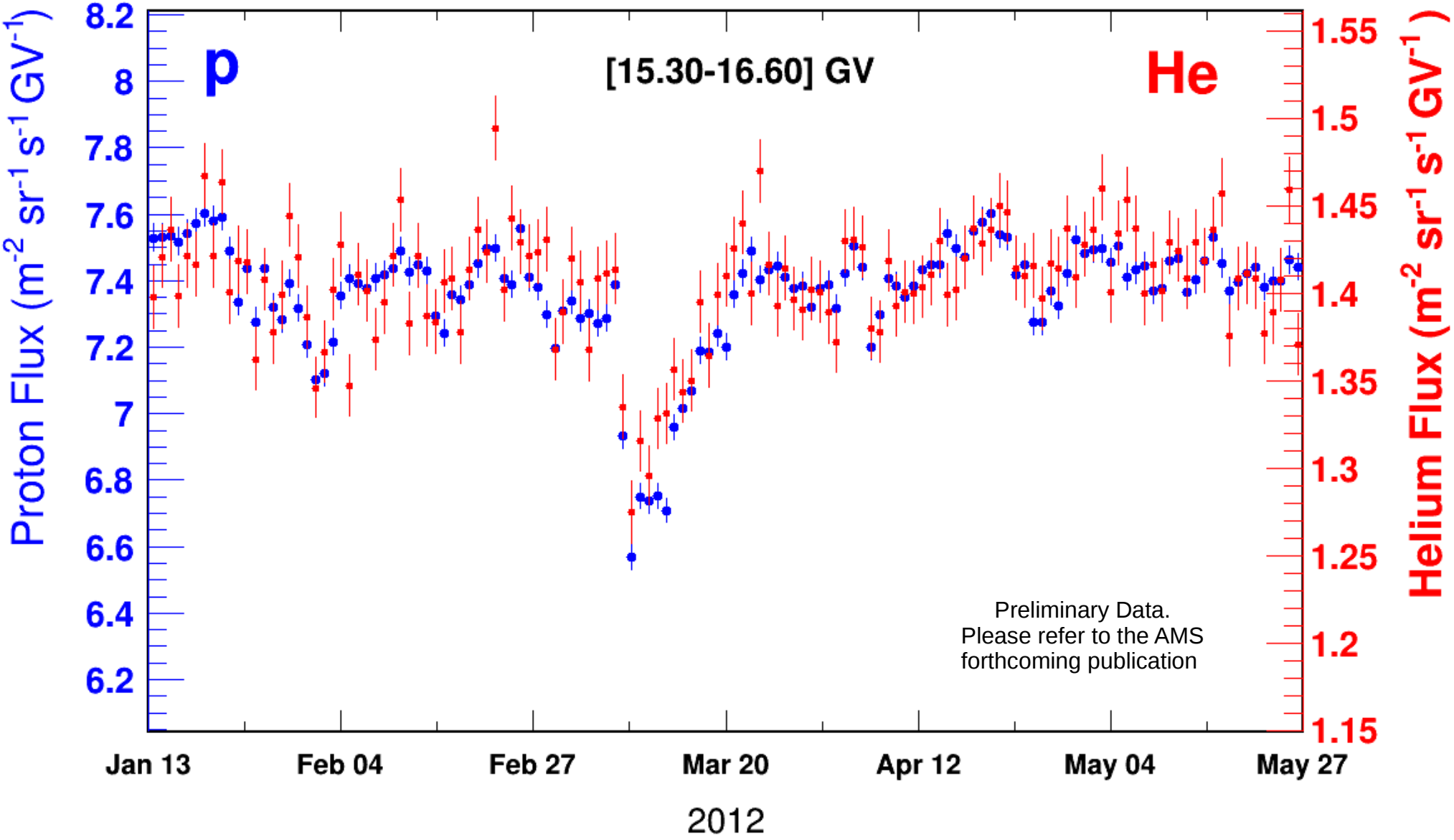
Proton & Helium Daily Fluxes



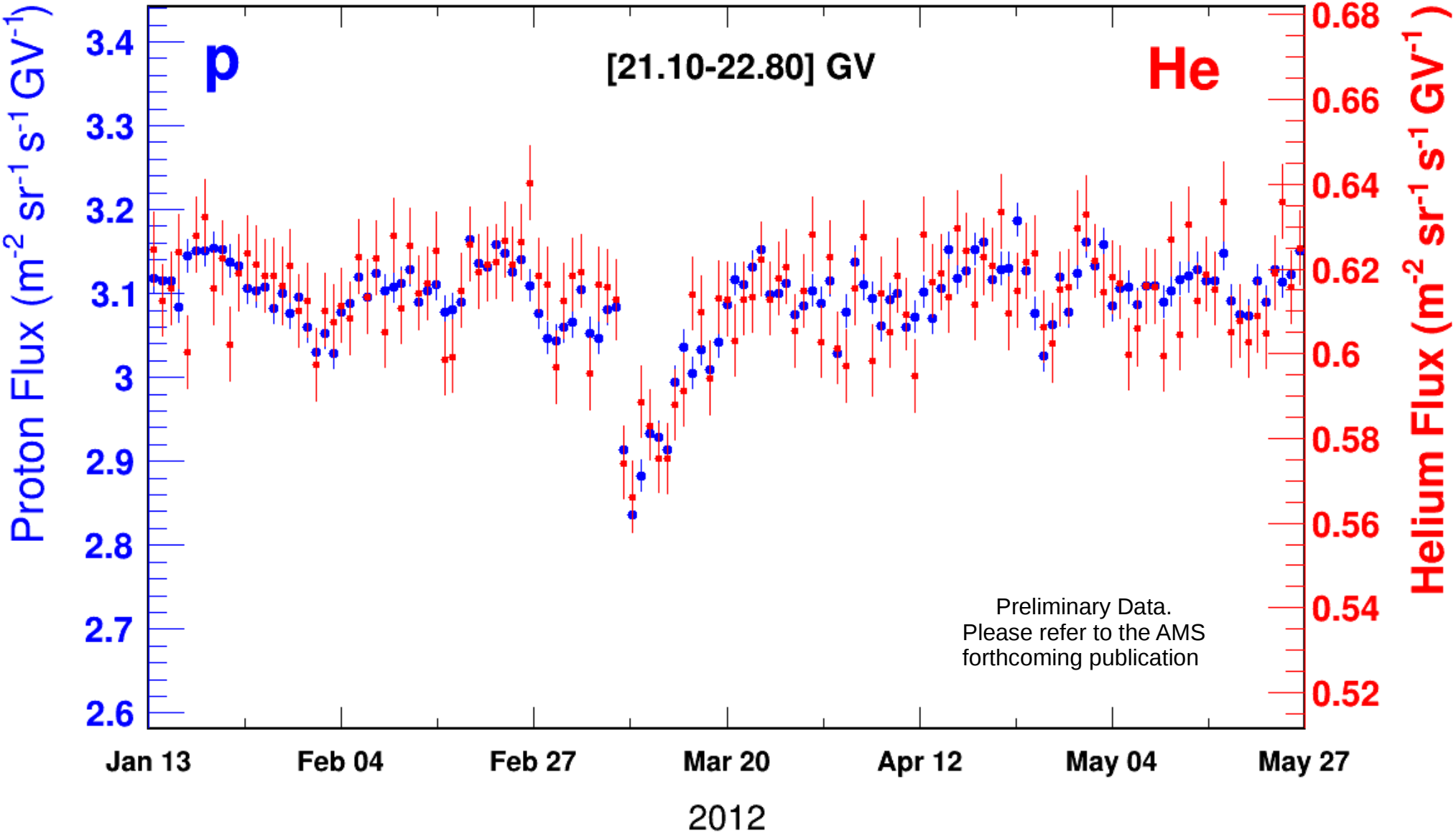
Proton & Helium Daily Fluxes



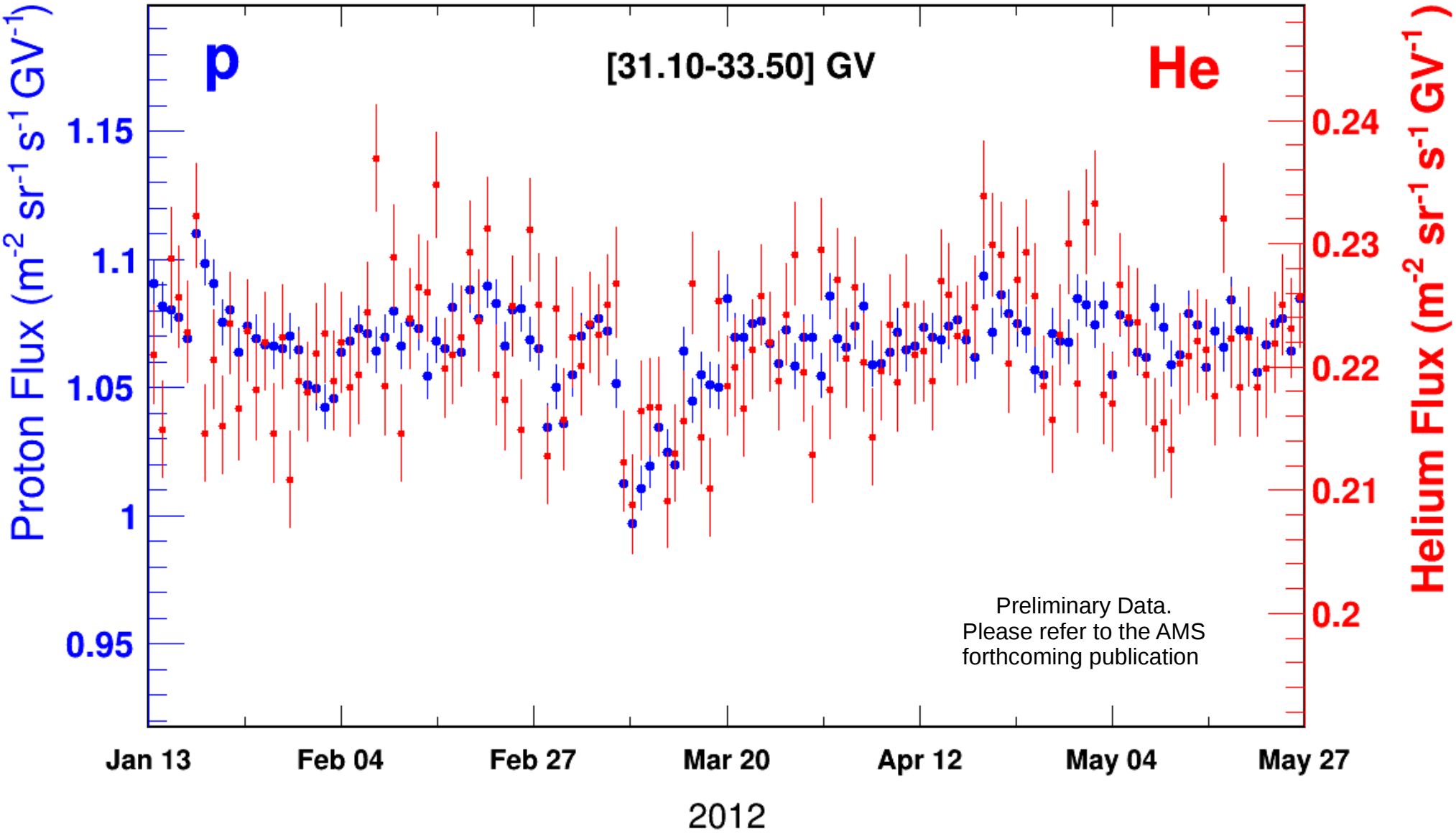
Proton & Helium Daily Fluxes



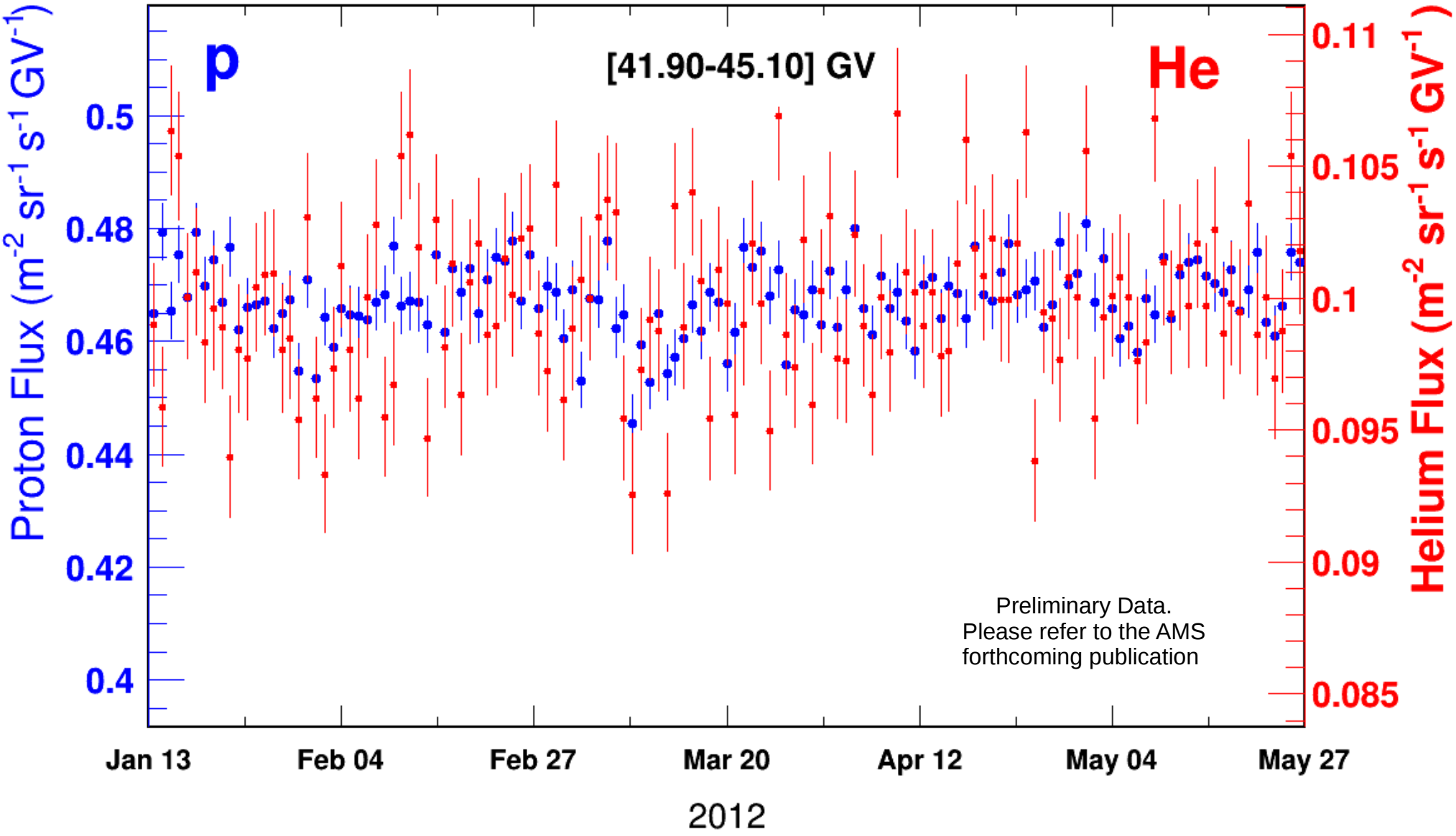
Proton & Helium Daily Fluxes



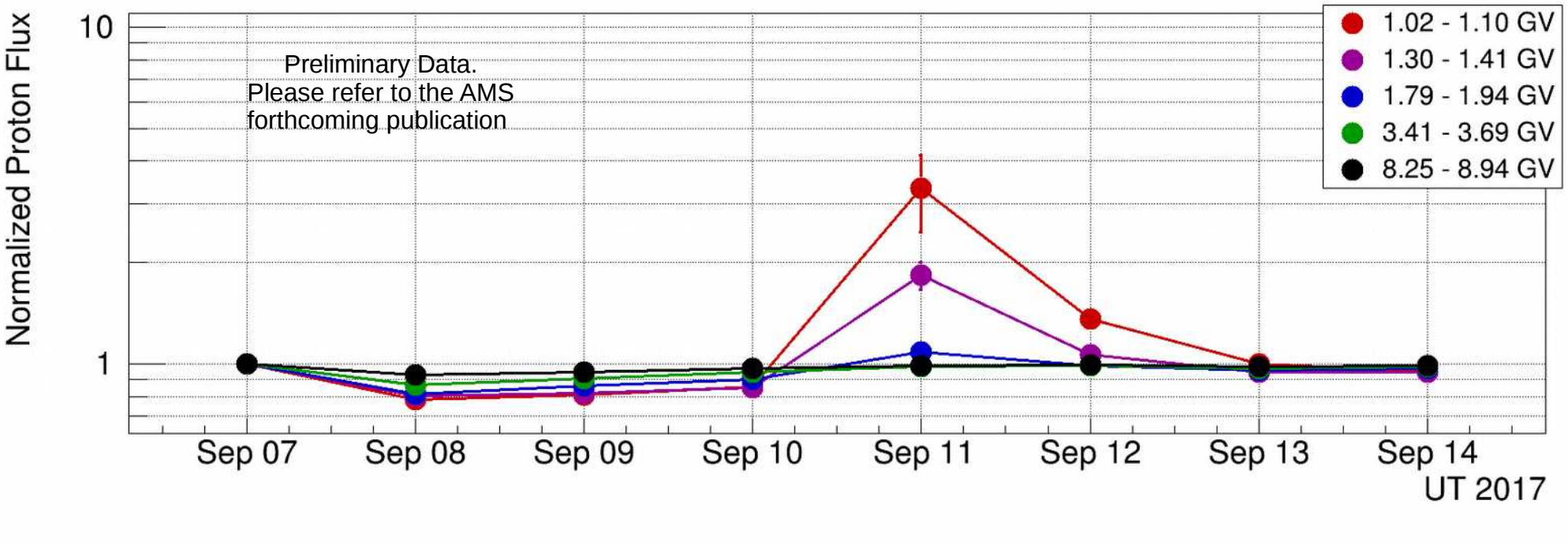
Proton & Helium Daily Fluxes



Proton & Helium Daily Fluxes



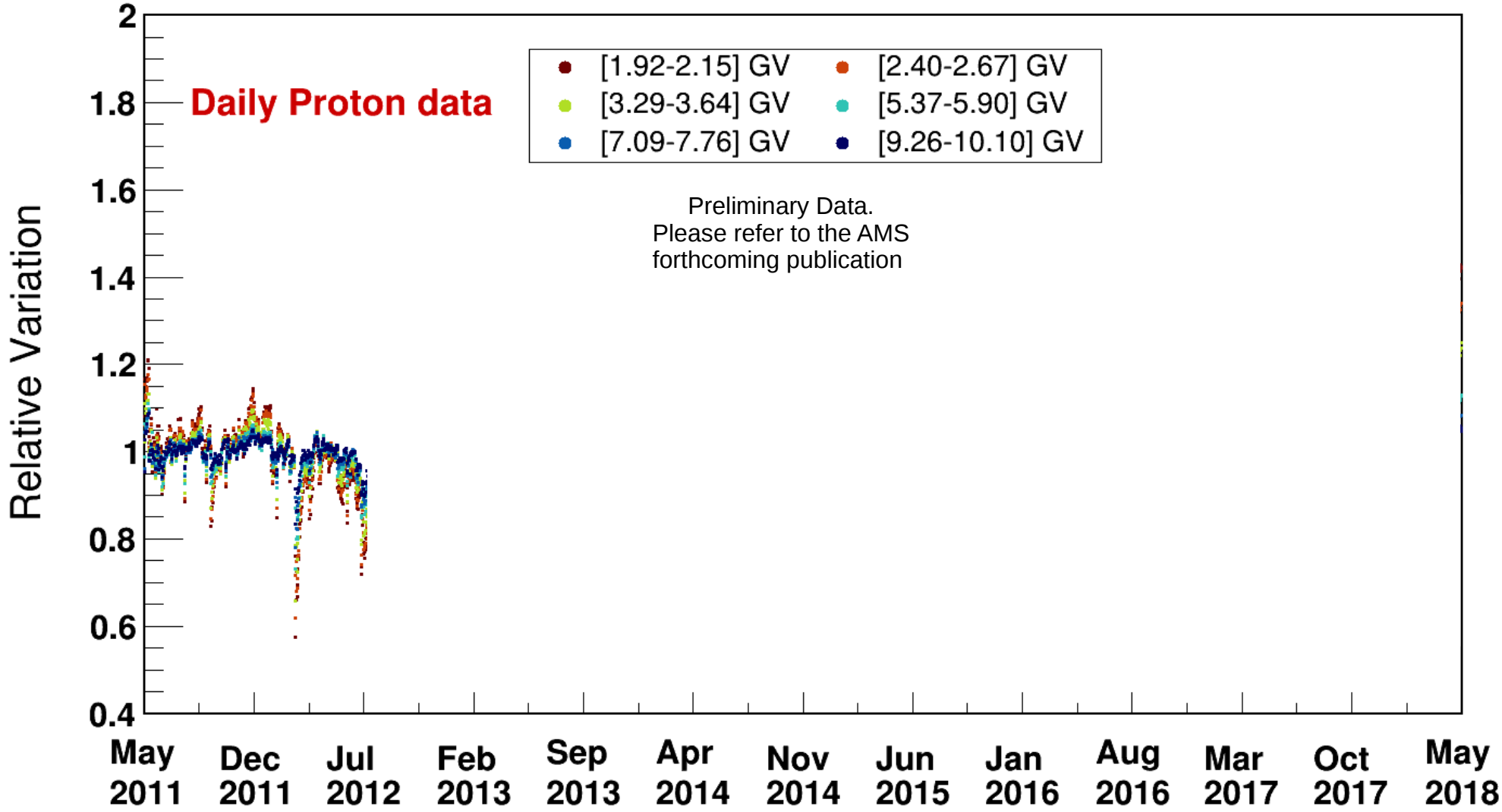
September 2017 SEP Event



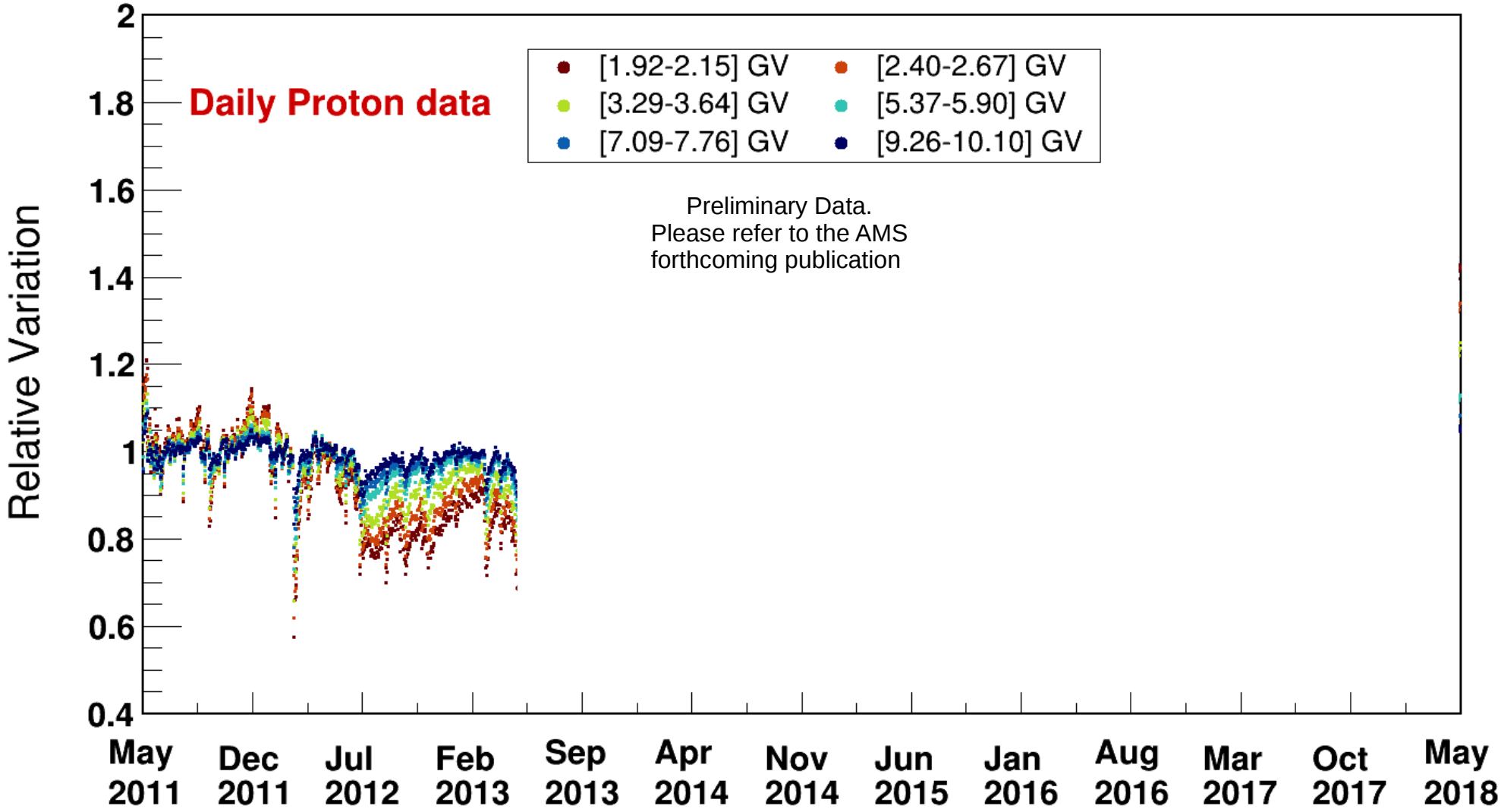
- Most recent Ground Level Enhancement (GLE) SEP event.
- X8.2 Flare at 16:06 on the 10th of Sept.
- Fast (2868 km/s) Halo CME associated with this event
- Interesting event because this was a GLE that occurred deep into the descending phase of solar activity.

See Chris Light's presentation
(parallel session Solar & Heliospheric) Monday 29th, 2019

Proton Daily Fluxes Relative Variation
May 2011- May 2018



Proton Daily Fluxes Relative Variation
May 2011- May 2018



Proton Daily Fluxes Relative Variation
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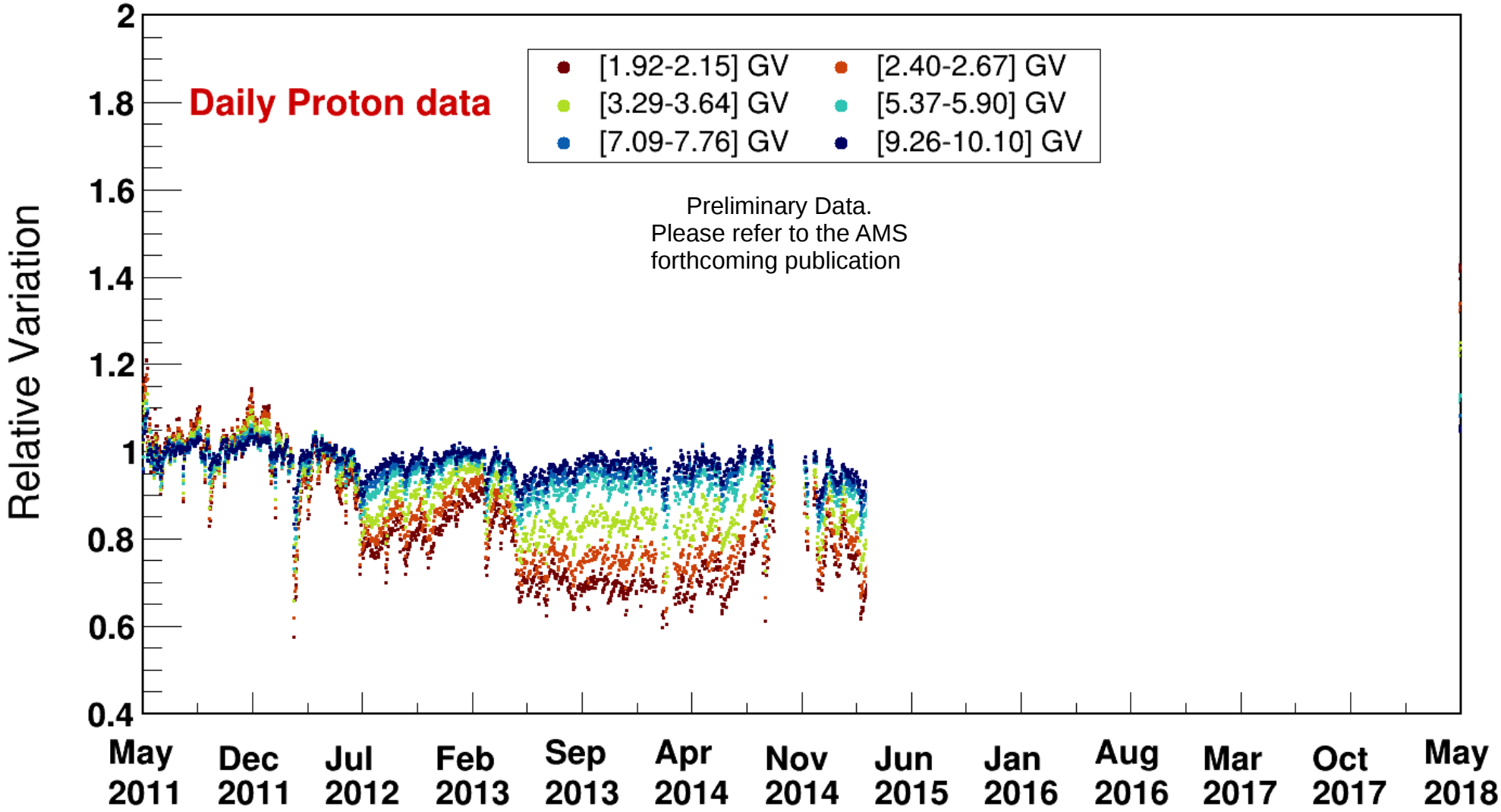
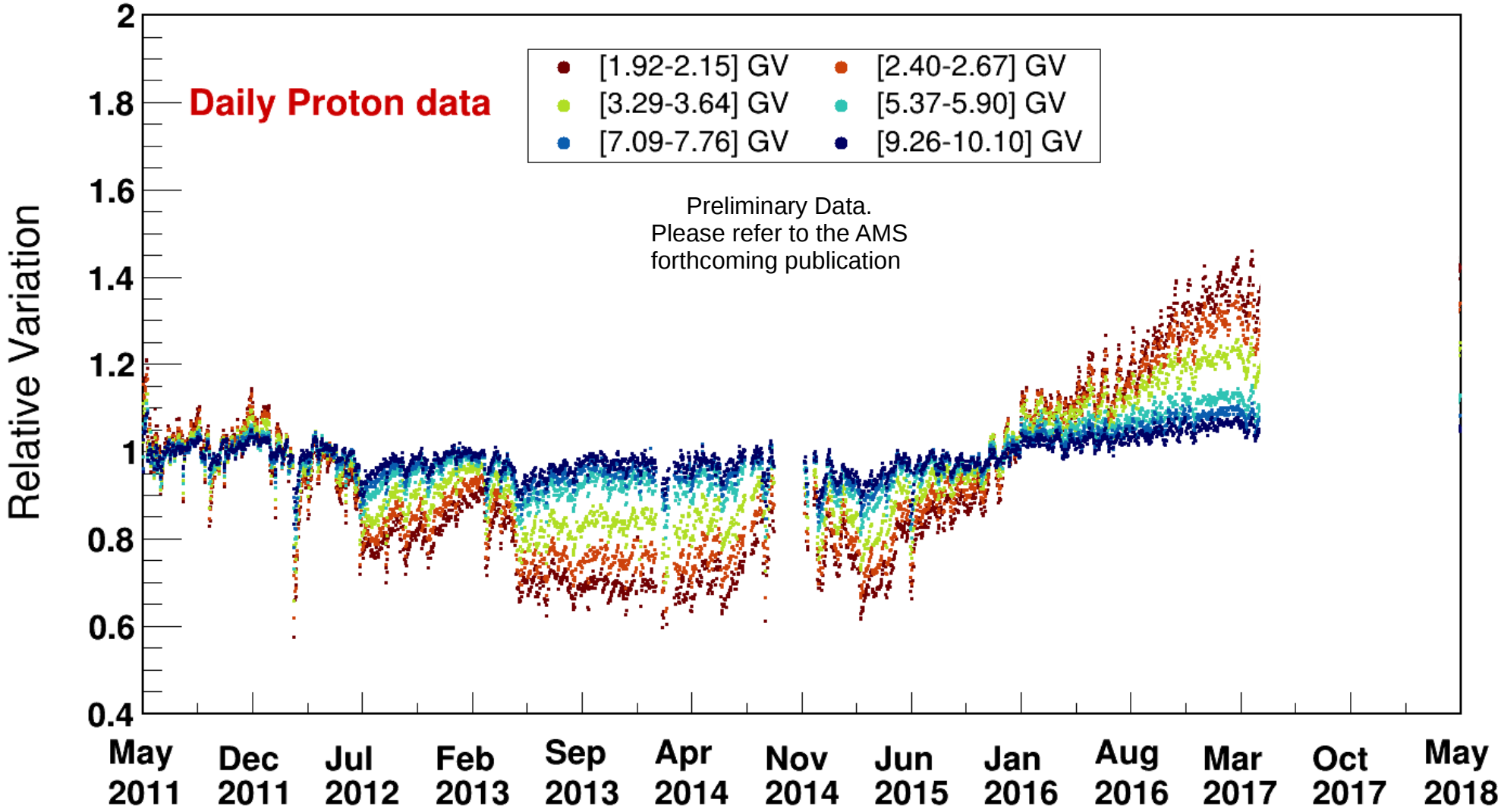
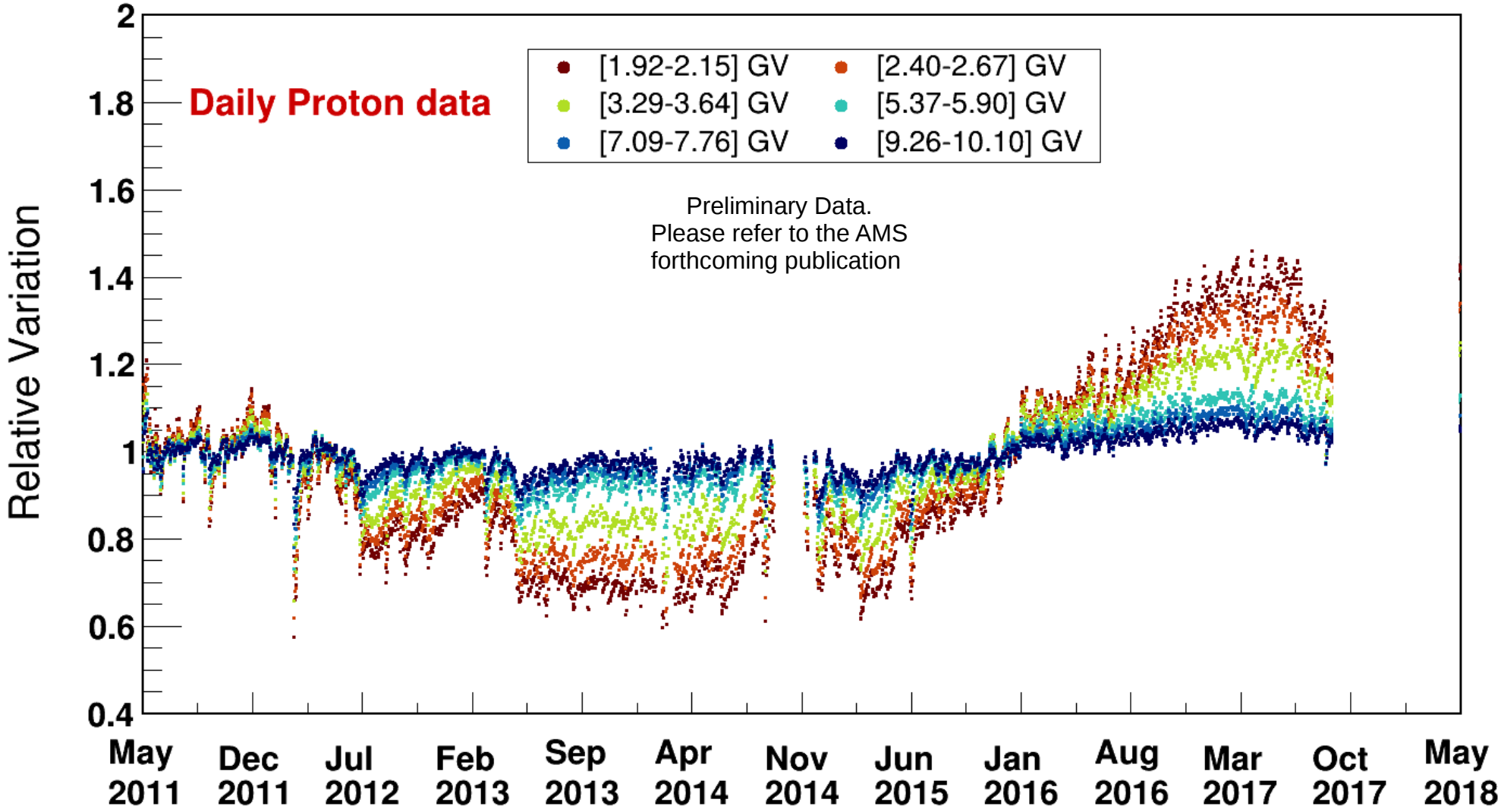


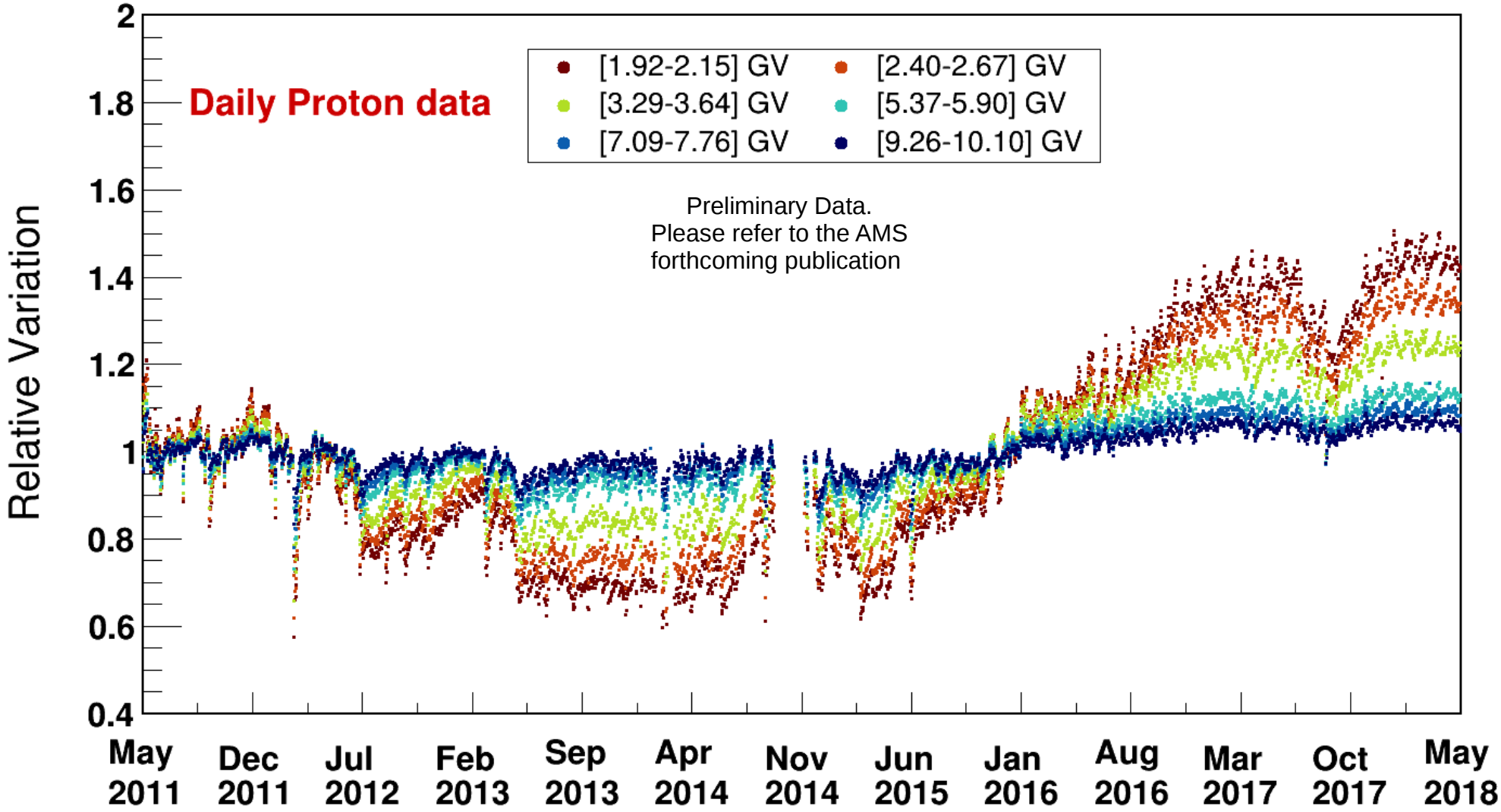
Proton Daily Fluxes Relative Variation
May 2011- May 2018



Proton Daily Fluxes Relative Variation
May 2011- May 2018



Proton Daily Fluxes Relative Variation
May 2011- May 2018



Summary

- Seven years of AMS data were analyzed.
- Proton and Helium daily fluxes were measured during solar cycle 24.
- Proton and Helium daily fluxes show nearly identical substructures up to ~40GV.
- The comparison of multiple rigidity ranges shows different behaviors depending on the solar cycle phase.