

Sunspot Proxy to Predict the Number of SPEs per Year Based on the Yearly Sunspot Number

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Overview

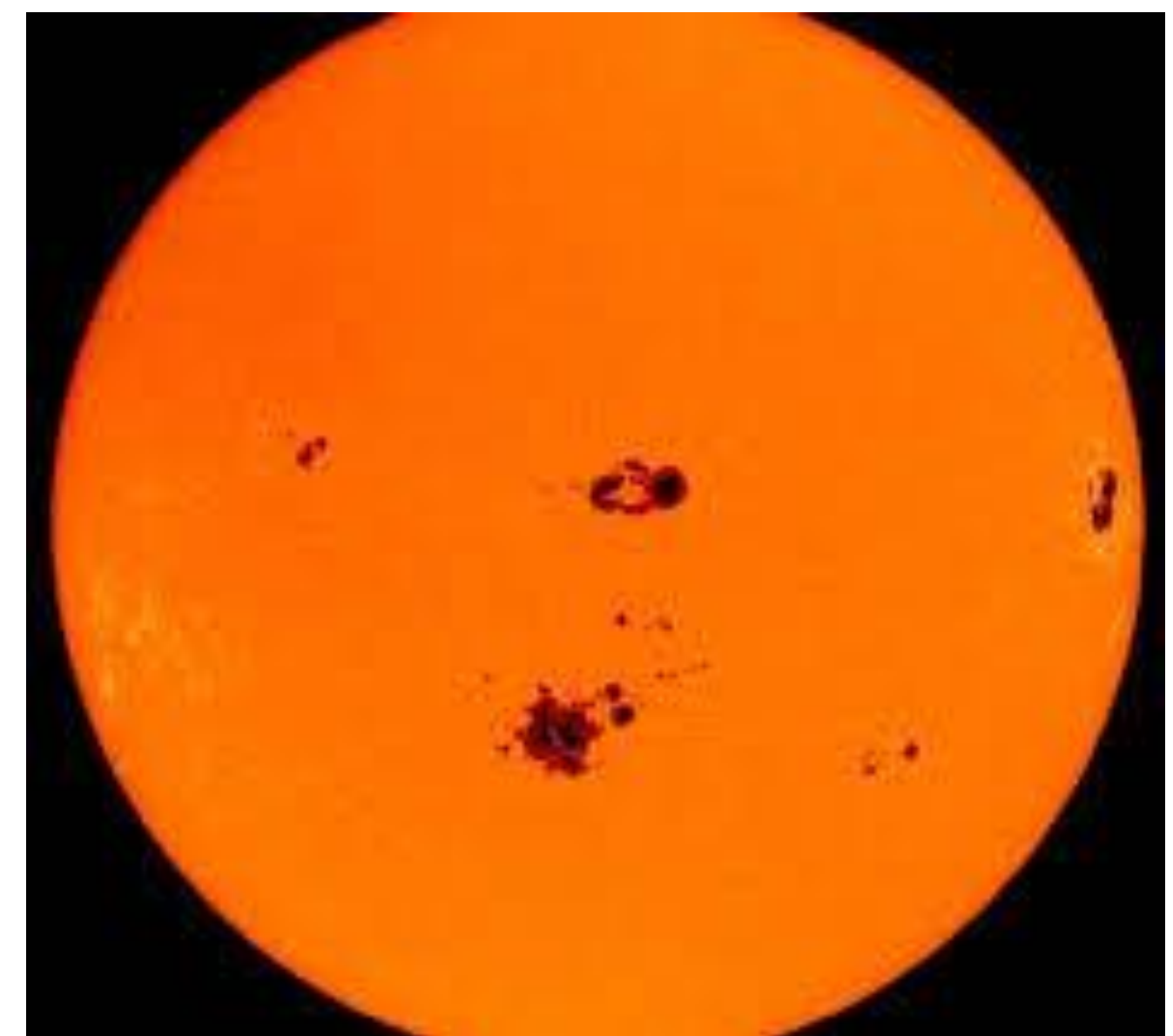
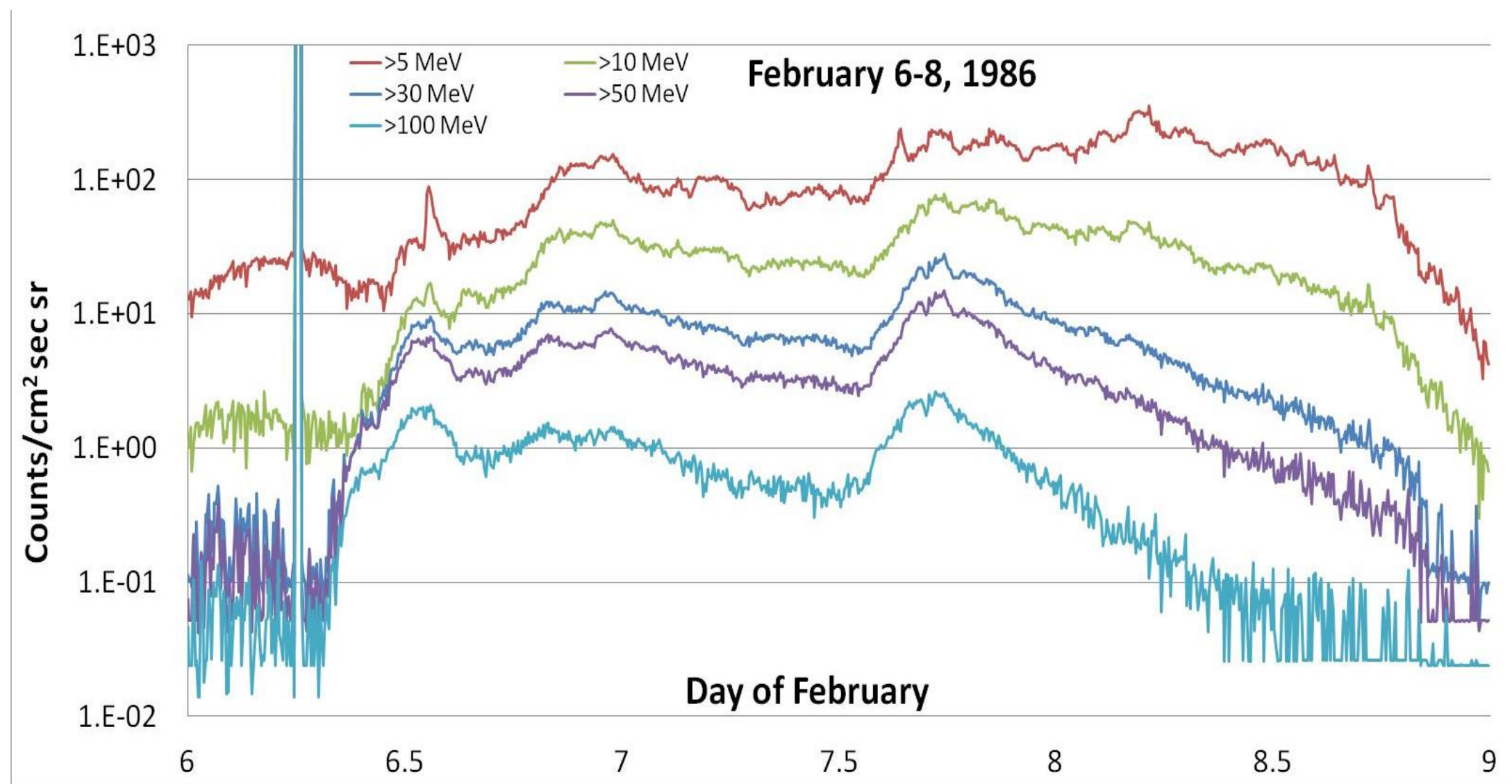
What is a solar energetic particle event?

- An outburst of high energy particles (mostly protons) accelerated by the Sun
- The accelerated particles flow out into space following the interplanetary magnetic field

What is a sunspot?

- A cooler spot on the surface of the sun caused by convection in the interior of the sun
- The solar magnetic field is concentrated and turbulent in sunspots.

An episode of solar activity with several solar particle events



Impact

- Gives mission planners and designers a tool to predict the number of solar particle episodes to expect during a mission.
- First prediction tool for solar energetic particle episodes.

Explanation

Provides a way to predict the number of episodes per year based on the yearly sunspot numbers.

Key Findings

Exponential distribution with an episode overlap correction factor.

$$N = (a * n + b) \exp[-q(a * n + b)]$$

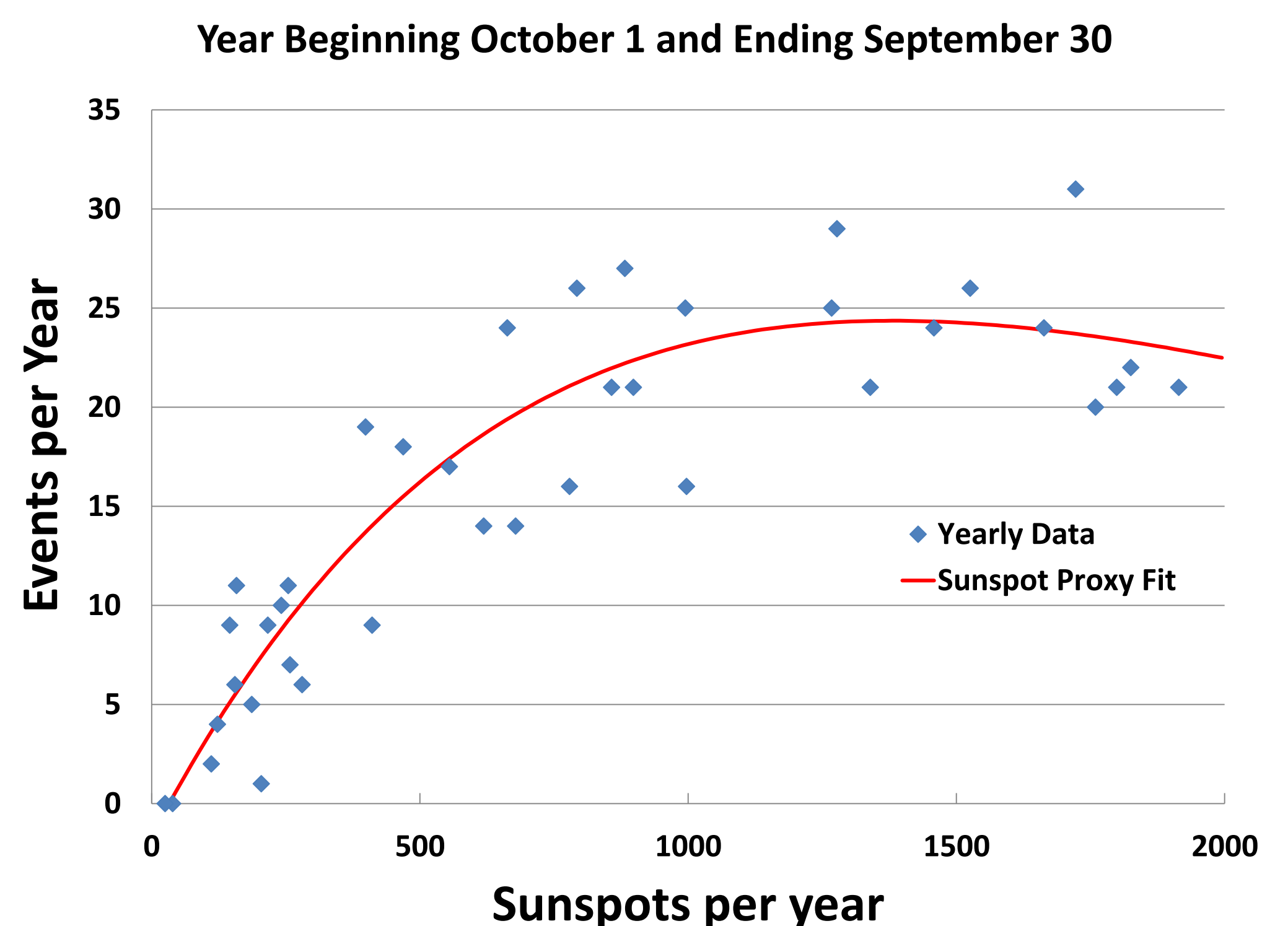
$$a=0.0491$$

$$b=-1.6122$$

$$q=0.0151$$

N= # of episodes

n= # of sunspots



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