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SONG science goals:

The scientific goals of **SONG** are:

1. To study the internal structure and evolution of stars at a level of detail similar to that achieved for the Sun using asteroseismology.

2. to search for and characterize planets with masses comparable to the Earth in short period orbits around nearby stars.

Current limits to asteroseismology and planet hunting:

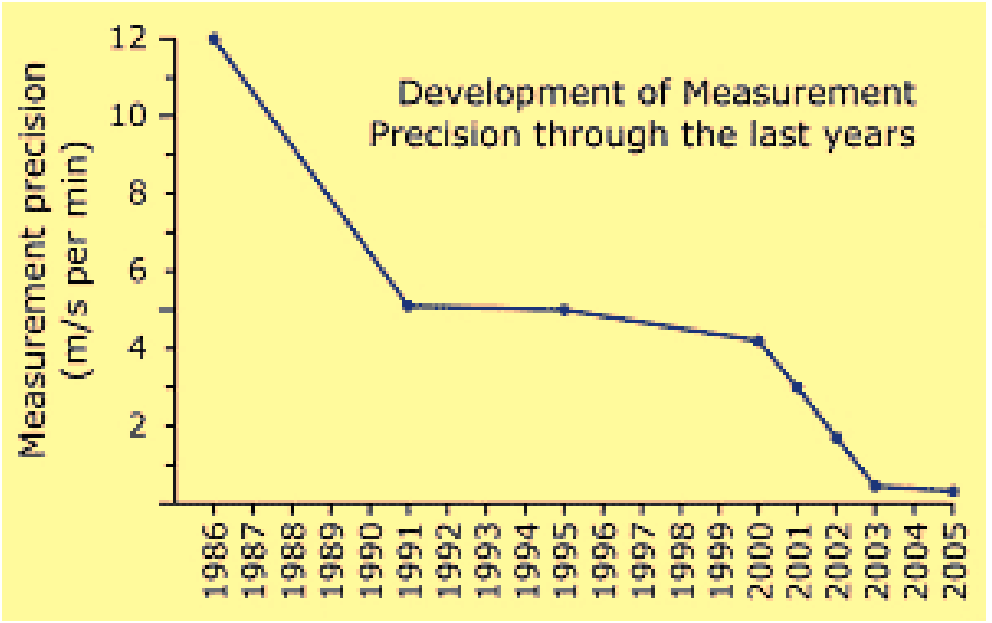
No/few facilities for obtaining long, continuous timeseries observations of stars with state-of-the-art instrumentation.

Limiting factor is NOT measurement precision.

Strategic decisions by ESO, NOAO ..... do not include time-series facilities.

For bright stars:

- Limiting factor is granulation, not photon noise
- Planets: problems with long-term stability.

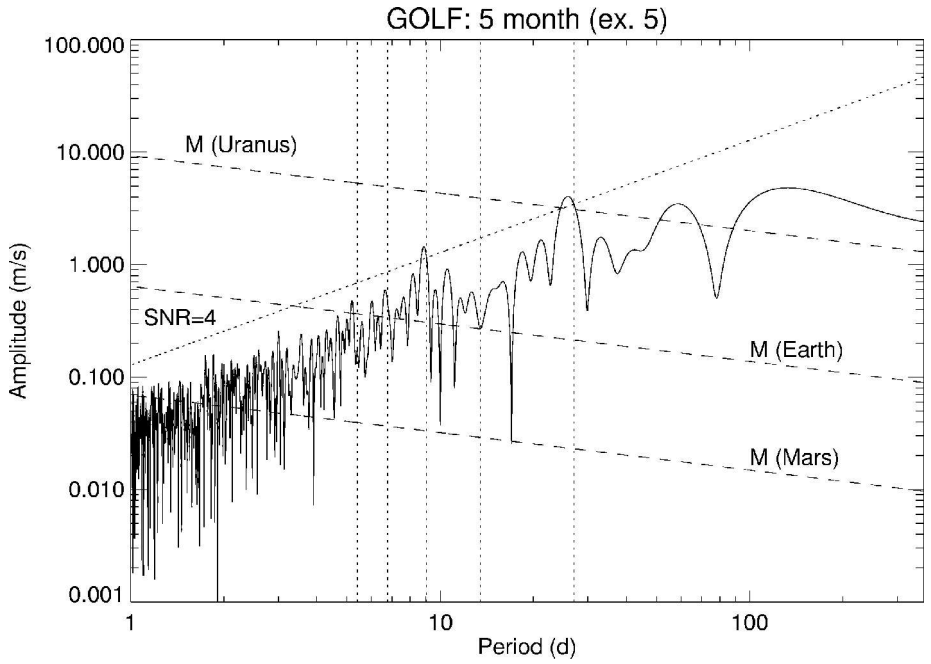


Network outline:

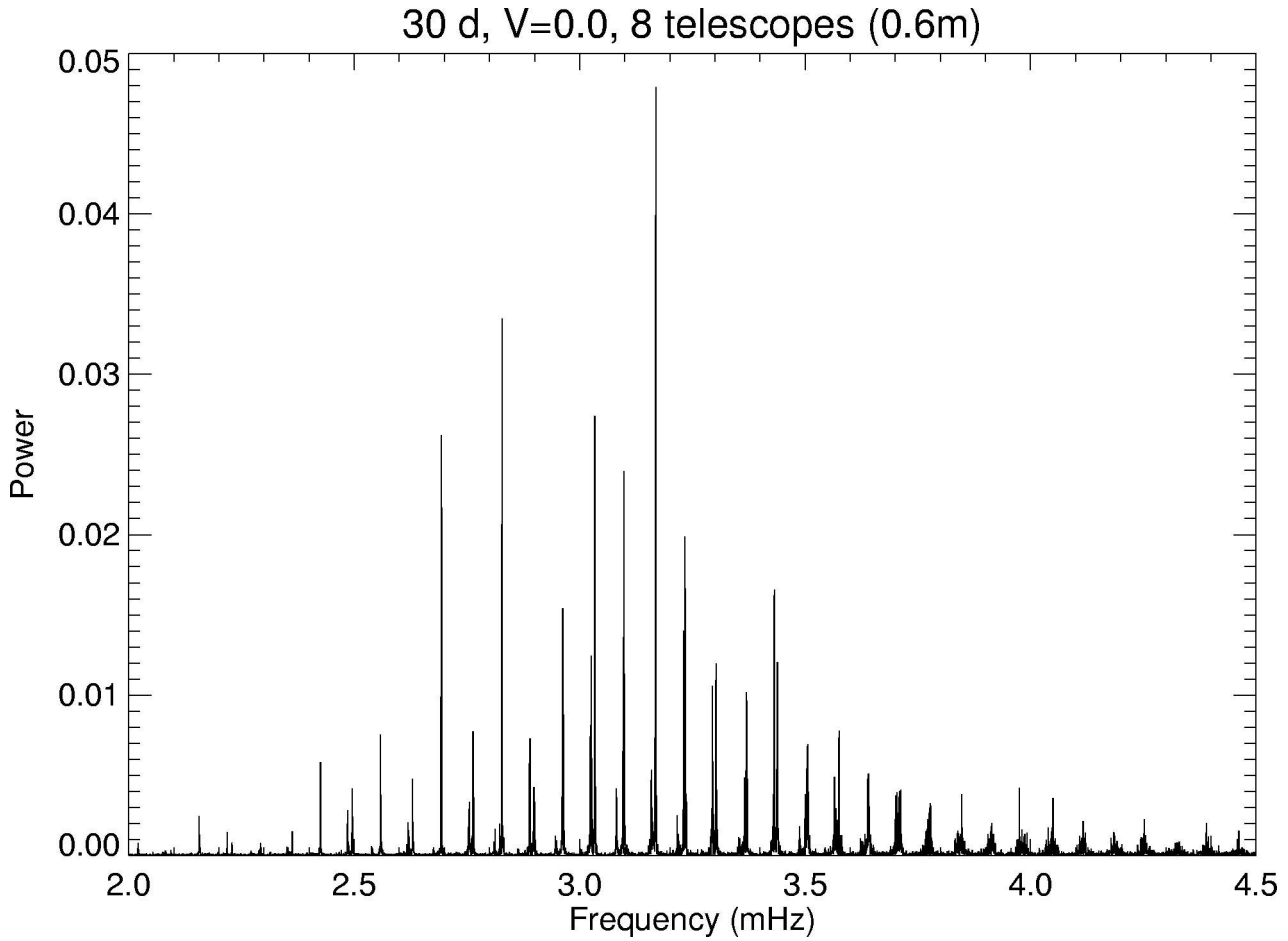
- 8 identical nodes; 4 southern and 4 northern.
- 3-4 “small” (~0.5m) telescopes per node.
- State-of-the-art spectrograph, optimized for RV work, fed via optical fibres from the telescopes.
- Remote operations.
- Pipeline data reduction.

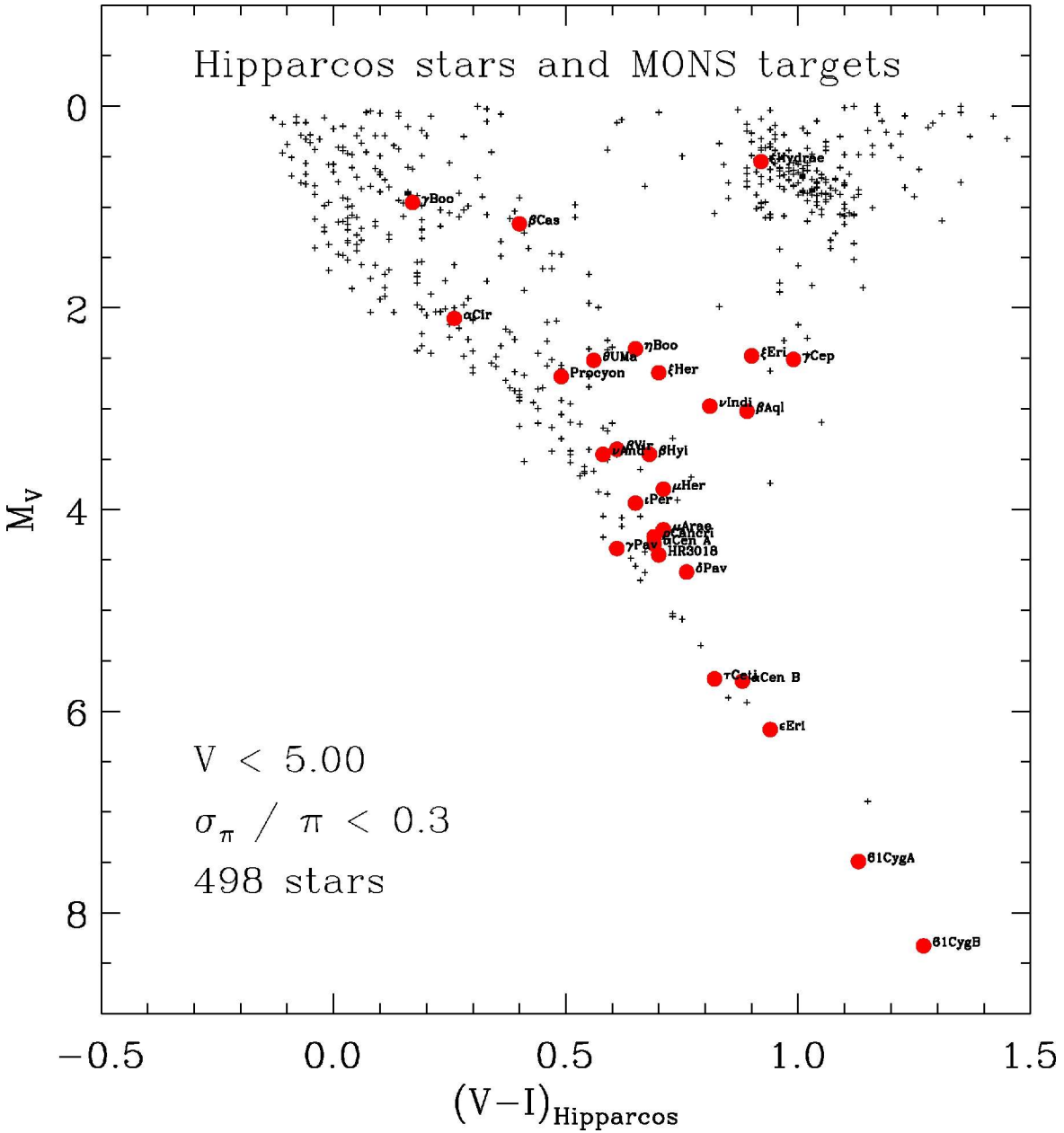
SONG capabilities

- V=0.0 0.5m/s
- V=5.0 5.0m/s
- Granulation noise limited at V< 3-4 (seismology) and V<7 (planets).
- Detection of M_{earth} planets in short period orbits.



GOLF data + realistic noise




Hipparcos stars and MONS targets
M_V
$(V-I)_{Hipparcos}$
0
2
4
6
8
−0.5
0.0
0.5
1.0
1.5
V < 5.00
σ_π / π < 0.3
498 stars
ηHydrae
γBoo
βCas
αCir
ηBoo
δUMa
Procyon
ξHer
νInd
βAql
βHyi
μHer
ιPer
μAra
αCenB
αCenA
HR3018
δPav
τCet
αCen B
εEri
61CygA
61CygB
ξEri
γCep

What makes **SONG** unique?

- Network: Continuous, long-term observations
- Bright stars: Small telescopes, lower prices
- Multiple Telscopes: Flexibility, control of systematic effects, multiple targets.
- Instrument: Less complicated to build highly efficient spectrograph for a small telescope
- Science: Synergy between planets and seismology observations.

Implementation and Cost:

Time line:

2006:	Design Study
2007-2008	Development and construction
2009	Deployment, Operations start

Budget:

Telescopes:	EUR 200.000,-
Spectrograph	EUR 300.000,-
Sites, infrastructure, logistics	EUR 100.000,-