Kevin Reardon

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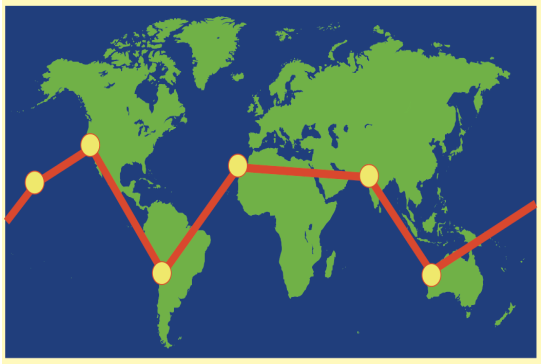
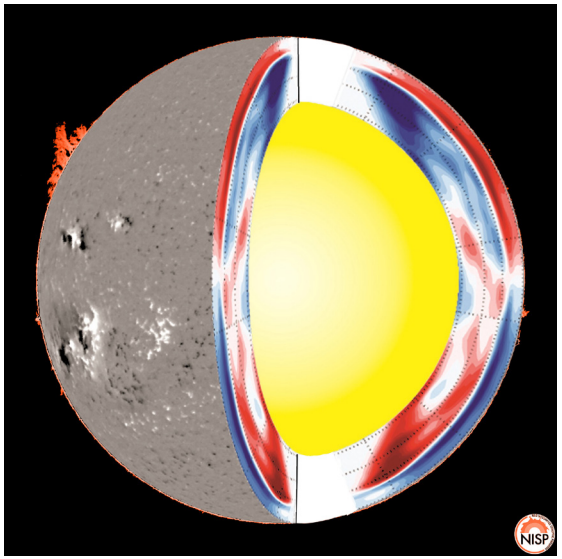
High-resolution, high-precision studies of a magnetically active stellar atmosphere

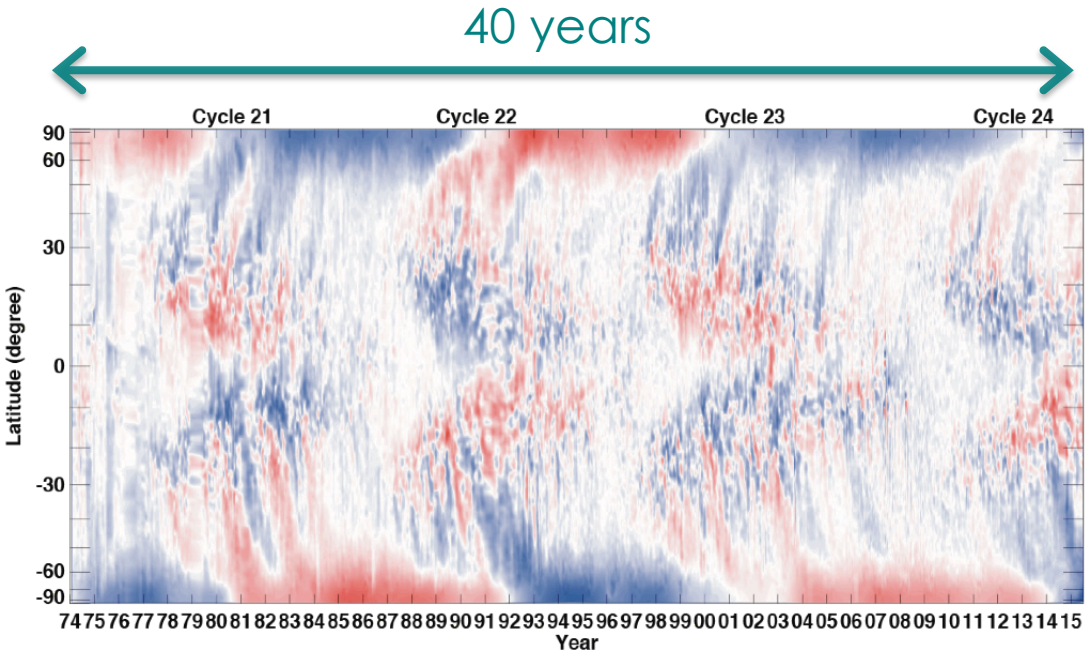
Global solar observations for helioseismology and space weather

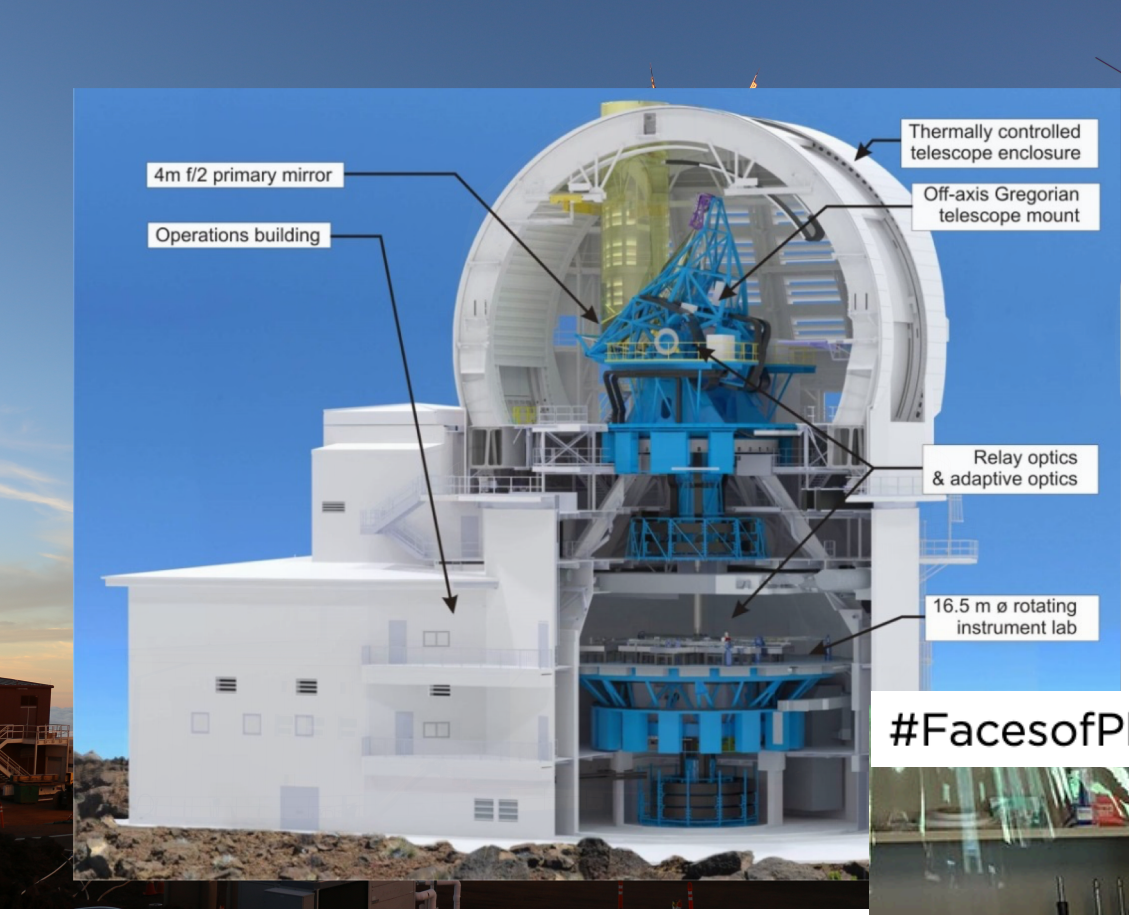
NSO Integrated Synoptic Program



- Operates network of telescopes that collect continuous observations of the whole Sun.
- Probe solar interior ➔ *stellar convection*
- Monitor and predict our space environment







DKIST

DANIEL K. INOUYE SOLAR TELESCOPE

First solar light

November 2019

On Haleakala, Maui

4-meter aperture

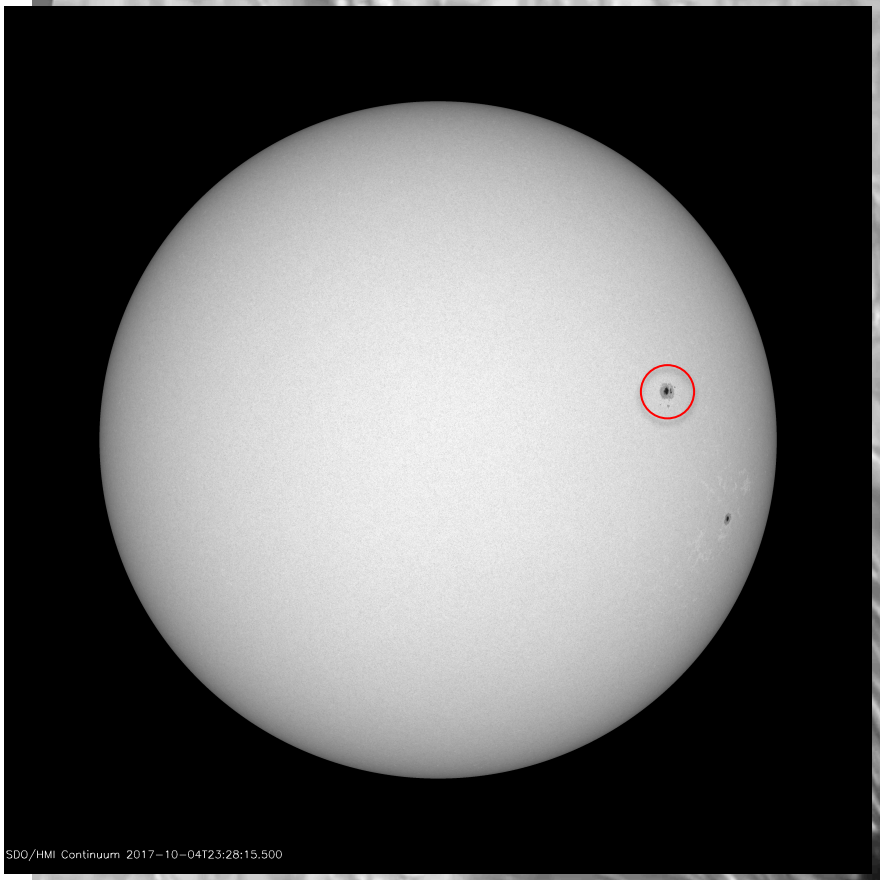
12 kW heat load

25 km spatial resolution

1 second temporal resolution

<10^{-4} spectropolarimetry

#FacesofPhotonics: Stargazer Stacey Sueoka



43'' = 31 Mm

Research Opportunities

20 Scientists located in Boulder and Maui

- *Analysis of dynamic motions in chromosphere (Reardon)*
- *Absolute wavelength calibration tools (Pillet / Reardon)*
- *Solar-cycle changes in temperature of solar atmosphere (Milic)*
- *Comparison of synthetic and observed hi-res spectral profiles to determine contribution to solar irradiance variations (Criscuoli)*
- *Unraveling the Dynamics of the Solar Interior (Tripathy)*
- *Development of Python tools for big data manipulation and visualization (various)*
- *And more!*

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Research Background and Interests

Paid, independent study, honors thesis?

Programming languages (IDL? Python?)

There is a general consensus that irradiance variability is (predominantly) caused by changes of surface magnetism

– but on what spatial scales?

Mentor: Serena Criscuoli

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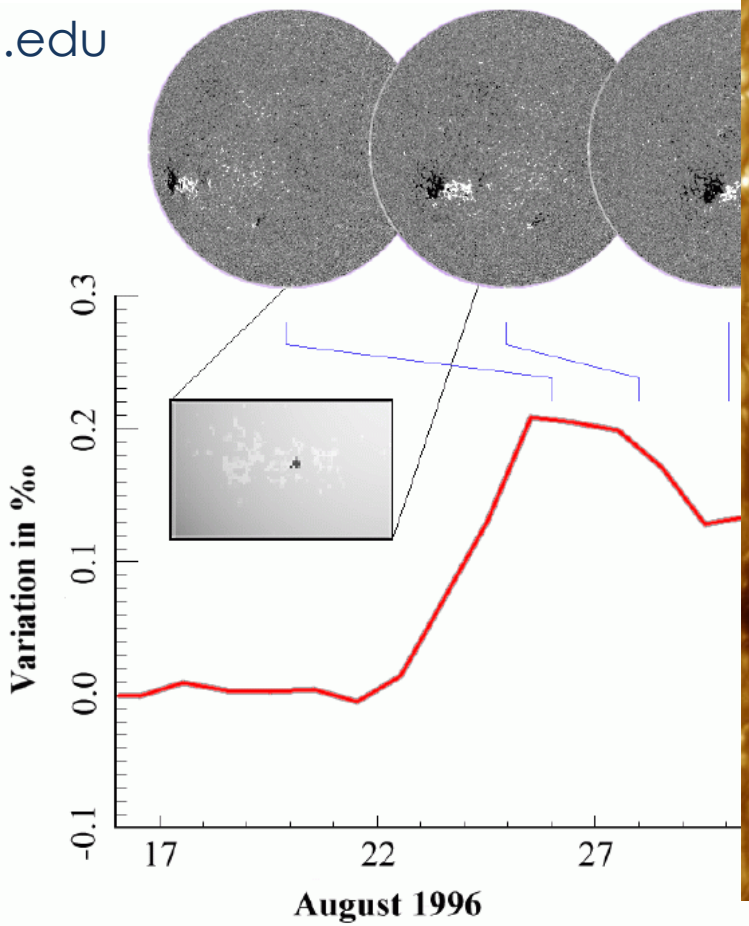
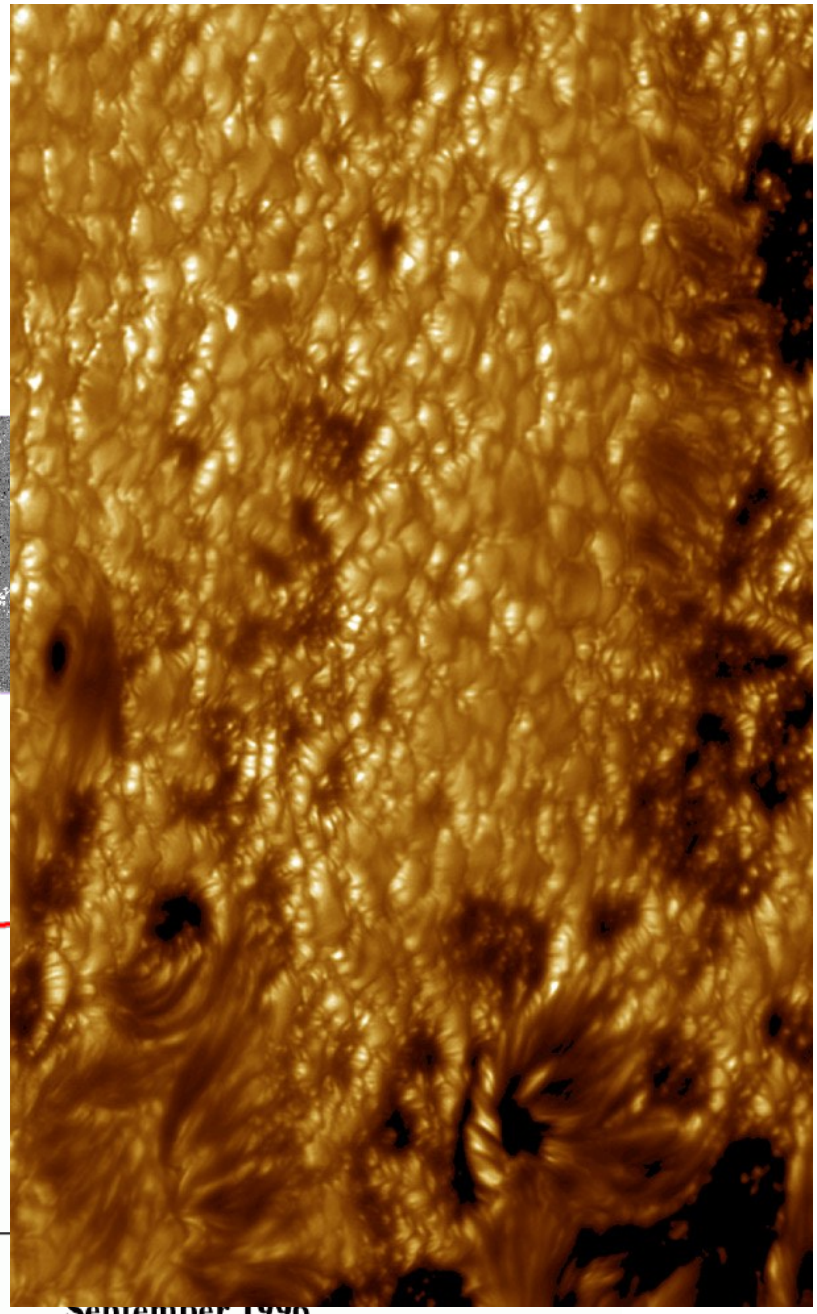


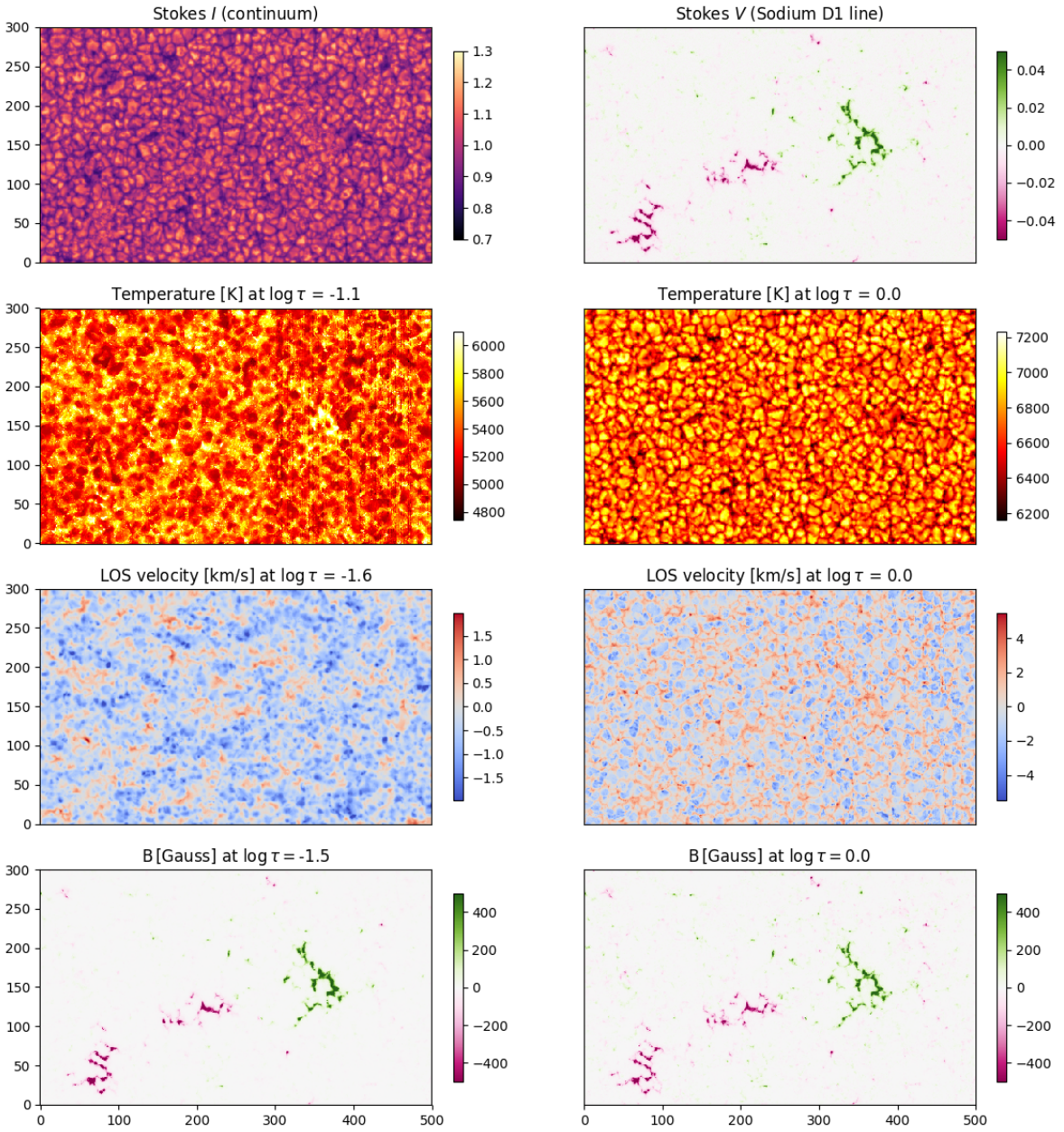


A long-term study of the solar atmospheric structure

Mentor: Ivan Milic

Ivan.Milic@colorado.edu

Goal: Perform detailed spectropolarimetric inference and analyze the differences in the quiet Sun atmosphere between solar maximum and minimum.



Unraveling the Dynamics of the Solar Interior

Mentor: S.C. Tripathy
stripathy@nso.edu

The goal of helioseismology is to provide accurate information about the Sun's interior dynamics and structure from observations of the acoustic/sound waves at the solar surface. The major physical quantities of interest are the internal rotation, magnetic field, subsurface flows and structure. It is believed that the knowledge about the subsurface structure is important to constrain the sunspot models and dynamo process in the interior since currently this is the only way to look inside the Sun. However, inferring information about the interior magnetic field and associated structure is complicated since the signals that are used to infer these properties are presumably contaminated by the magnetic field. In this context, our goal is to understand the interaction between the observed acoustic waves and the magnetic field using both numerical simulations and observational data. This will also help us to understand the origin of Sun's activity cycle.