SunDash - an Interactive WebApp & UI for Monitoring NASA Logged Solar Activity

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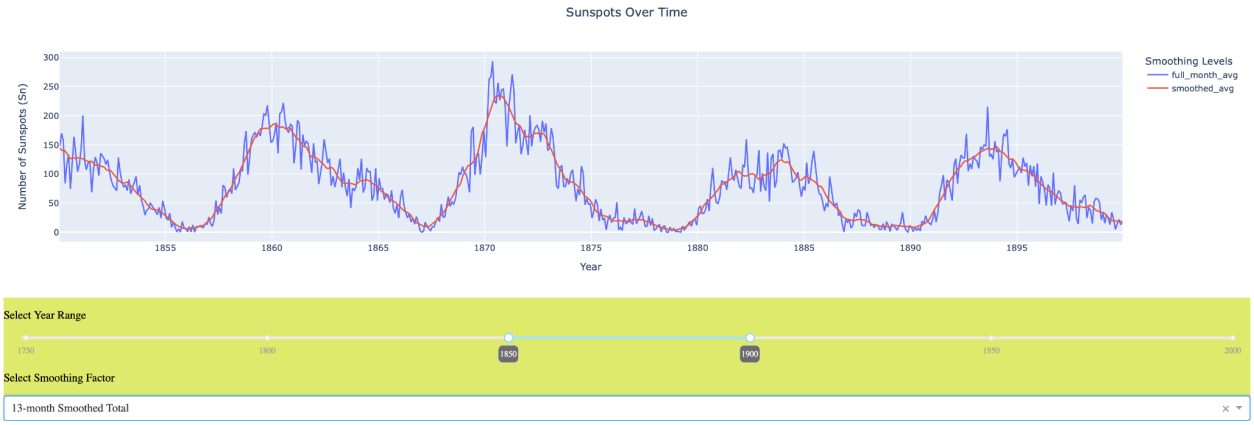
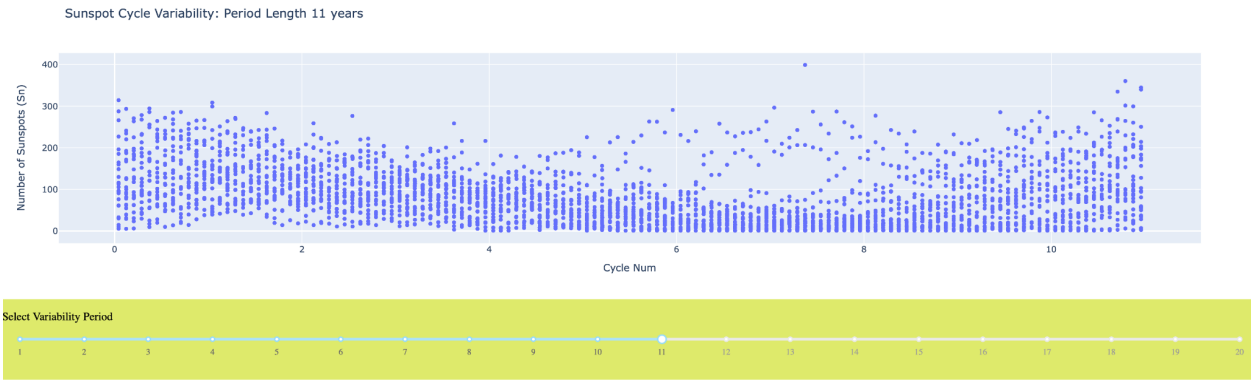
Extended Abstract

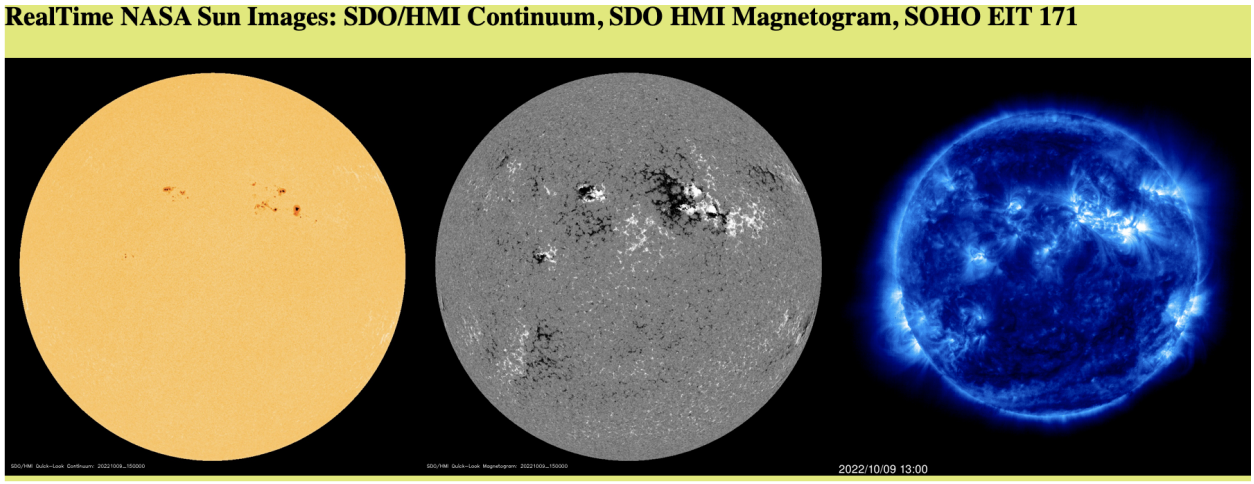
SunDash is an interactive analysis tool -- written in Python -- used to observe and extrapolate NASA solar data from the past ~250 years. Developed in Python's Dash framework, SunDash is built on top of a Flask backend and locally deployable. In principle, it displays and manipulates data of sunspot history to provide the user with a digestible tool to interpret daunting information [1]. Immediately, the user is thrown into a fairly straightforward mapping of sunspot records over time, ranging from markings in the mid-1700s all the way through the 21st century. Here, the range of average sunspot totals per month is selected with an interactive RangeSlider below the plot as well as the amount of extrapolated smoothing wished to be viewed alongside the full dataset (daily-moving-average, yearly-average, and 13-month-total average have been implemented thus far) [2]:



The next figures included in the dashboard provide the user with tools to visualize variability in sunspot cycles. Here, the dataset is divided into user-selected periods (by year), resulting in clear clustering/grouping patterns at different cycle levels:



The final element of the dashboard is linked to a real-time NASA feed of solar images. The user is faced with three different solar filter images, ranging from a simple continuum plot to an awe-inspiring magentogram [3]:



References:

[1] “Silso: World Data Center for the Production, Preservation and Dissemination of the International Sunspot Number.” *SILSO | World Data Center for the Production, Preservation and Dissemination of the International Sunspot Number*, https://www.sidc.be/silso/.

[2] “Sunspot Number: Silso.” *Sunspot Number | SILSO*, https://www.sidc.be/silso/datafiles.

[3] “The Very Latest SOHO Images.” *NASA*, NASA, https://soho.nascom.nasa.gov/data/realtime/realtime-update.html.