MINOS Data Quality Monitoring check

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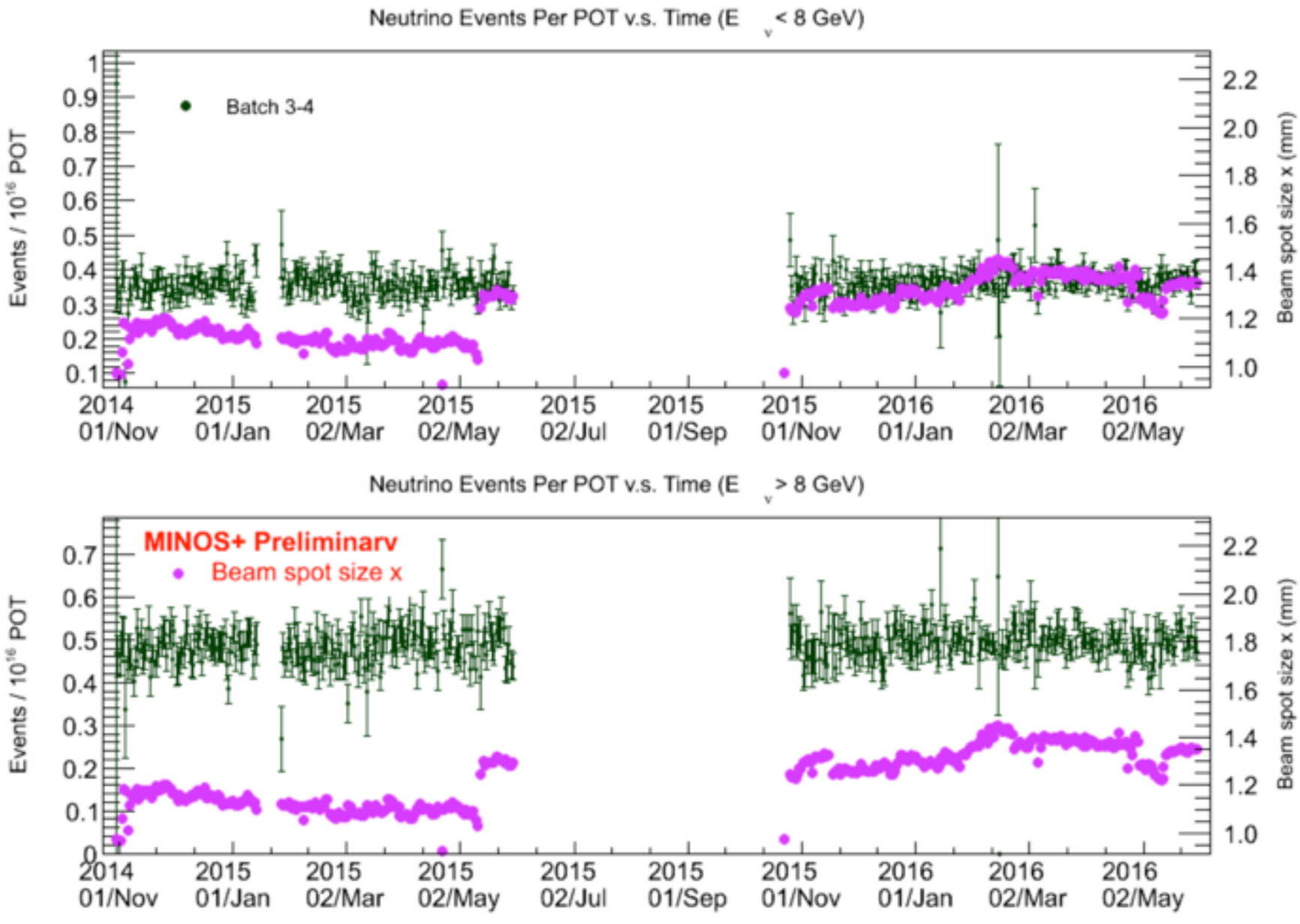
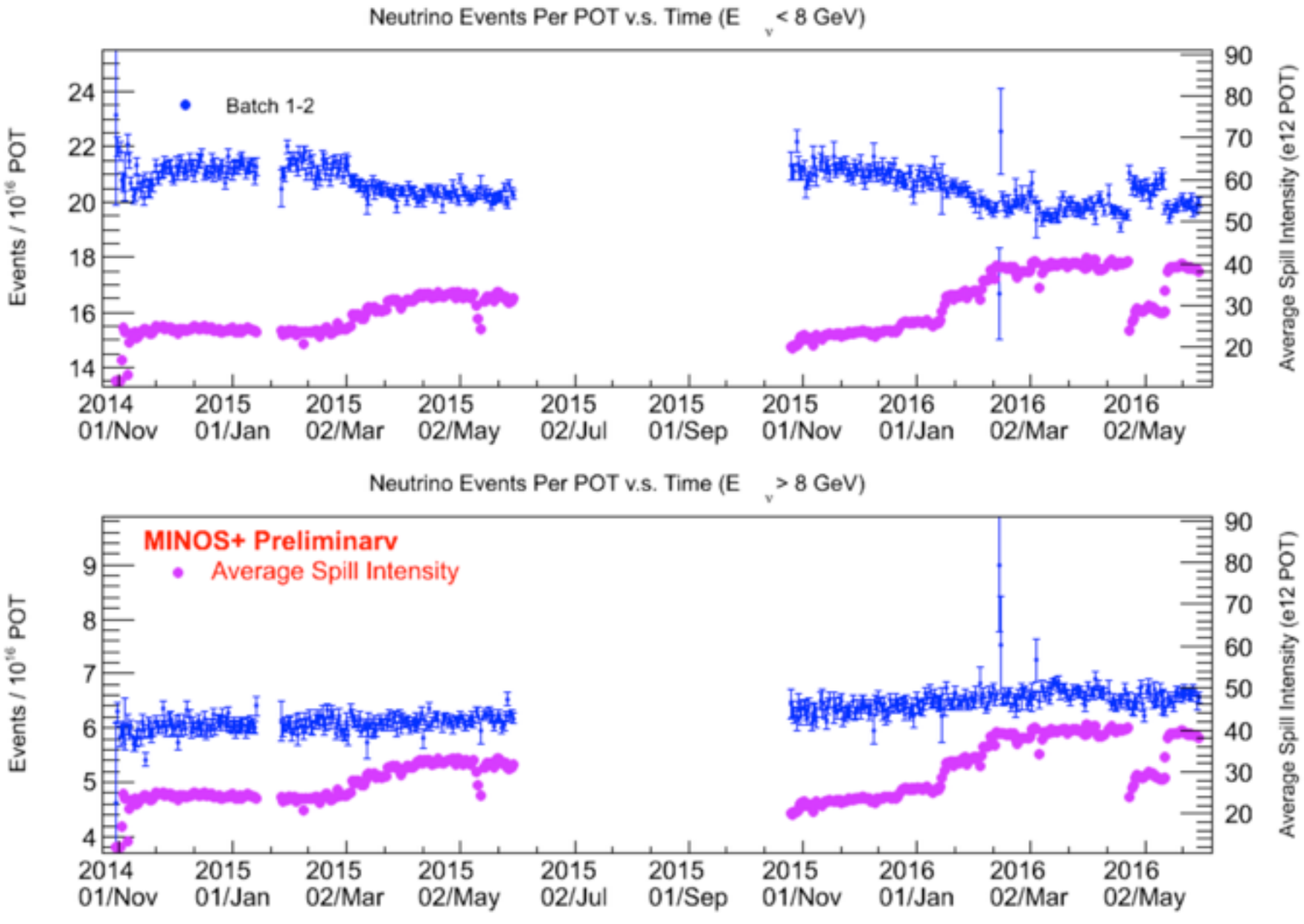
Problem and effects

- James showed the horn 1 mis-alignment problem.
- Julia confirmed that MINOS should see a rise in high energy tail.
- Oct 2015 - June 2016 run are very complicated, but we can reuse the Nov 2014 - May 2015 information to compare.
- Two effects may cause similar shifts: beam spot size, intensity.

Beam spot size



Intensity


Neutrino Events Per POT v.s. Time (E ν < 8 GeV)
Batch 1-2
Events / 10^16 POT
Average Spill Intensity (e12 POT)
2014 01/Nov
2015 01/Jan
2015 02/Mar
2015 02/May
2015 02/Jul
2015 01/Sep
2015 01/Nov
2016 01/Jan
2016 02/Mar
2016 02/May
Neutrino Events Per POT v.s. Time (E ν > 8 GeV)
MINOS+ Preliminary
Average Spill Intensity

Important to notice

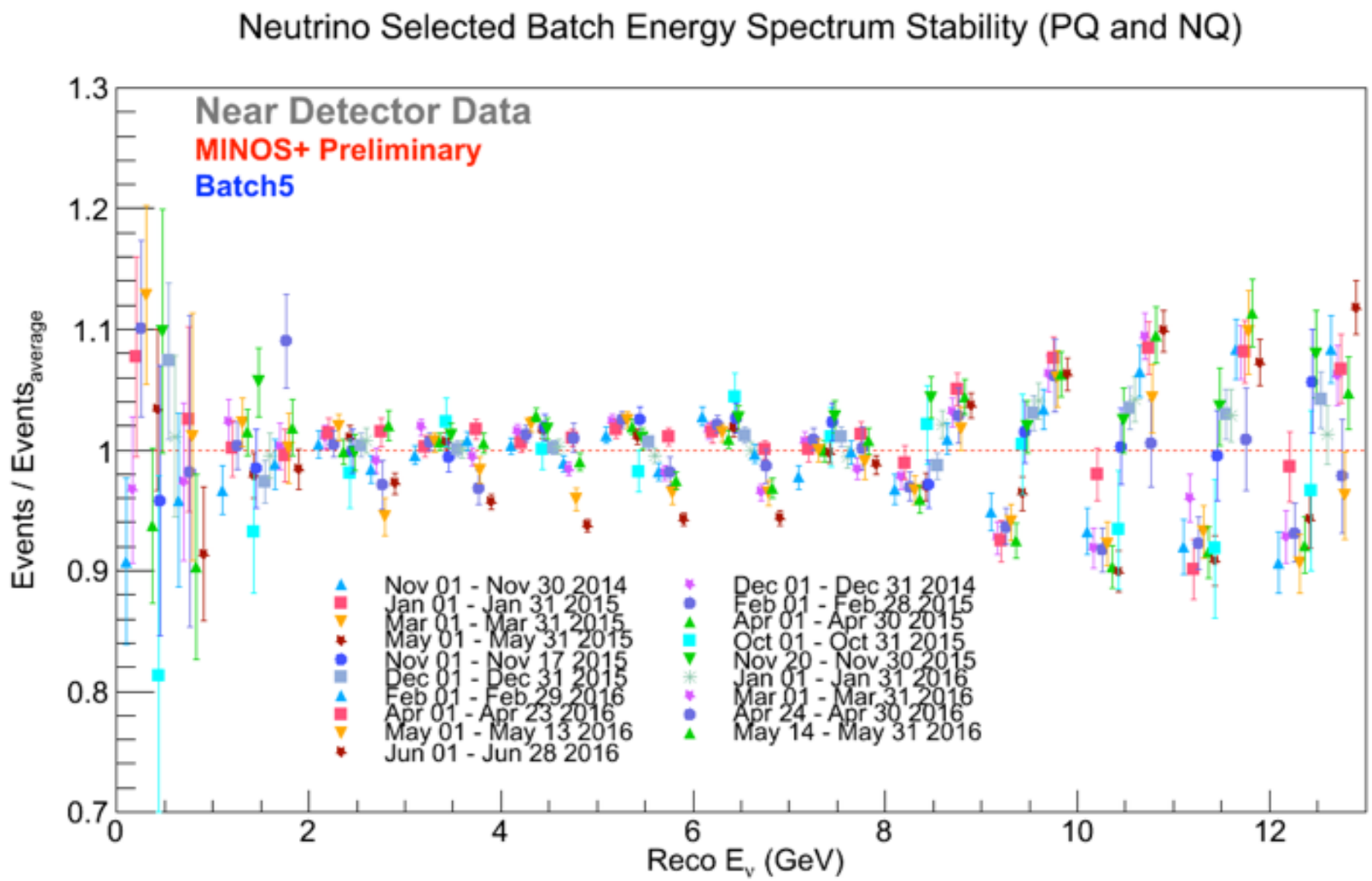
- Intensity of Feb 2015 is similar with Oct 2015 - Dec 2015.

- Beam spot size of May 2015 is similar with Oct 2015 - Dec 2015.

- Spot size change can be observed by comparing May 2015 with April 2015 point.

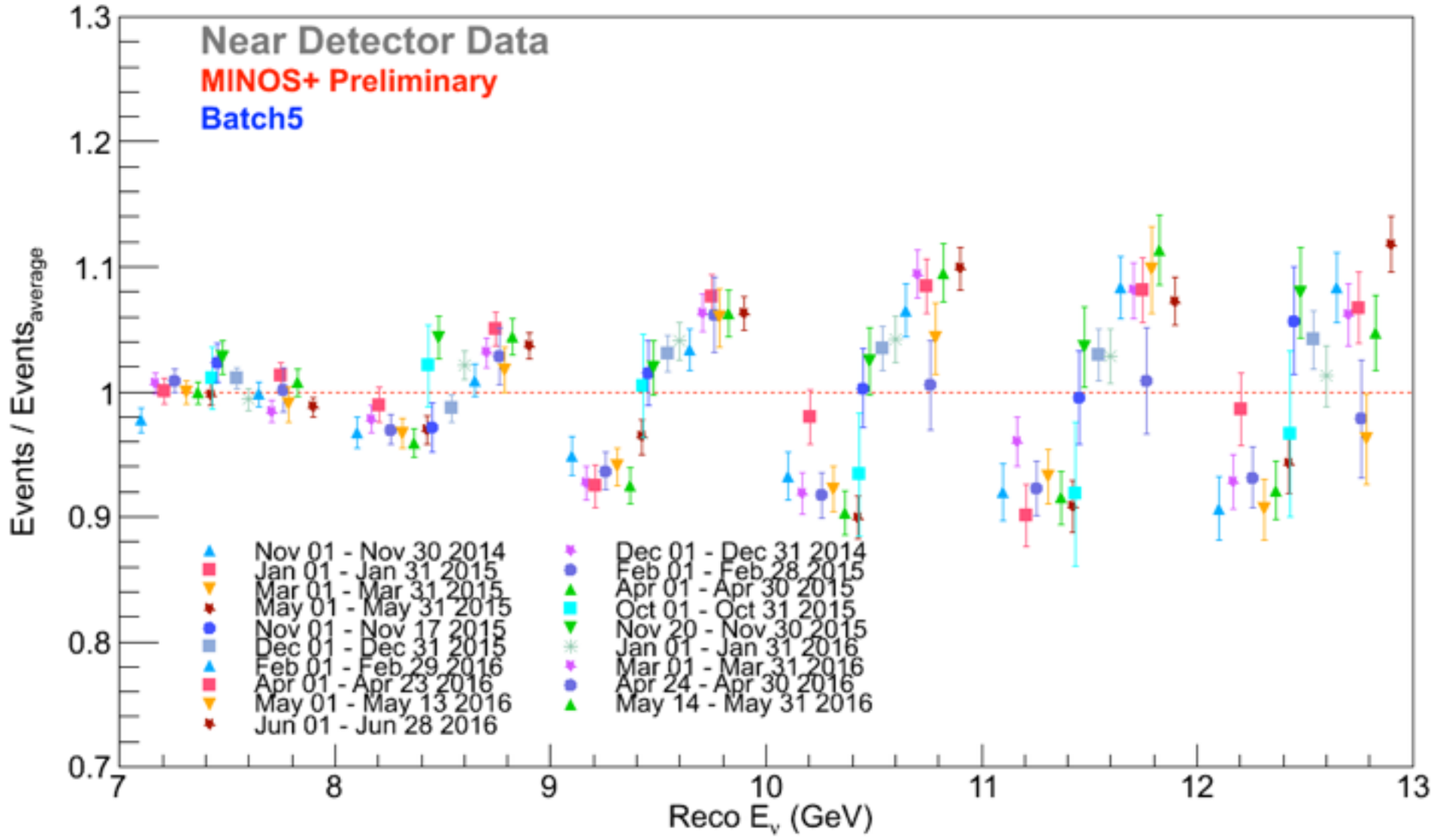
- Intensity change can be observed by comparing Feb 2015 with May 2015 point.

What do we see Batch5



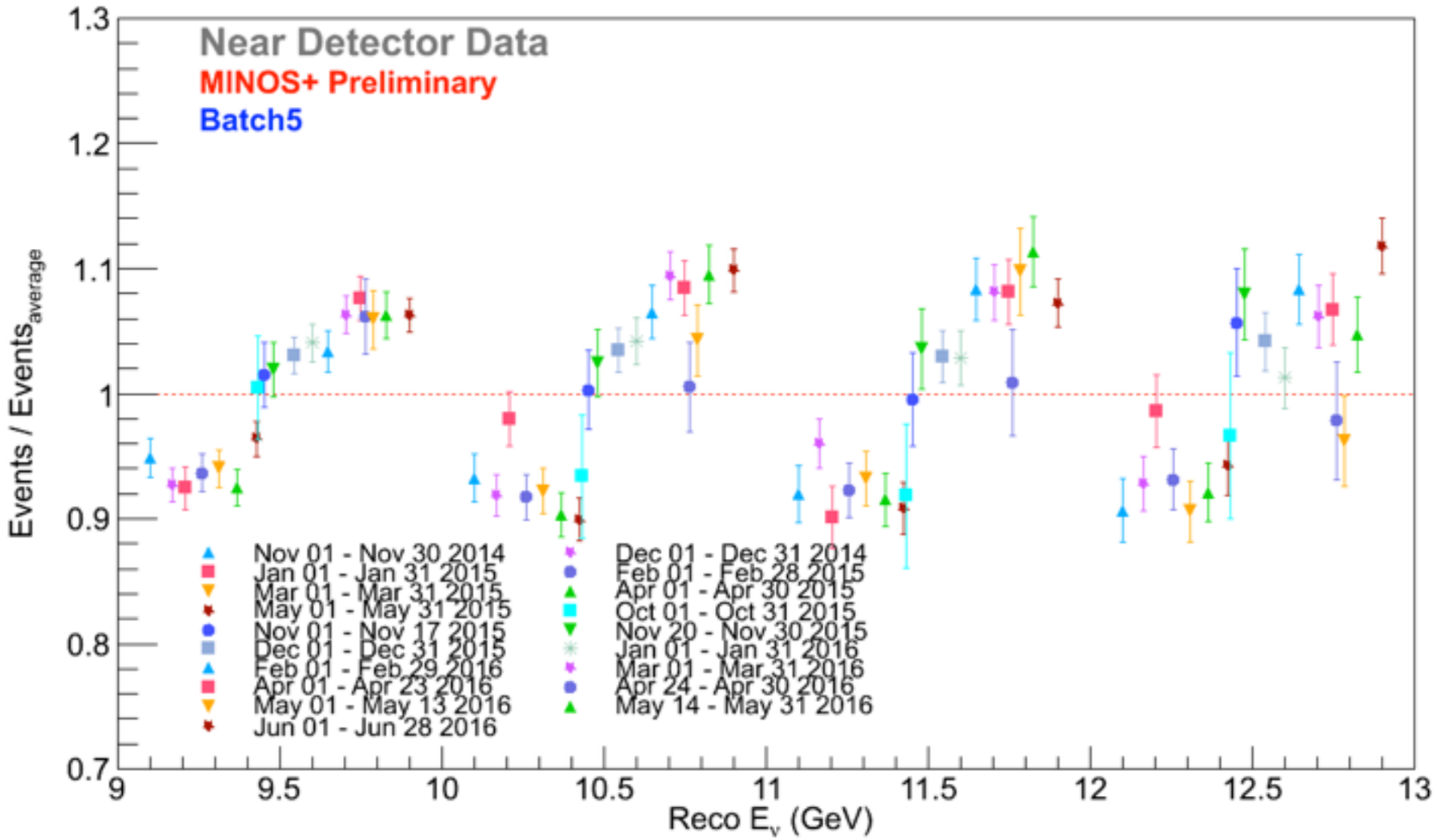
7-13 GeV

Neutrino Selected Batch Energy Spectrum Stability (PQ and NQ)

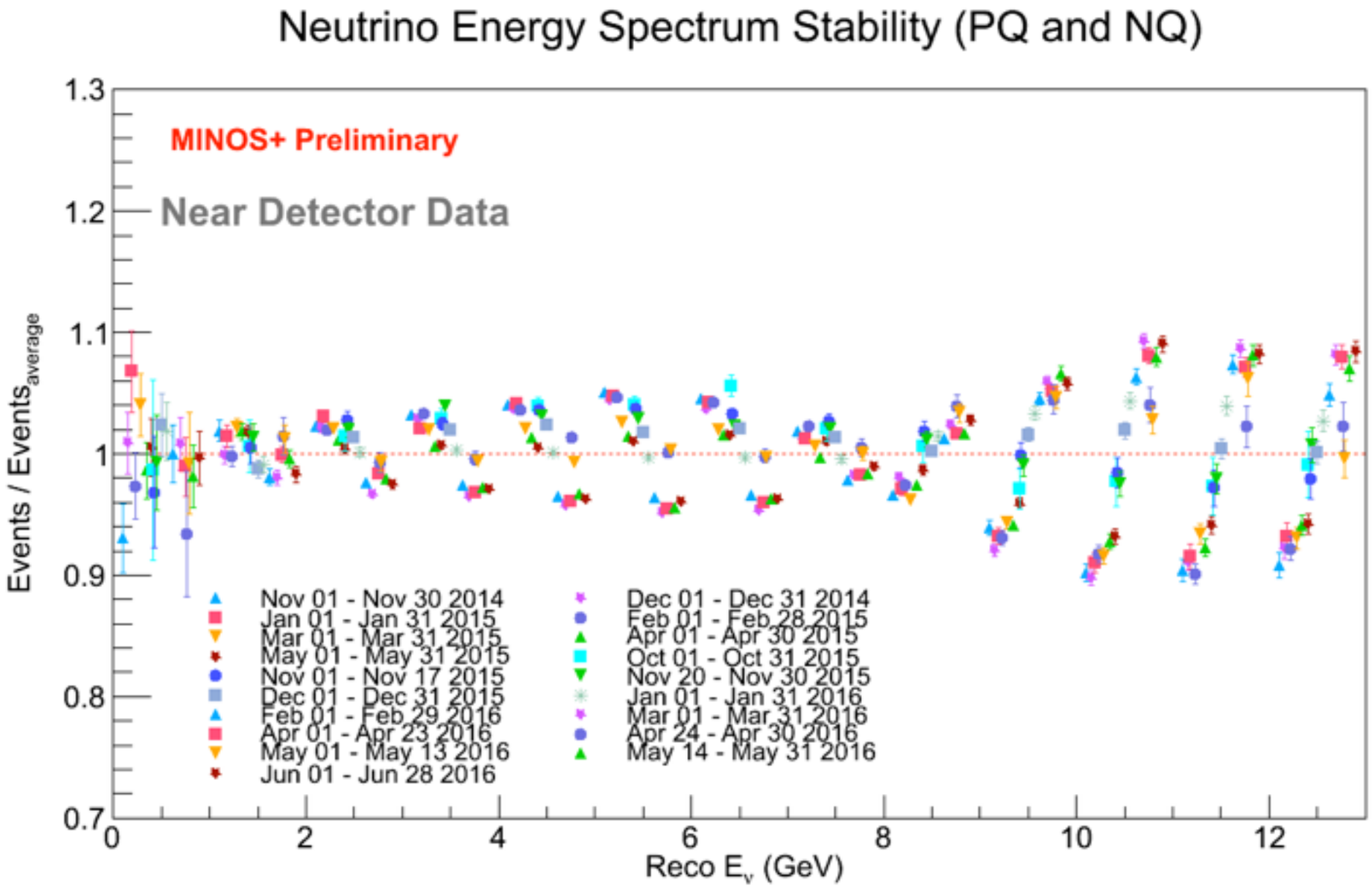


9-13 GeV

Neutrino Selected Batch Energy Spectrum Stability (PQ and NQ)

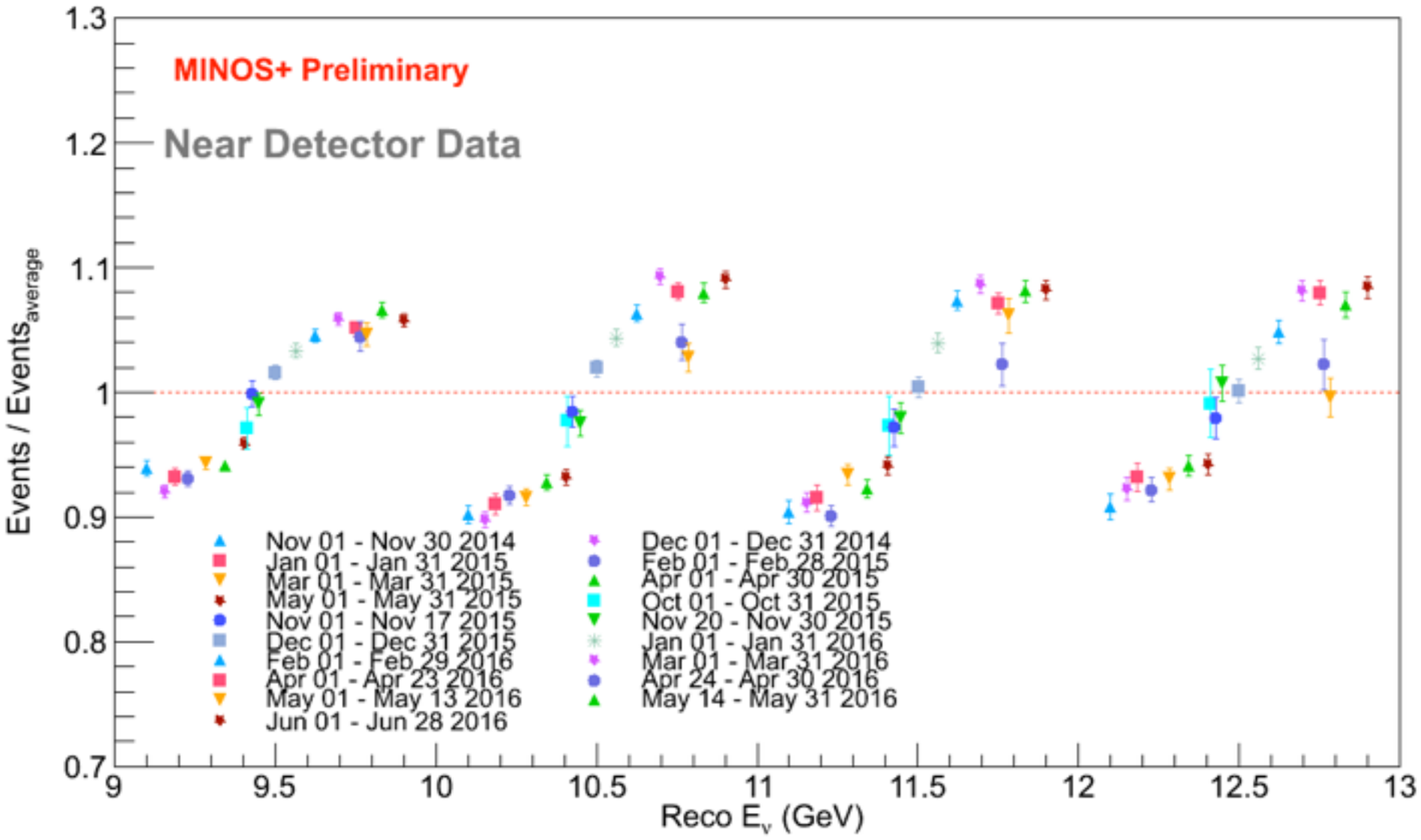


Full event stability for all batches

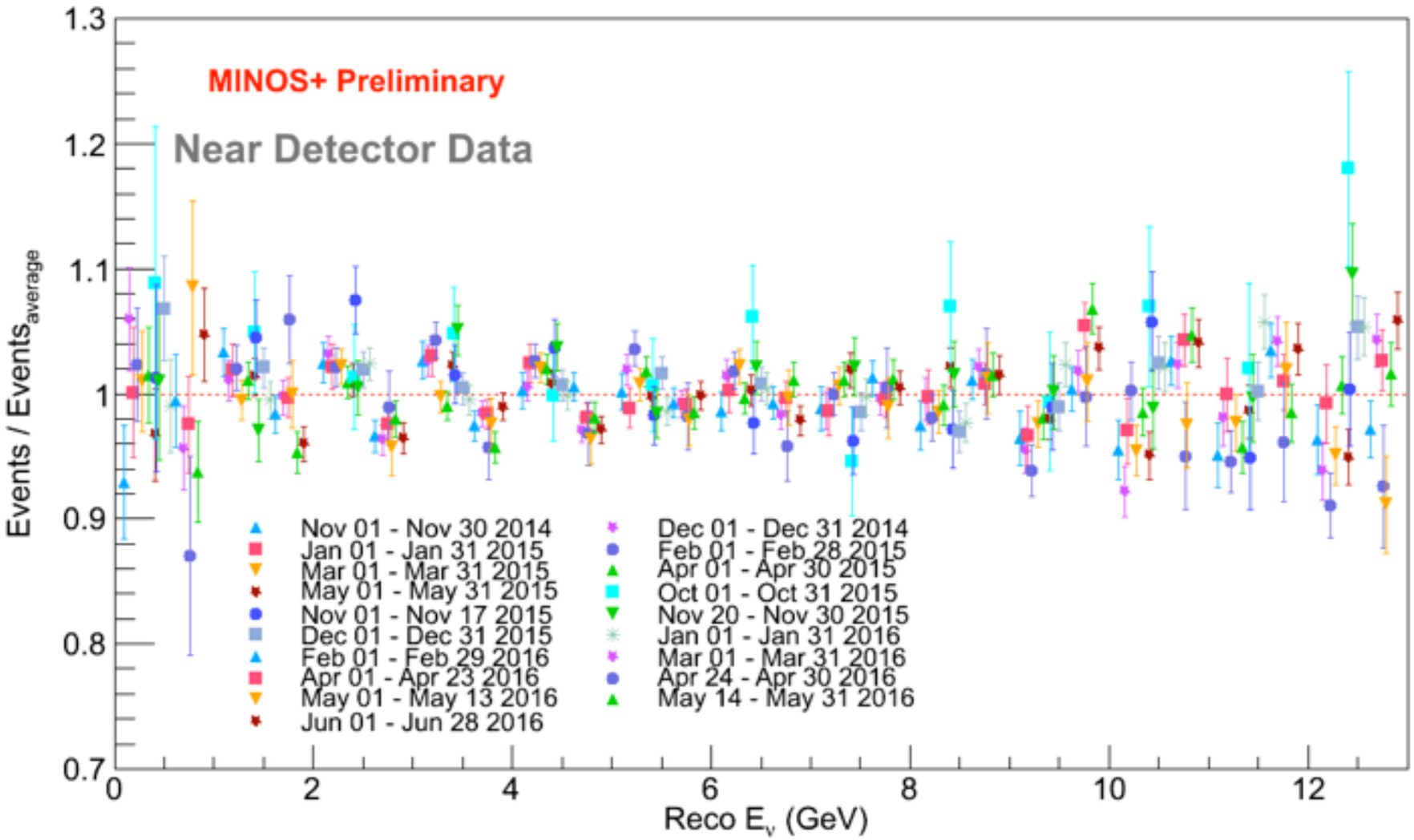


9-13 GeV

Neutrino Energy Spectrum Stability (PQ and NQ)

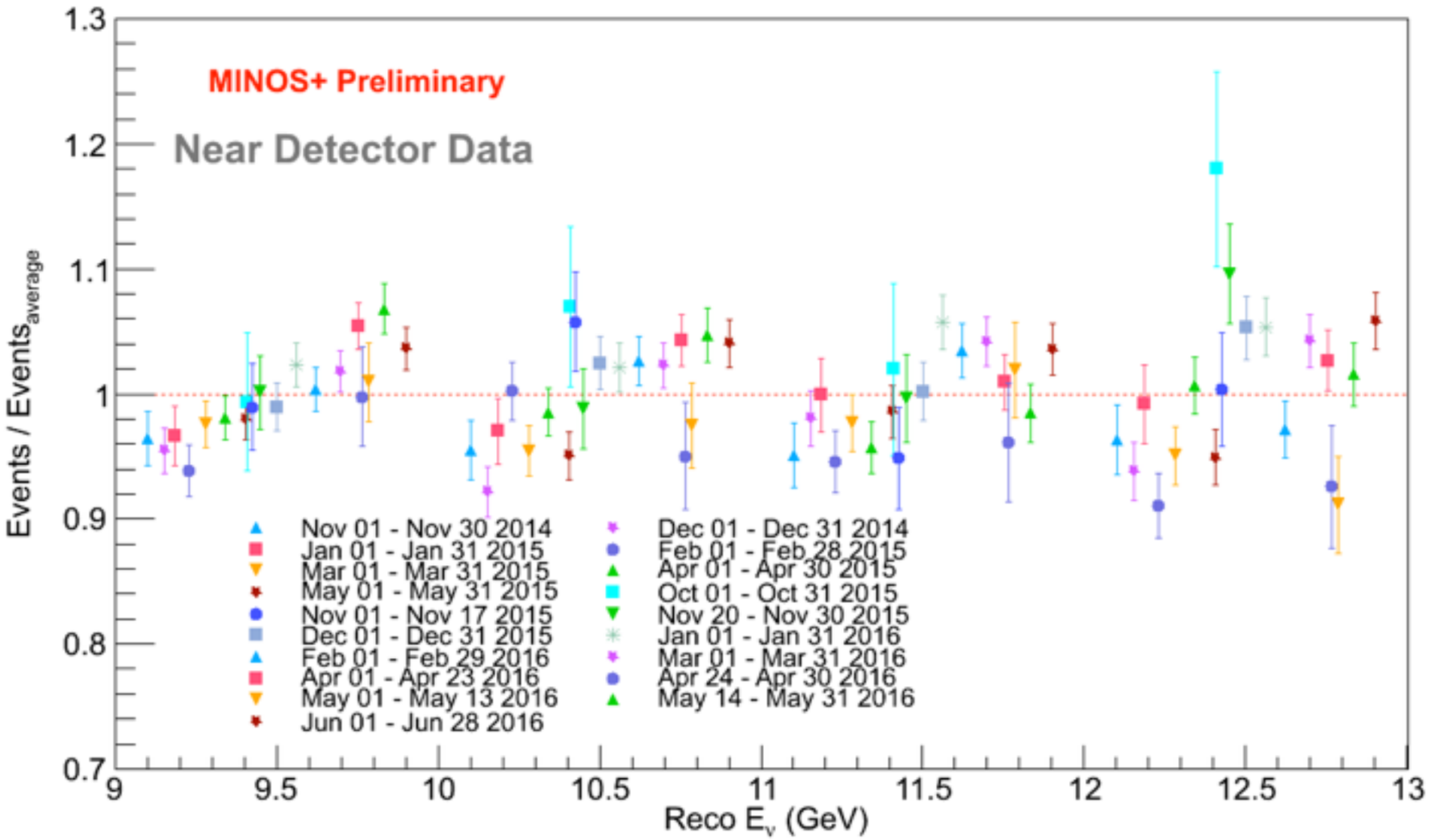


PQ events

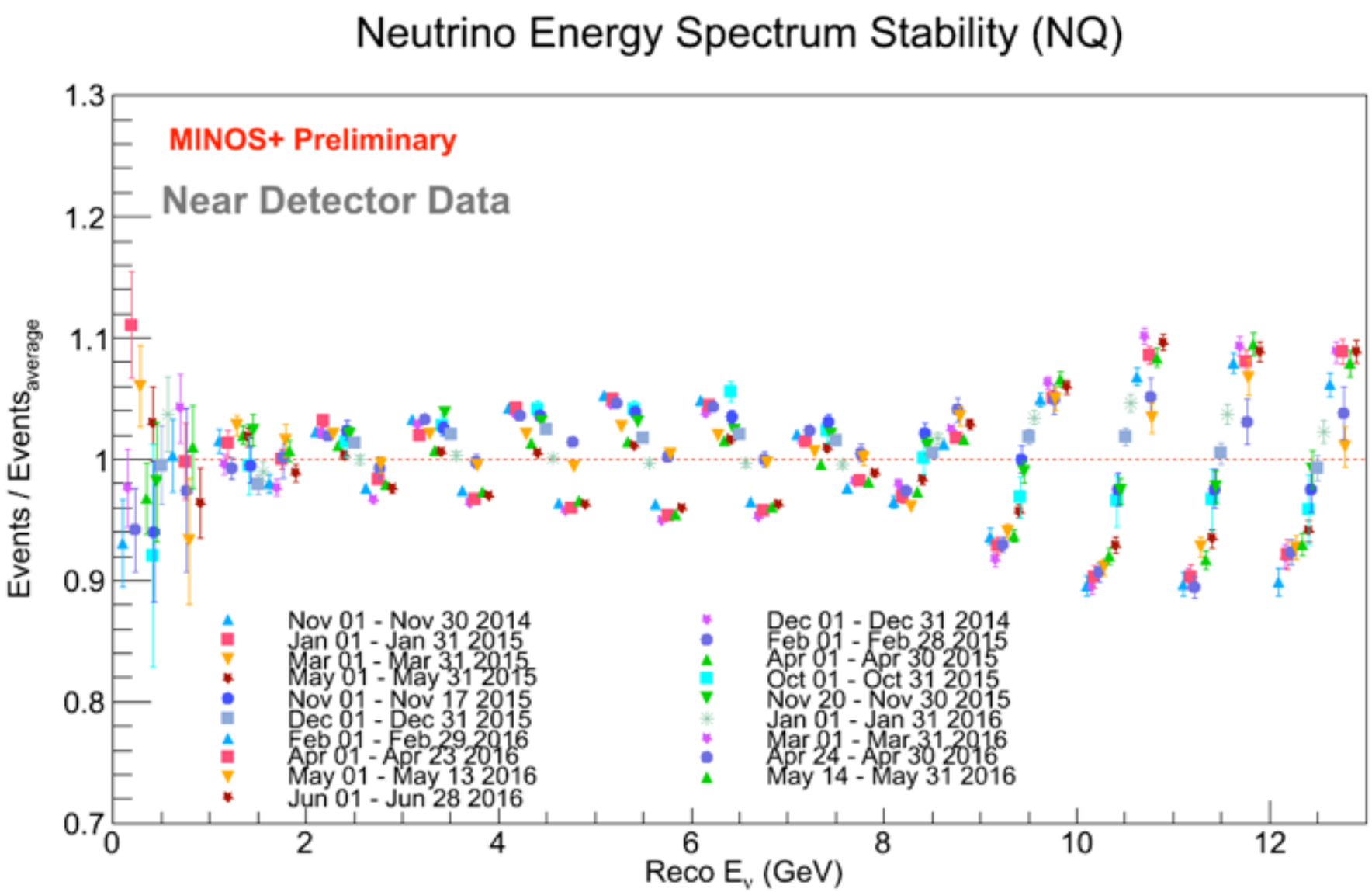

Neutrino Energy Spectrum Stability (PQ)
MINOS+ Preliminary
Near Detector Data
Events / Events_average
Reco E_ν (GeV)
Nov 01 - Nov 30 2014
Jan 01 - Jan 31 2015
Mar 01 - Mar 31 2015
May 01 - May 31 2015
Nov 01 - Nov 17 2015
Dec 01 - Dec 31 2015
Feb 01 - Feb 29 2016
Apr 01 - Apr 23 2016
May 01 - May 13 2016
Jun 01 - Jun 28 2016
Dec 01 - Dec 31 2014
Feb 01 - Feb 28 2015
Apr 01 - Apr 30 2015
Oct 01 - Oct 31 2015
Nov 20 - Nov 30 2015
Jan 01 - Jan 31 2016
Mar 01 - Mar 31 2016
Apr 24 - Apr 30 2016
May 14 - May 31 2016

9-13 GeV

Neutrino Energy Spectrum Stability (PQ)



NQ events


Neutrino Energy Spectrum Stability (NQ)
MINOS+ Preliminary
Near Detector Data
Events / Events_average
Reco E_ν (GeV)
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Mar 01 - Mar 31 2016
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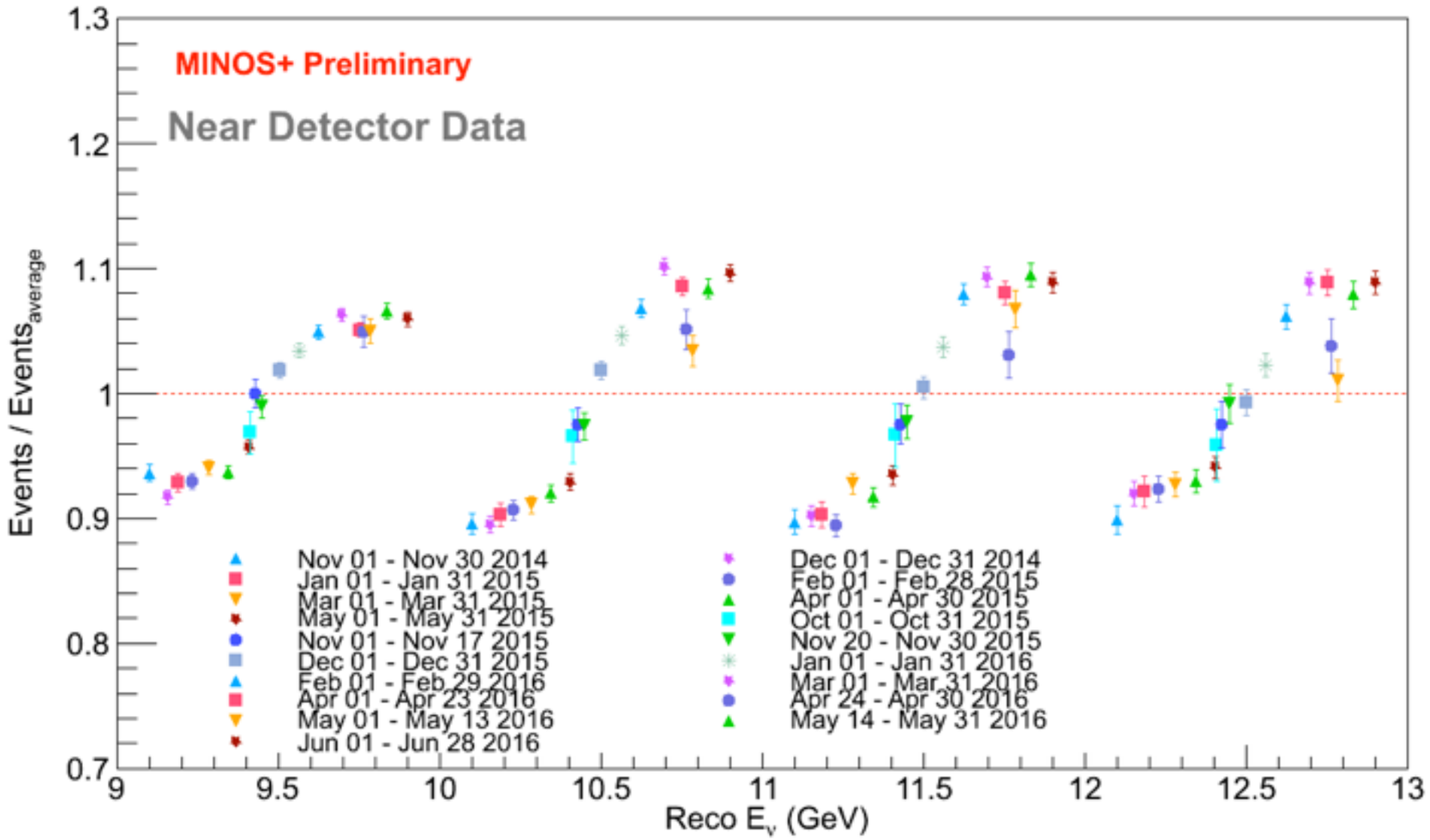
May 14 - May 31 2016

9-13 GeV

Neutrino Energy Spectrum Stability (NQ)



Conclusion

- The only obvious step function occurs at the start of the Oct 2015 - June 2016 run.