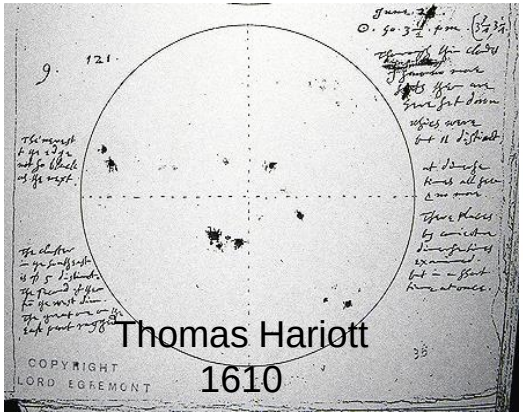
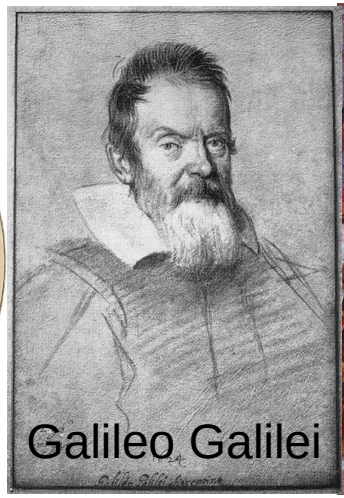
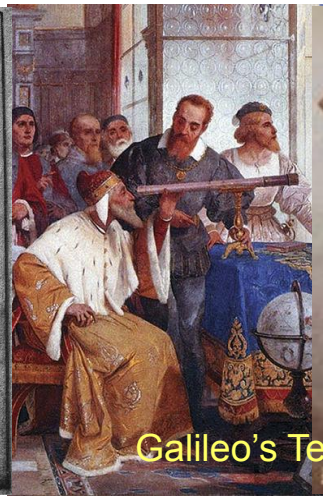
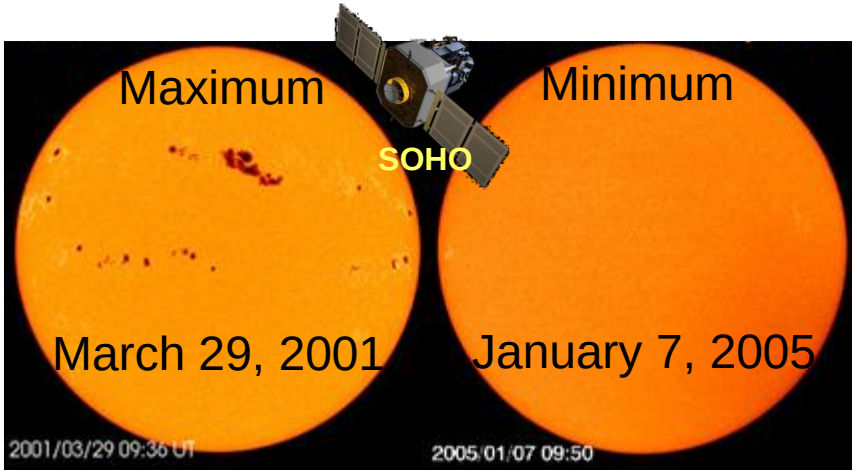
Centuries of Sunspot Observing

We have observed sunspots with telescopes for 400 years

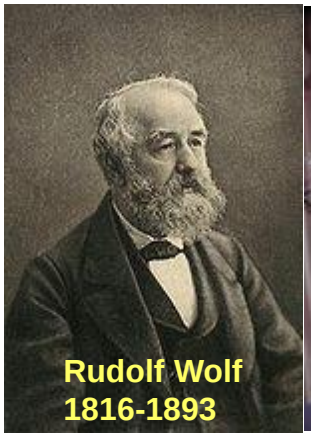








Sunspots observed by Spacecraft

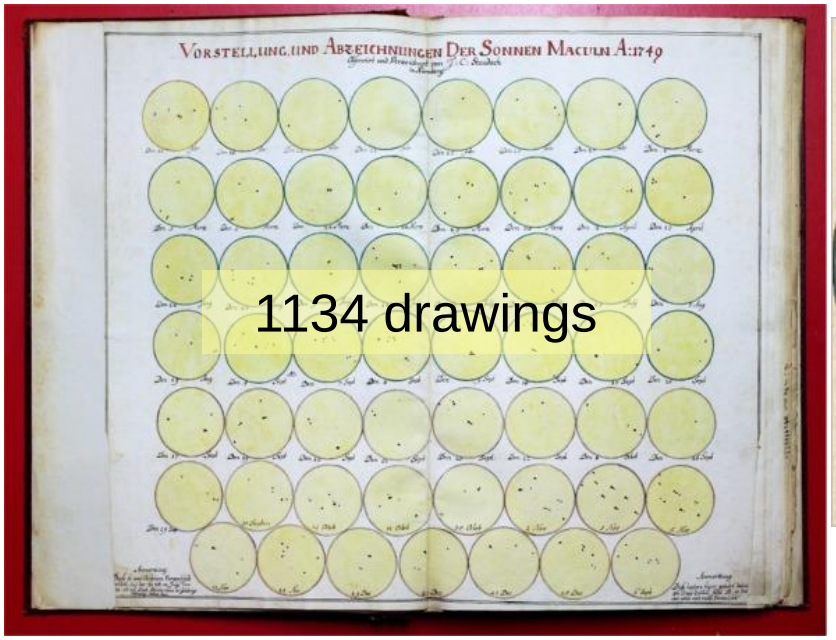


'Compiler' of Sunspot Number

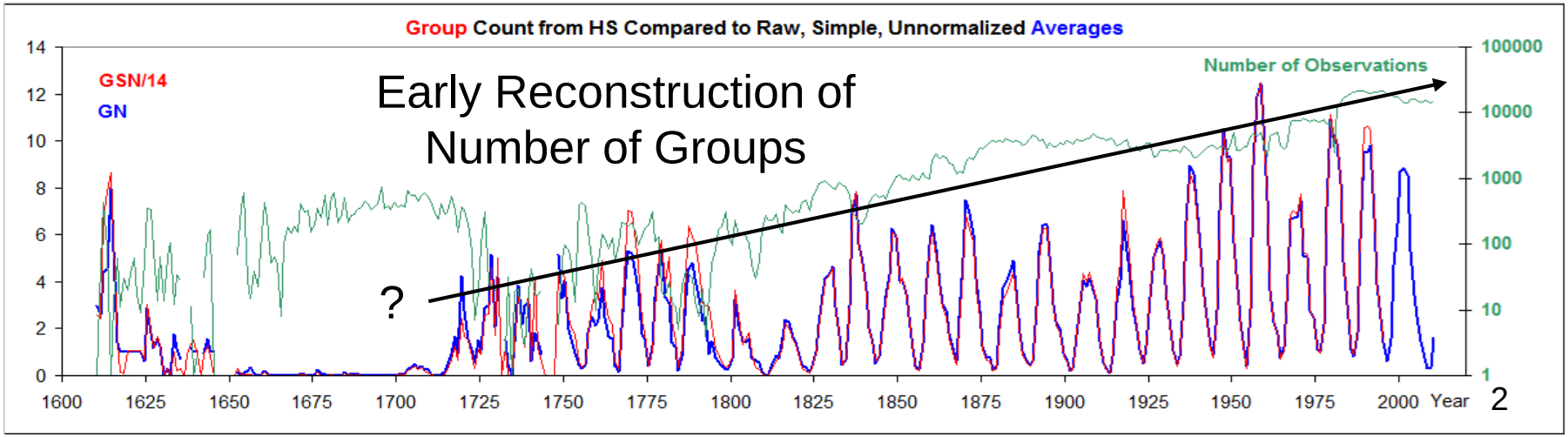
Still used today

The sunspot number is always determined using **small** telescopes

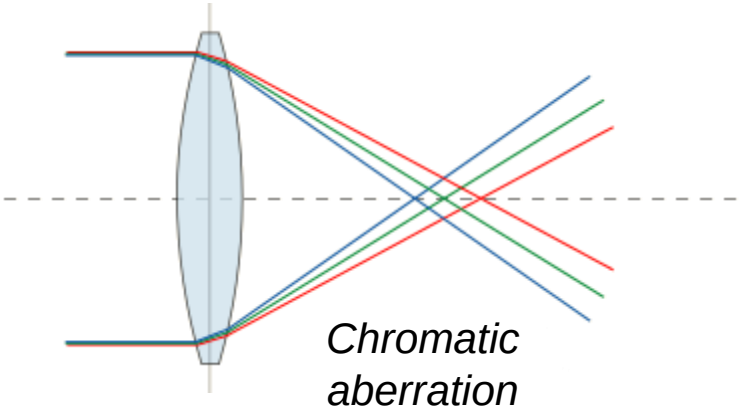
Our Knowledge of Sunspots in the 18th Century is Based on J.C. Staudach's Drawings 1749-1799



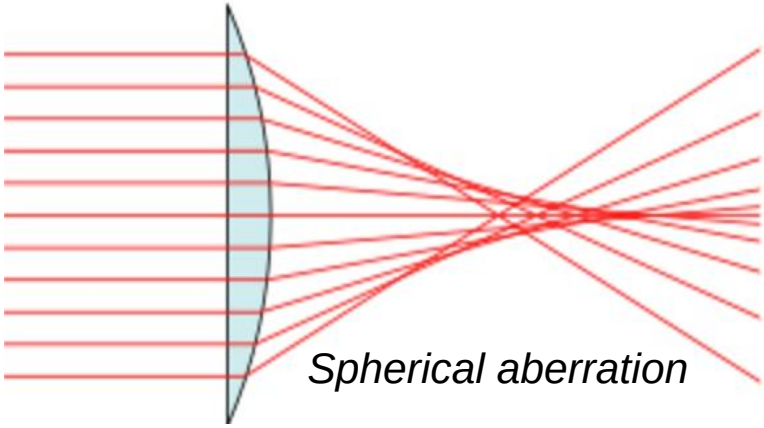
13th & 15th February 1760



Aberrations of Singlet Lenses



Chromatic aberration



Spherical aberration

Briggs, NM

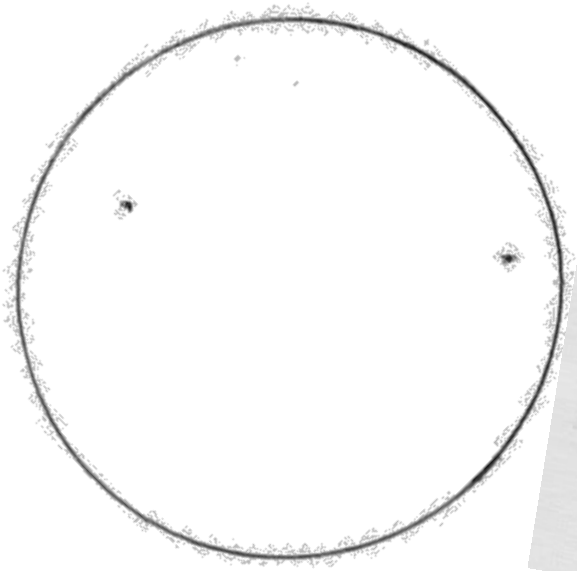
Spencer, NY

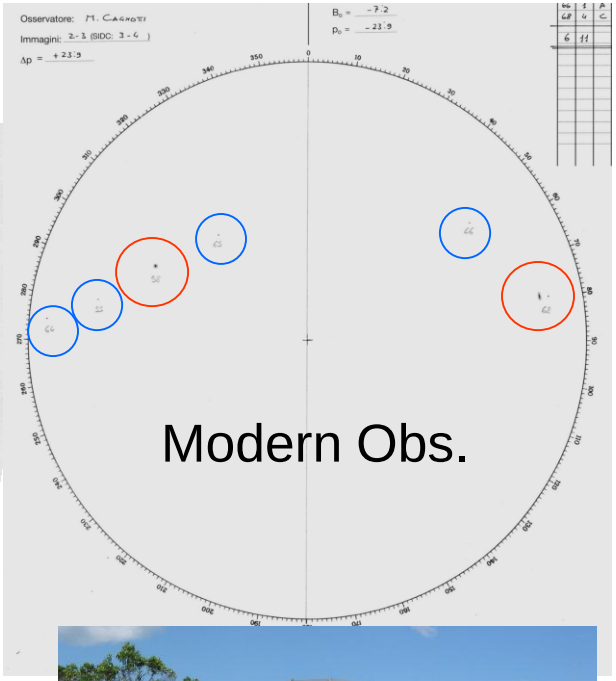
the Antique Telescope Society

Telescopes from the mid-1700s

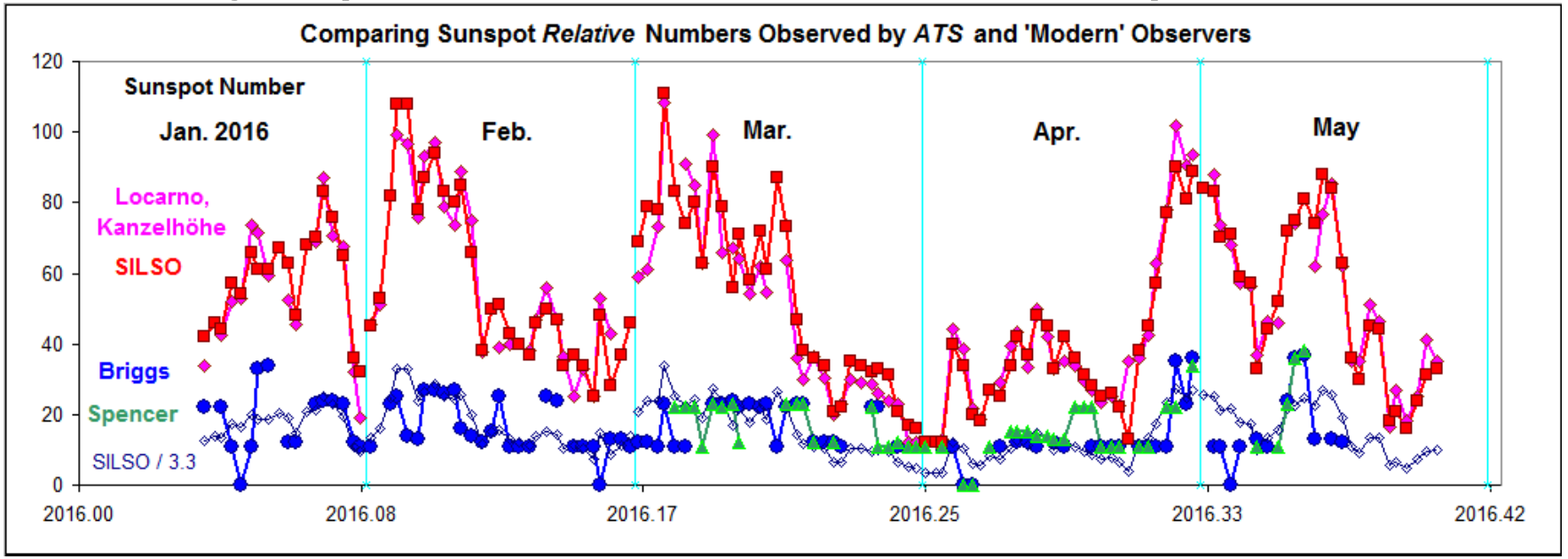
Stephani, Germany

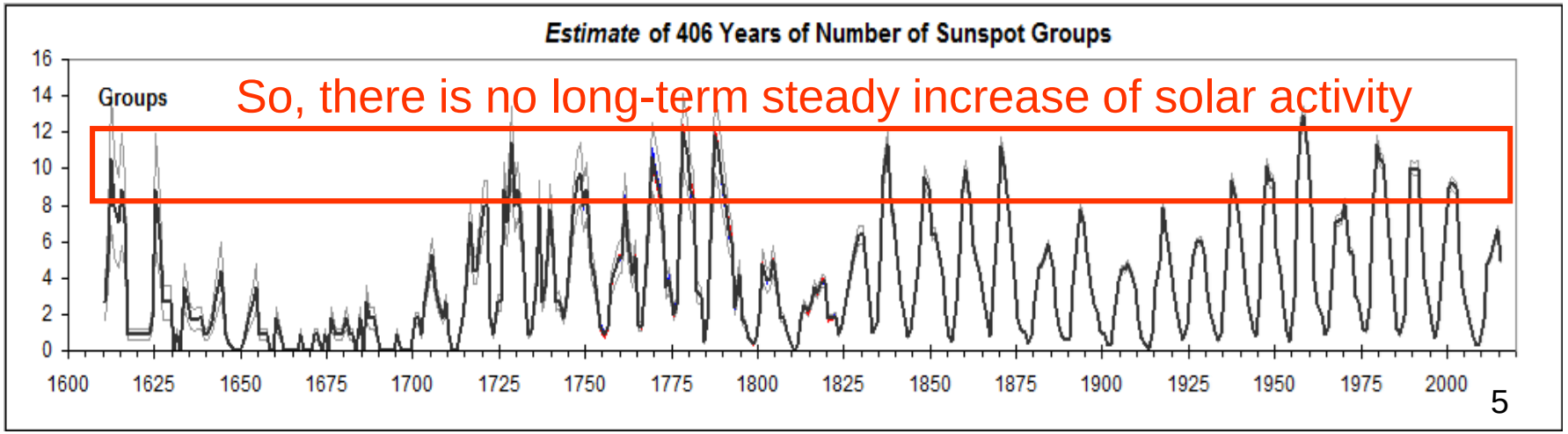
Sunspots 2016-03-11

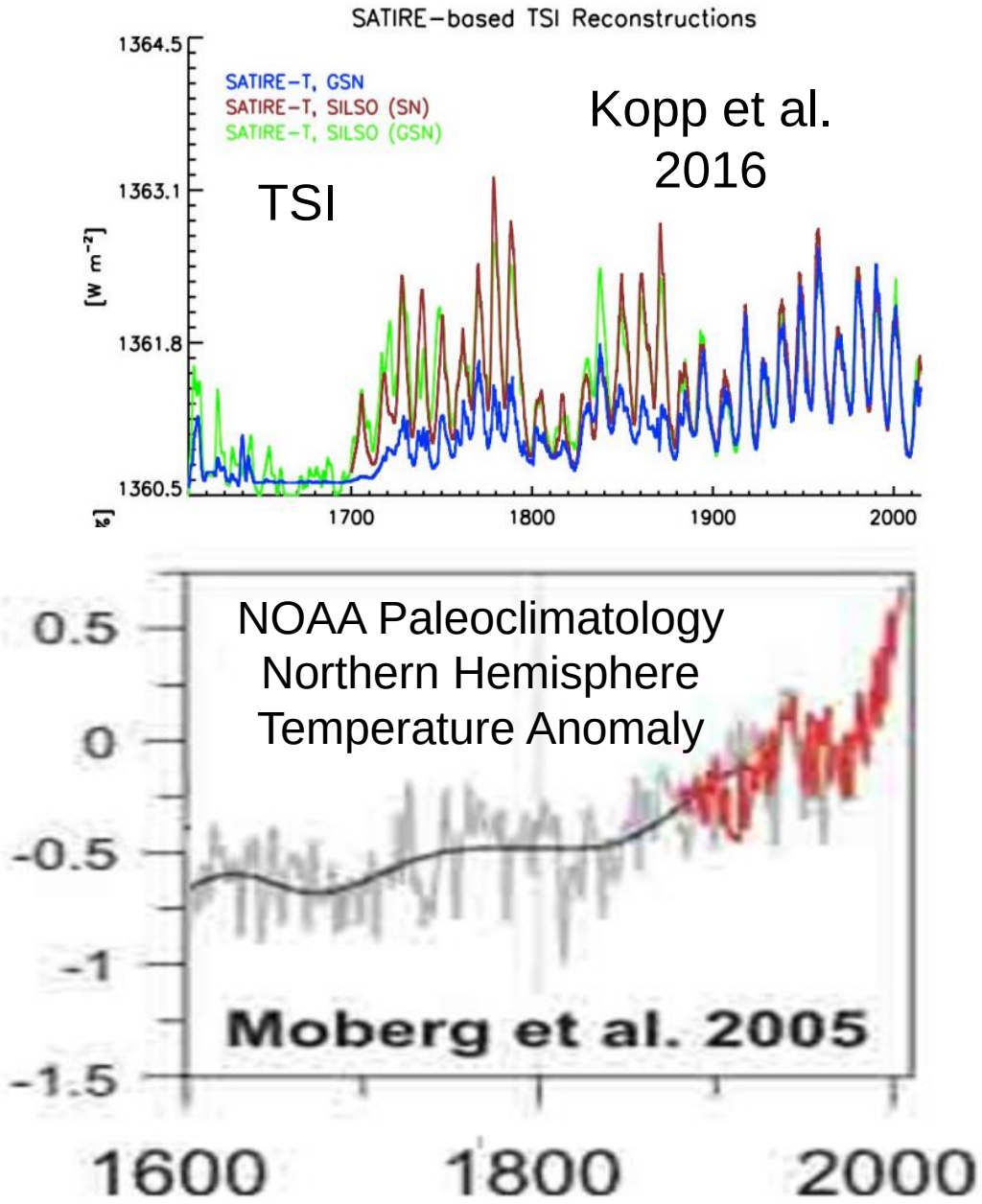




Modern Observers See Three Times as Many Spots as The Old Telescopes Show







Why Is This Important?

1. The Total Solar Irradiance (output of heat) in the past before satellite measurements is reconstructed from the sunspot numbers and is used as input to climate models
2. Predictions of future solar activity, damaging solar storms, and our general understanding of the sun rely on knowledge about its past behavior

SCIENCE HIGHLIGHTS FROM SPD 2016

The Sun is a magnetic star. Its magnetic field affects Earth, by causing space weather that affects our technology. Understanding its formation and effects gives rise to some of the most challenging scientific problems of our time. We present four different exciting advances in the search to understand the consequences and origin of the Sun's magnetic field.

First, an exciting new result about the origins of hard-to-predict "Stealth CMEs" that can launch from the Sun and impact Earth without an obvious signature at the surface.

Next new insights into the formation of sunspots, produced via strikingly beautiful simulations of the flows inside the star.

Third, understanding the long-term evolution of the Sun's magnetic field drove one team of scientists to recreate 18th century telescopes in the modern era.

Finally, in the 21st century the titanic four-meter-diameter solar telescope DKIST is nearing completion and will enable new observation of solar magnetism at the very finest scales.

Leif Svalgaard, Stanford University, Boulder, June 2016