The Sco OB 2 Association

The nearest (massive) star forming region in the Gould Belt

03 Sep. 2015

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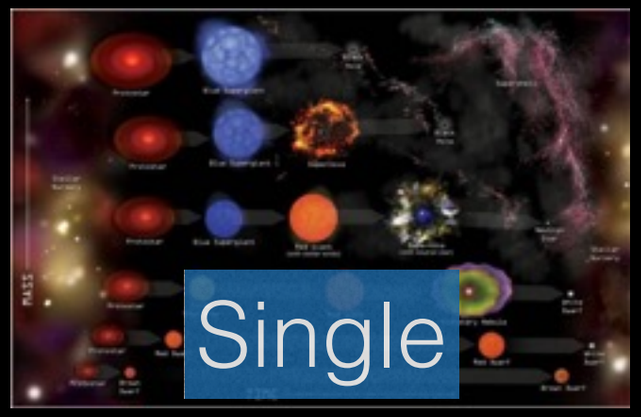
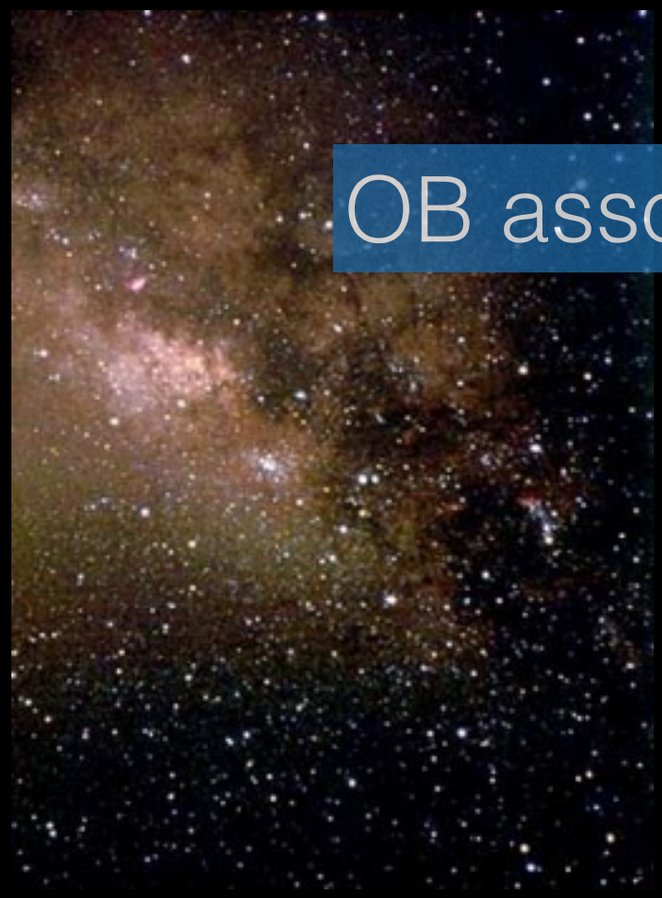
Outline

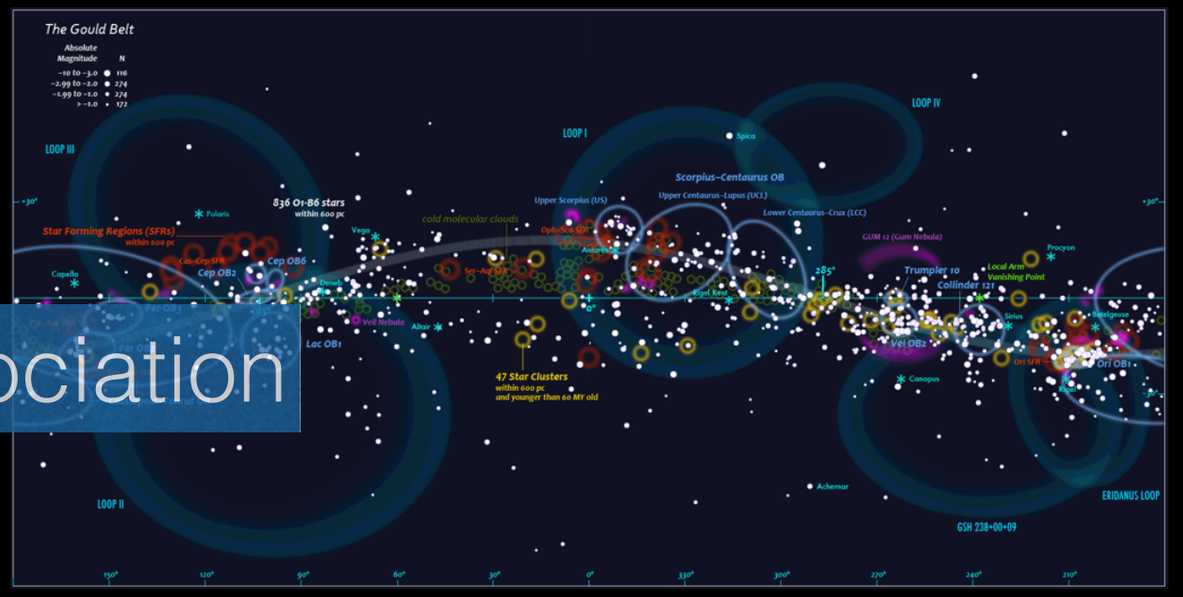
- Motivation
- The Gould Belt
- Scorpius-Centaurus OB2
  - Methods (what I’m doing now)
- Gaia

Process of Star Formation

- Different scales

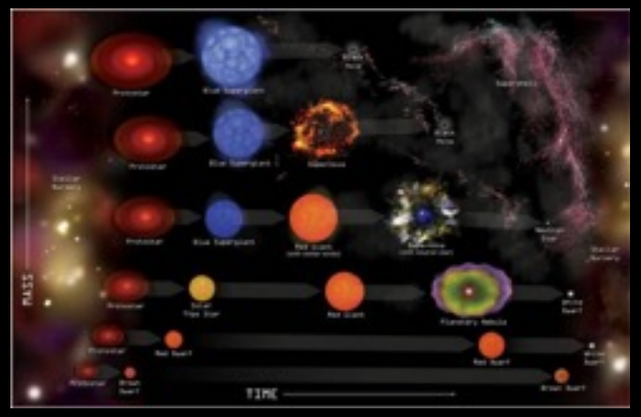


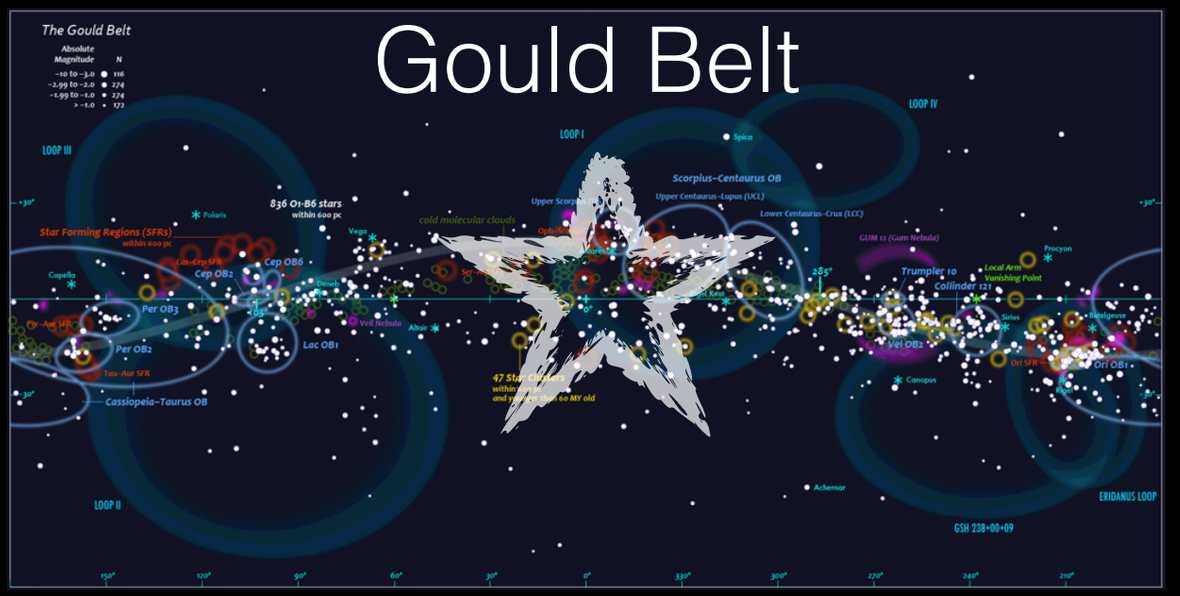




Process of Star Formation

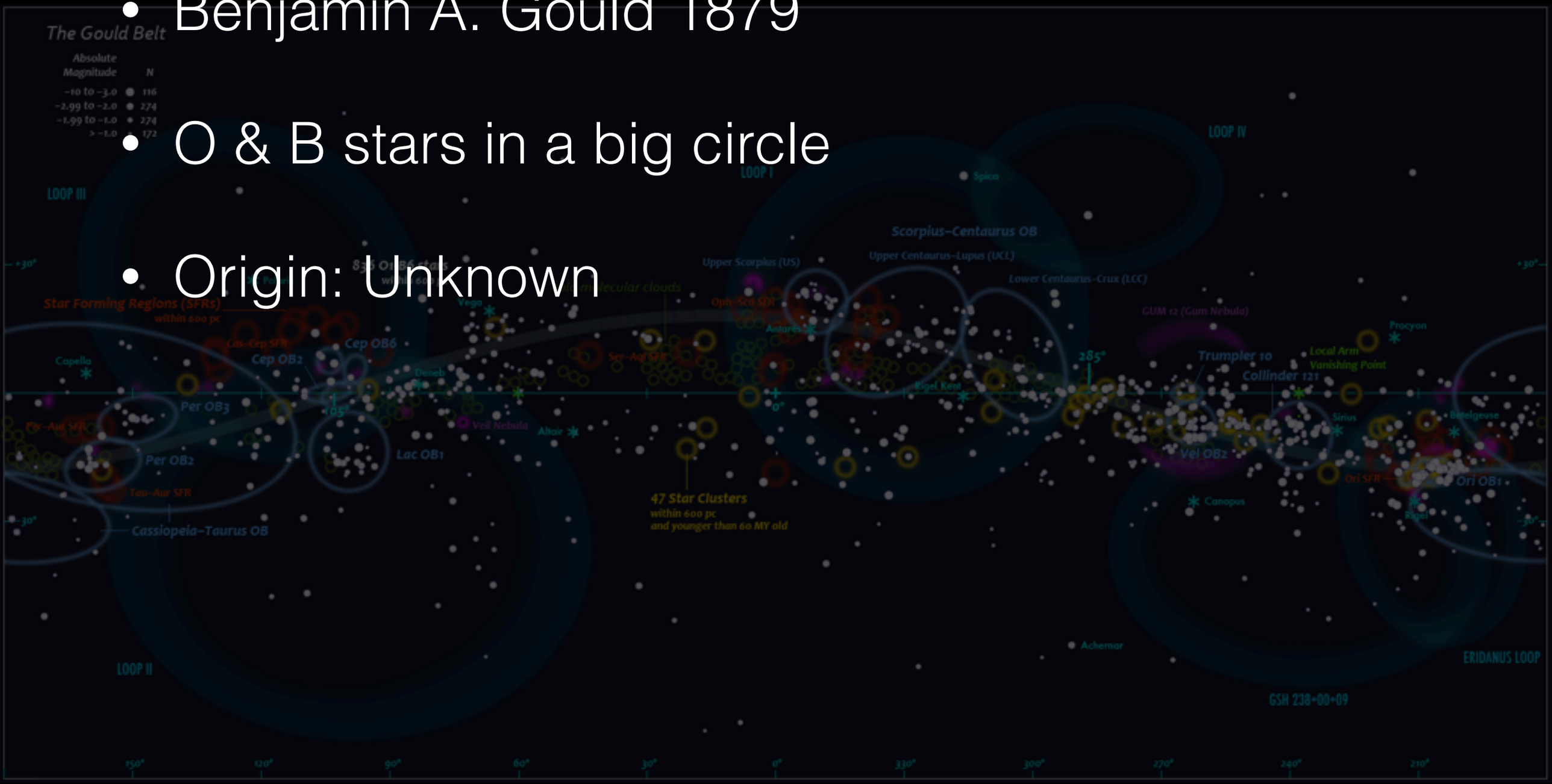
- Different scales



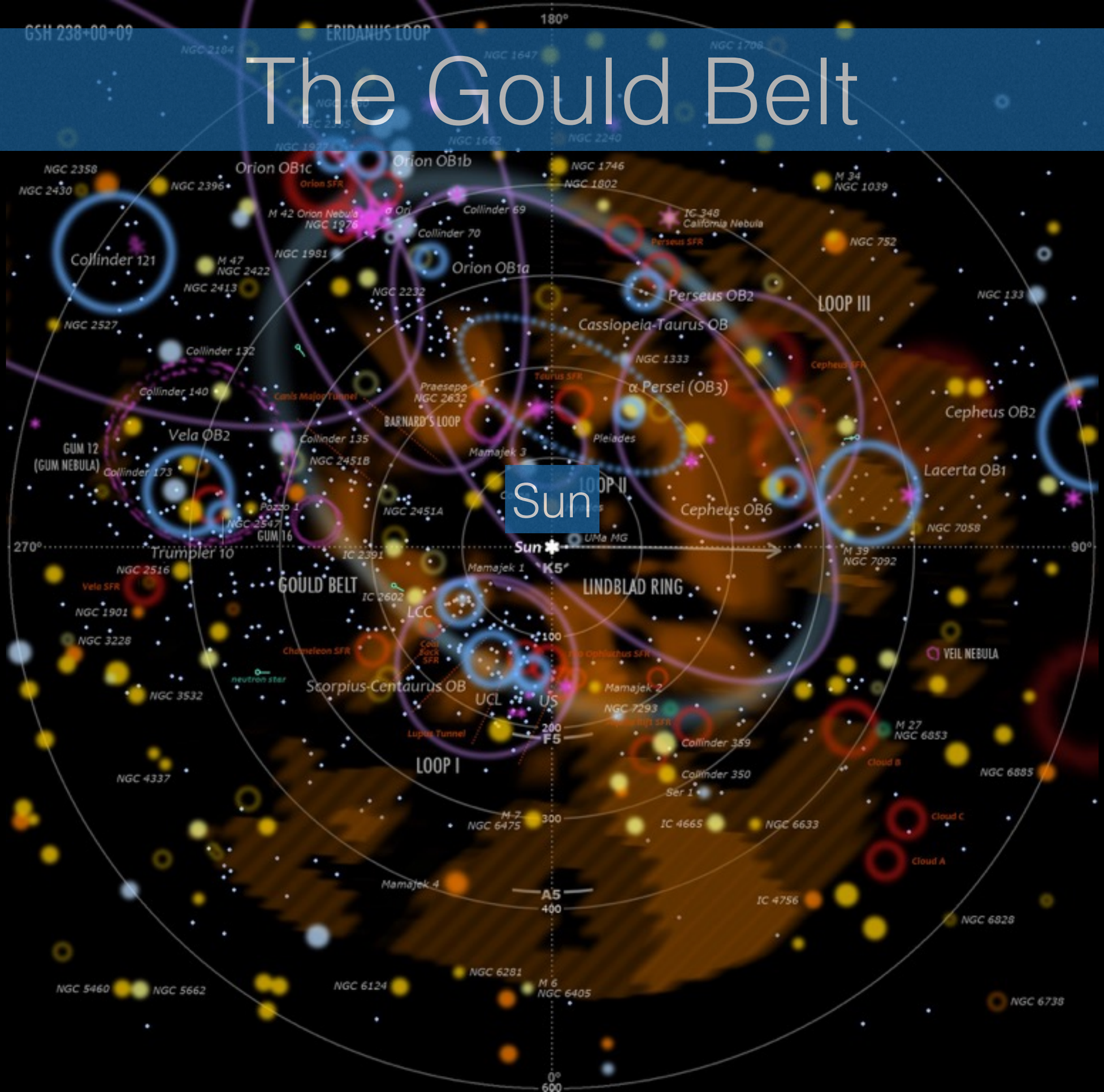


The Gould Belt

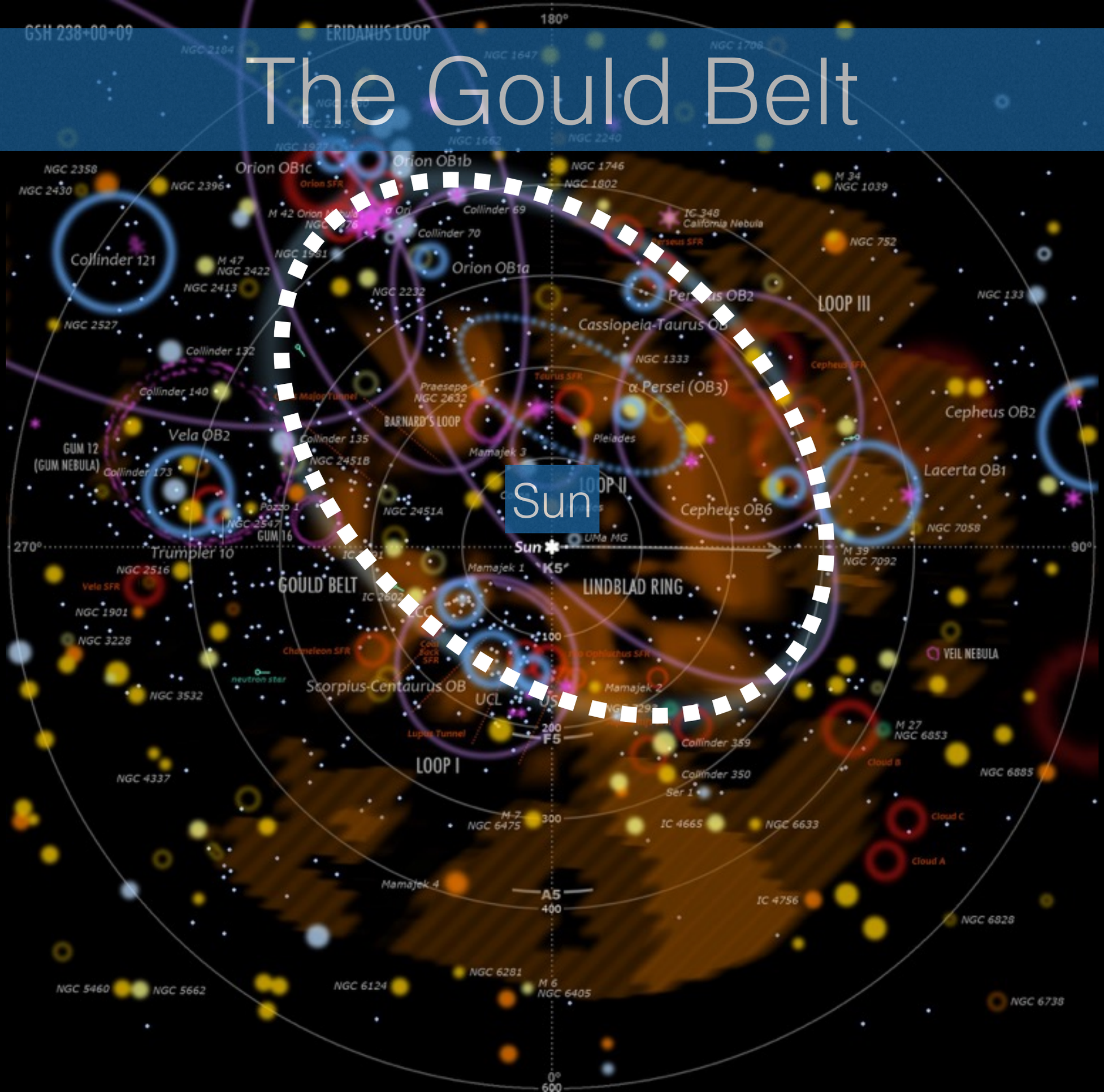
- Benjamin A. Gould 1879
- O & B stars in a big circle
- Origin: Unknown



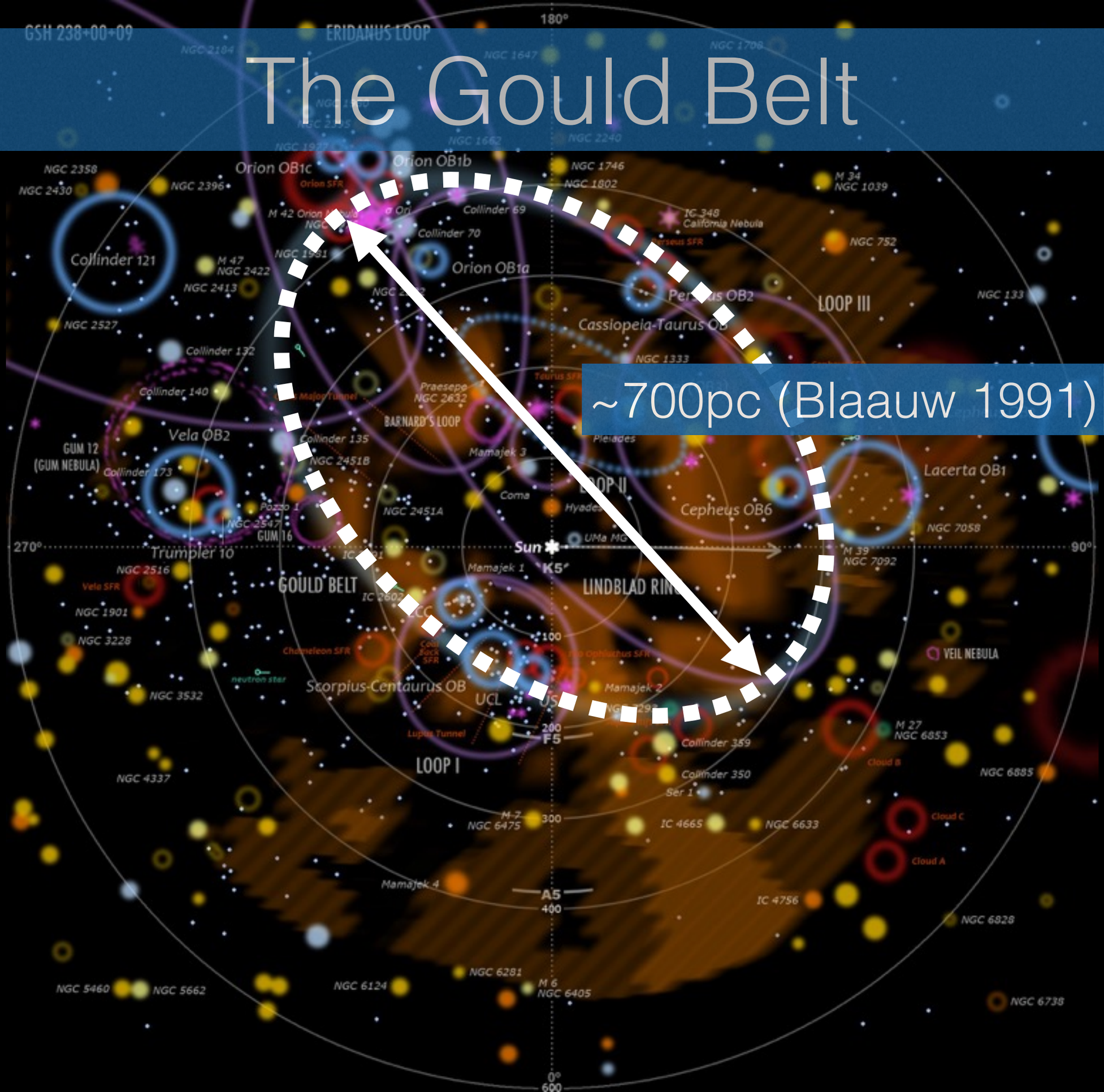
The Gould Belt



The Gould Belt



The Gould Belt



The Gould Belt

Orion OB1
<12 Myr

+Molecular Gas
(Lindblad 1974)

Perseus
OB2
~ 7 Myr

Cas-Tau
25~50 Myr

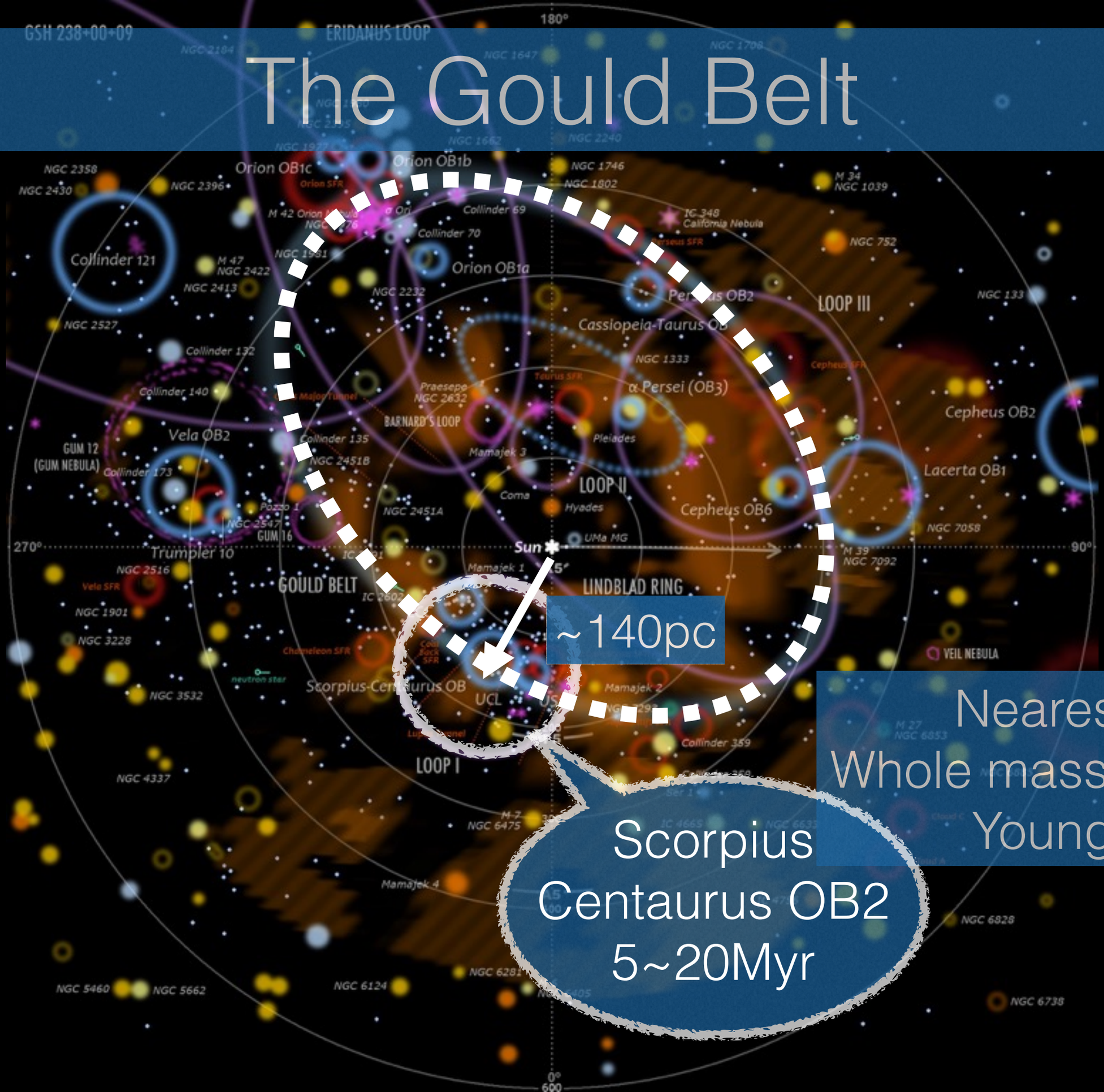
Scorpius
Centaurus OB2
5~20Myr

Introduction:
Blauww 1991

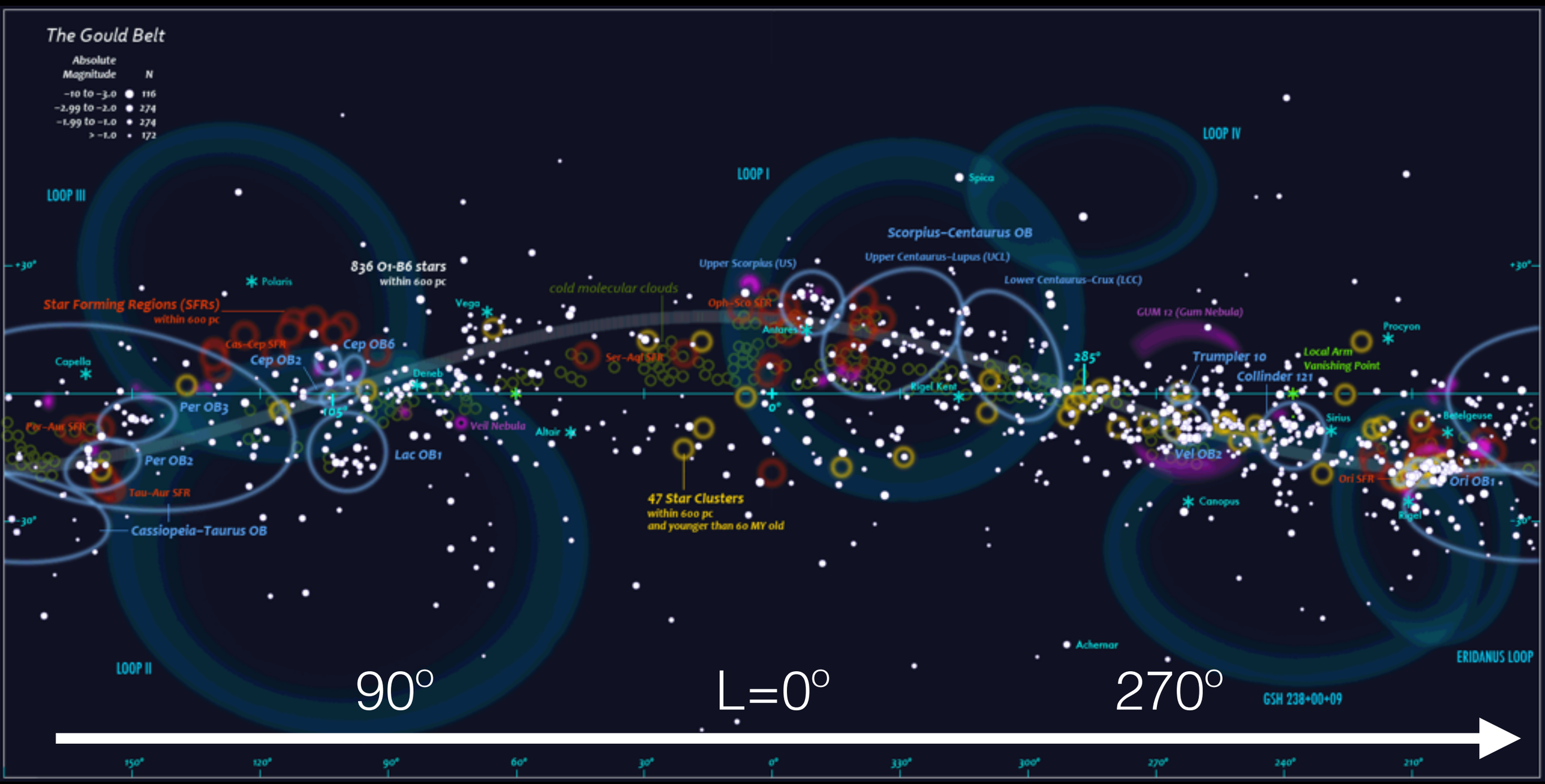
Complete census:
de Zeeuw et al. 1999

de Geus et al. 1989
Mamajek et al. 2002
Pecaut et al. 2012
Rizzuto et al. 2015

The Gould Belt



OB Associations in the Gould Belt



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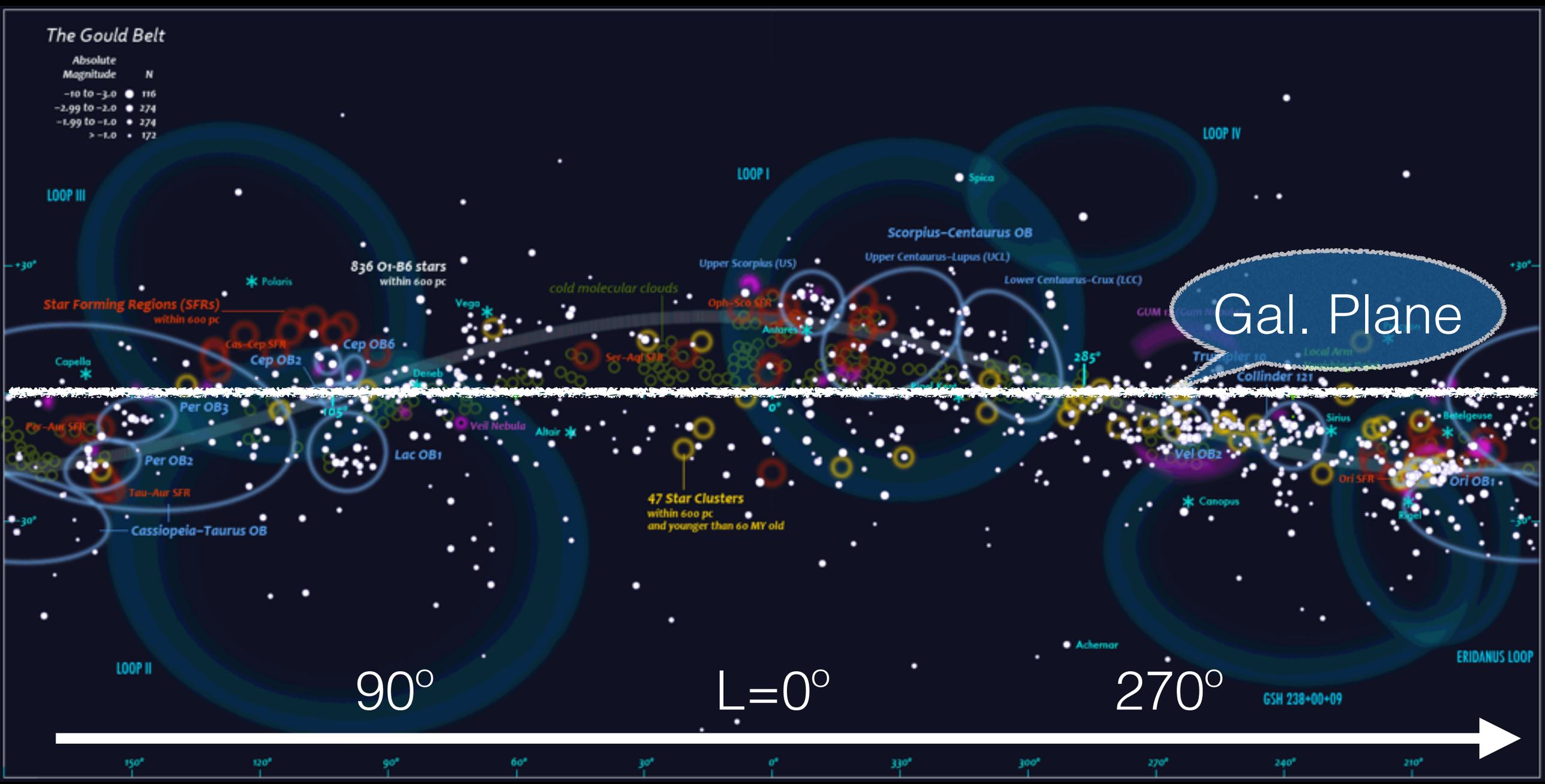

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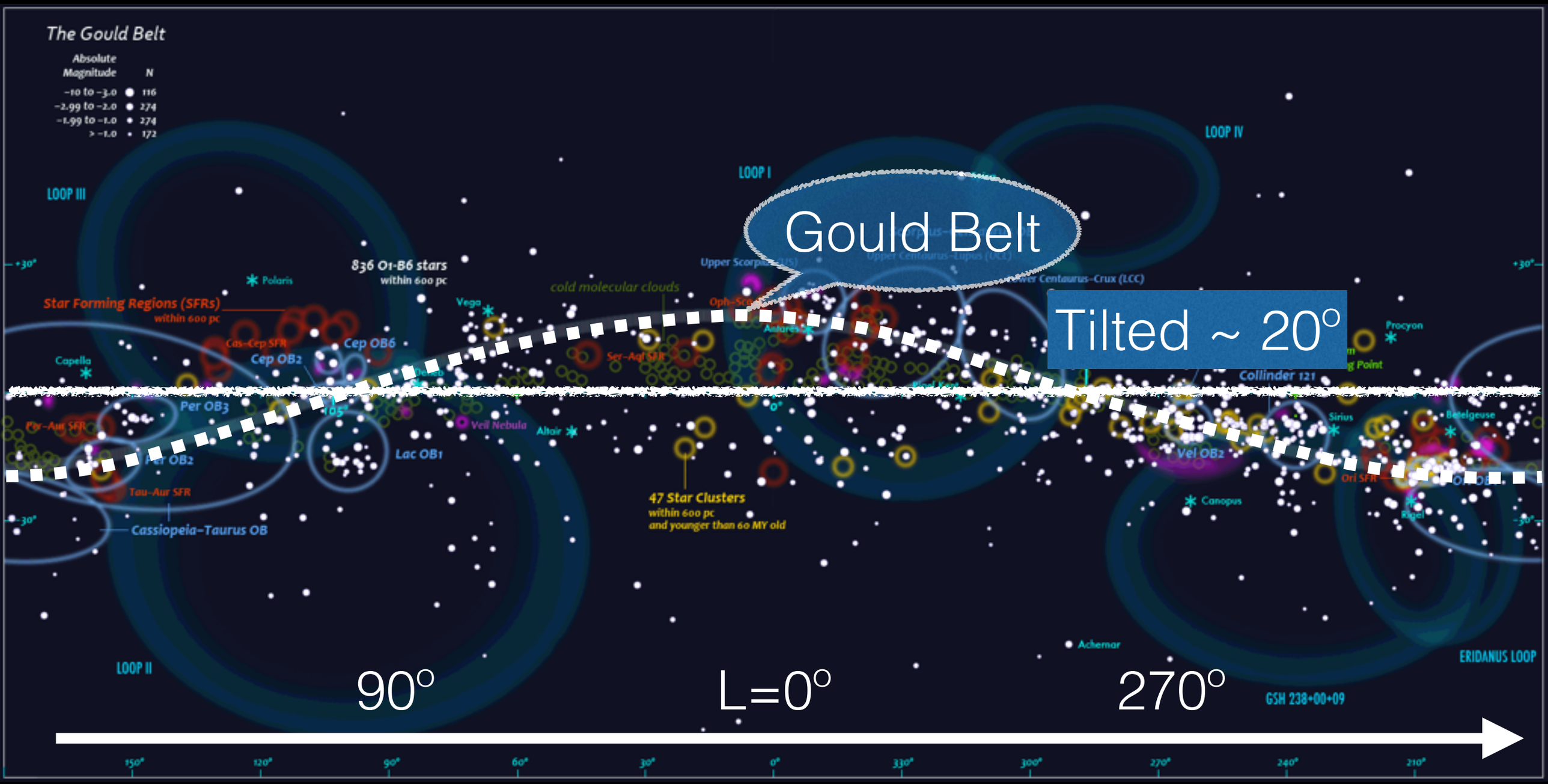
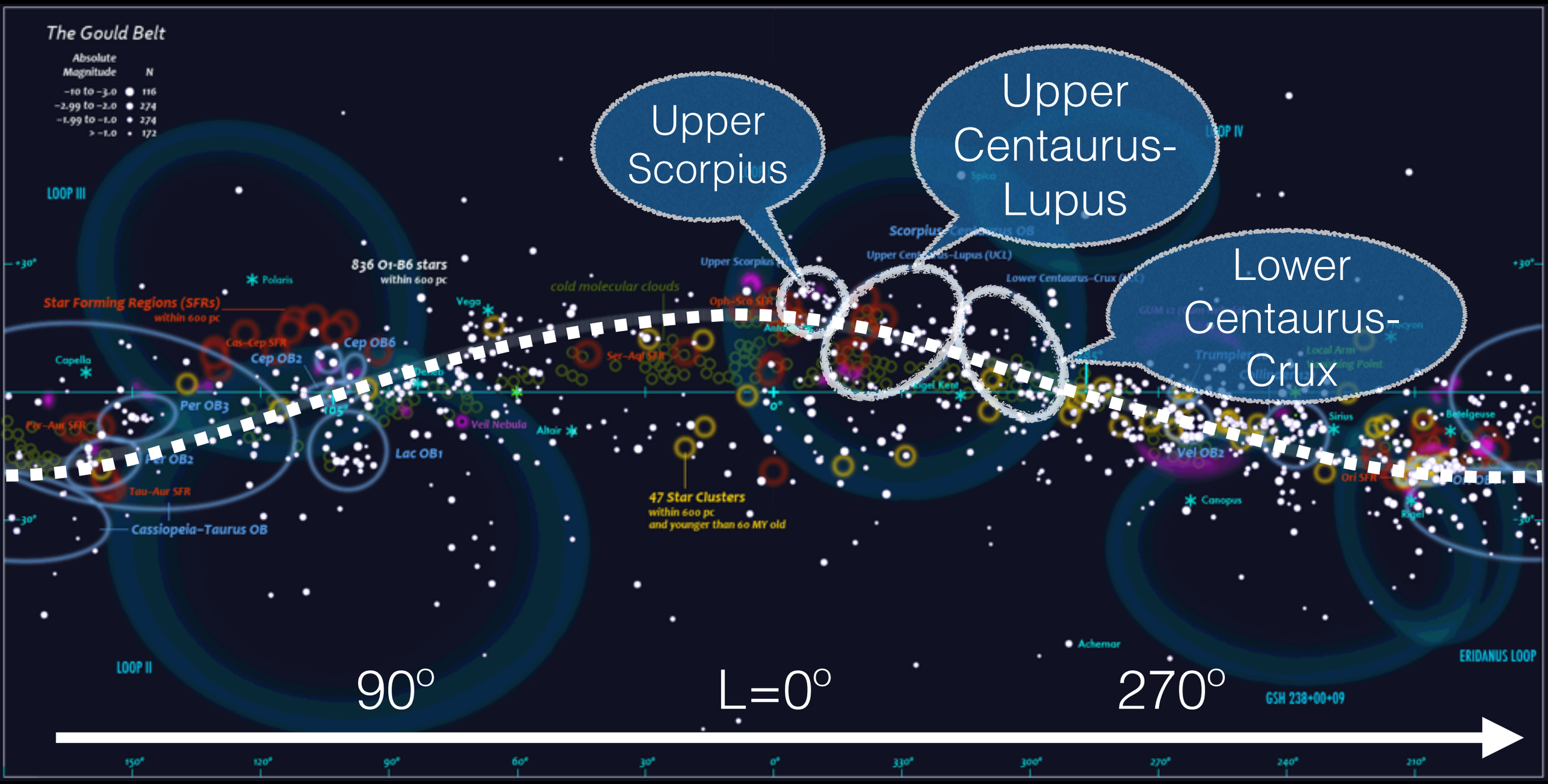
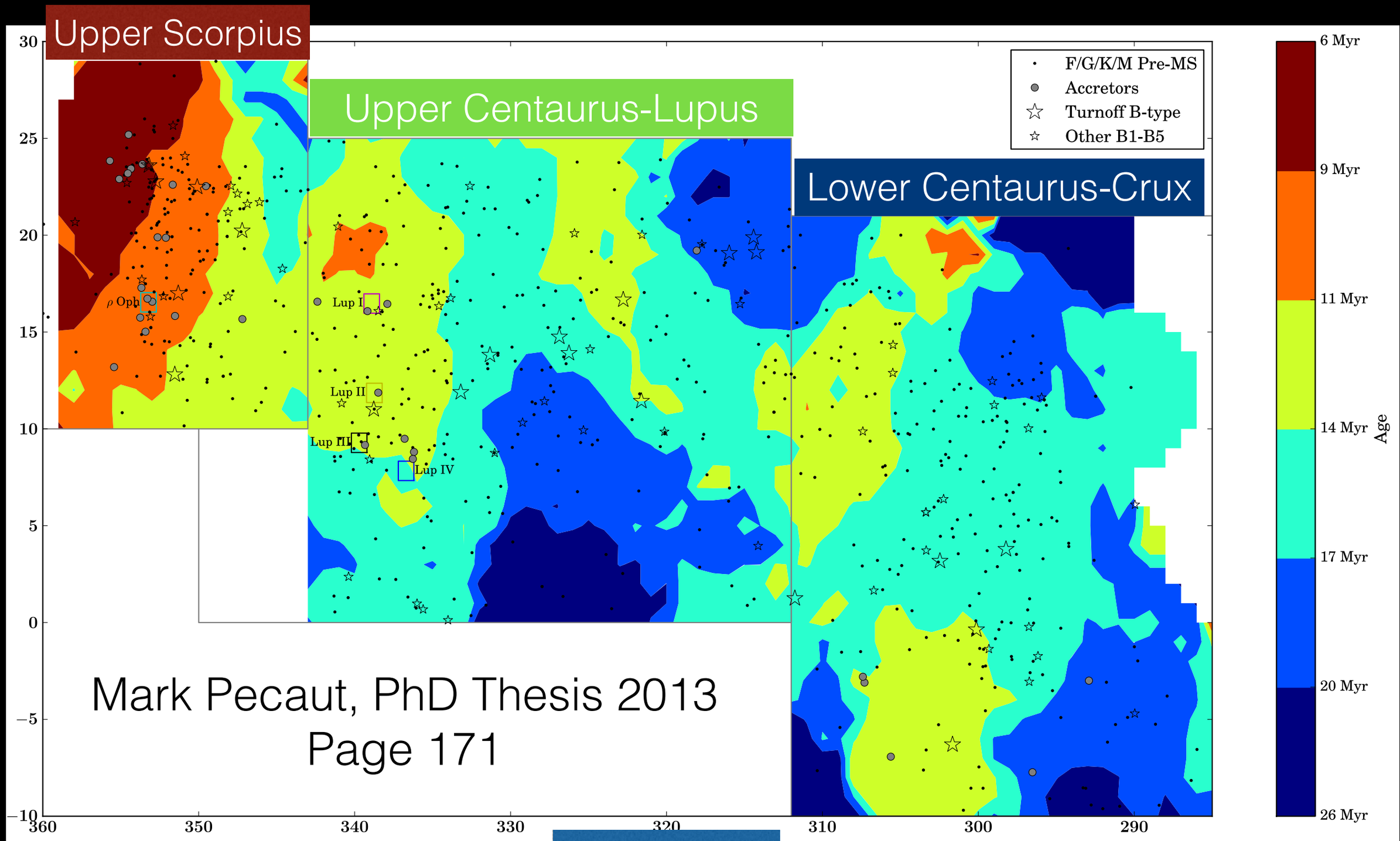


Scorpius-Centaurus OB2 in the Gould Belt



The Age Map in Sco-Cen



Mark Pecaut, PhD Thesis 2013
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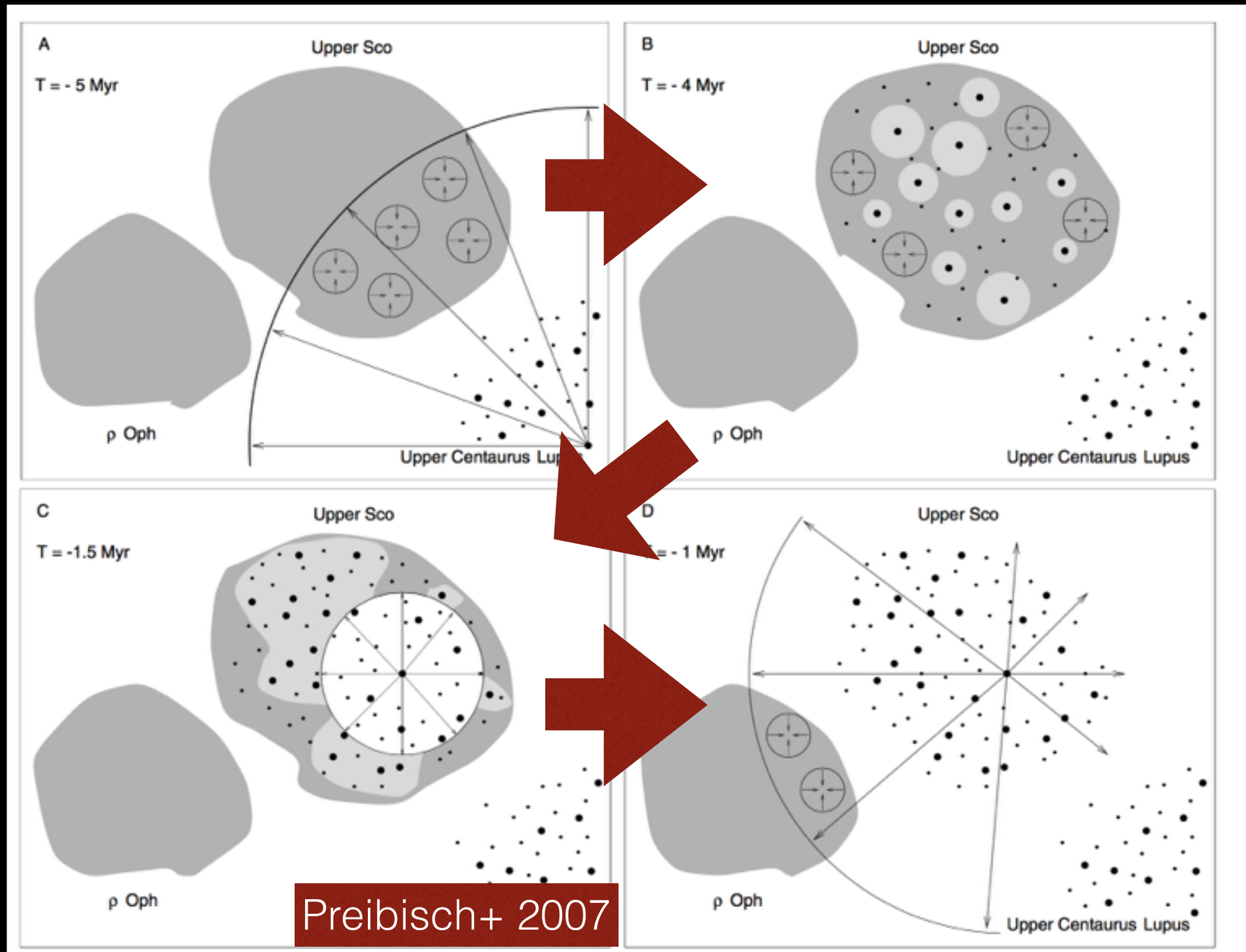
Sequential Star Formation

Adriaan Blaauw 1964, 1978, 1991

Elmegreen & Lada 1977, Thaddeus 1977



Preibisch+ 2007

Step 1:

Determine Membership

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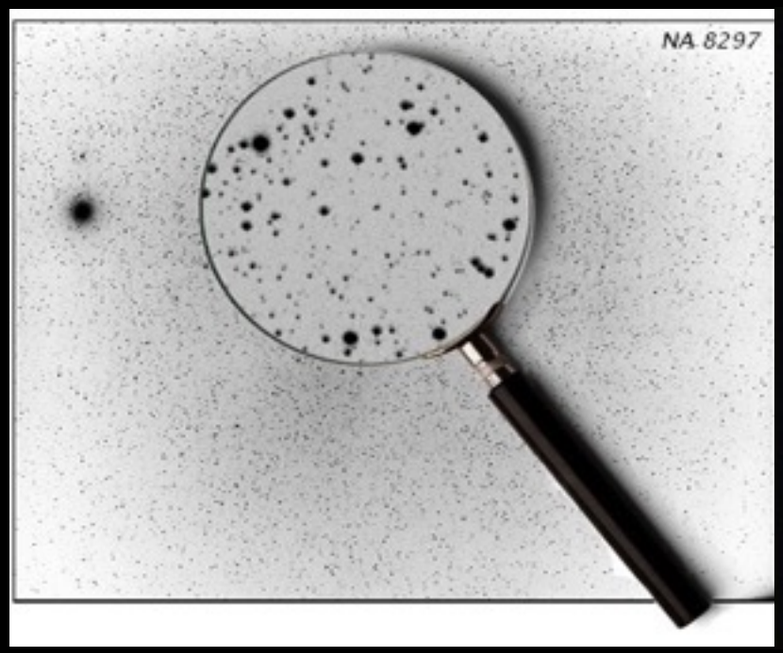
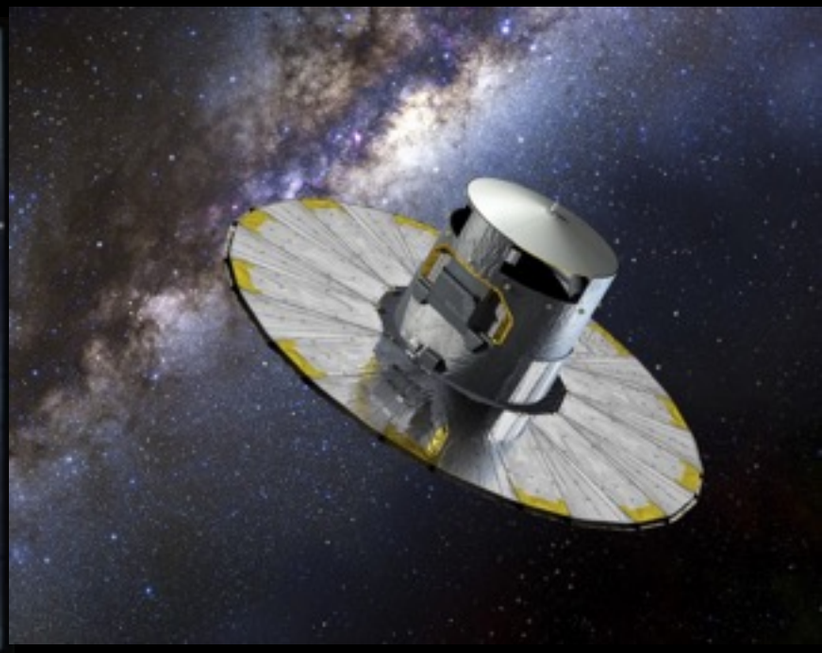
Determine Membership

- Measure the proper motions





Photographic plate

Long, long ago…

HIPPARCOS
1997

Gaia
~2017

sub-arcsec/yr

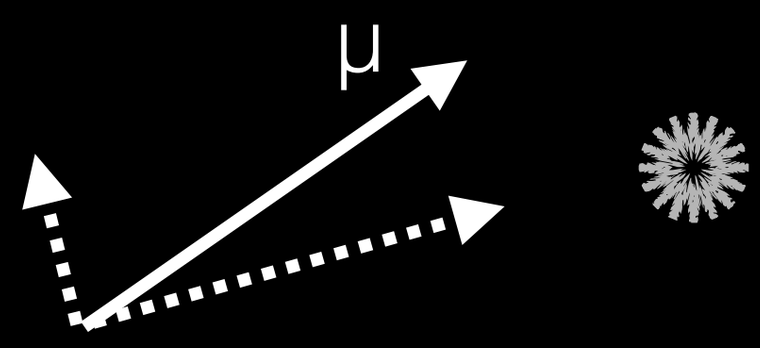
~mas/yr

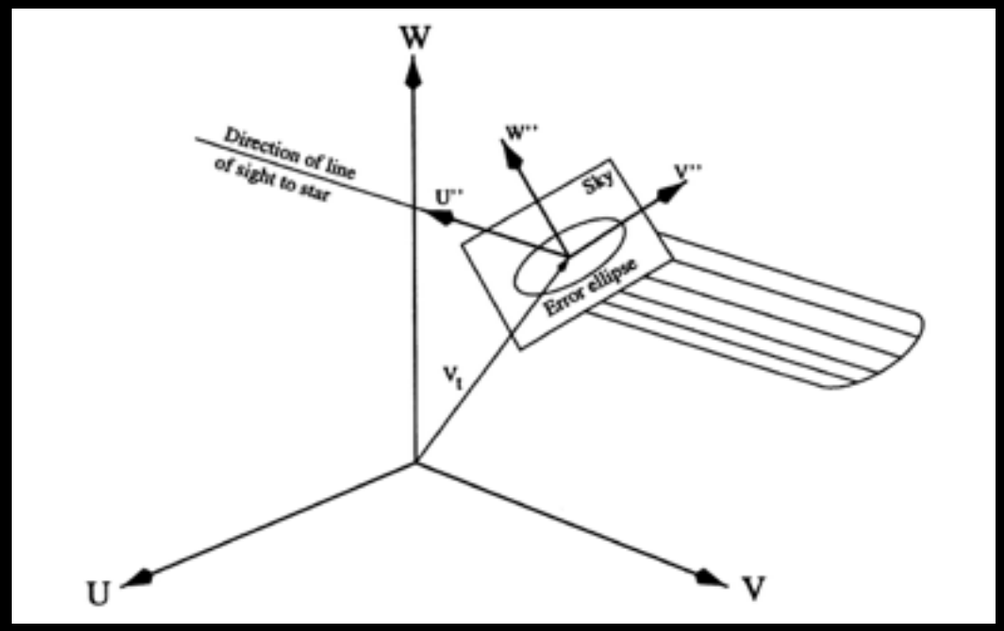
~50μas/yr

+RV! ~1km/s

Step 1:
Determine Membership

- Methods: convergent point + “spaghetti”





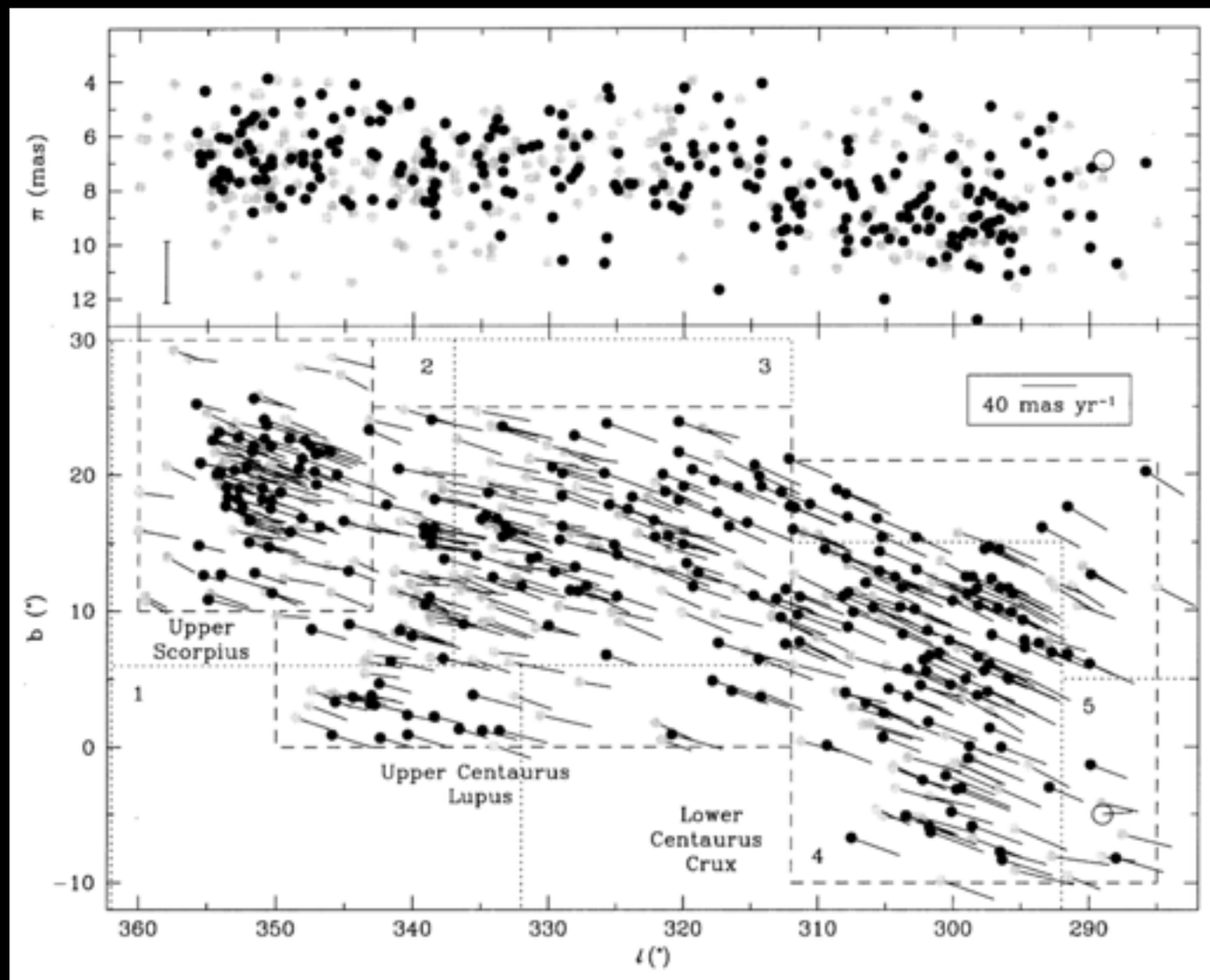
Convergent point
de Bruijne 1999

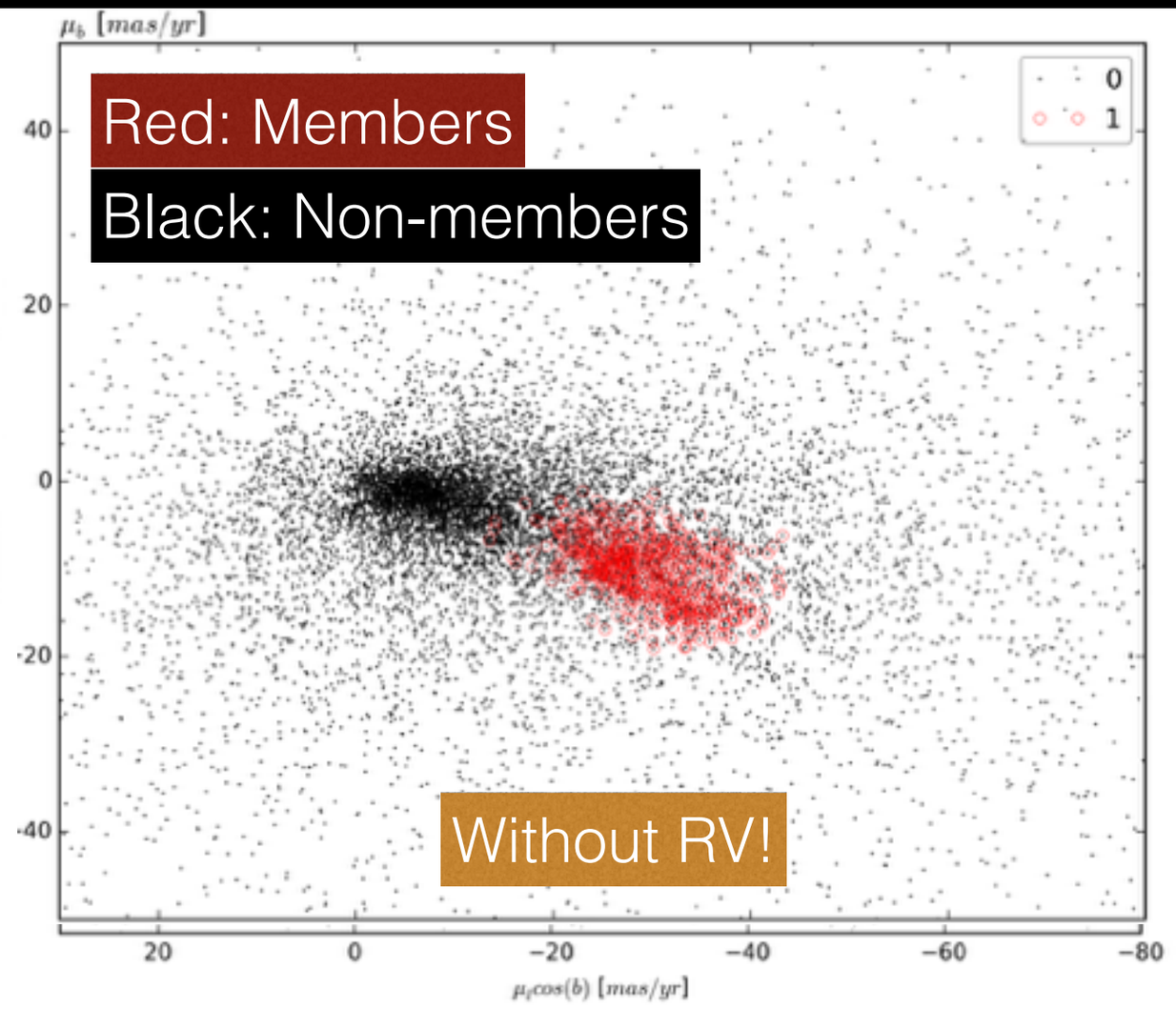
Spaghetti Method
Hoogerwerf et al. 1999

de Zeeuw et al. 1999

Step 1: Determine Membership

- Example - Sco OB2, 521 members





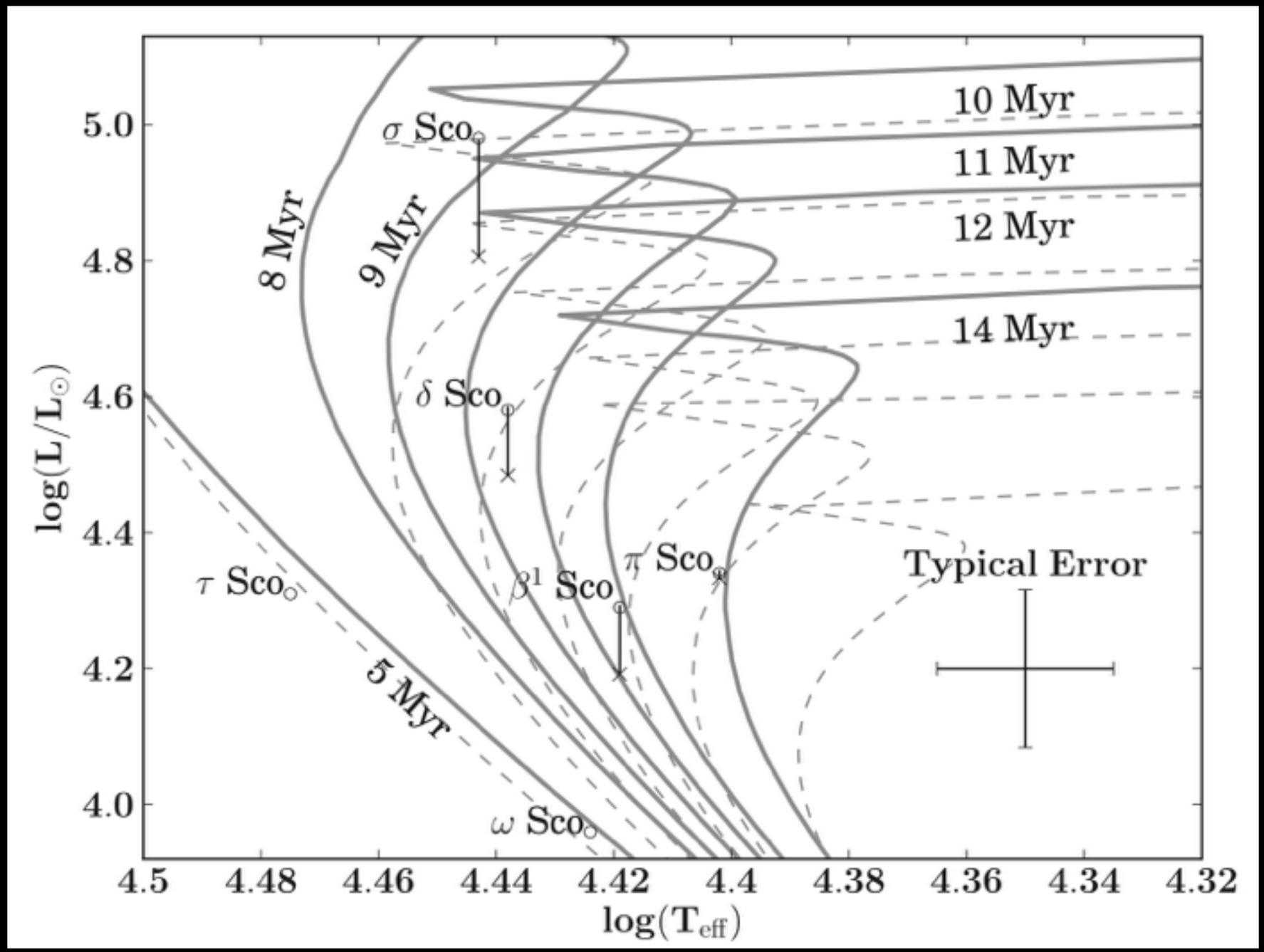
De Zeeuw et al. 1999

Step 2:

Determine Age

Step 2: Determine Age

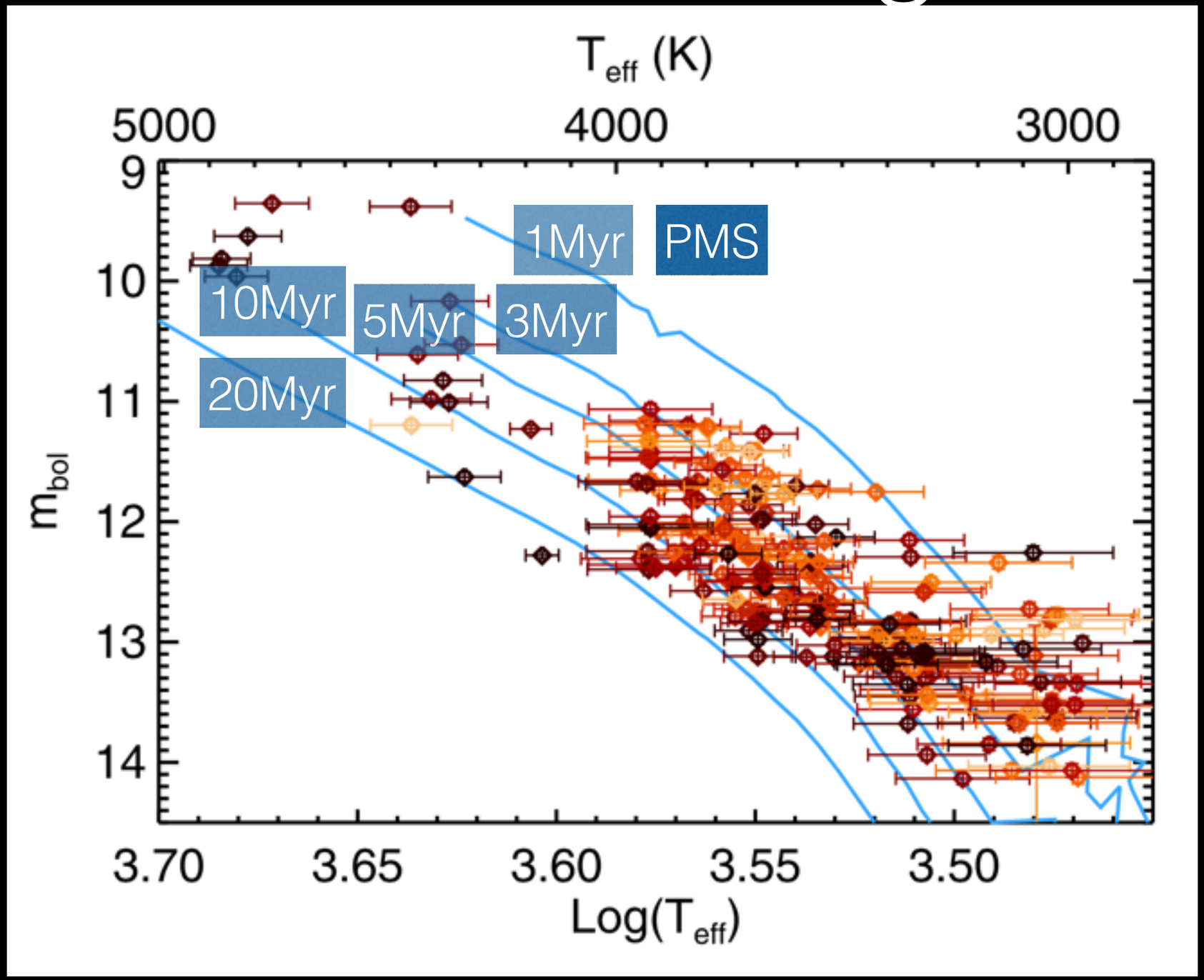
UScoHigh mass



Pecaut et al. 2012

Step 2: Determine Age

USco Low mass



Rizzuto et al. 2015

Sco OB2

- D ~ 140 pc
- Long. x Lat. x π = 75° x 40° x (12 ~ 4 mas)
- Age Gradient: [5~11 Myr] - [16 Myr] - [17 Myr]

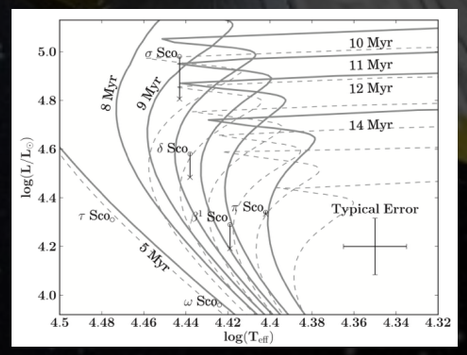
de Geus et al. 1989
Mamajek et al. 2002
Pecaut et al. 2012
Rizzuto et al. 2015

Kinematic

- 521 Members (High & mid mass) & 100+ (Low mass)

Gaia

- 1st release: 20x precise PM on existing HIP PM
- Complete population with PM and RV
  - More members, better stat.
- Less error —> velocity dispersion
- Expansion, velocity-mass relation, binaries, runaways, etc.
- Photometry: complete HRD
- —> Origin of the Gould Belt



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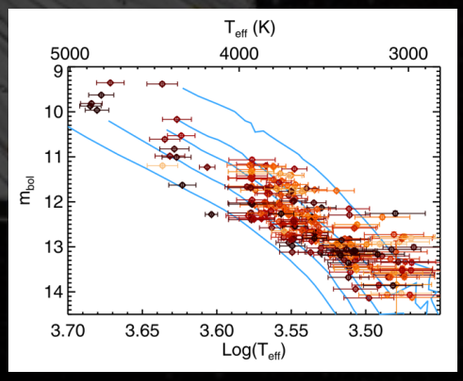
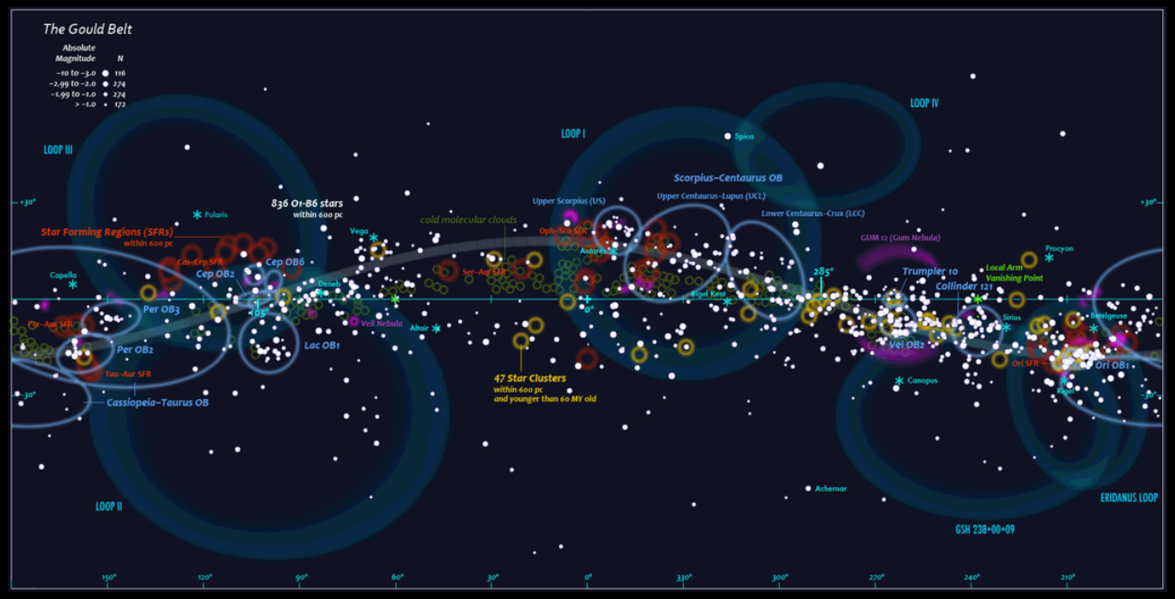


Key Points



- The Gould Belt: Origin?
  - configuration
- Sco OB2: Start point, Sequential SF
- Gaia: PM+RV, complete population in the Gould Belt

Sources of illustration Pictures

binary sf
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single sf
http://starformation.synthasite.com

OB association
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