3D dust distribution in the Galaxy based on LAMOST

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OUTLINE

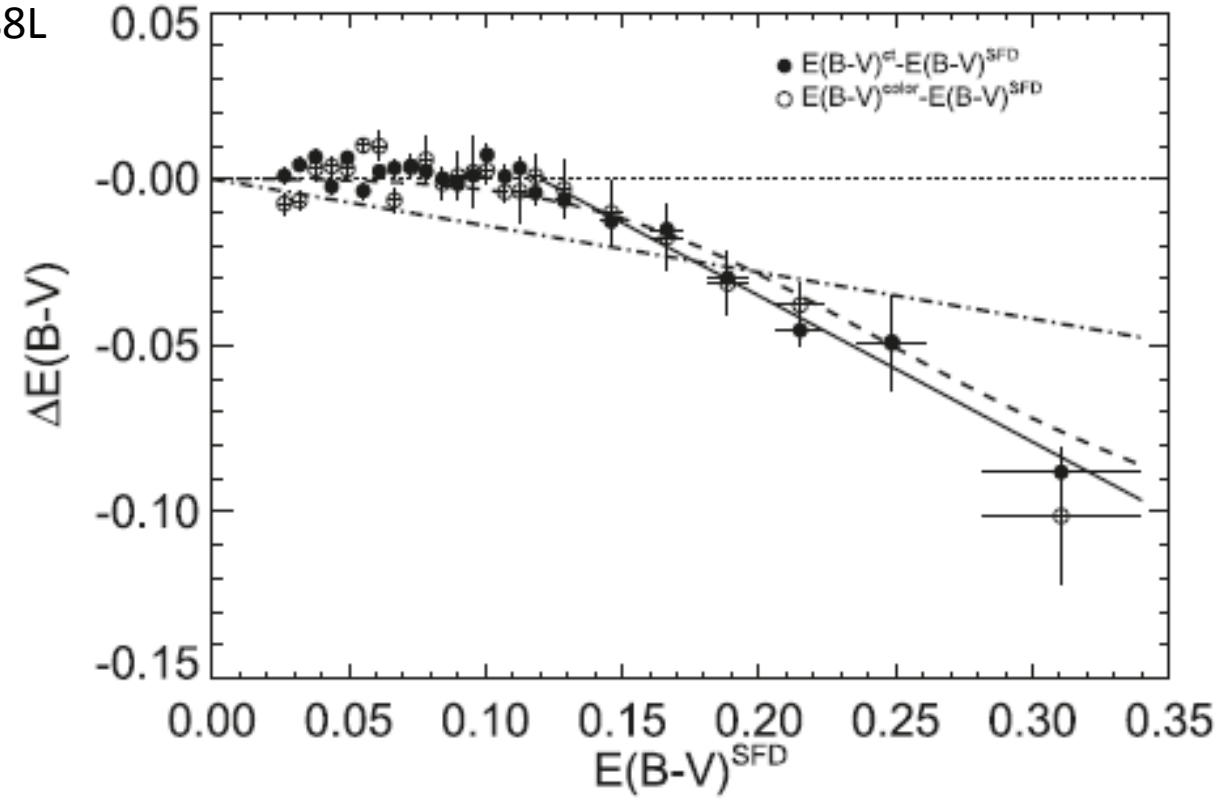
- background
- Data and method
- Primary result
- Future work

background

➢ 2D Galactic extinction based on SCUSS

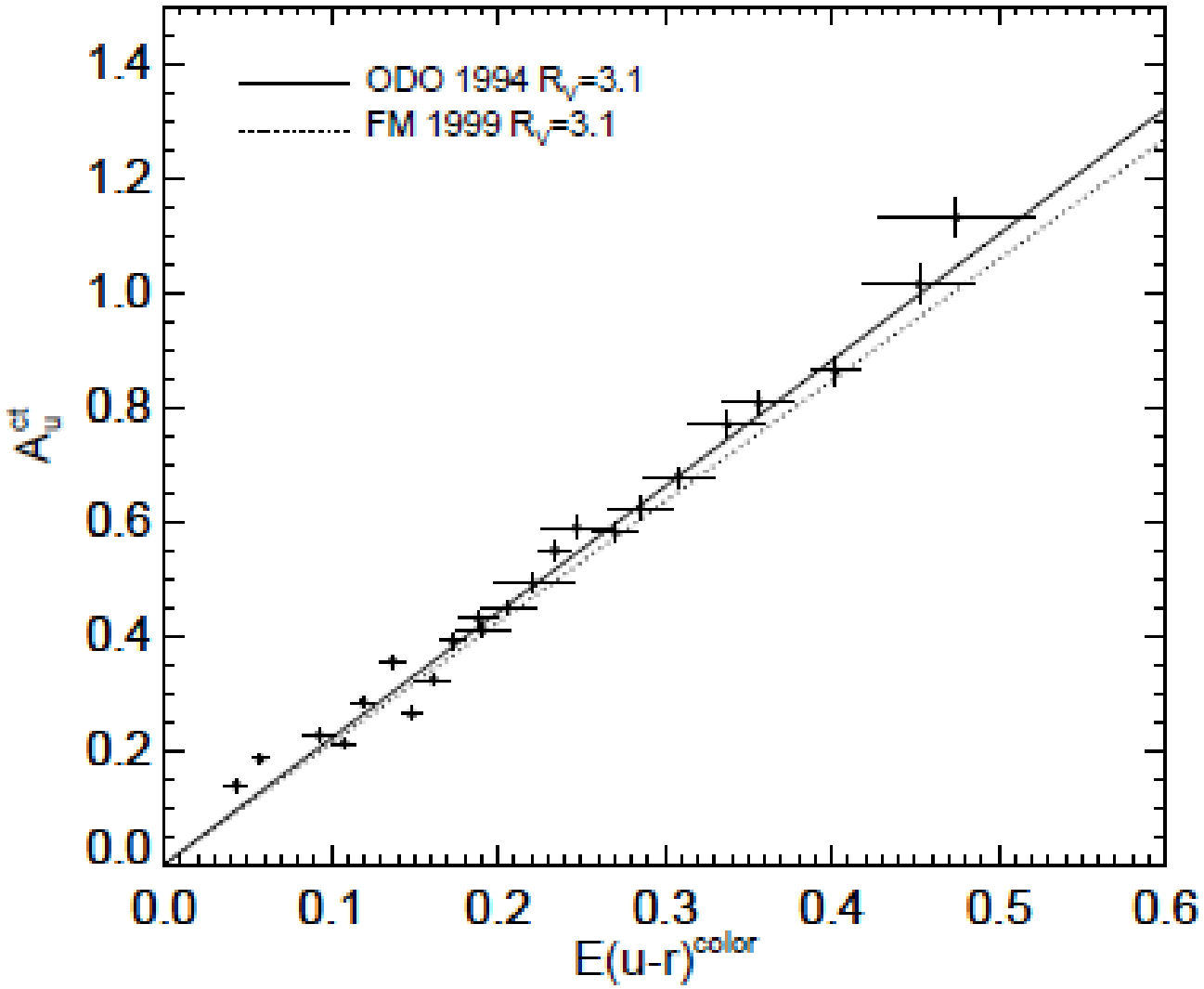
Li et al. 2017 AJ 153 88L

$b < -30^{\circ}$



$E(B-V)_{SFD} < 0.12$ mag: the extinction and reddening from the number counts and color distribution are in good agreement with the SFD results.

$E(B-V)_{SFD} > 0.12$ mag: the SFD map overestimates the Galactic reddening systematically, $\Delta E(B-V) = 0.43[E(B-V)_{SFD}-0.12]$.



The Galactic extinction curve is in good agreement with the RV = 3.1 extinction law of O'Donnell (1994).

- **Many works on 3D extinction map.**

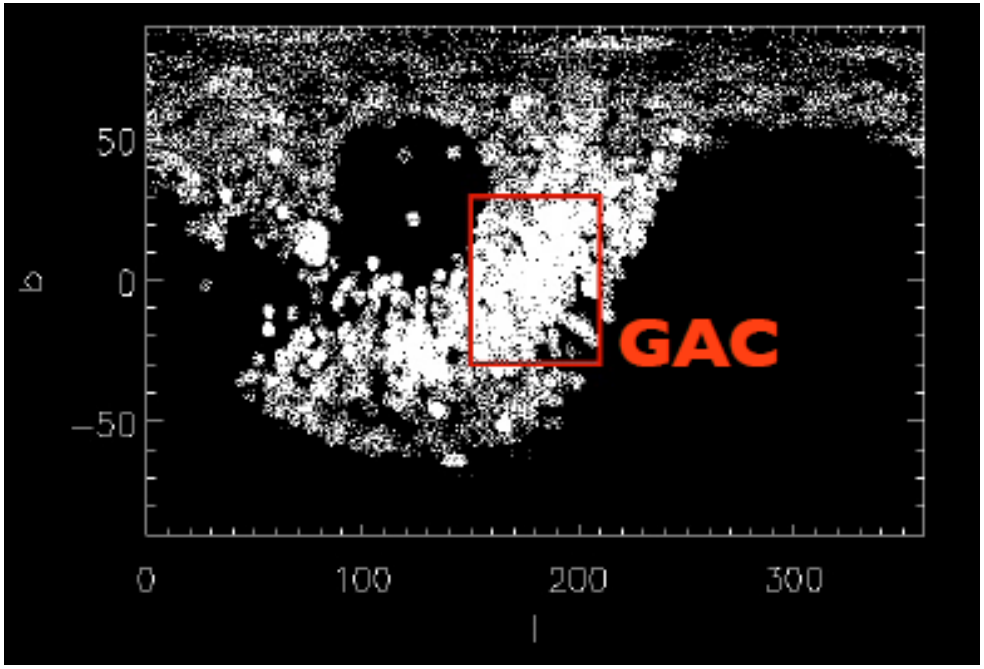
  (Sale et al.2014; Chen et al. 2014; Hanson et al. 2016)

- **What's the smooth structure of dust distribution?**

	scale length (kpc)	scale height (pc)
Drimmel et al.2001	2.26	134
Sharma et al. 2011	4.20	88
Pandey et al. 1987	---	160
Joshi 2005	---	125

Data

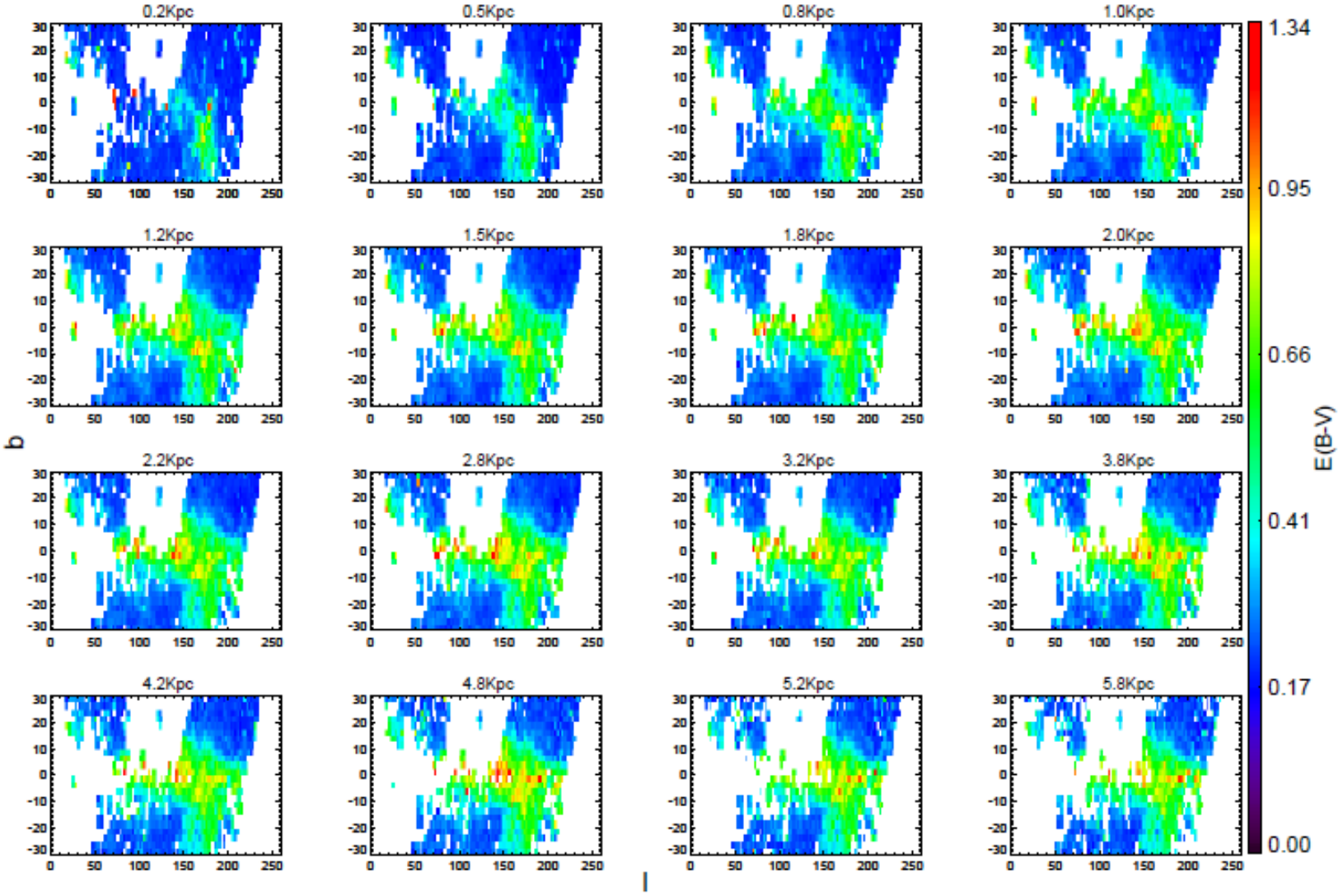
6M stars with independent, accurate measurement of E(B-V) and distance by Yuan et. al.



$$-30^\circ < b < 30^\circ$$

● method

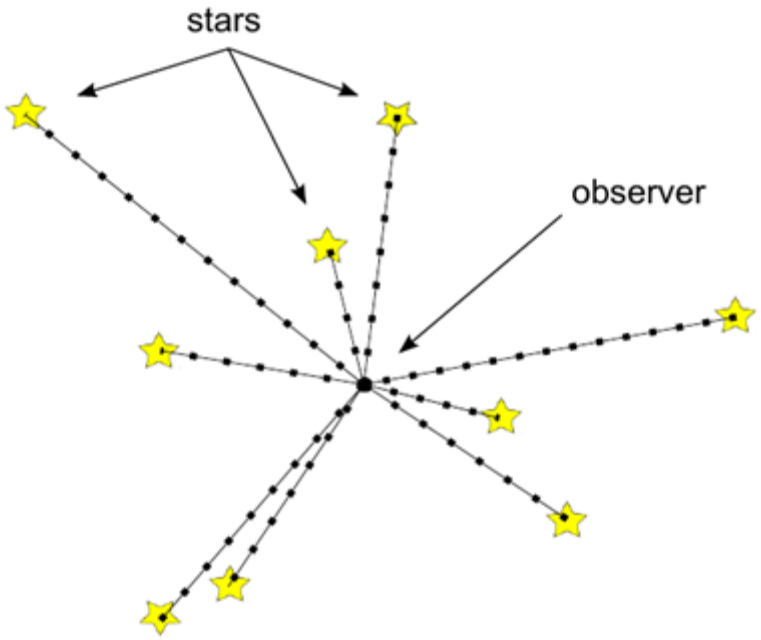
$$E_i^{observe}(l_i, b_i, r_i) : 2.5^\circ \times 2.5^\circ \times 250\,pc$$



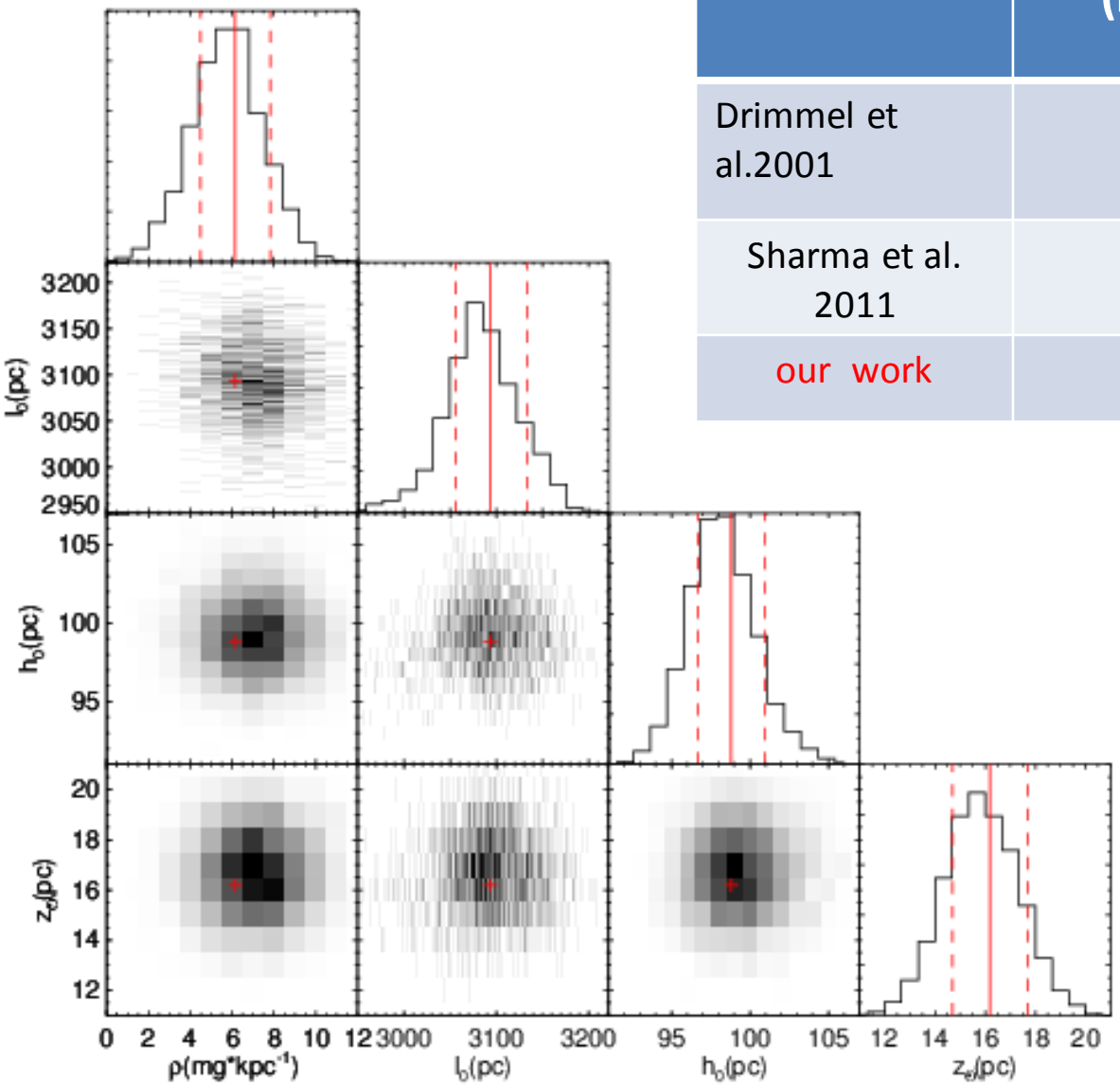
$$E_i^{\mathrm{mod}\,el} = \int_0^{\infty} \rho_{D\mathrm{ust}}(l_i, b_i, r_i)\,dr$$

$$\rho_{Dust}(l,b,r) = \rho_0 \exp[-\frac{R}{l_0} - \frac{|z|}{h_0}]$$

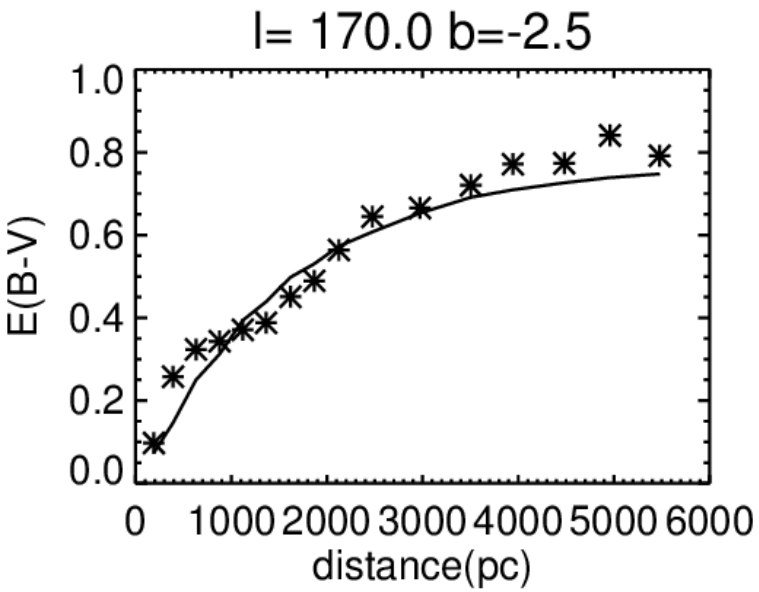
MCMC fit : $\rho_0, l_0, h_0, Z_\odot$

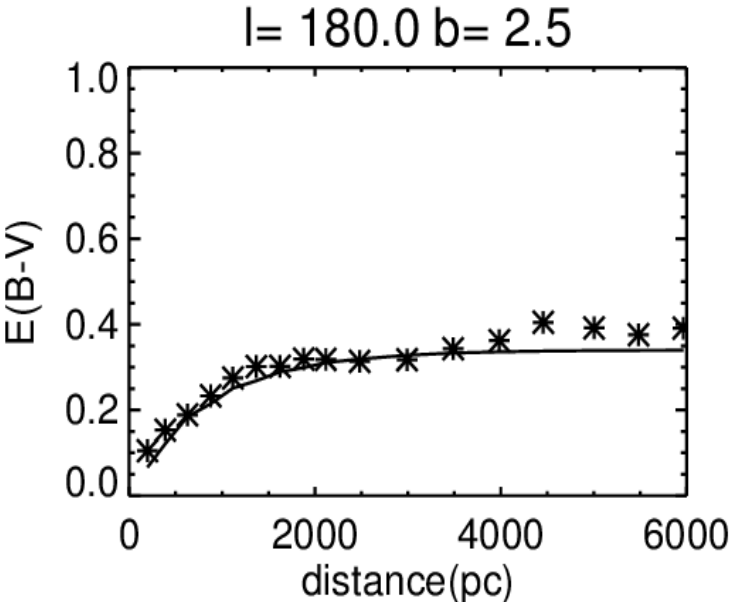


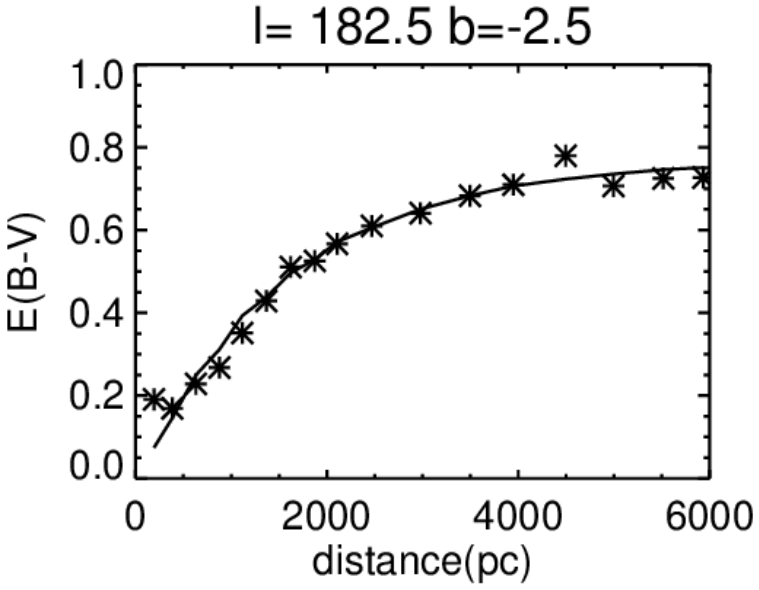
Primary result

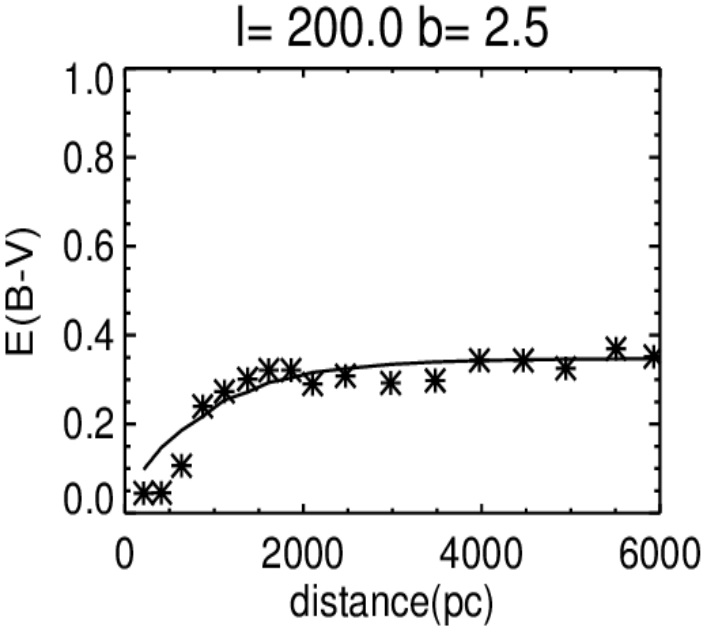


	Scale length (kpc)	scale height (pc)
Drimmel et al.2001	2.26	134
Sharma et al. 2011	4.20	88
our work	3.09	98

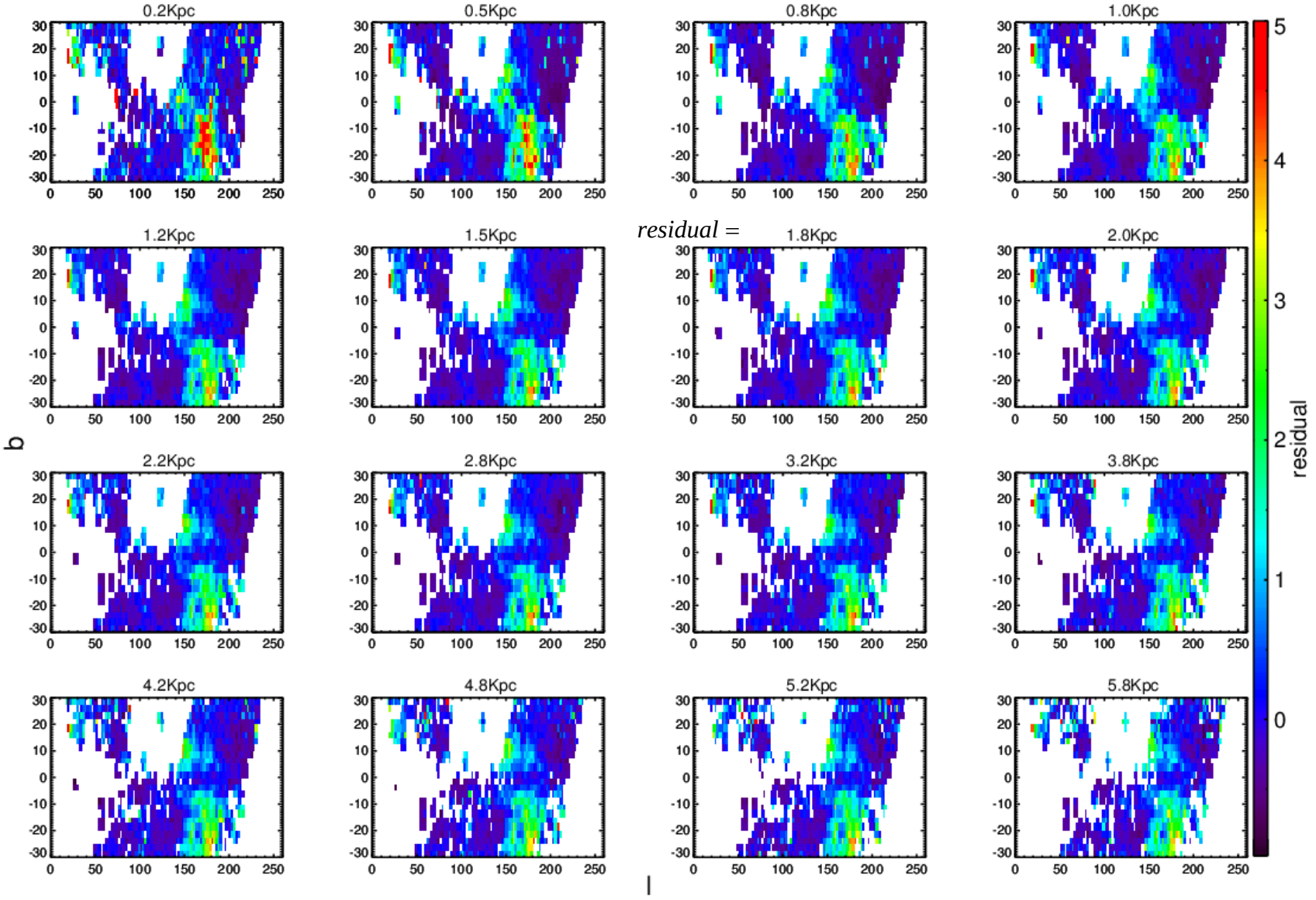

l= 170.0 b=-2.5
E(B-V)
distance(pc)
0.0
0.2
0.4
0.6
0.8
1.0
0
1000
2000
3000
4000
5000
6000

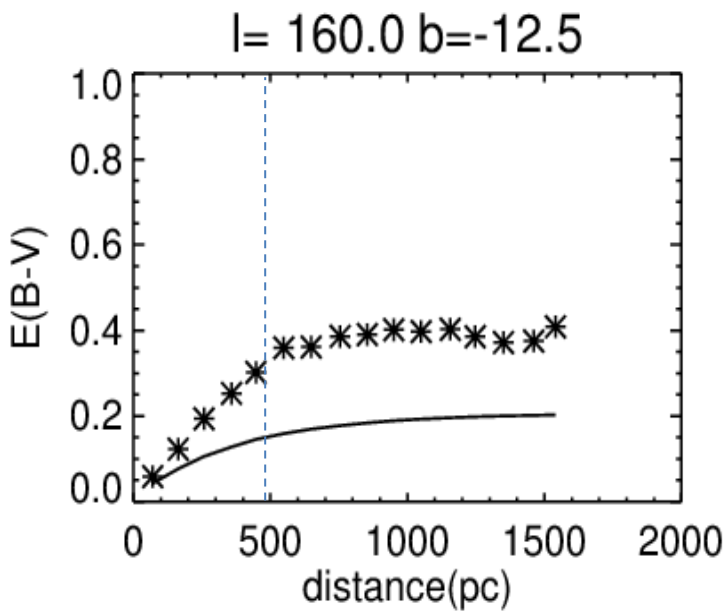

l= 180.0 b= 2.5
E(B-V)
distance(pc)
0.0
0.2
0.4
0.6
0.8
1.0
0
2000
4000
6000

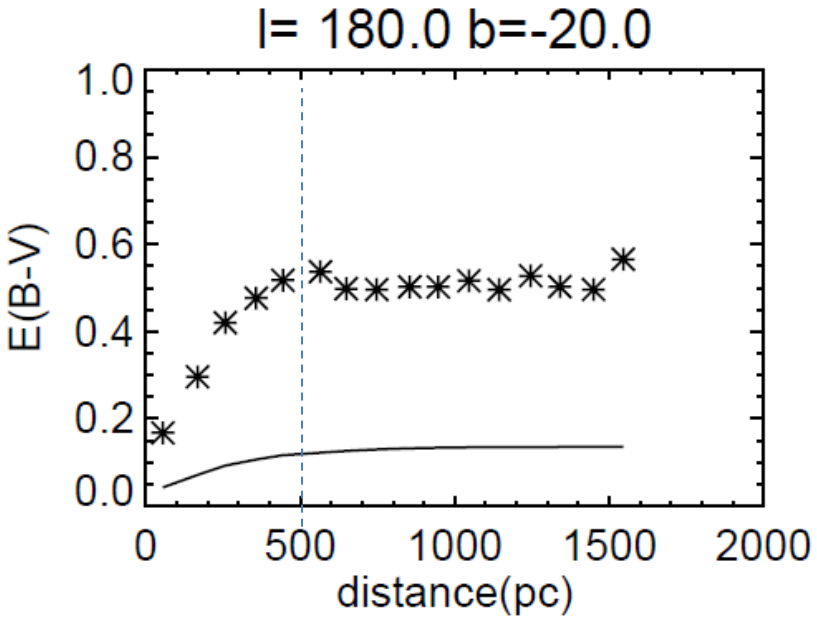

l= 182.5 b=-2.5
E(B-V)
distance(pc)
0.0
0.2
0.4
0.6
0.8
1.0
0
2000
4000
6000

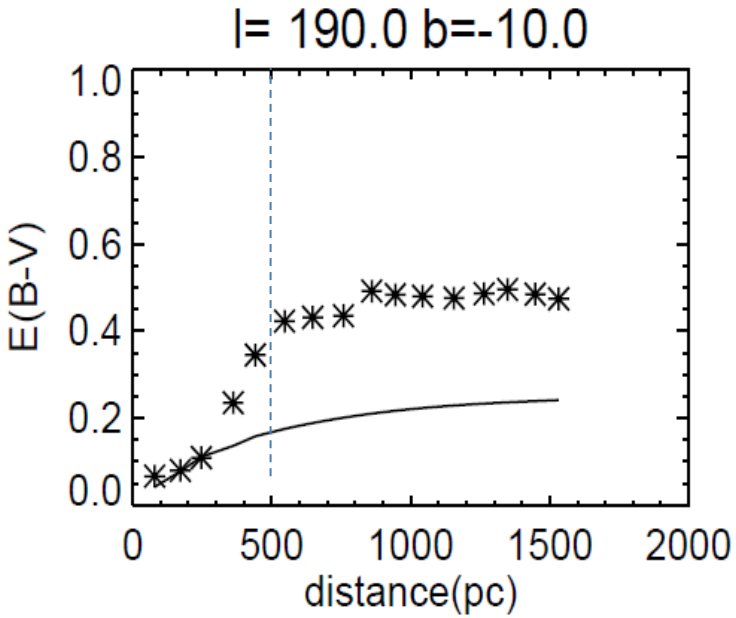

l= 200.0 b= 2.5
E(B-V)
distance(pc)
0.0
0.2
0.4
0.6
0.8
1.0
0
2000
4000
6000

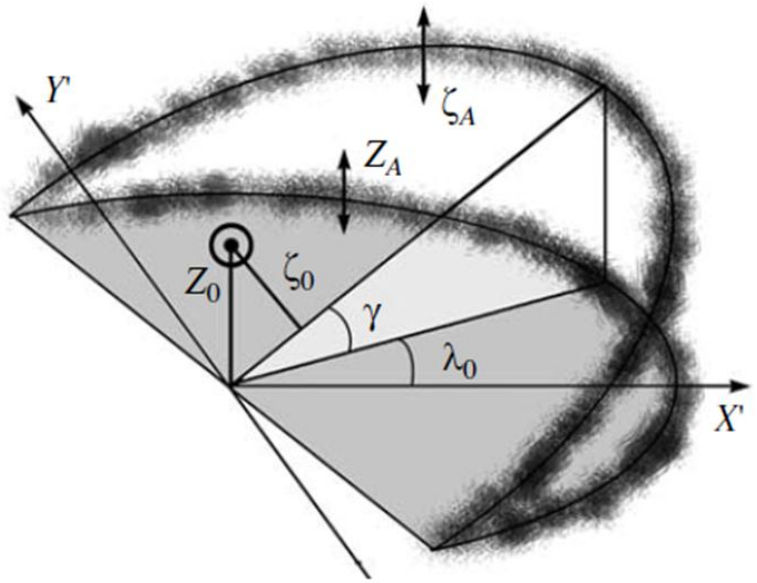
$$residual = (E_{ob} - E_{mo})/E_{mo}$$







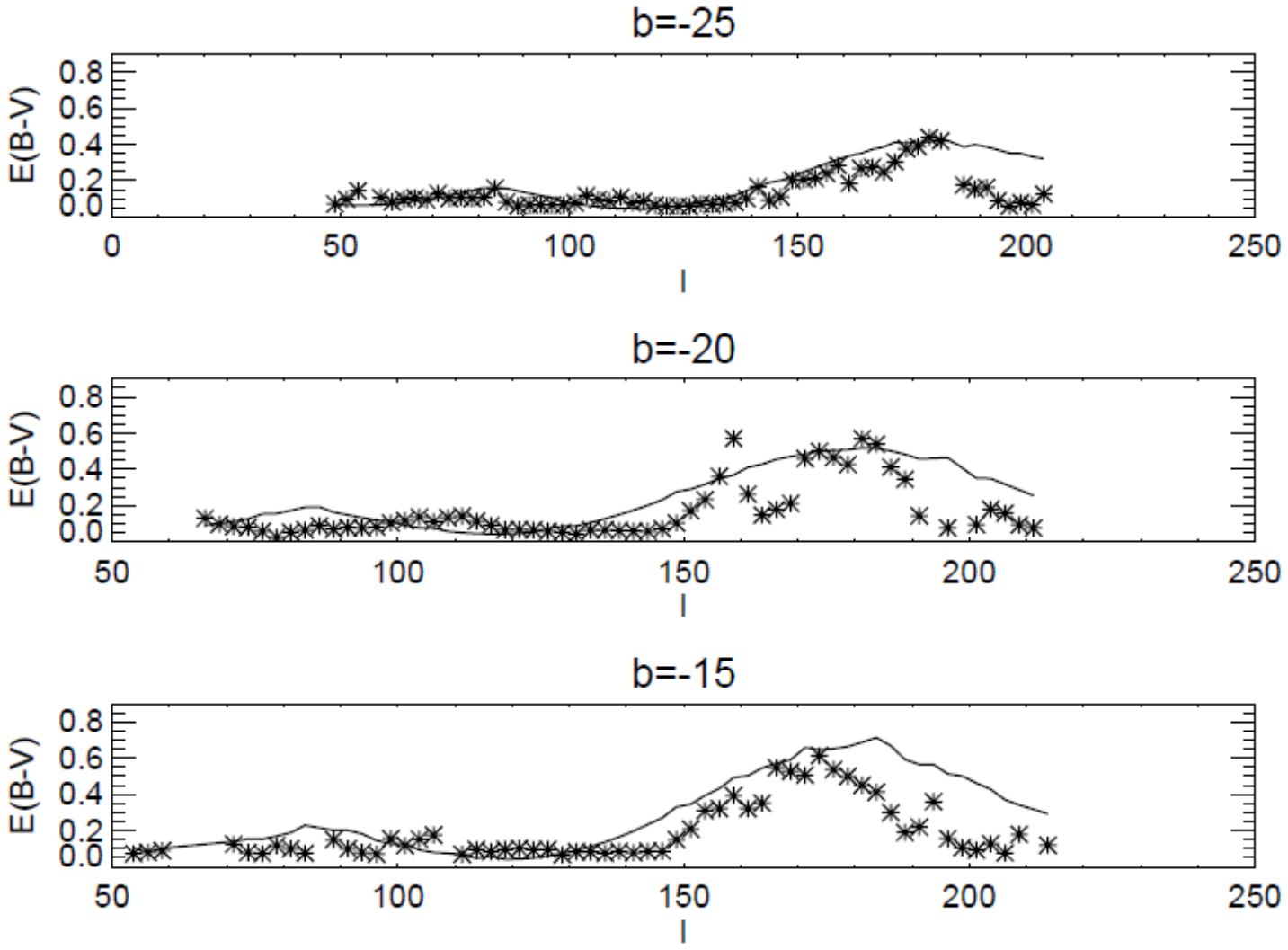




Gontcharov 2009 Gould Belt

Future work

500pc



Thank you !