

연관된 이미지 변환하기

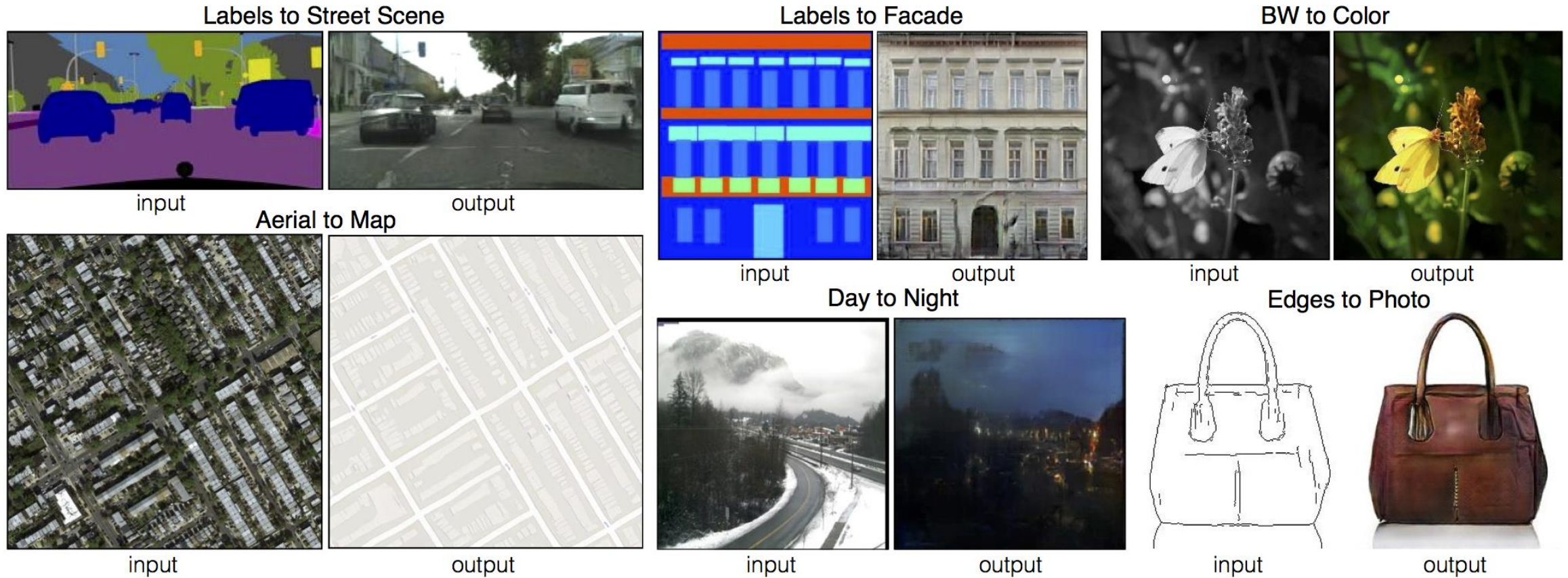
- 태양 흑점스케치로 자기장 지도 생성 -

이 하 림

경희대학교 우주탐사학과

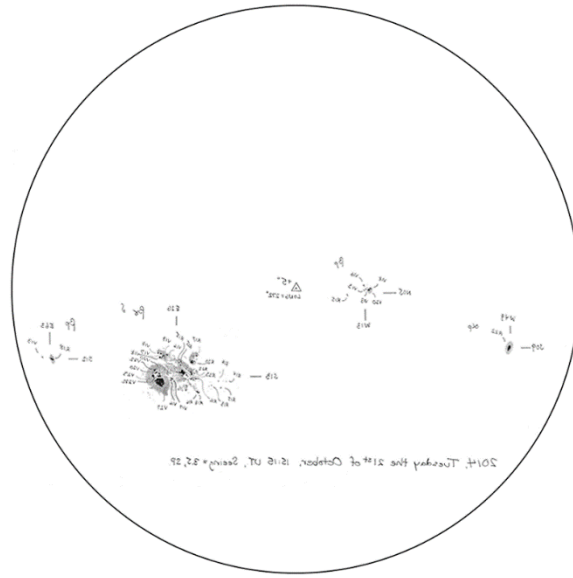
harim@khu.ac.kr

Model



Isola et al. (2017) suggested a general-purpose solution to resolve image-to-image translation problems using **conditional GANs**.

Purpose



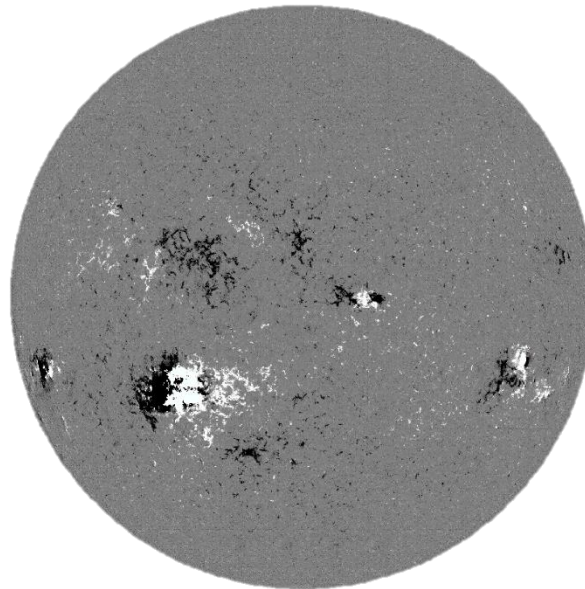
Sunspot Drawing

1600

1800

2000

**Space
Weather
Quantities**



Magnetogram

1900

2000

Purpose

1612
Galileo Sunspot

Sunspot Drawing

1600

1800

2000

1859
Carrington Sunspot

Magnetogram

1900

2000

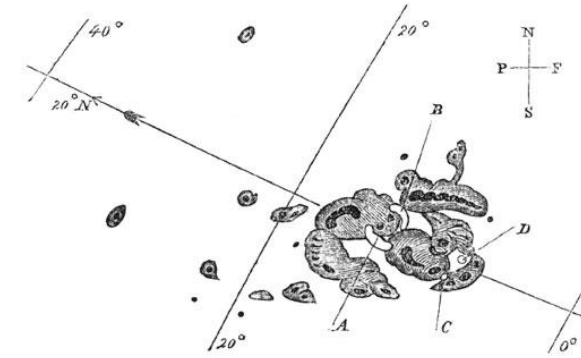
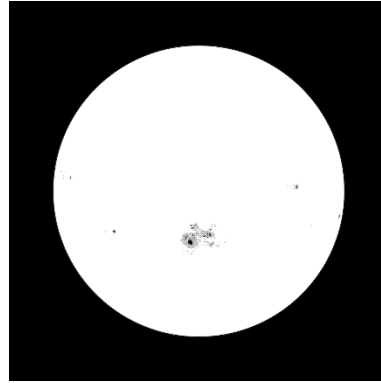
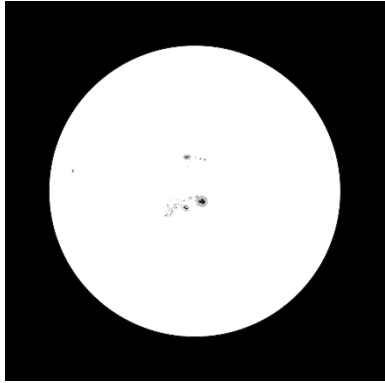
Data

Training

Test

Generation

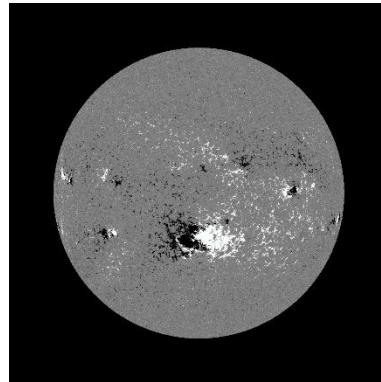
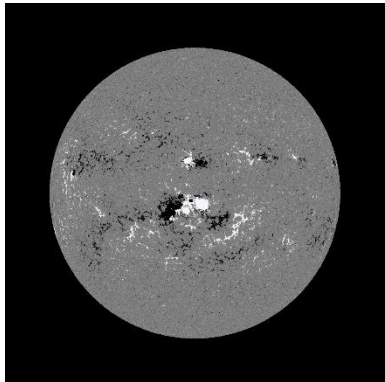
Input
[1024x1024]



Sunspot drawing from Mount Wilson Observatory

Carrington sunspot drawing

Output
[1024x1024]



SDO/HMI magnetogram

AI-generated

AI-generated

Training (700)

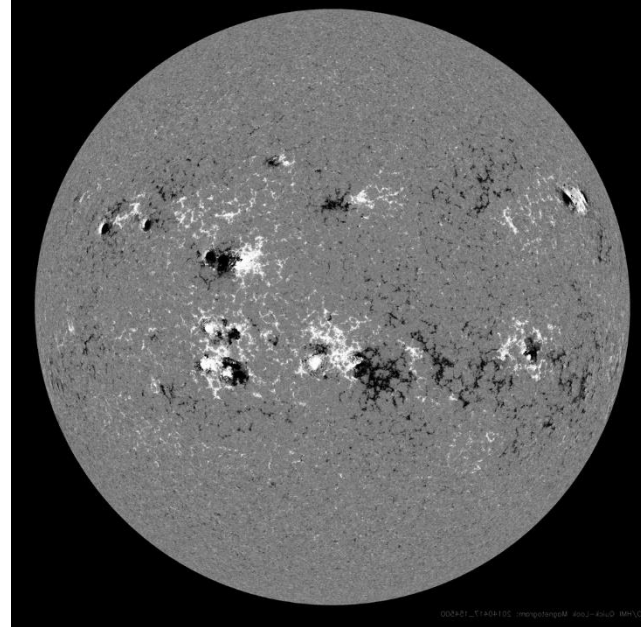
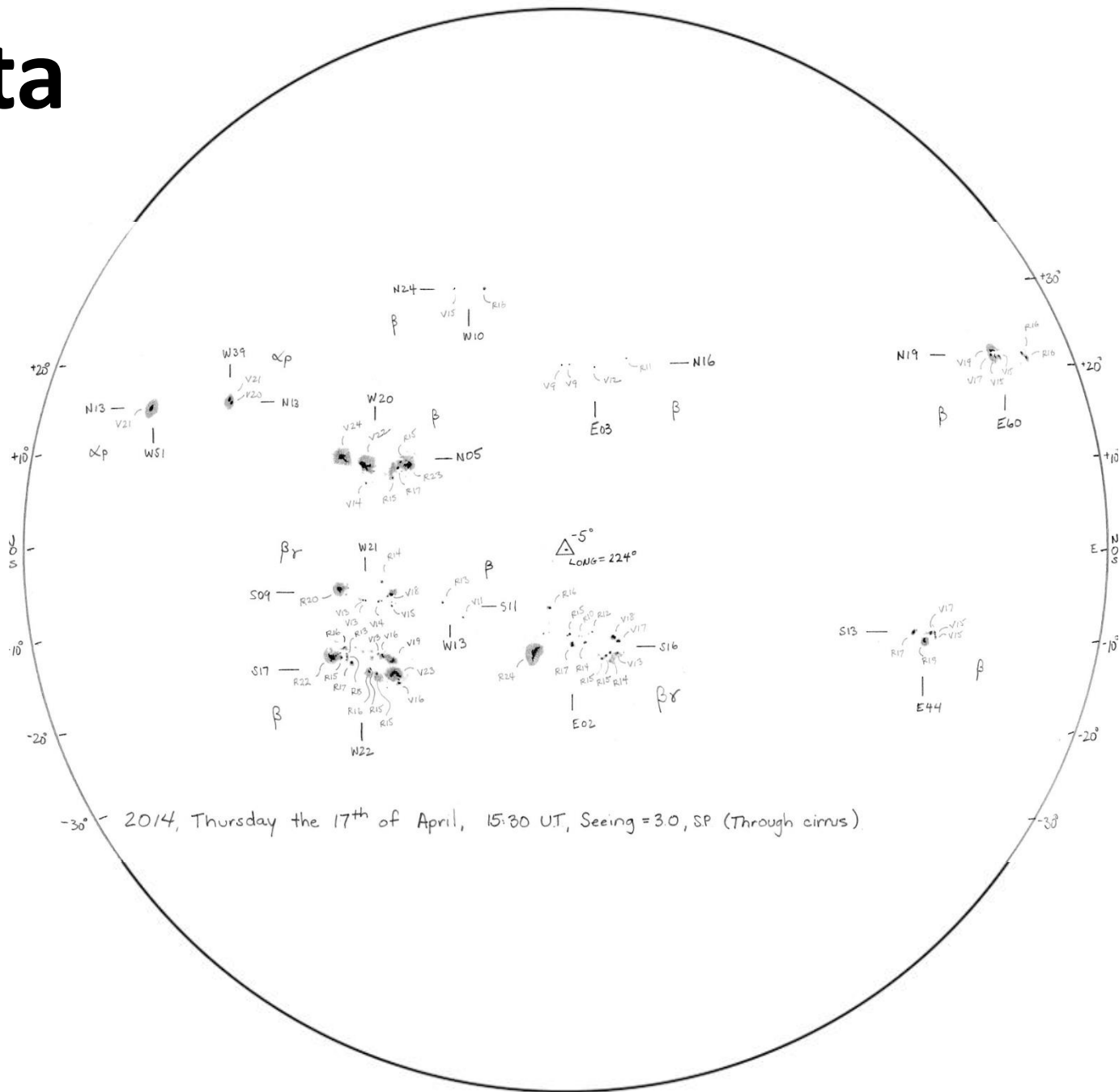
2012.01.01 ~ 2014.09.14

Test (93)

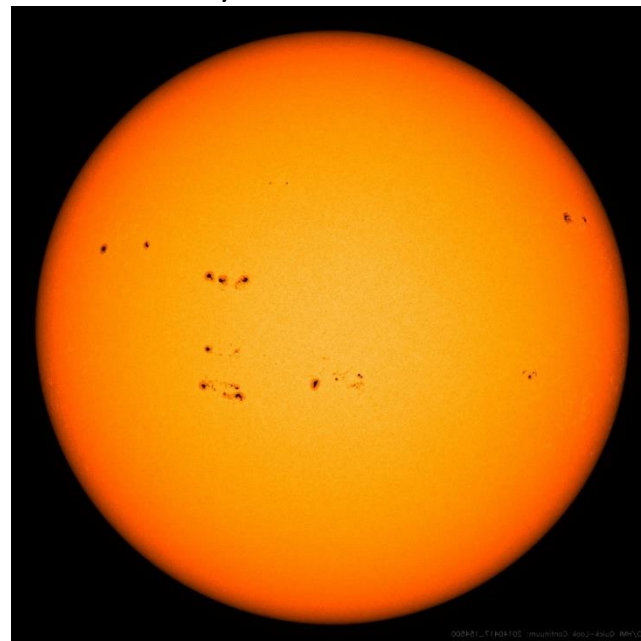
2014.09.15 ~ 2014.12.31

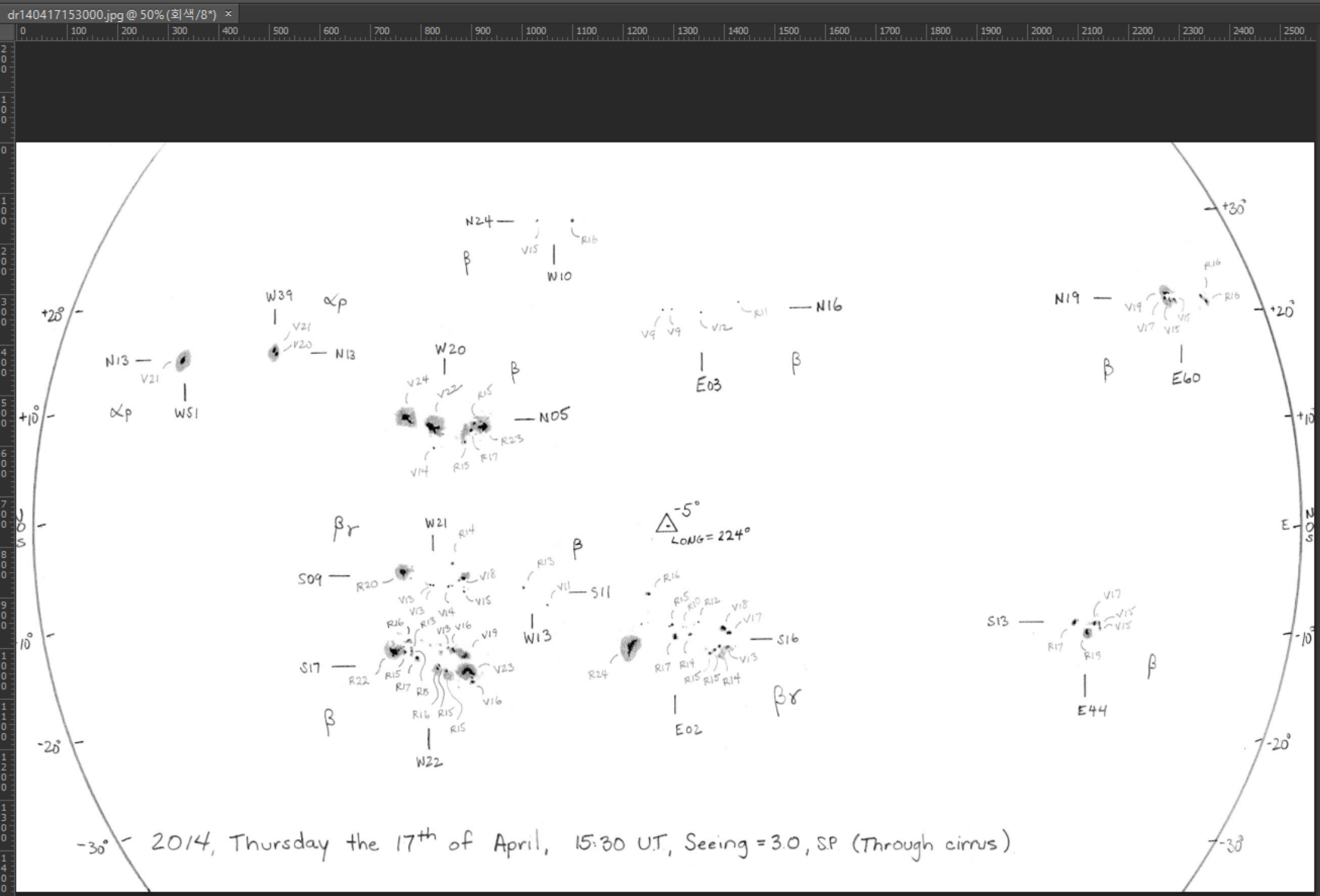
Generation

Data

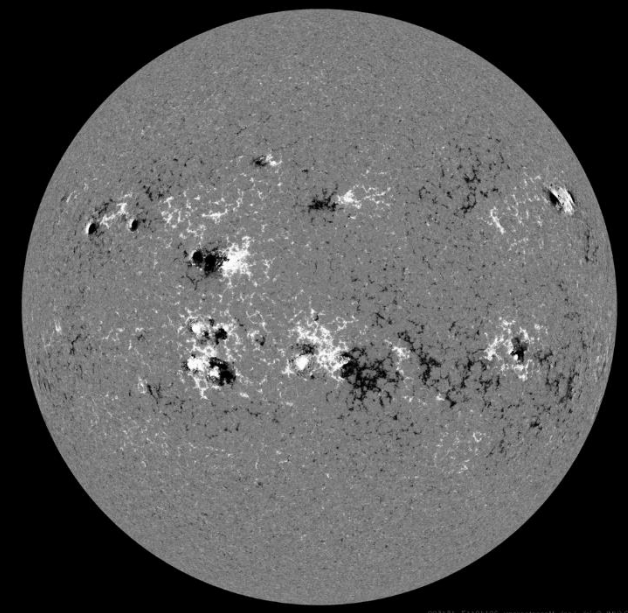


▲ SDO/HMI magnetogram
2014.04.17 15:30:00 [UT]
▼ SDO/HMI Continuum

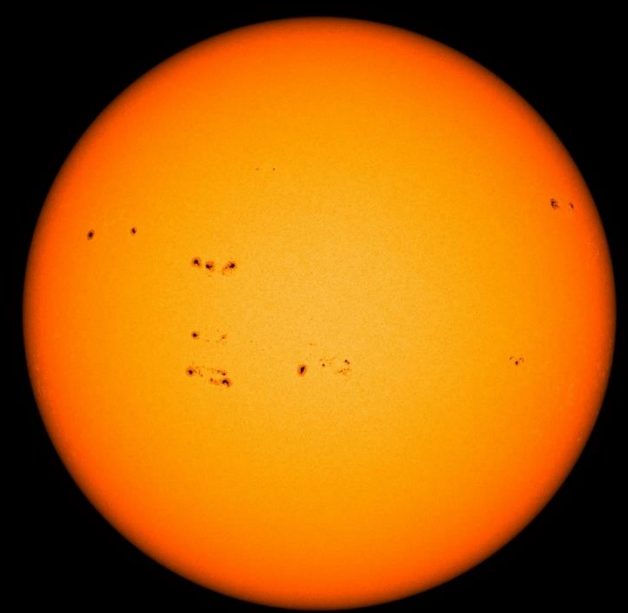




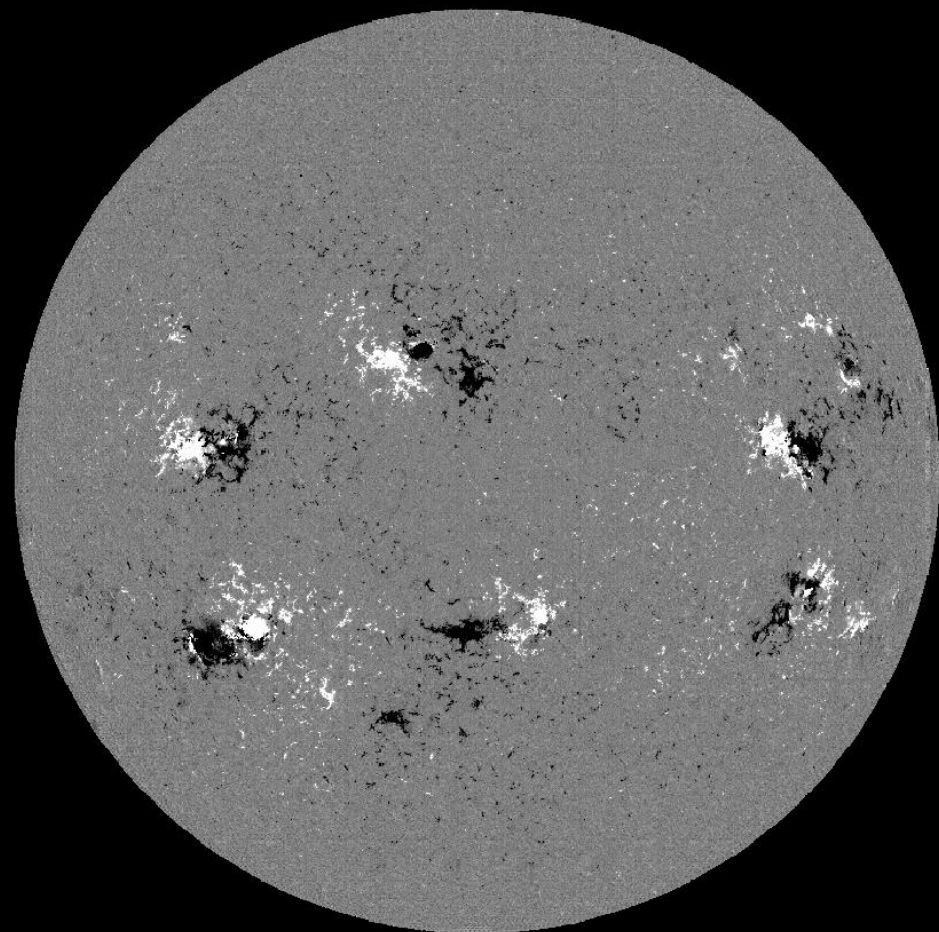
-30 - 2014, Thursday the 17th of April, 15:30 UT, Seeing = 3.0, SP (Through cirrus)



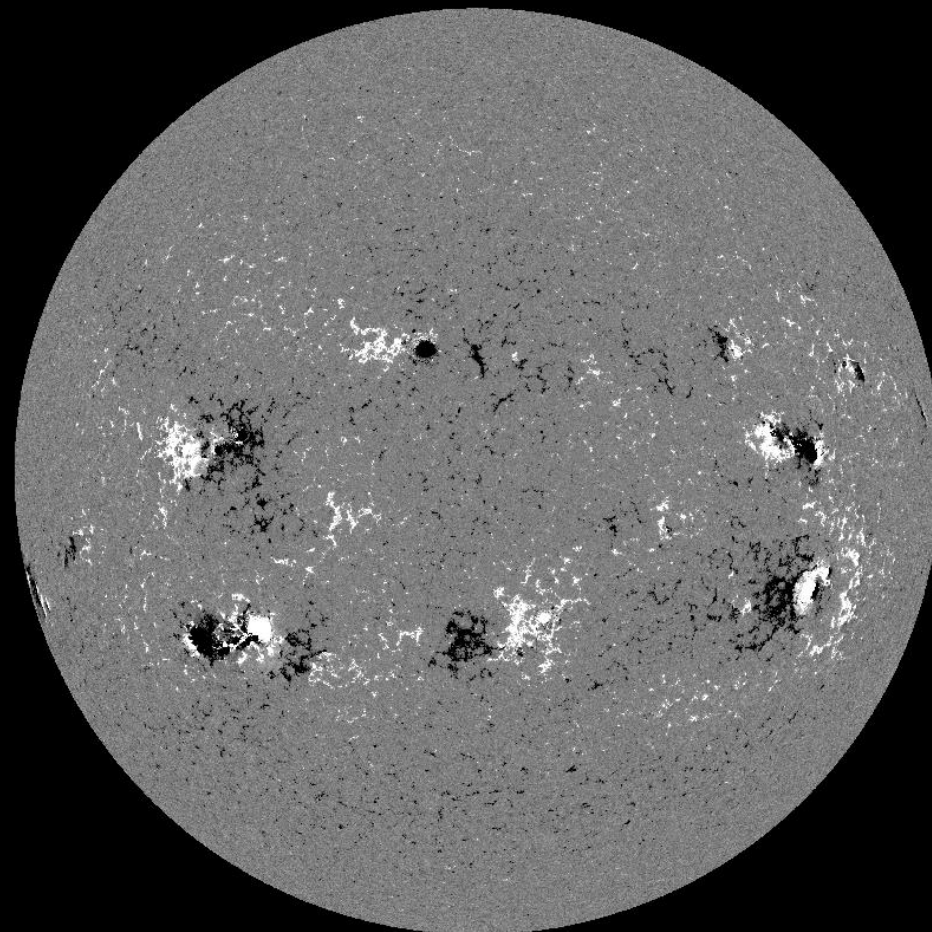
<input checked="" type="checkbox"/>	확대 0.5%	F3
<input checked="" type="checkbox"/>	축소 0.5%	F4
<input checked="" type="checkbox"/>	클리핑마스크	F5
<input checked="" type="checkbox"/>	클리핑마스크적용	F6
<input checked="" type="checkbox"/>	반전 png 저장	F7
<input type="checkbox"/>	저장	



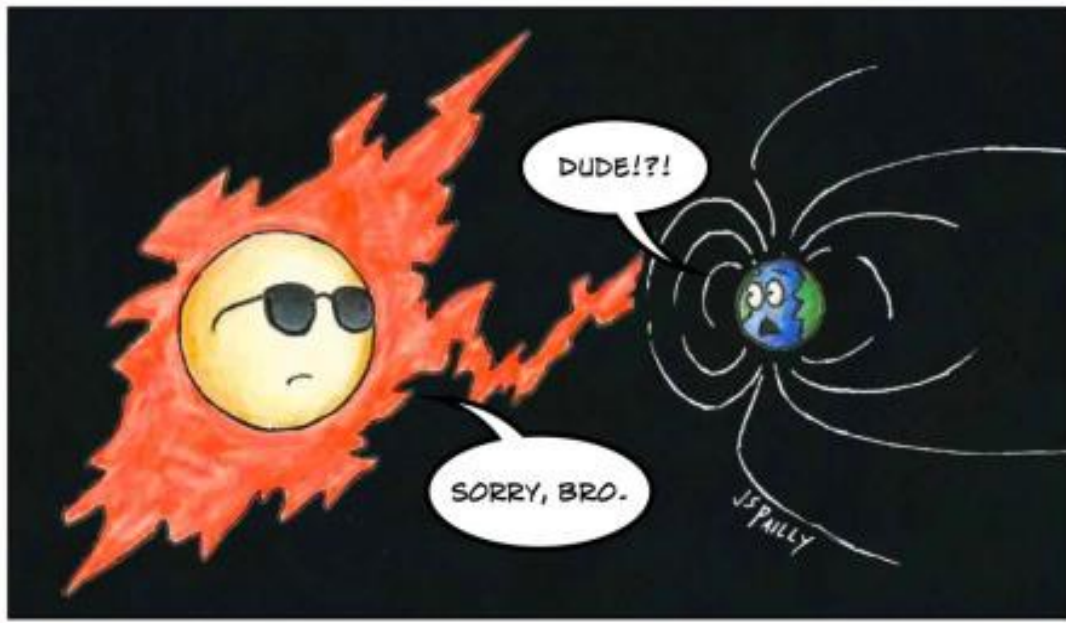
Test: 2014.11.29 17:45:00 [UT]



AI-generated magnetogram



SDO/HMI magnetogram



1600

1800

2000

1859
Carrington Sunspot

New York Times 1859

The Auroral Display in Boston.

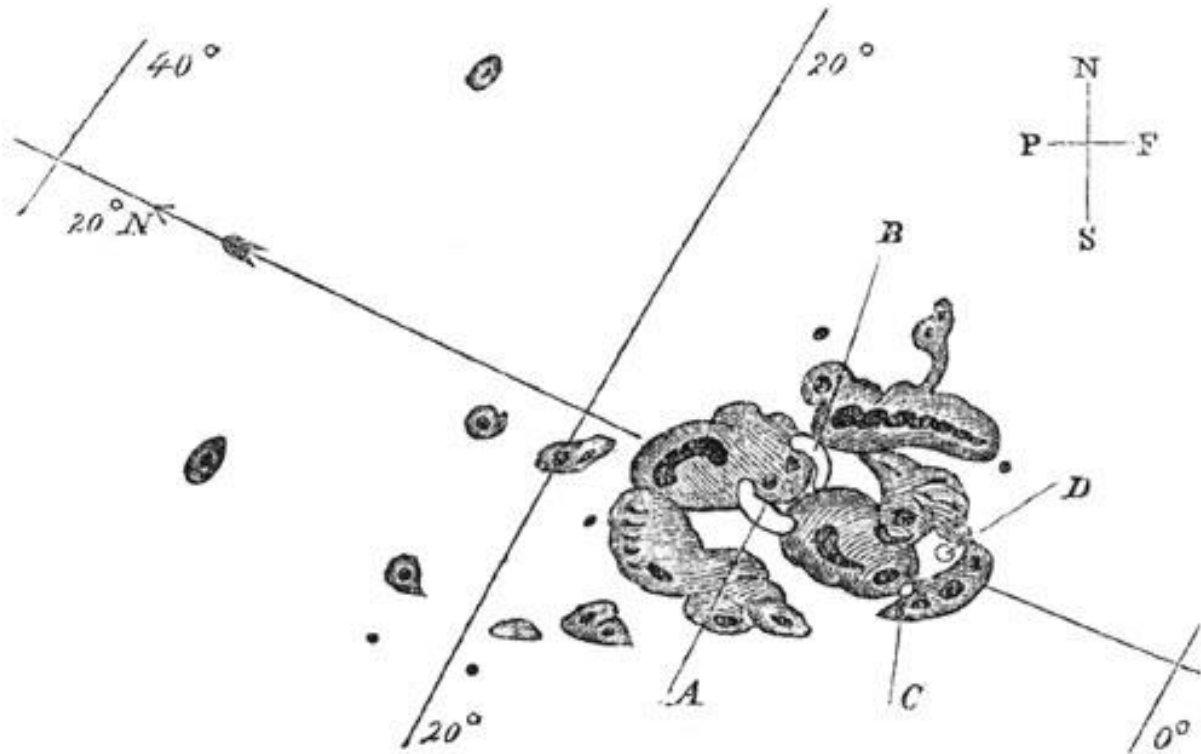
Boston, Friday, Sept. 2.

There was another display of the Aurora last night, so brilliant that at about one o'clock ordinary print could be read by the light. The effect continued through this forenoon, considerably affecting the working of the telegraph lines. The auroral currents from east to west were so regular that the operators on the Eastern lines were able to hold communication and transmit messages over the line between this city and Portland, the usual batteries being discontinued from the wire. The same effects were exhibited upon the Cape Cod and other lines.

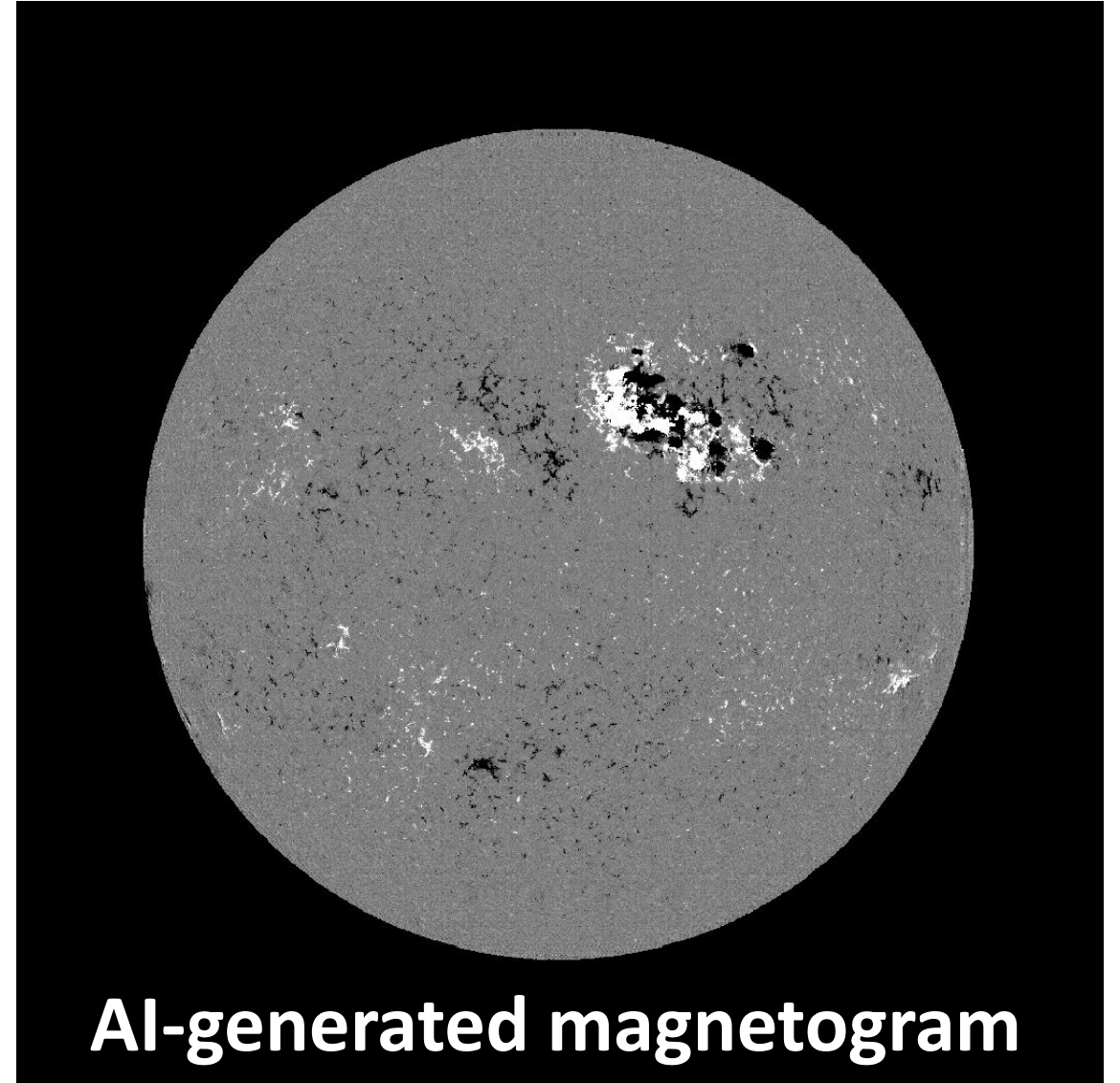
The New York Times

Published: September 3, 1859
Copyright © The New York Times

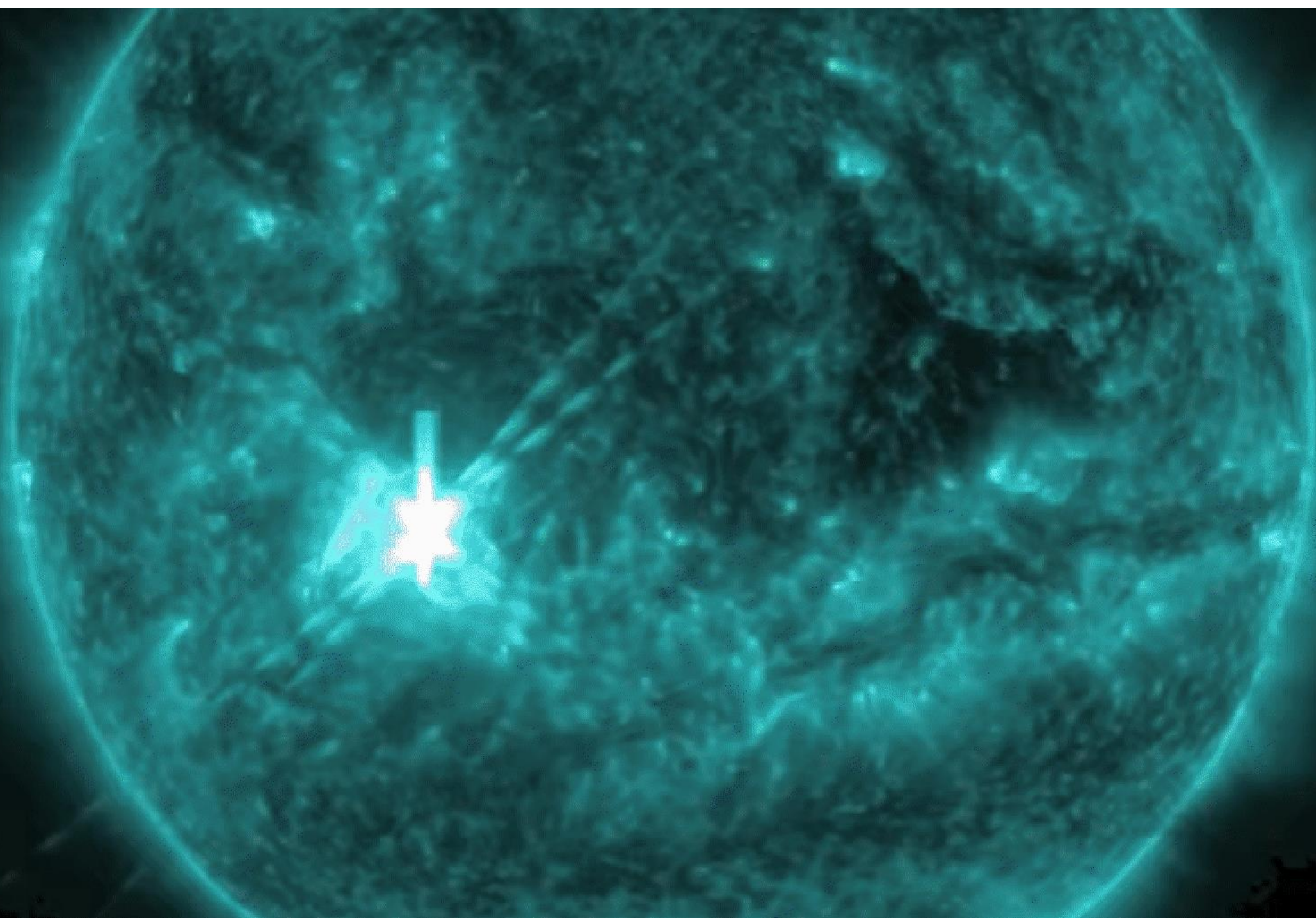
Generation: the Carrington sunspot!

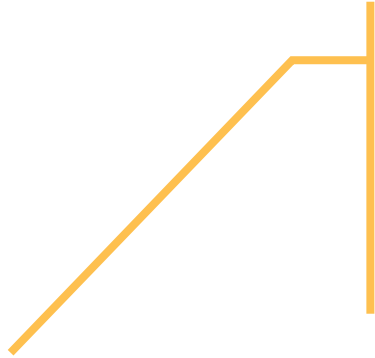


Carrington sunspot in 1859



AI-generated magnetogram





1612 Galileo Sunspot



1600

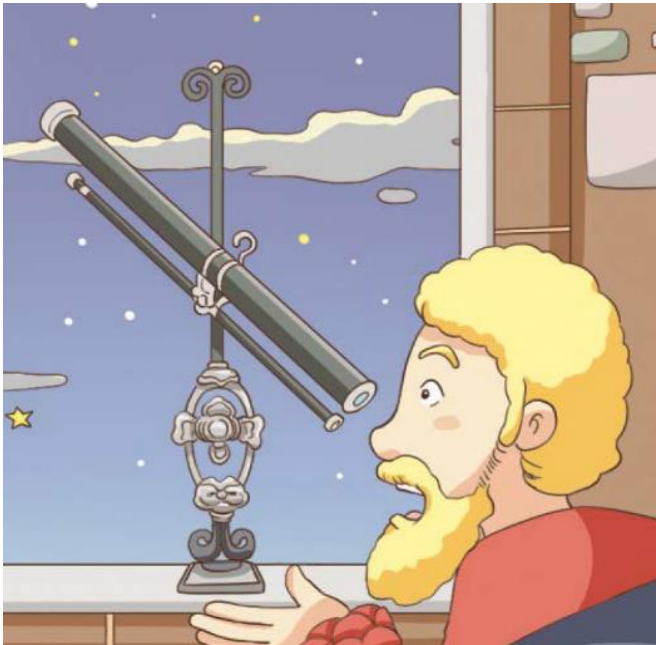
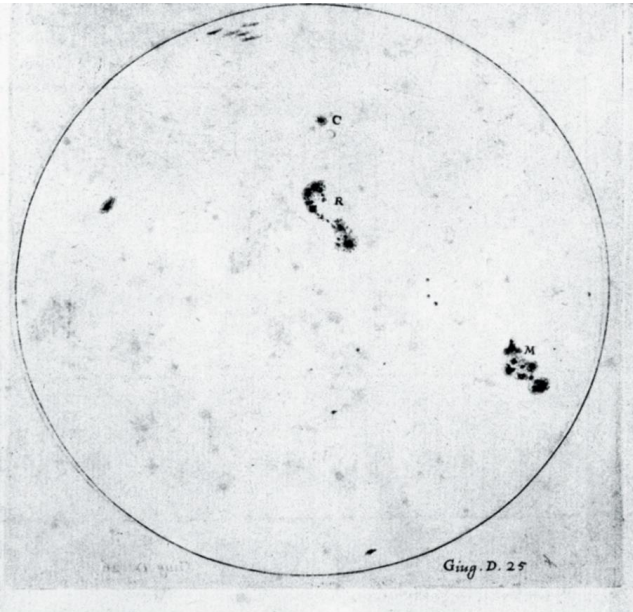
1800

2000

Galileo was drawing sunspots as early as 1613.

400 YEARS COUNTING SPOTS

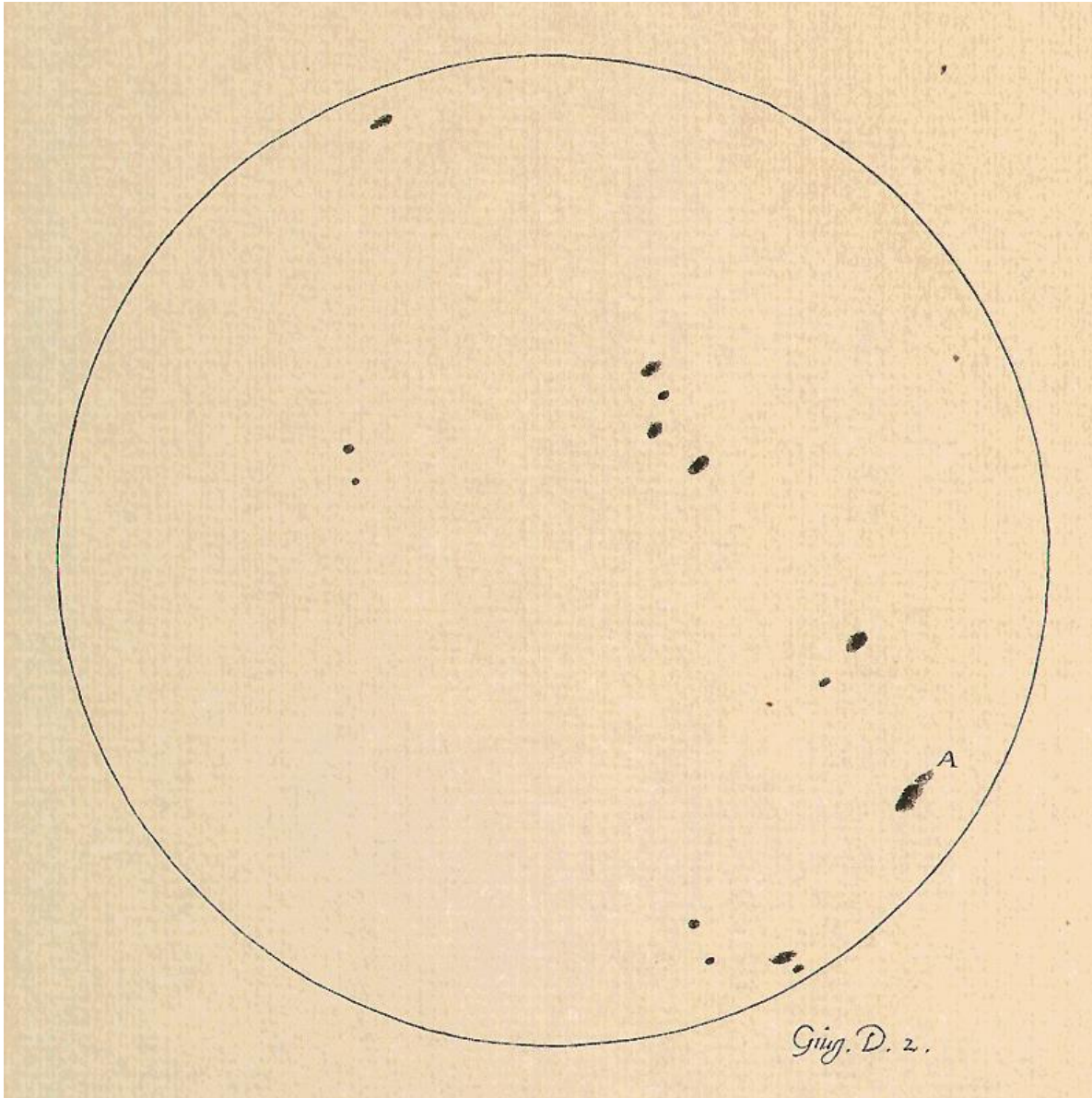
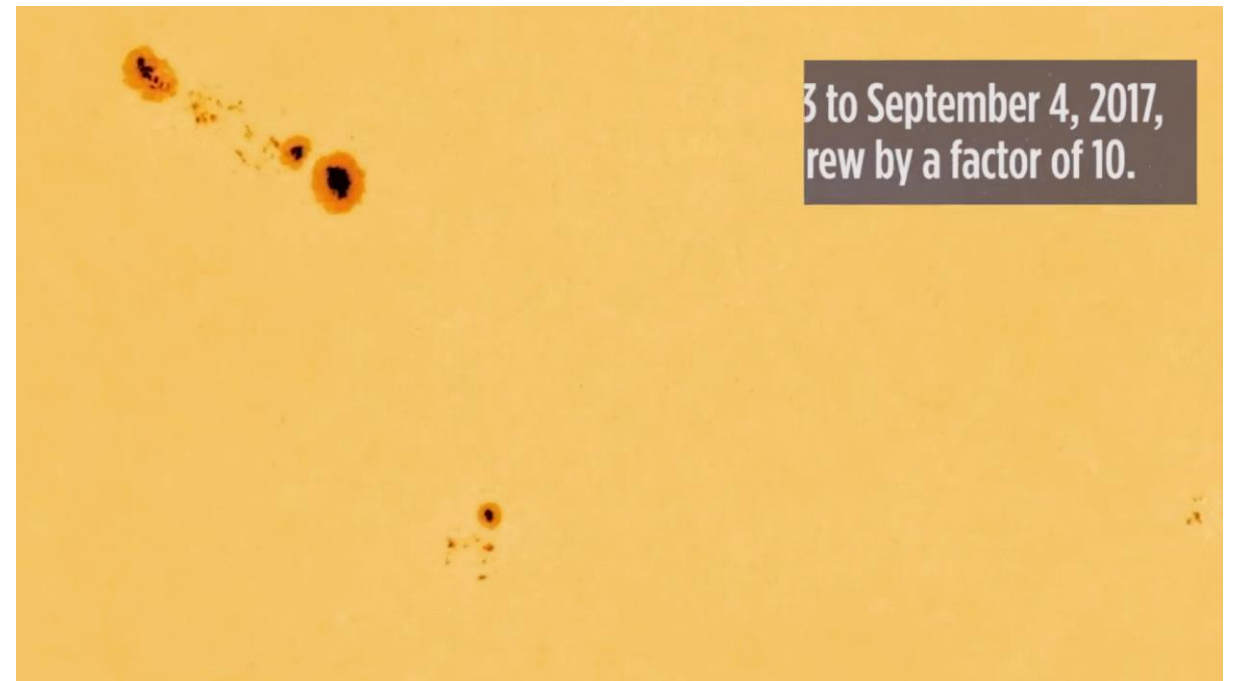
SLOW SCIENCE



Active

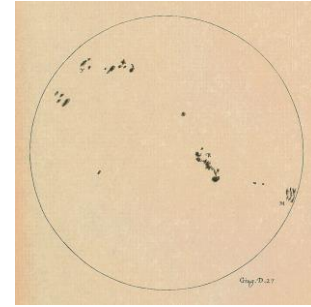
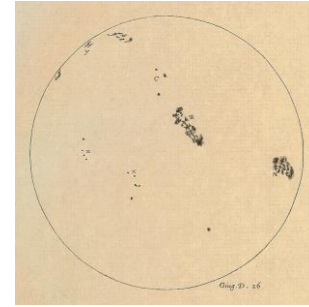
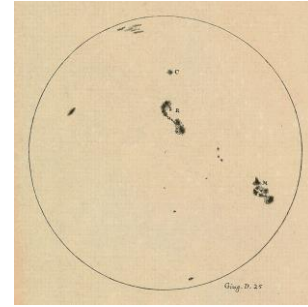
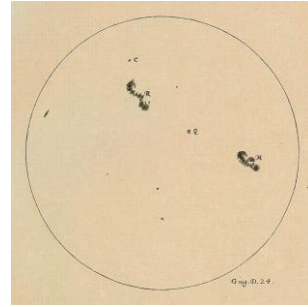
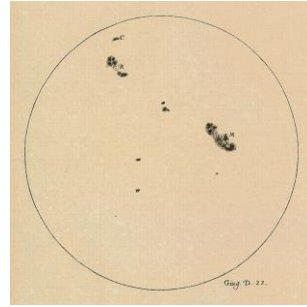
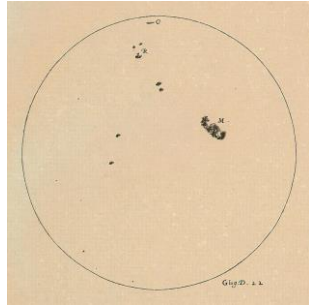
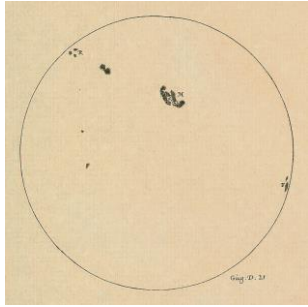
Rotate

▼ SDO/HMI 2017.09.03 – 2017.09.07

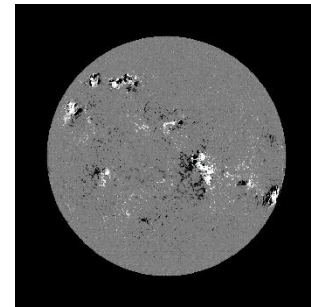
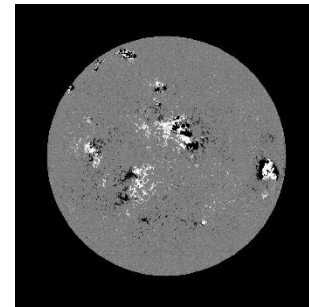
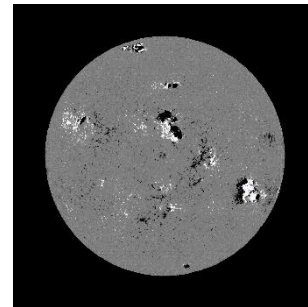
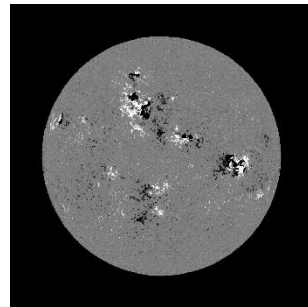
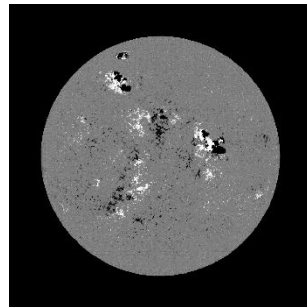
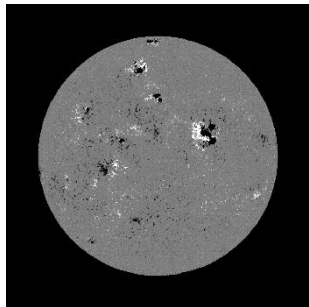
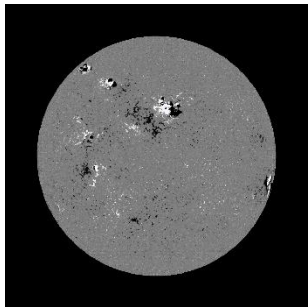


▲ Galileo sunspot drawing 1613.06.02 - 1613.07.08

Generation



Galileo sunspot drawing 1613.06.02 - 1613.07.08



AI-generated Magnetogram !

1600

1800

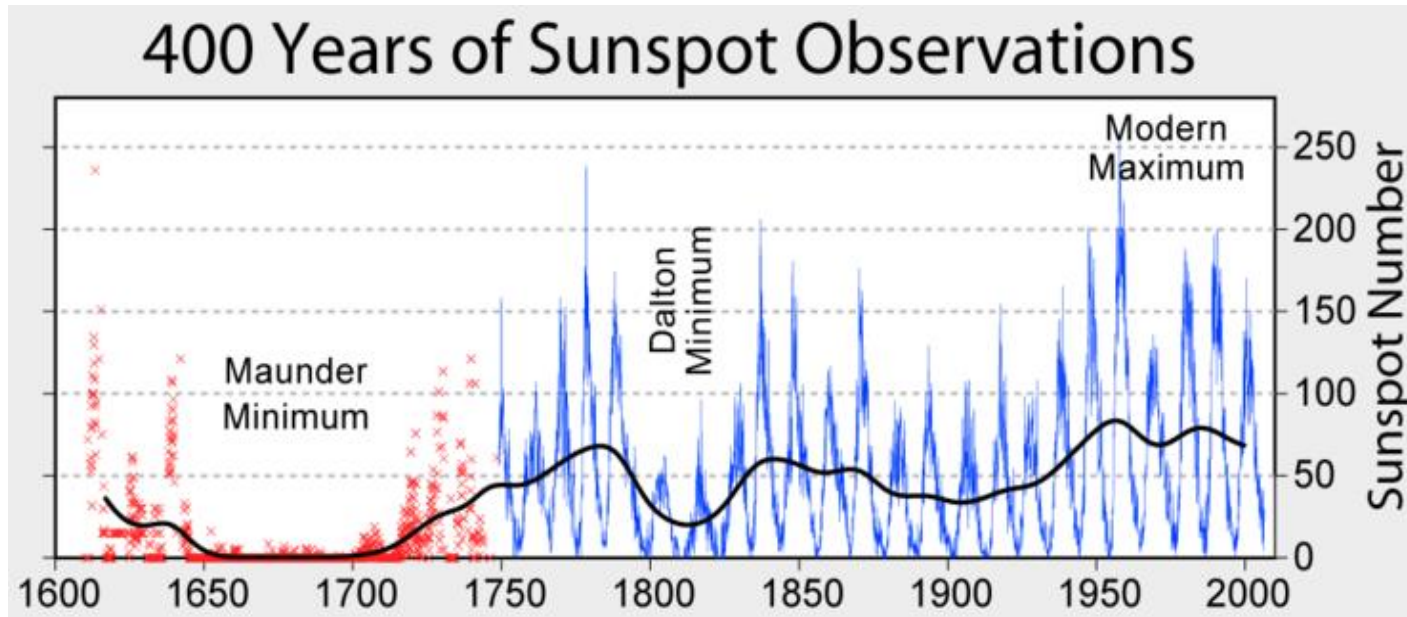
2000

Sunspot Drawing

1600

1800

2000



Magnetogram

1900

2000

THANK YOU !