Stellar Spin in Open Clusters

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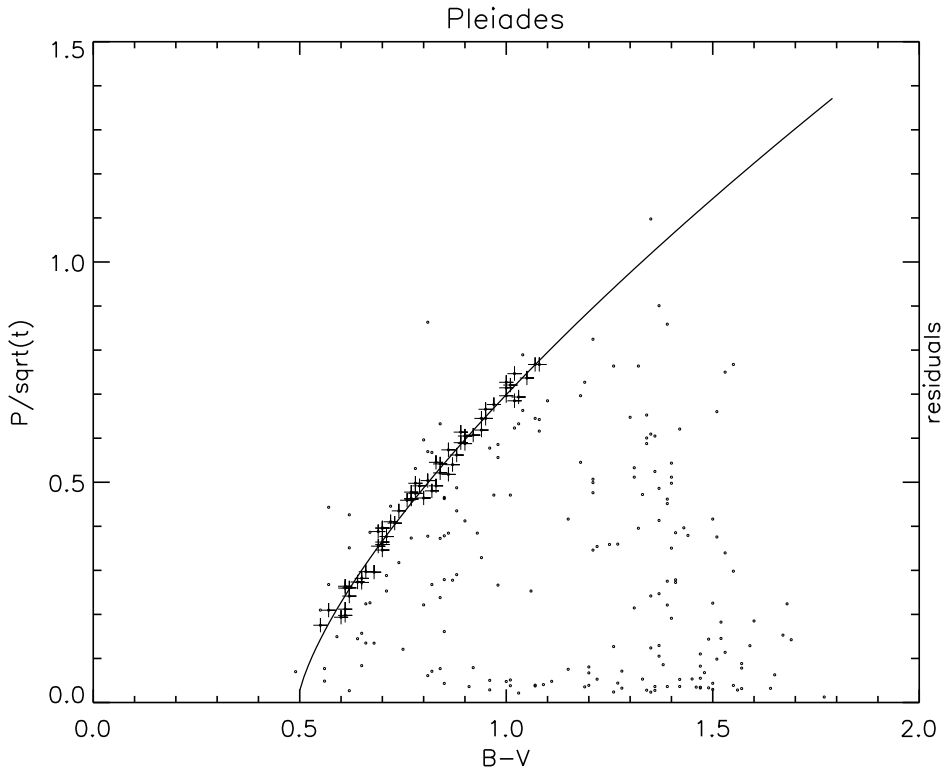
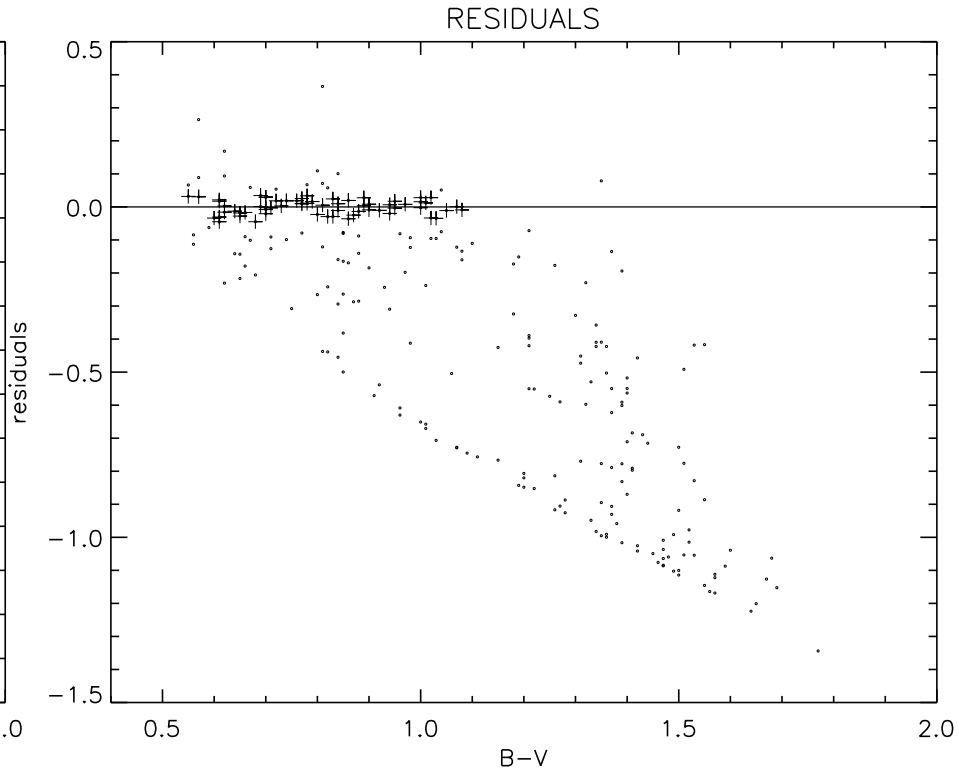
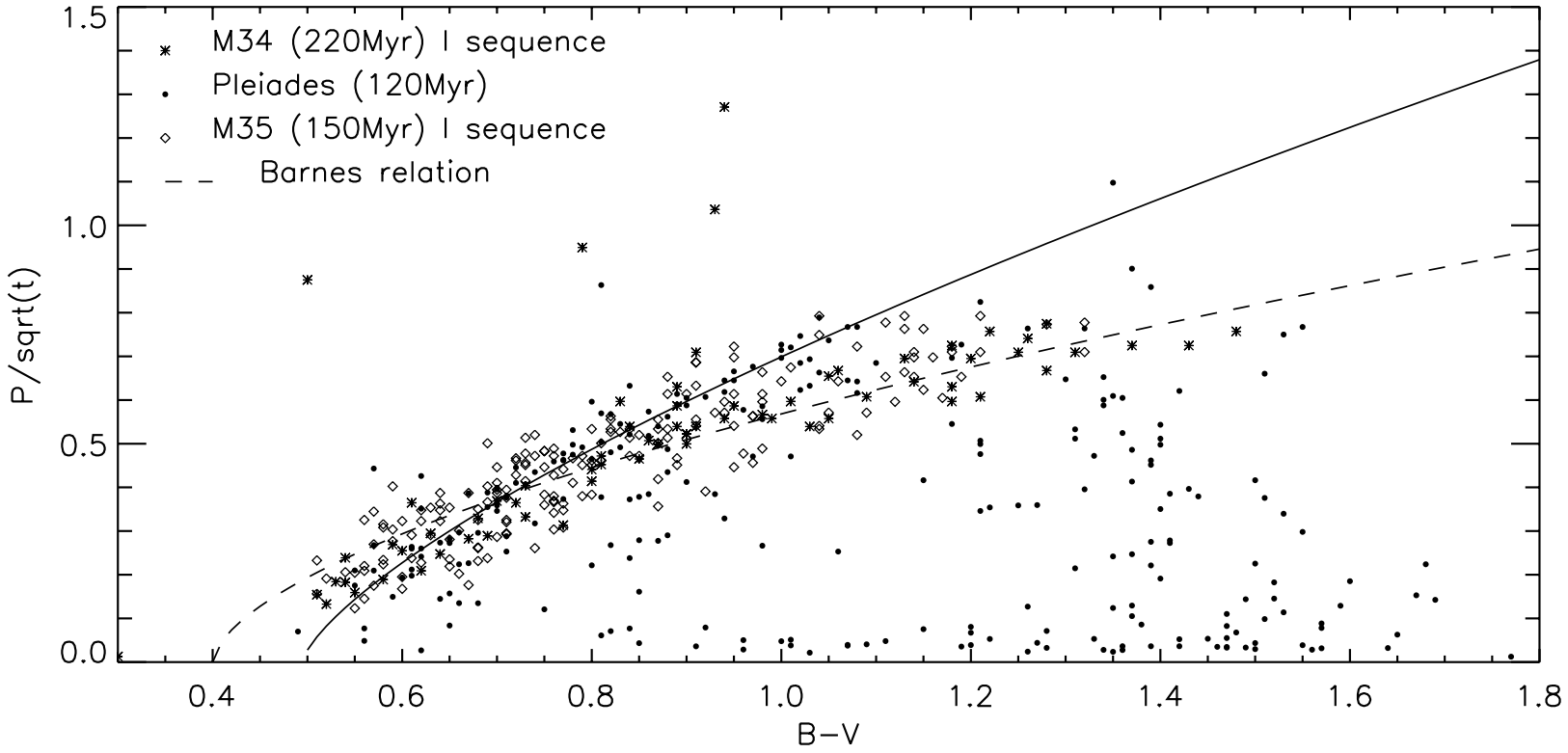
Rotational periods vs. (B-V) in the Pleiades





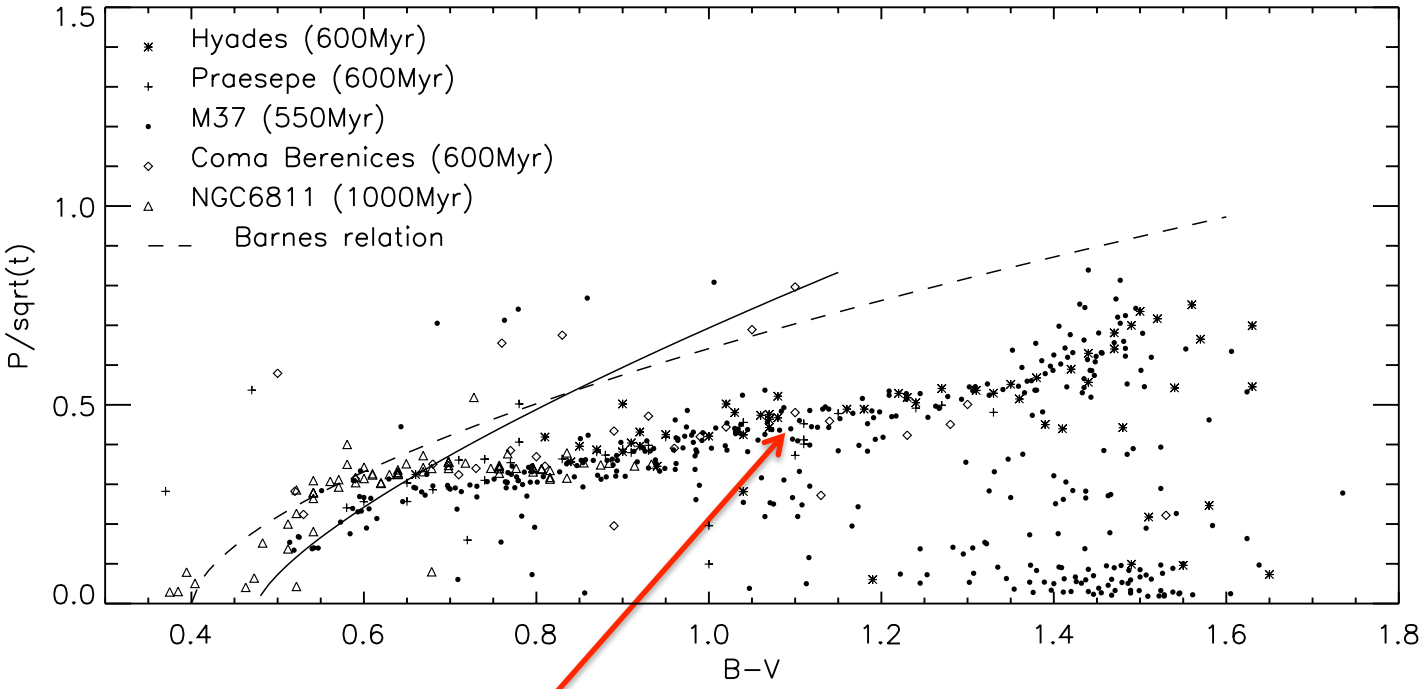
Data from: Hartman+2010
Fit from Brugaletta2014

Rotational periods vs. (B-V) in the Pleiades, M35, and M34



Data from: Hartman+2010; Meibom+2009,2011

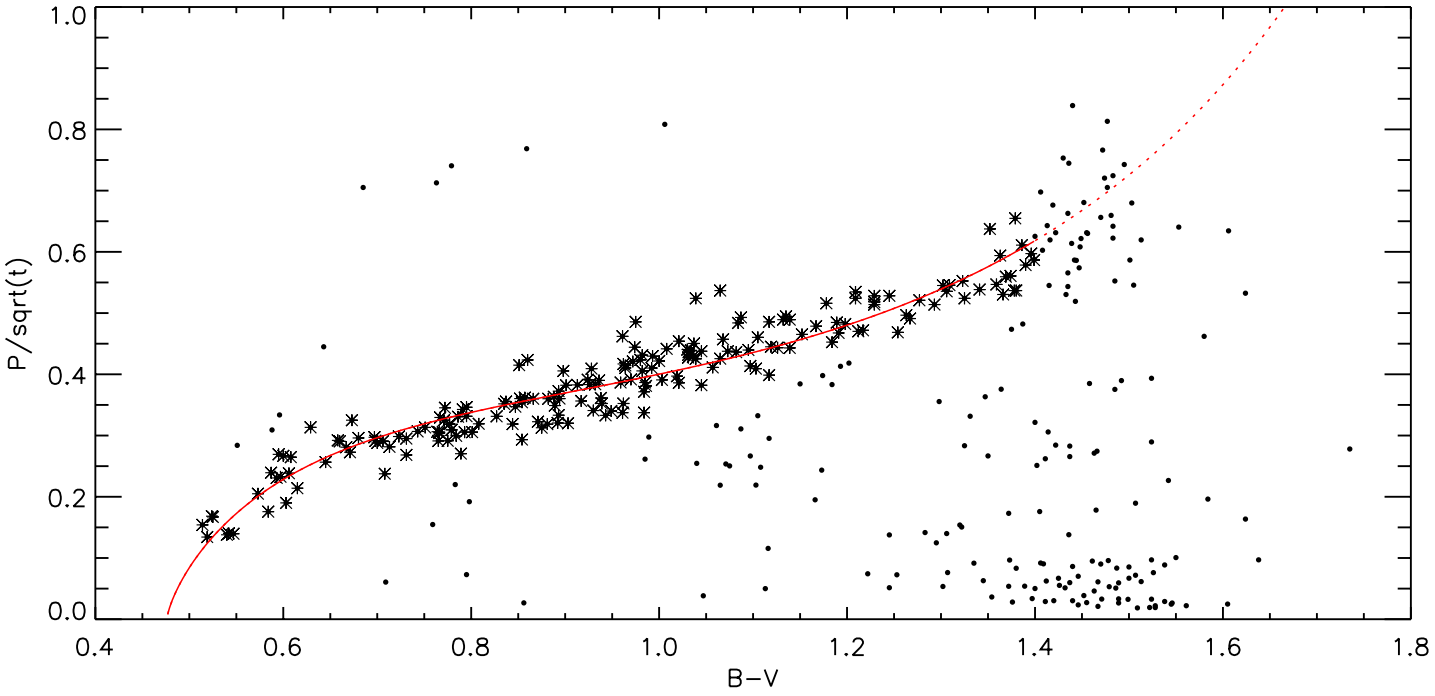
Rotational periods in M37, Hyades, Praesepe and Coma Berenices



Breakdown of Skumanich law

Data from: Hartman+2010; Meibom+2009,2011

M37 (550 Myr)



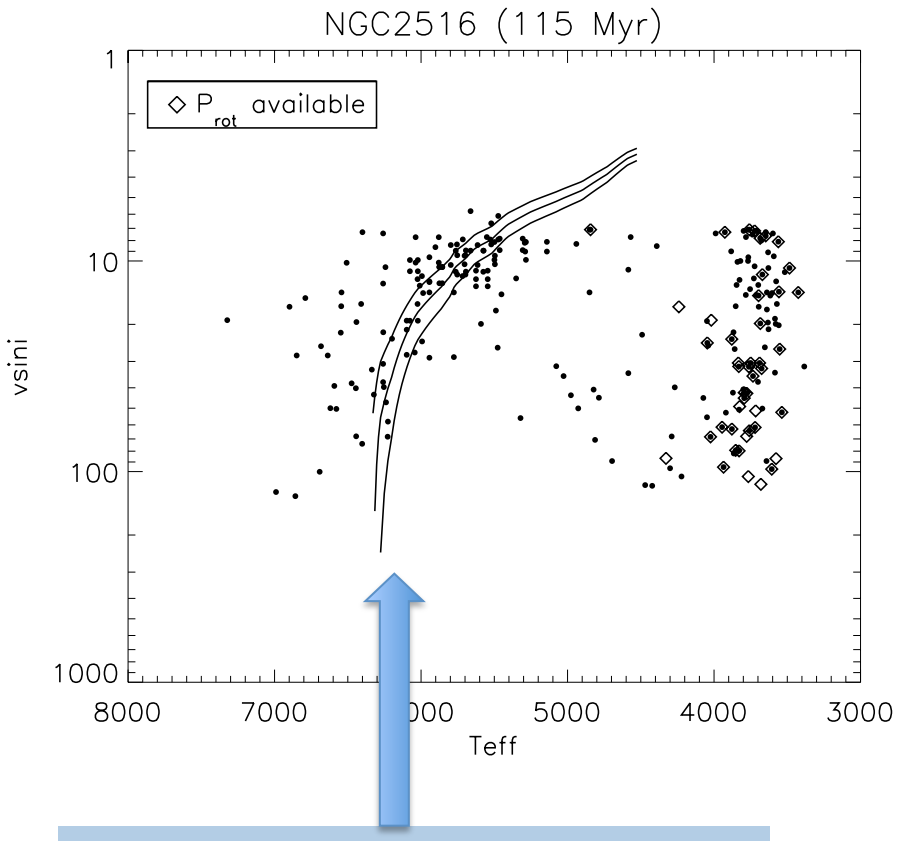
Fit from Brugaletta2014

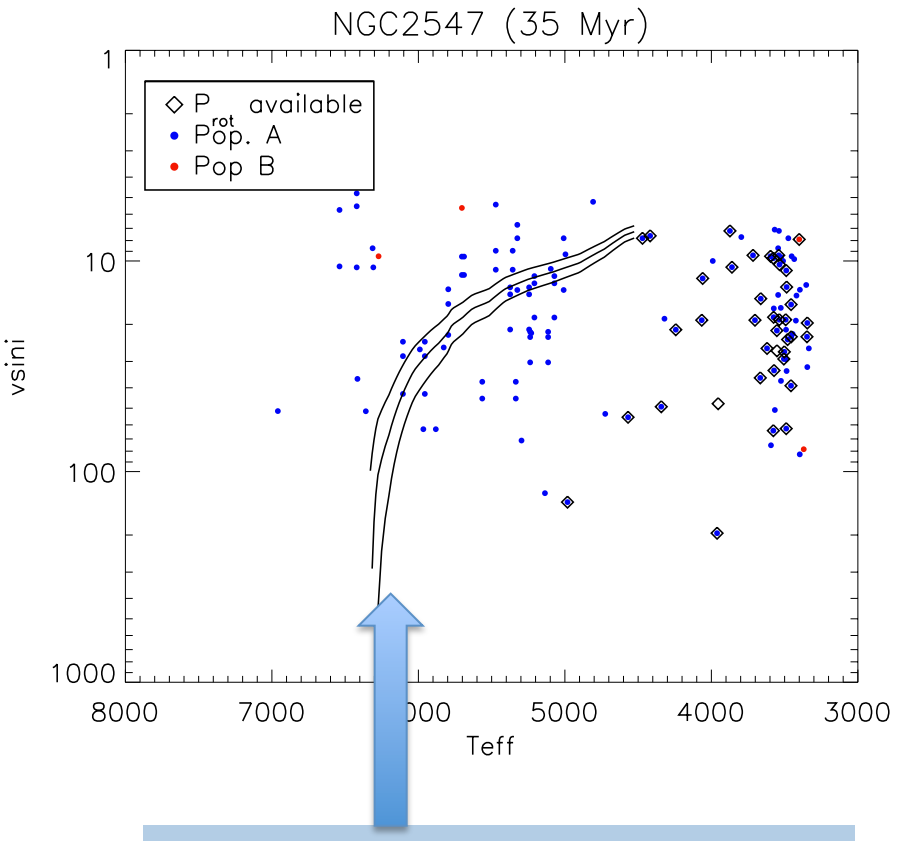
Info from photometric periods in OCs

- A slow-rotators sequence builds up in time
- A lower limit in age for the slow-rotators sequence to be identifiable is not well established as yet
- The slow-rotators sequence evolve in time in a predictable way
- The mass-rotation-age relationship for the slow-rotators sequence is not trivial: breakdown of the Skumanich law.

Combining periods and projected rotational velocity from GES

P_{rot} from Irwin+2007,2008





From Prot-mass-age assuming no preferential inclination

Scaled in age assuming Skumanich-law

Combining Prot and vsini

$$R \sin i \propto P \times v \sin i$$

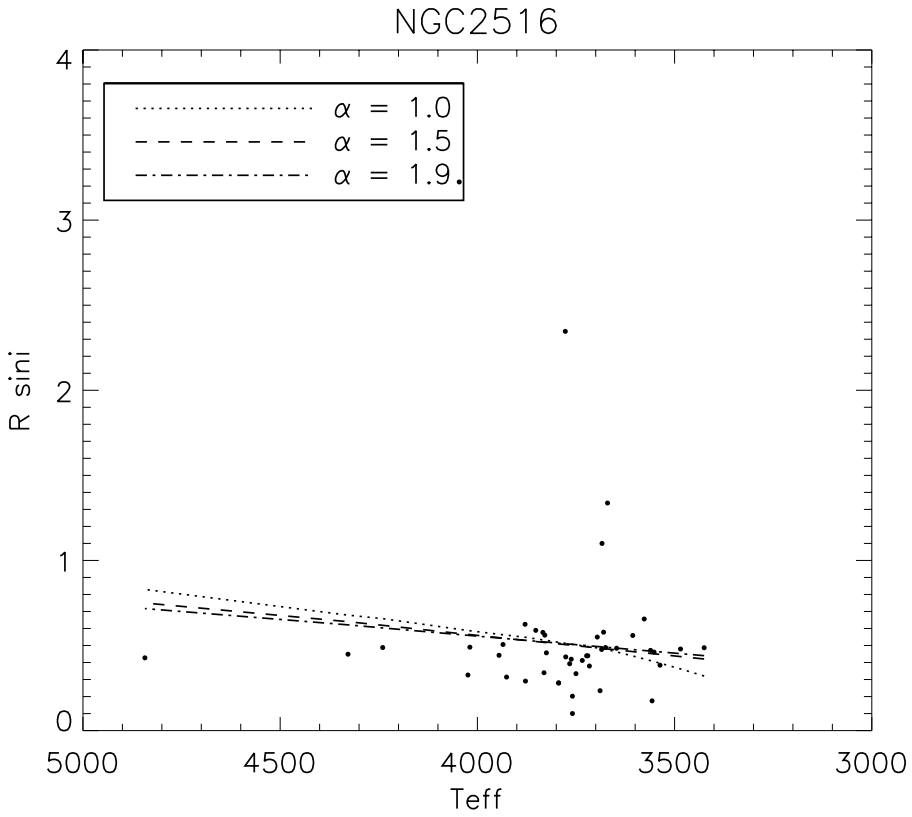
Model independent

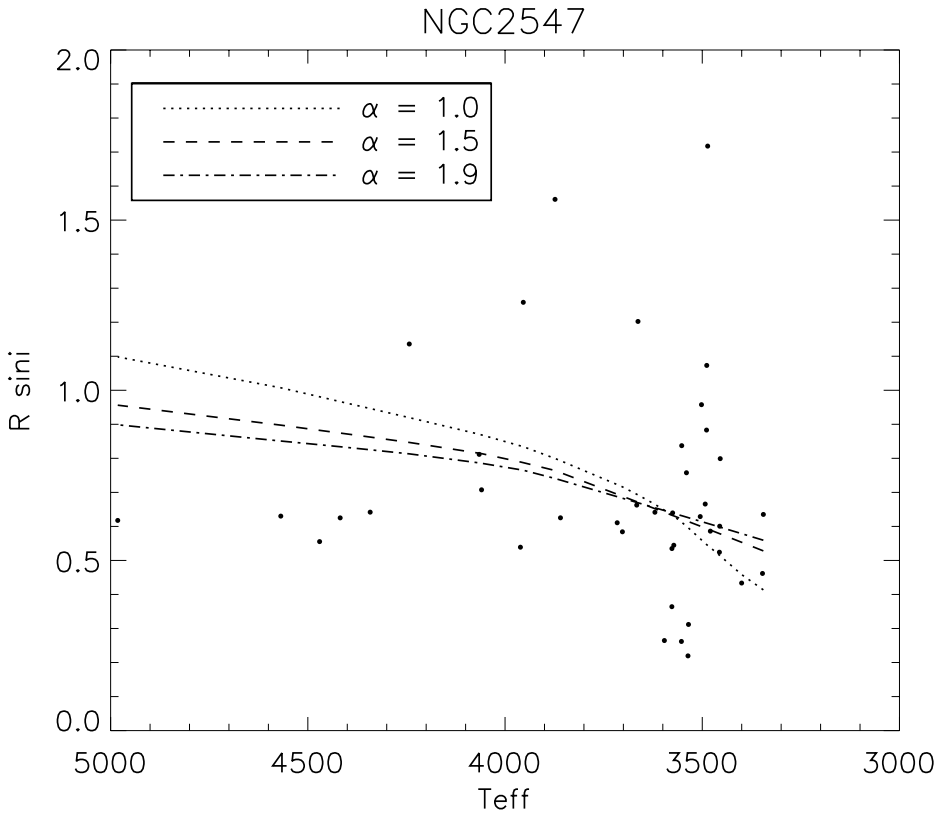
$$\sin i = \frac{R \sin i}{R_{\text{theo}}}$$

Model dependent

Statistical tests of model radius

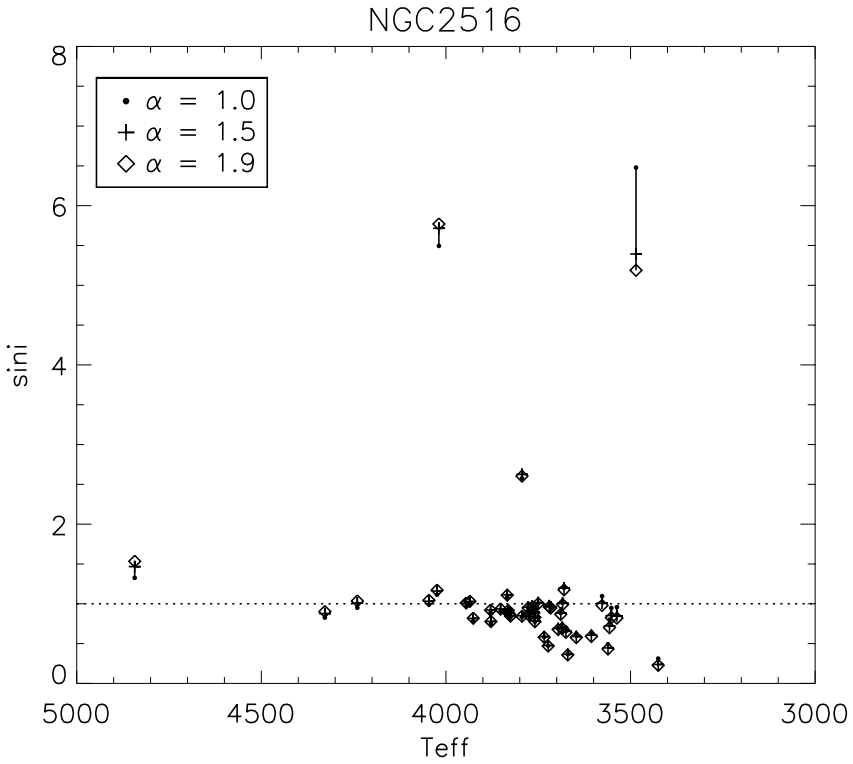
Combining periods and projected rotational velocity from GES

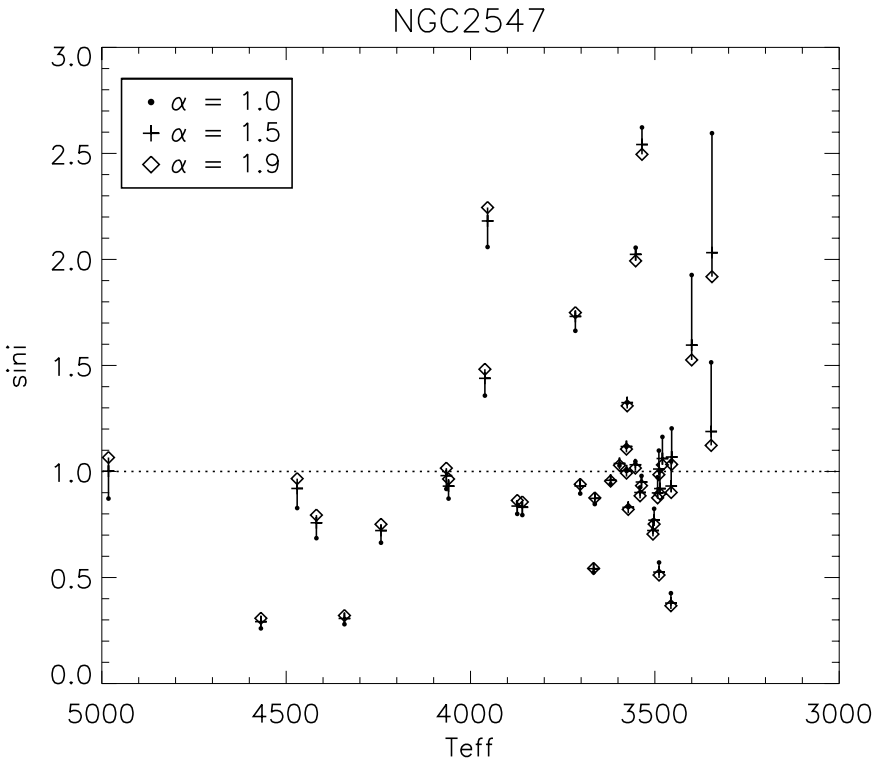




P_{rot} from Irwin+2007,2008
Models from Baraffe+1998

Combining periods and projected rotational velocity from GES





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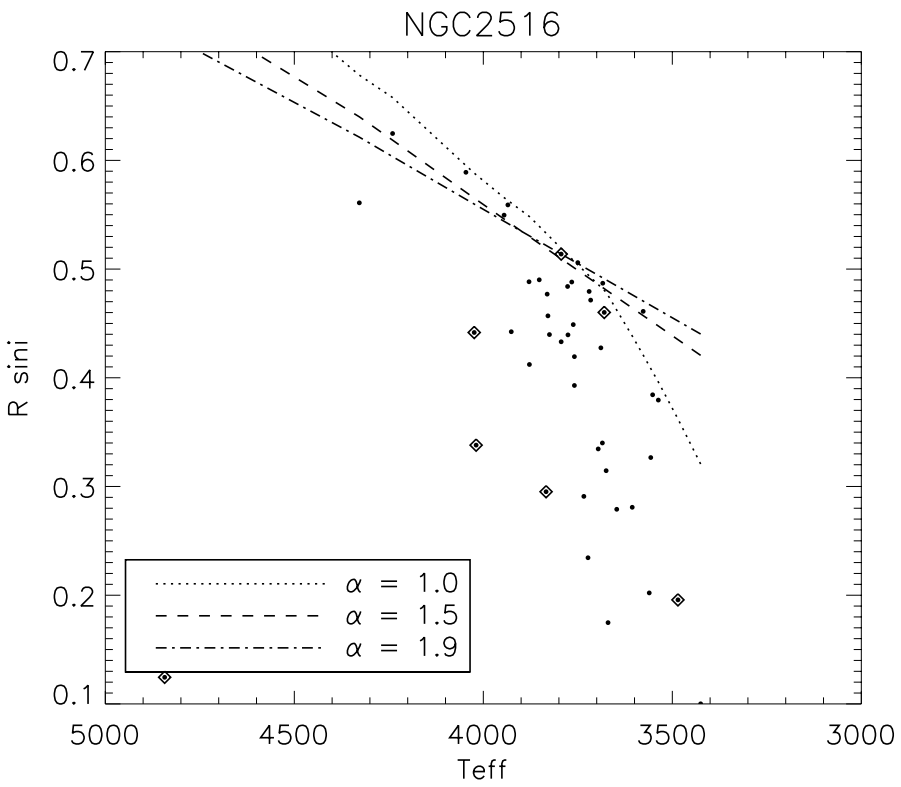
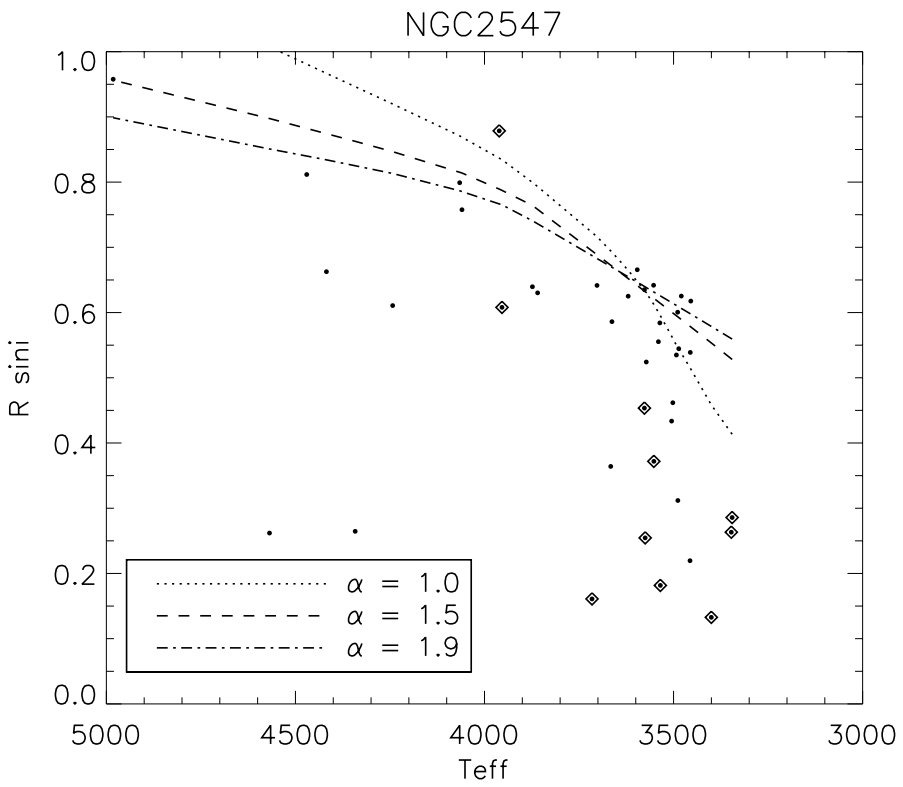
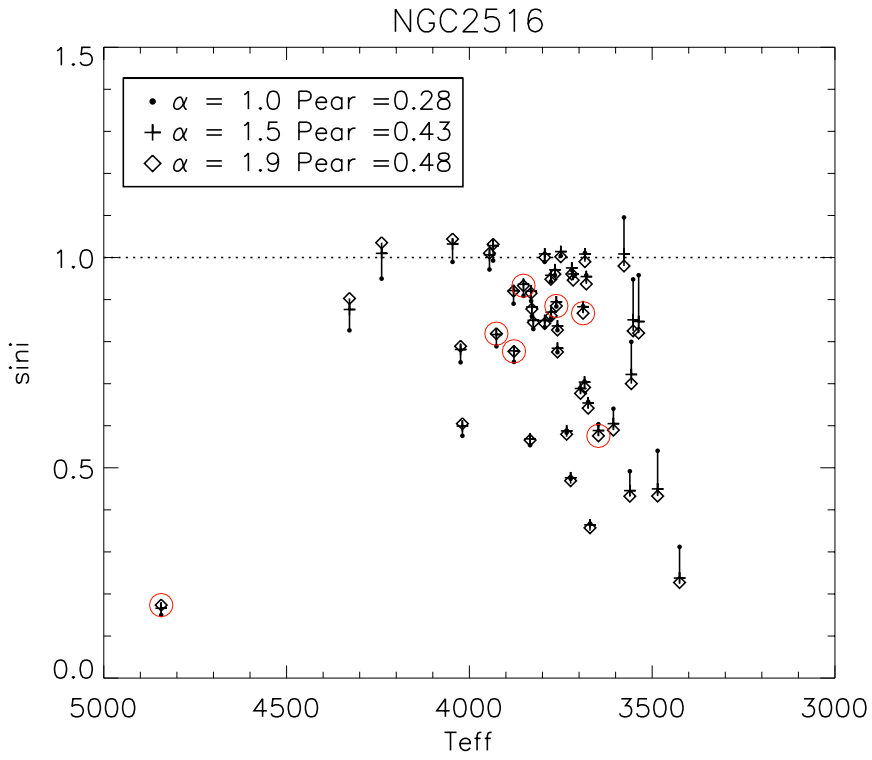
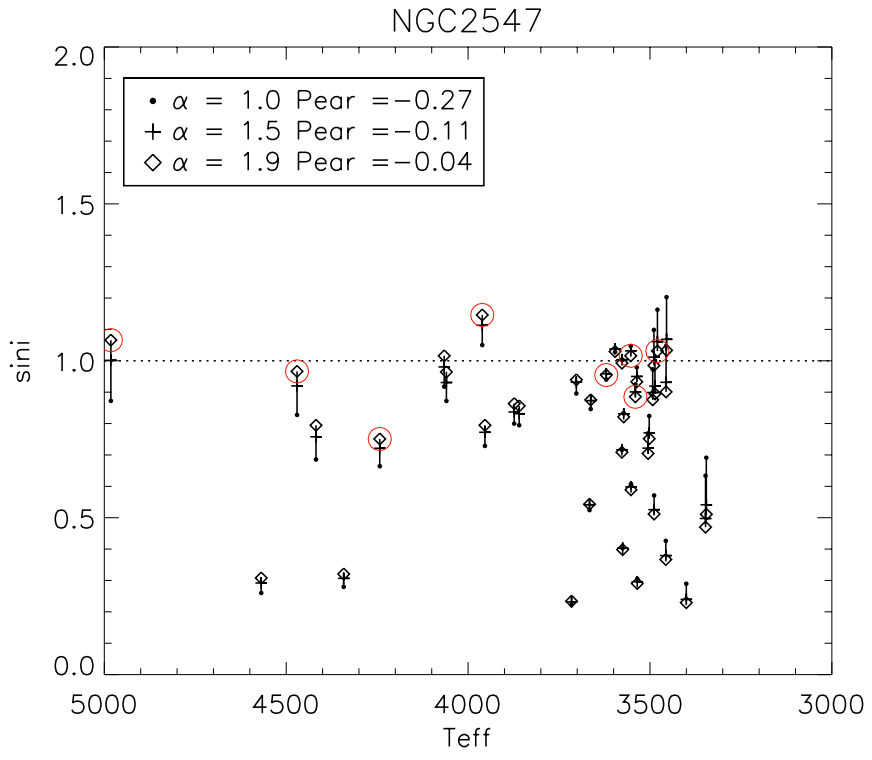




P_{rot} from Irwin+2007,2008
Models from Baraffe+1998
Alias correction with 10% tolerance

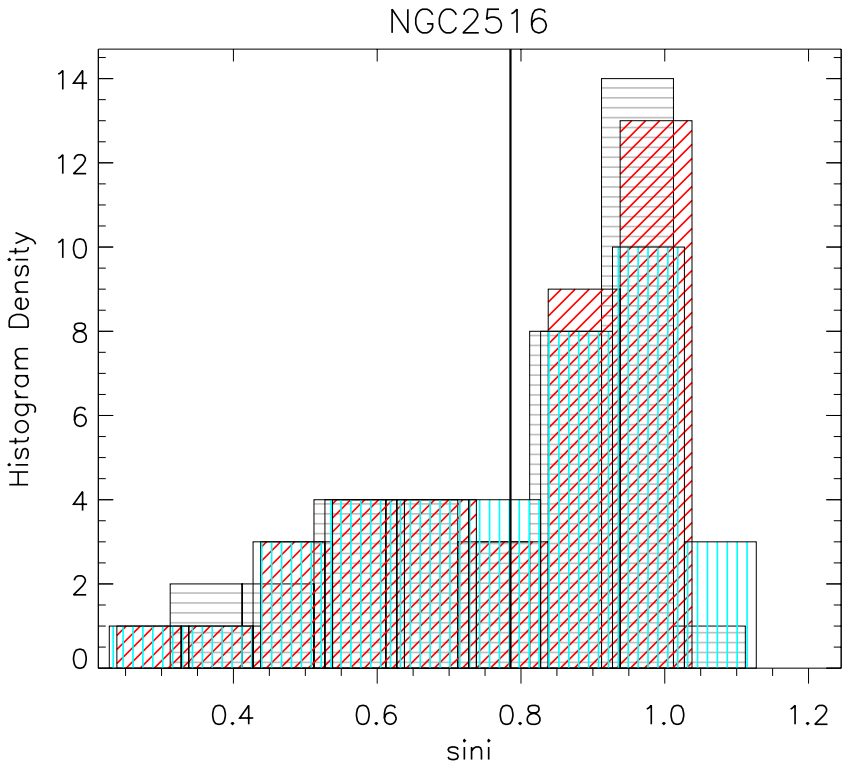
Combining periods and projected rotational velocity from GES

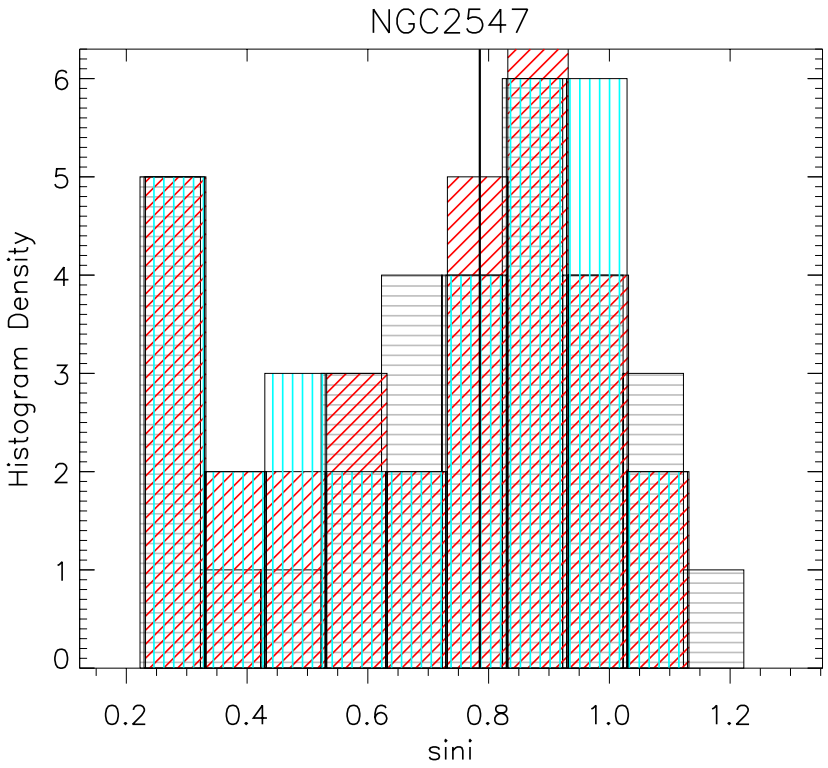




P_{rot} from Irwin+2007,2008
Models from Baraffe+1998
Alias correction with 10% tolerance
Correction not included in correlation

Combining periods and projected rotational velocity from GES





Distribution peaks misplaced

Conclusions

- Promising comparison of vsini vs. Teff diagrams with gyro-chronology relationships
- Periods of stars with approx. solar mass very useful but lacking in important cases
- Useful statistical tests for model stellar radius
- Observational biases to be assessed
- Eventual preferential spin orientation evidences hinders on model stellar radius accuracy