Session Organizers:
Irina Kitiashvili, Michael J. Thompson, Mausumi Dikpati, Todd Hoeksema, Ricky Egeland
Part 1: Travis Metcalfe
“The Disappearance of Sun-Like Activity Cycles”

Spindown stops at critical Rossby

van Saders et al. (2016, Nature)
Slower rotators absent or undetected

McQuillan et al. (2014); van Saders et al. (2017, in prep)
Part 1: Travis Metcalfe
“The Disappearance of Sun-Like Activity Cycles”

Activity cycles grow longer, disappear

Metcalfe & van Saders (2017, submitted)
Part 1
“The Disappearance of Sun-Like Activity Cycles”
Discussion

• Understanding the stellar observations
• Ideas for future observational tests
  • Current solar angular momentum loss (hard)
  • Stellar differential rotation at low rotation/activity. Anti-solar?
  • Stellar wind / planet interaction in radio as mass loss constraint
  • CME vs. wind dominated mass loss over time; extension to angular momentum loss
• Impact on understanding of dynamo models
  • If Sun in transition, is there something special about solar parameter regime in models?
  • Modeling trends found in stellar observations
Part 2: Lisa Upton
“The Solar Puzzle: Connecting the Pieces”

New Sunspot Cycle Data

- What is the “REAL” Sunspot Cycle?
- Is the Modern Maximum Unique?
- What did the Maunder Minimum really look like?
- Do we even know what a “normal” cycle is?

Hoyt, Schatten, Clette, Svalgaard

Deniz Ölçek -- Long-term solar activity in a 2x2d babcock-leighton model
Part 2: Lisa Upton
“The Solar Puzzle: Connecting the Pieces”

Where are Active Regions Formed?
- Do they form in the tachocline in the convection zone?
- Are they rooted or do they break off and rise to the near surface?

What does the Meridional Flow Really Look Like?
- Fisher et al. (2000)
- Brown et al. (2011)
- Zhao et al. (2013)
- Zhao et al. (2013)

What does Giant Cell Convection Really Look Like?
- Hanasoge et al. (2010)
- Hathaway et al. (2015)
- Augustson et al. (2012)
- Hathaway et al. (2013)

Dynamo Models
Observations

Andrey Maksimovich Stejko -- 3D Global Modeling of the Solar Dynamo
Hanasoge et al. (2010)
Hathaway et al. (2015)

Alexander Kosovichev -- Helioseismic Observations and Constraints on Solar and Stellar Dynamo Models

Irina N. Kittiashvili -- Realistic 3D radiative modeling of turbulent structure of moderate-mass stars and Sun

Alexander Kosovichev -- Helioseismic Observations and Constraints on Solar and Stellar Dynamo Models
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Cycle Prediction

Data Assimilation

Because DA has its own set of challenges:
- Variety of data types
- Variety of data quality
  - Short Duration in higher quality data
- Unknown or poorly quantified uncertainties
  - In Observations
  - In Models
- Knowing how to best combine the two
- Hesitance to “reinvent the wheel”

Irina N. Kitiashvili -- Using Data Assimilation Methods for Prediction of Solar Activity
Ilpo Virtanen -- How radial is the photospheric magnetic field?
Part 2
“The Solar Puzzle: Connecting the Pieces”
Discussion

• New sunspot number reconstructions may be warranted, but not universally accepted
• Lots of open questions on the nature of the interior
  • Active region formation
  • Meridional flow structure
  • Convective amplitudes
• … and their impact on models
• Babcock-Leighton models and cycle variability, intermittency, and sensitive response single active regions
  • See posters by D. Ölçek and M. Nagy
• Data assimilation efforts: recent advances, challenges (understanding uncertainties), funding difficulties
• Cycle prediction: how predictable are solar cycles? What predictions are operationally/scientifically useful?
Related Sessions at AGU 2017 Fall Meeting

Abstract Submission deadline is 2 August, 2017.

**SH003: Solar Cycle 24 Prediction Retrospective**
Invited Speakers: Scott McIntosh (HAO, UCAR), Andres Munjooz-Jaramillo (SWRI)
Conveners: William Dean Pesnell (NASA / GSFC), Douglas Alan Biesecker (NOAA/SWPC), Lisa Upton (HAO)

**SH004: Observations, Modeling, and Predictions of Solar Activity From the Deep Interior to the Corona**
Invited Speakers: Yuhong Fan (HAO, UCAR), Janet Luhmann (University of California, Berkeley)
Conveners: Irina Kitiashvili (NASA Ames), Mausumi Dikpati (HAO, UCAR)