PAST > PRESENT > FUTURE
1610 > 2010 > 2050

Growth of Knowledge and Understanding of The Sun-Earth System
Scheinners Helioscopium
Helevius Observations 1644

May

August, September, October
Modern Sunspot Observations
October 24, 2003
Bill Livingston  Kitt Peak  NSO
Sunspot Latitude Distribution
Maunder Minimum
1660 to 1720
(Ribes and Ribes, 1993)
MODERN SOLAR OBSERVATIONS
June 15, 2010

- MDI/SOHO IMAGE
- NSO Magnetogram
NEW KNOWLEDGE

1704  Newton describes solar prism spectrum

1724  Fahrenheit Hg Thermometer invented

Cycle 23-24 Minimum Epoch

“Mini Maunder Minimum”

F10.7 cm Radio Flux

MgII Index

Total Solar Irradiance (TSI) 1360.85 W/m²
Solar Magnetic Activity and Total Irradiance Since the Maunder Minimum
K.F. Tapping · D. Boteler · P. Charbonneau · A. Crouch ·
A. Manson · H. Paquette

Figure 9  Modelled total irradiance and disc irradiance since 1600.
Solar Dynamics Observatory
Gives new pictures of solar atmosphere variability at beginning of Solar Cycle 24
Next 40 Years

2010 to 2050

Important?
If trend continues to 2050, temperature anomaly ~ 1.3°C
World Population Growth

- NOW! 6.5 billion
- 2010
- 2050
- 11 billion