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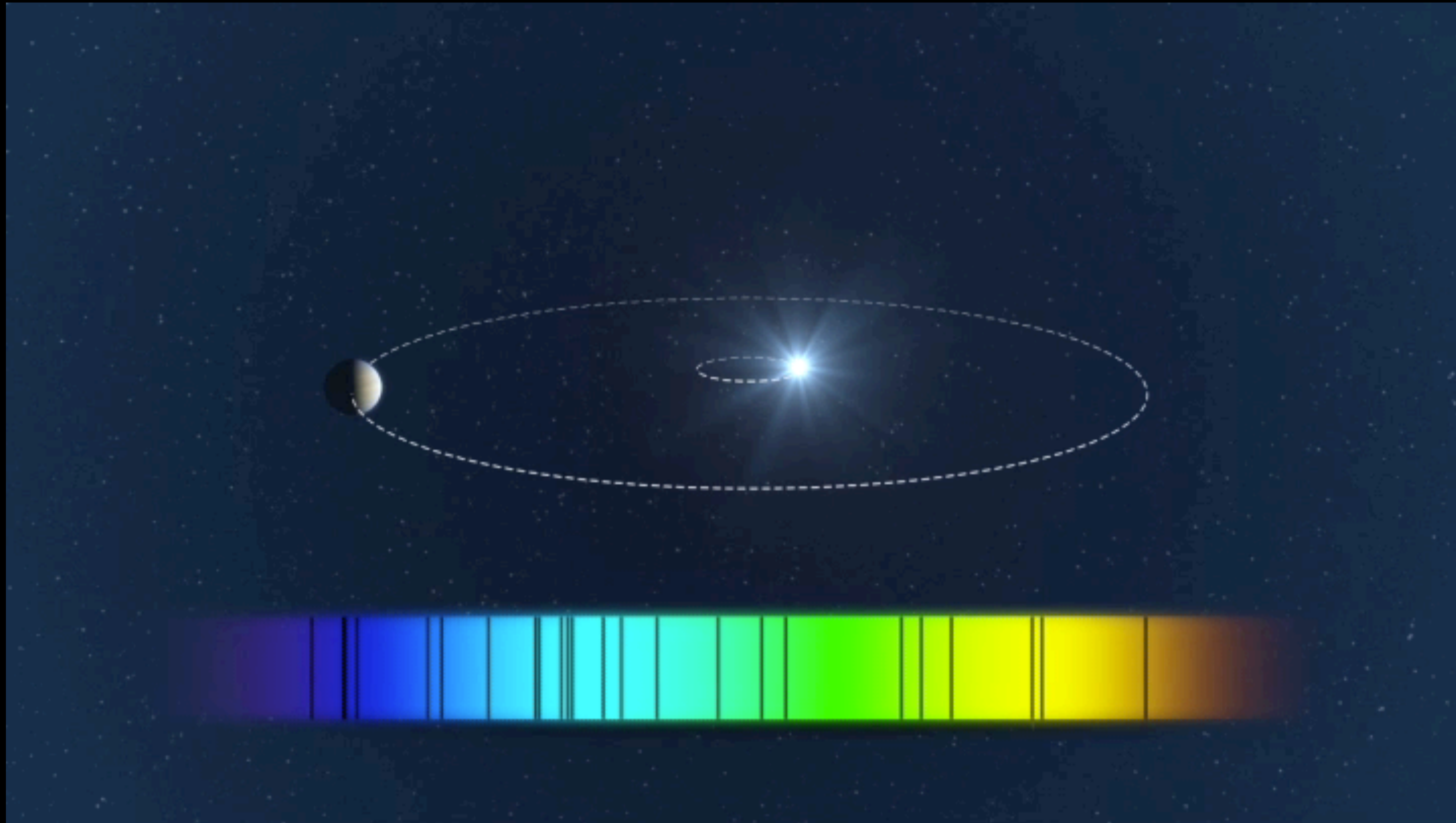
New Astrophysical Insights Into Radial Velocity Jitter



PennState

Fabienne Bastien
Jason Wright

THE RADIAL VELOCITY (RV) METHOD



RVs IN THE TRANSIT ERA

Radial velocities are crucial for transit follow-up:

- planet confirmation/rejection
- mass from RVs + radius from transit = planet densities

Between survey programs and follow-up,
RV facilities can't keep up!

RADIAL VELOCITY JITTER

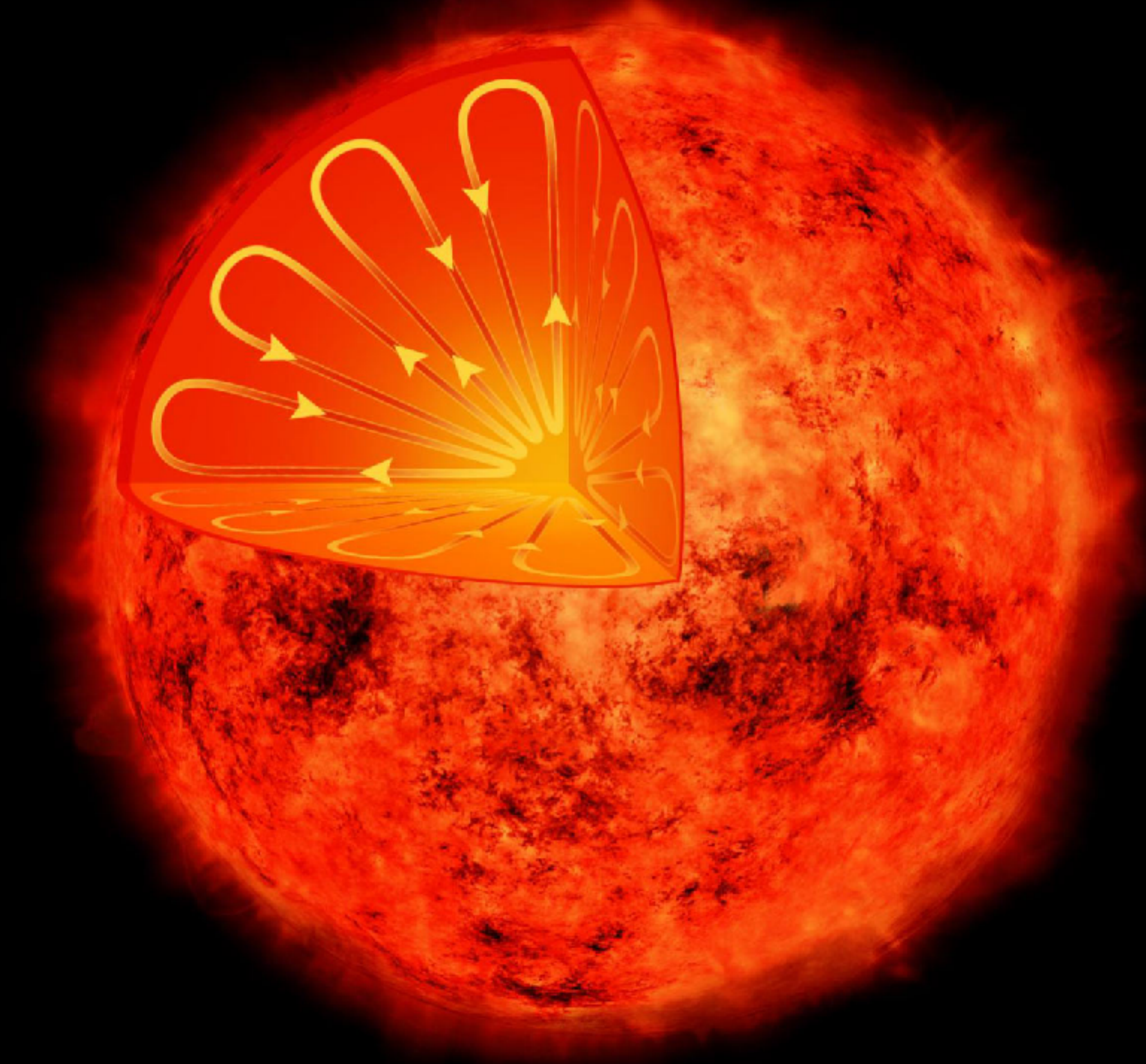
In short, RV "noise" induced by stellar variability

My exoplanet perspective is showing...

Magnetically driven

star spots

flares



Convection driven

granulation

oscillations

MORE ACTIVE STARS HAVE HIGHER RV JITTER

Saar et al. (1998)

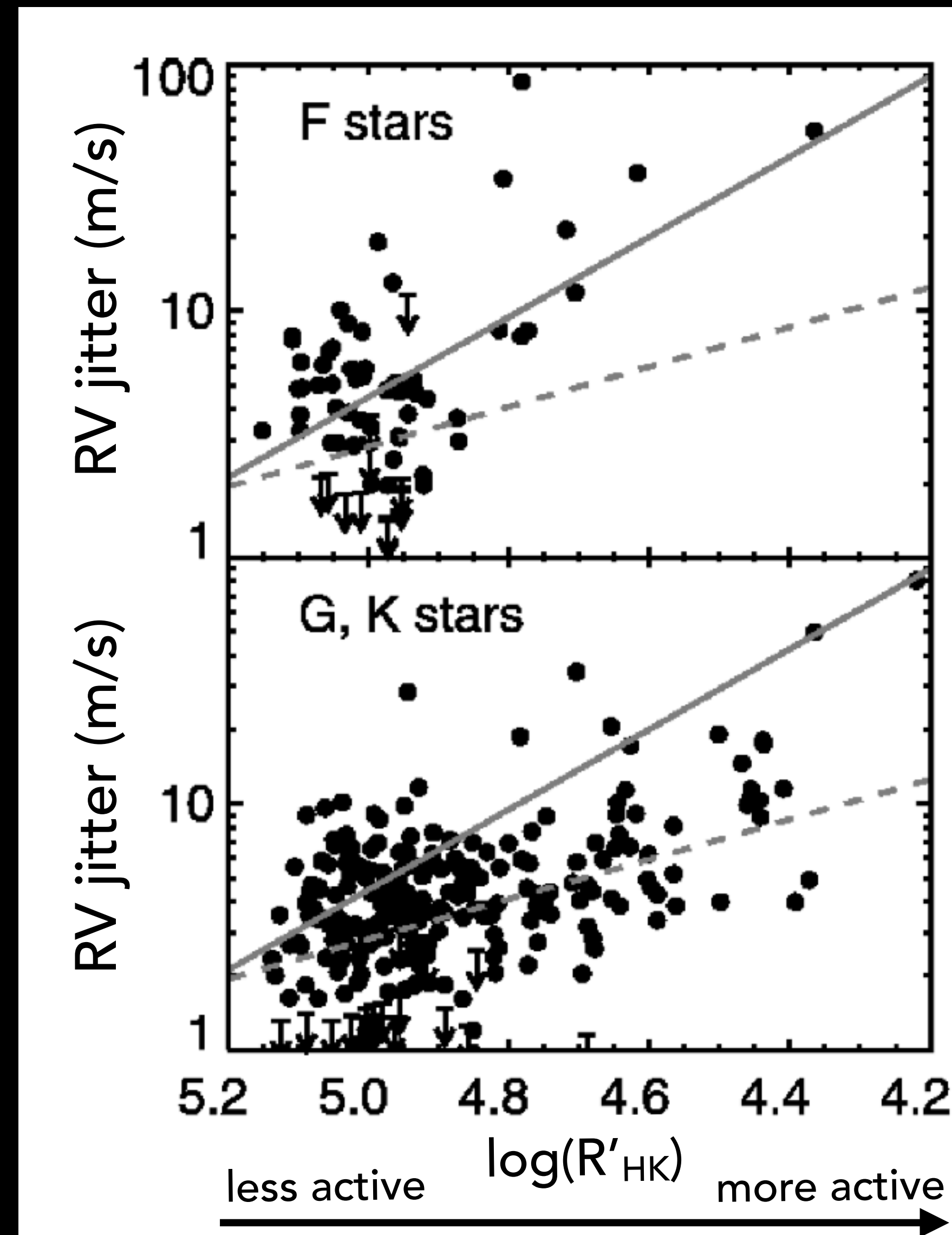
Santos et al. (2000)

Wright (2005)

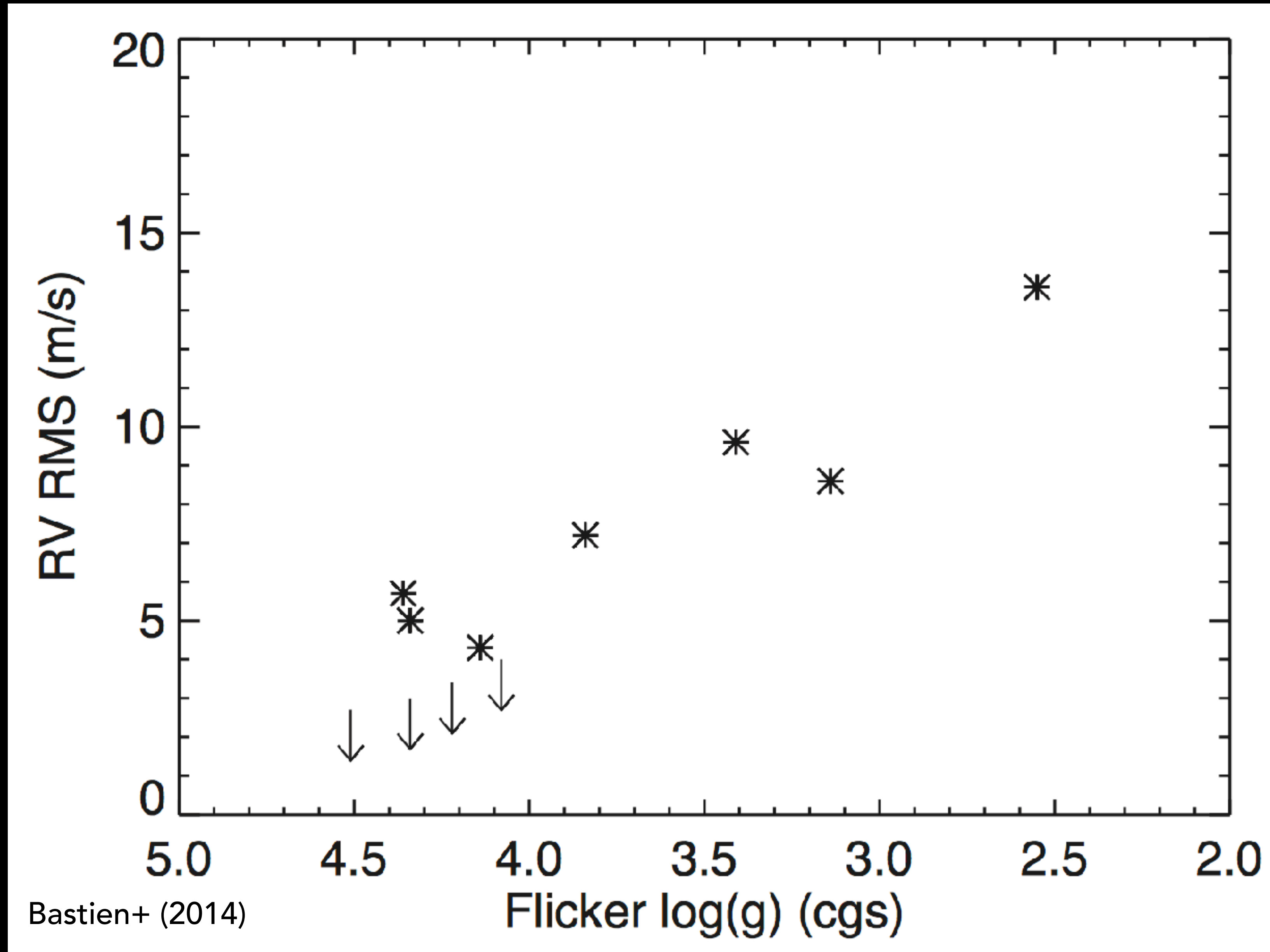
Isaacson & Fischer (2010)

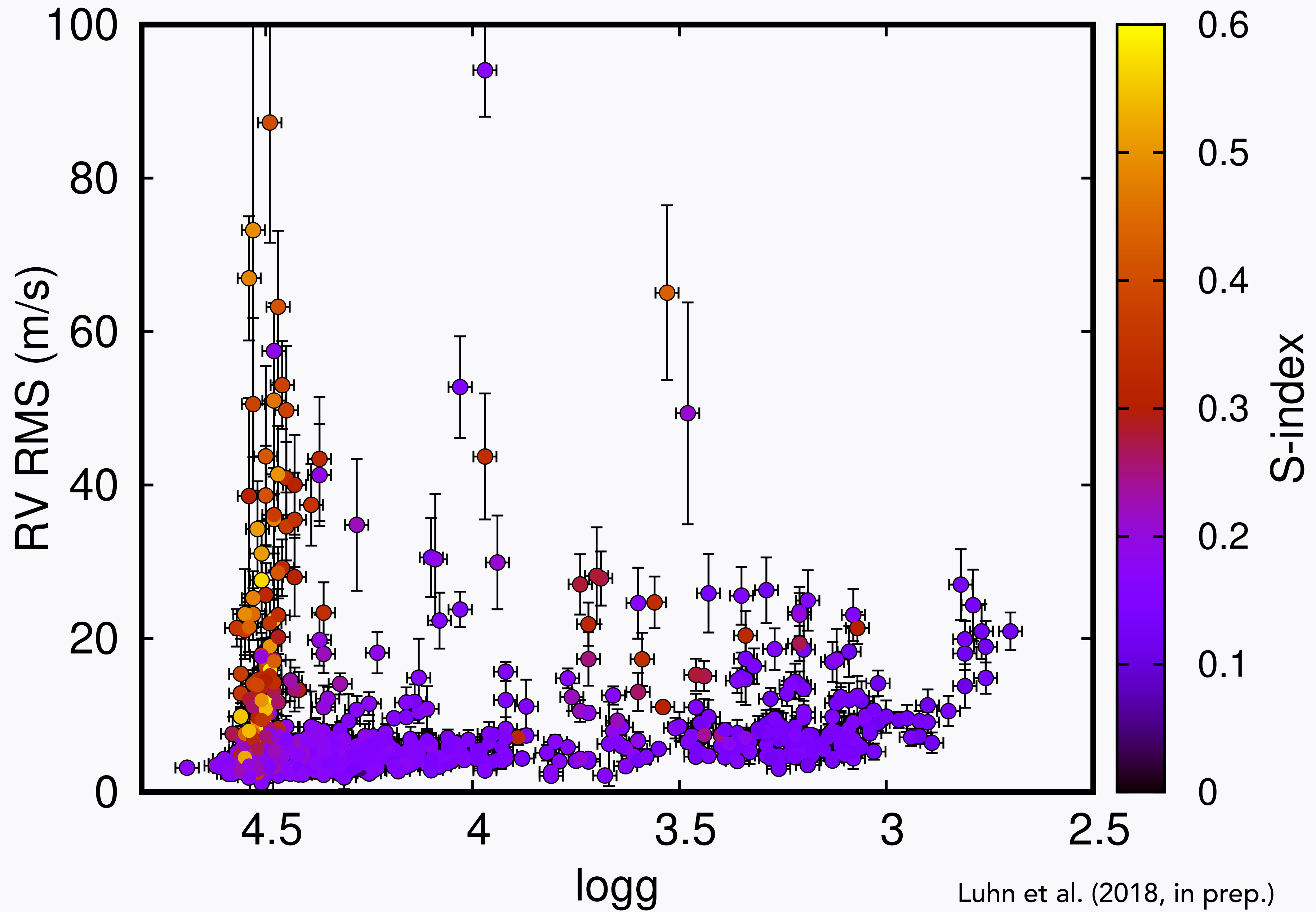
...among others

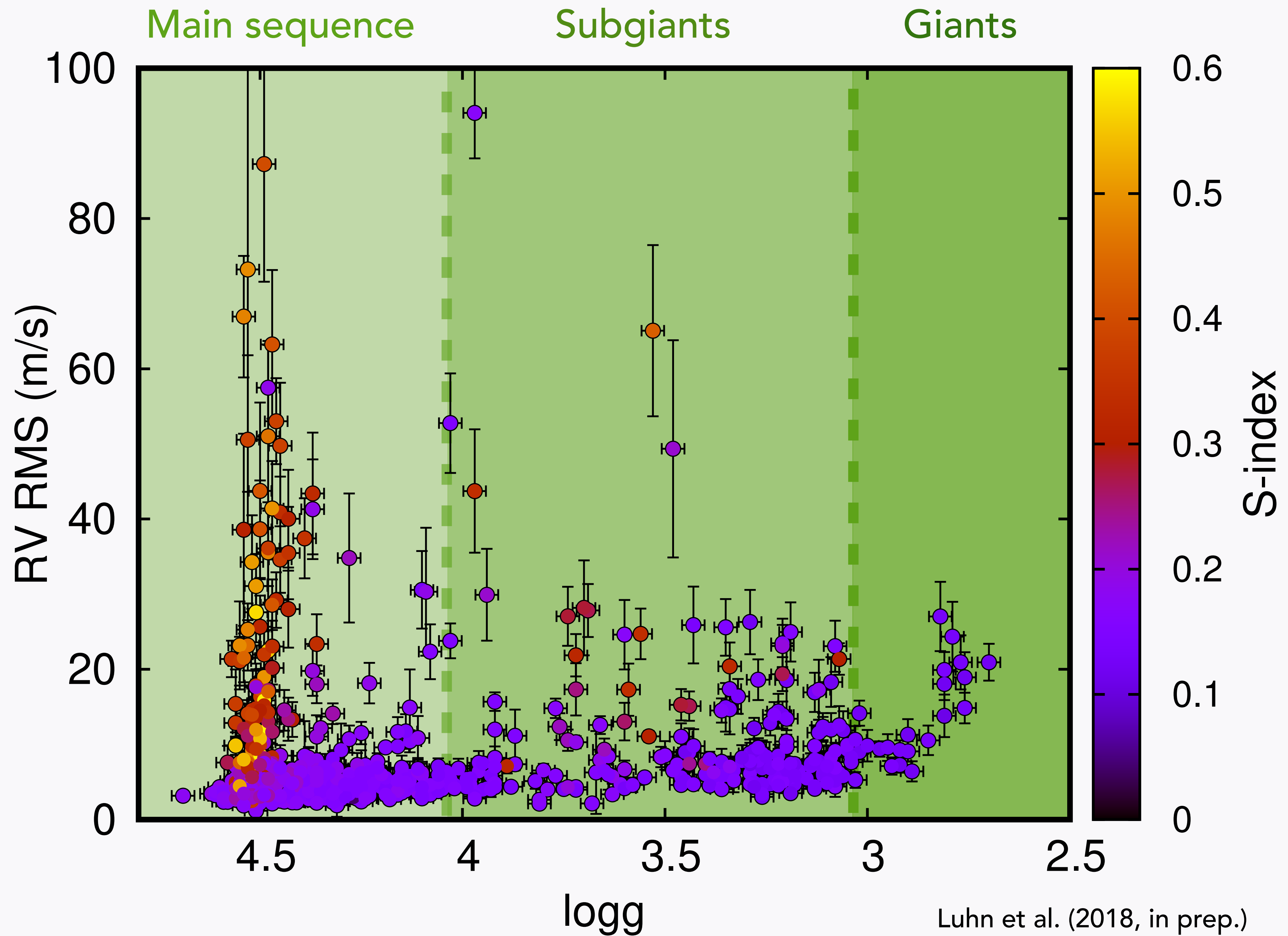
Wright (2005)

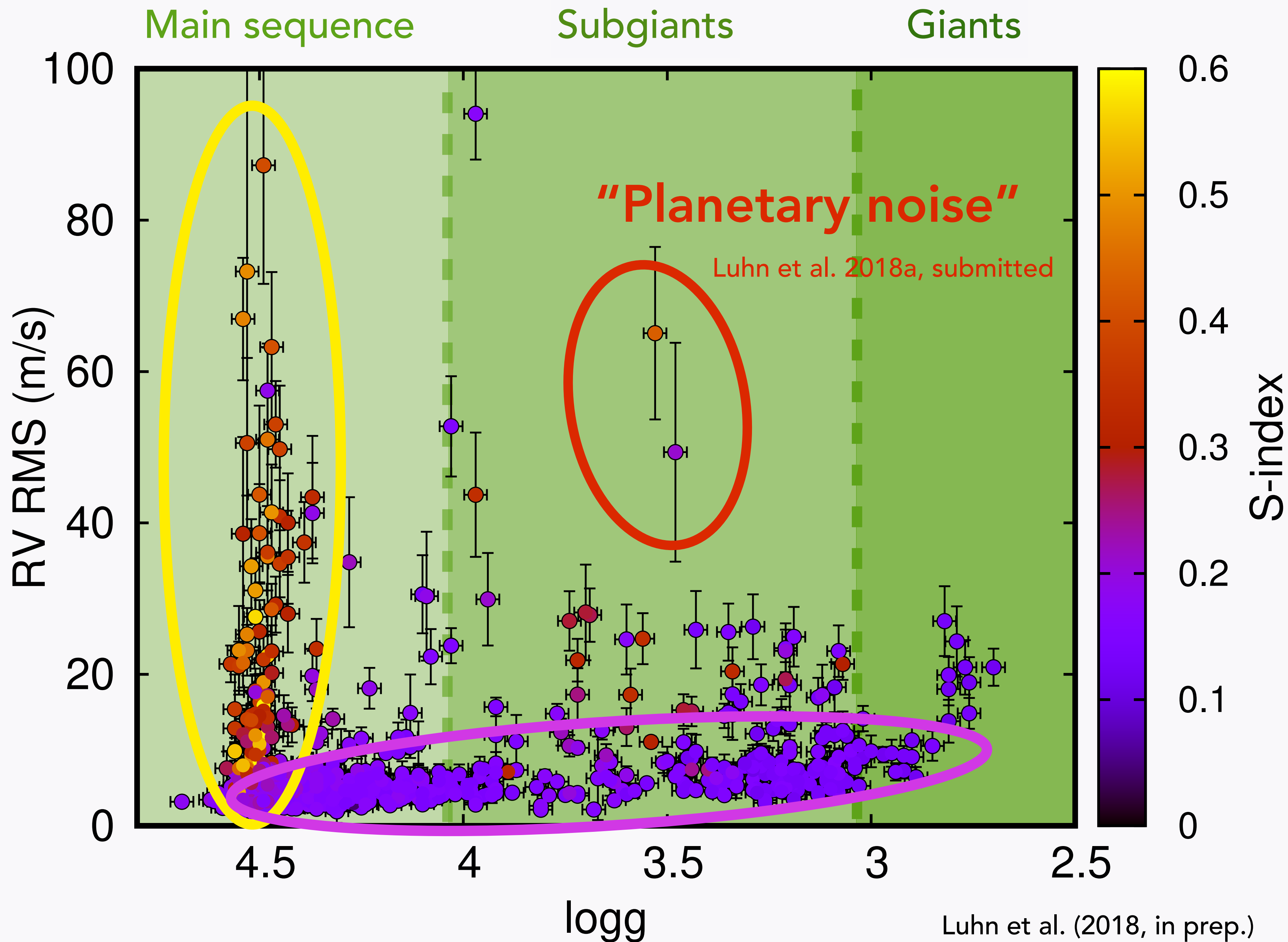


MORE EVOLVED STARS HAVE HIGHER RV JITTER









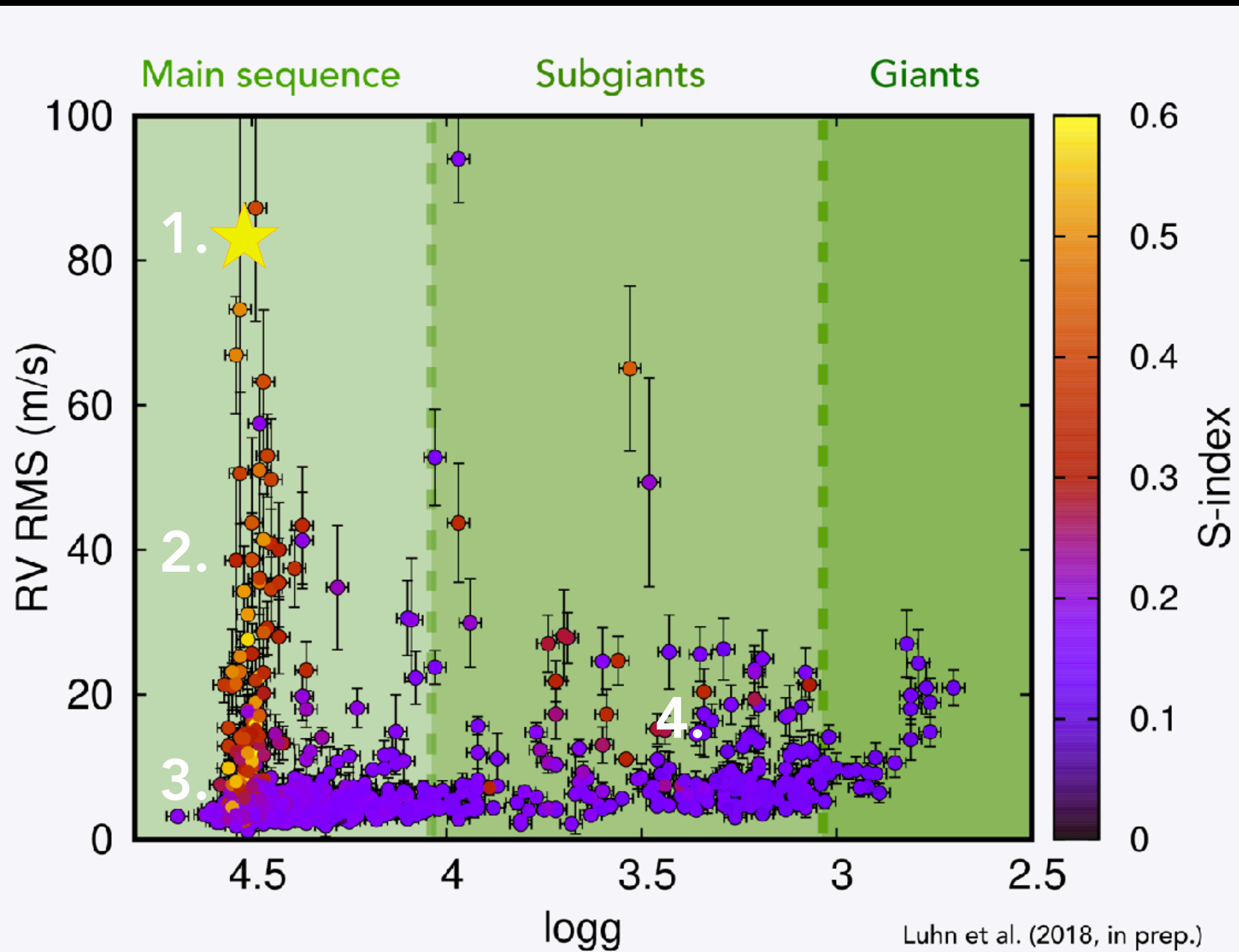
Activity-dominated

Active stars pile up
toward high logg
(~ZAMS)

Convection-dominated

Inactive stars increase
with evolution

RV JITTER TRACKS STELLAR EVOLUTION



1. Star is born, active and jittery

2. Spins down, decrease in activity/jitter

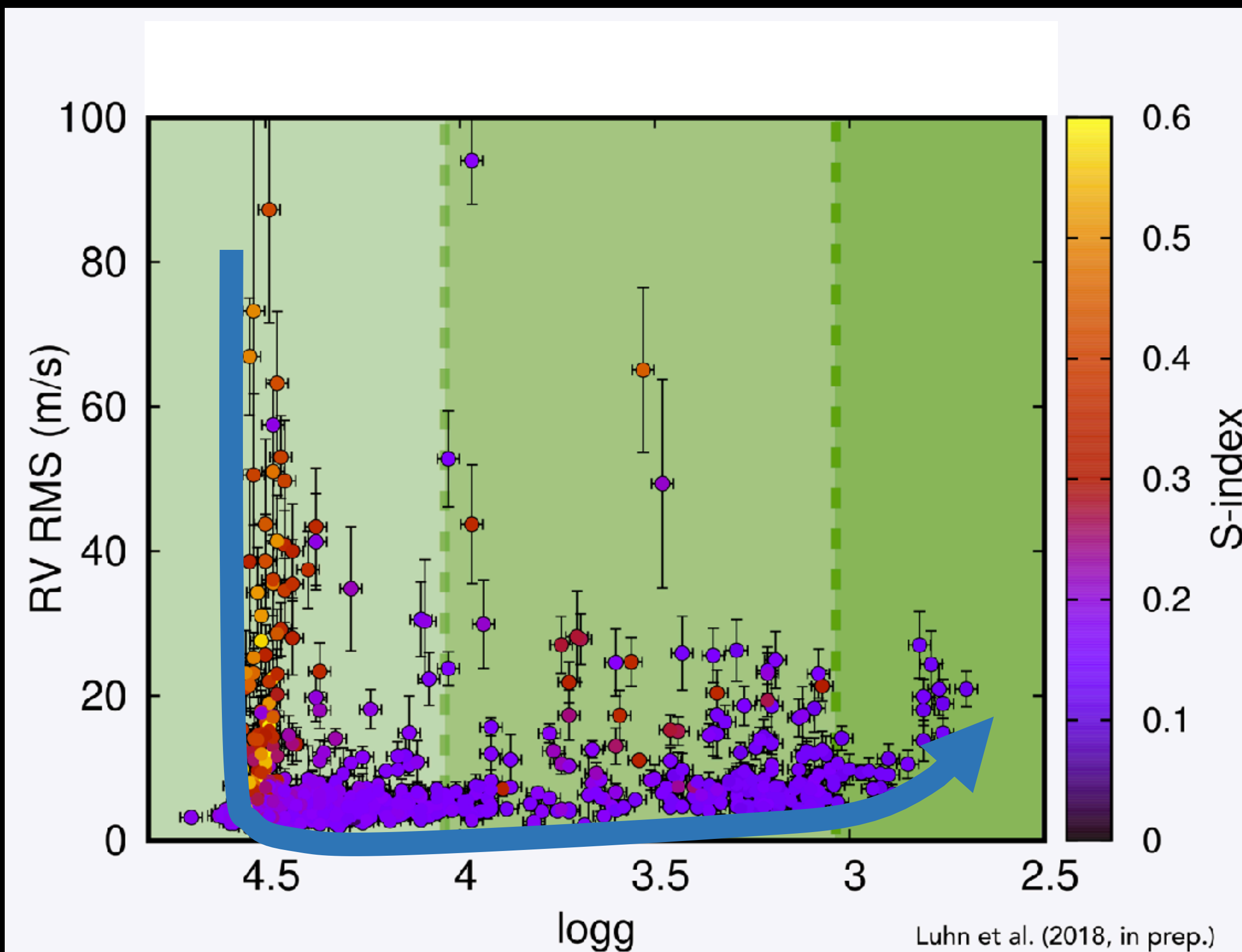
3. Falls to "jitter minimum"

4. Gradual increase from convection

CONCLUSIONS

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RV jitter tracks stellar evolution!



We can use this sample as a tool to predict amplitude and dominant component of RV jitter.

Precise radial velocities provide another means of studying stellar evolution.