

Different red disc-like galaxies at intermediate/high redshifts

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in collaboration with:

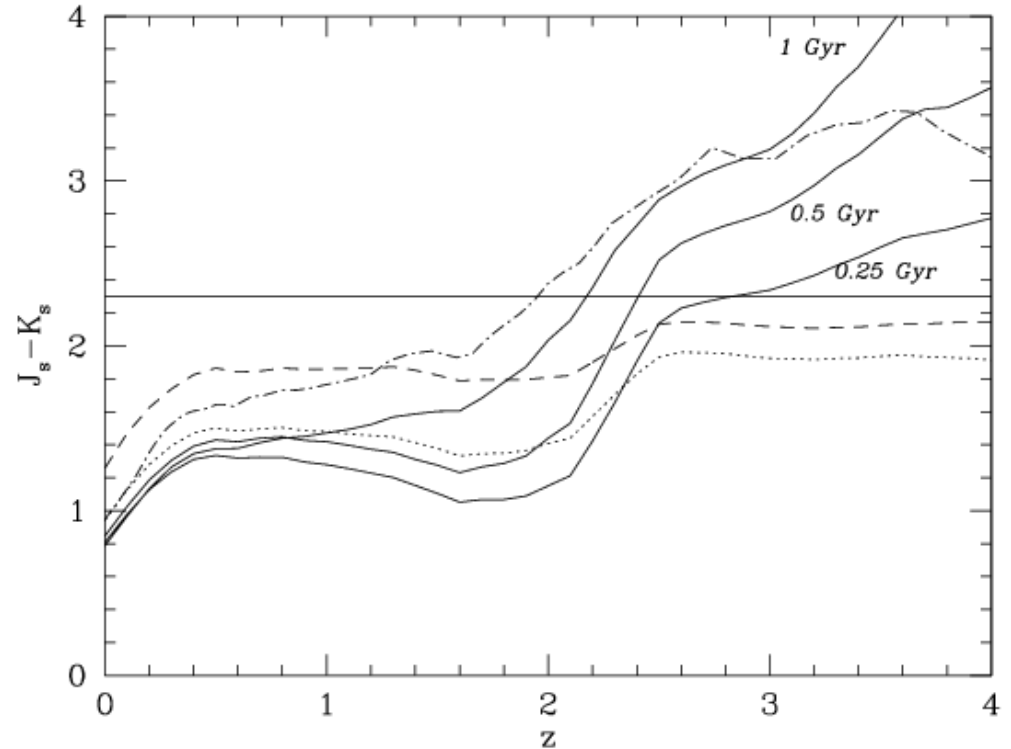
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A.N. Witt (Un. of Toledo)

Outline

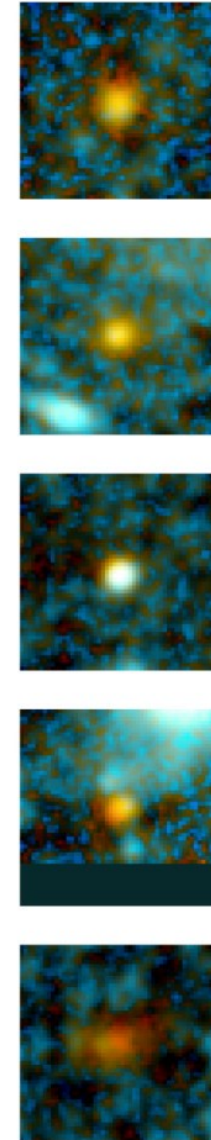
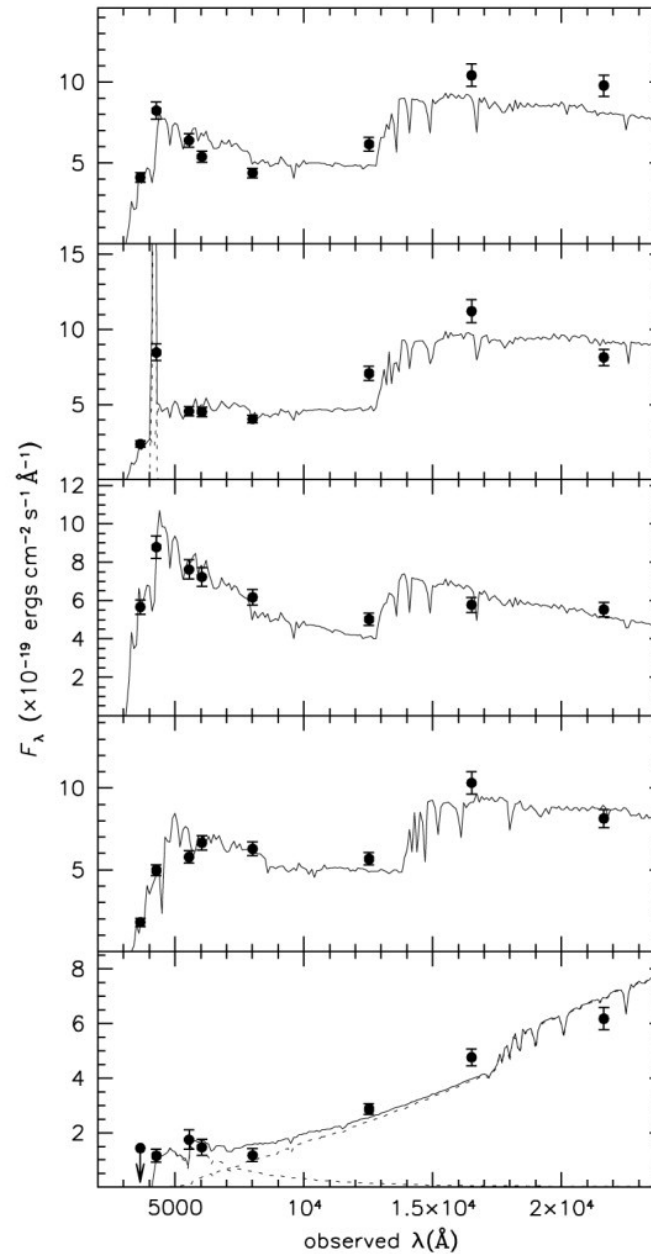
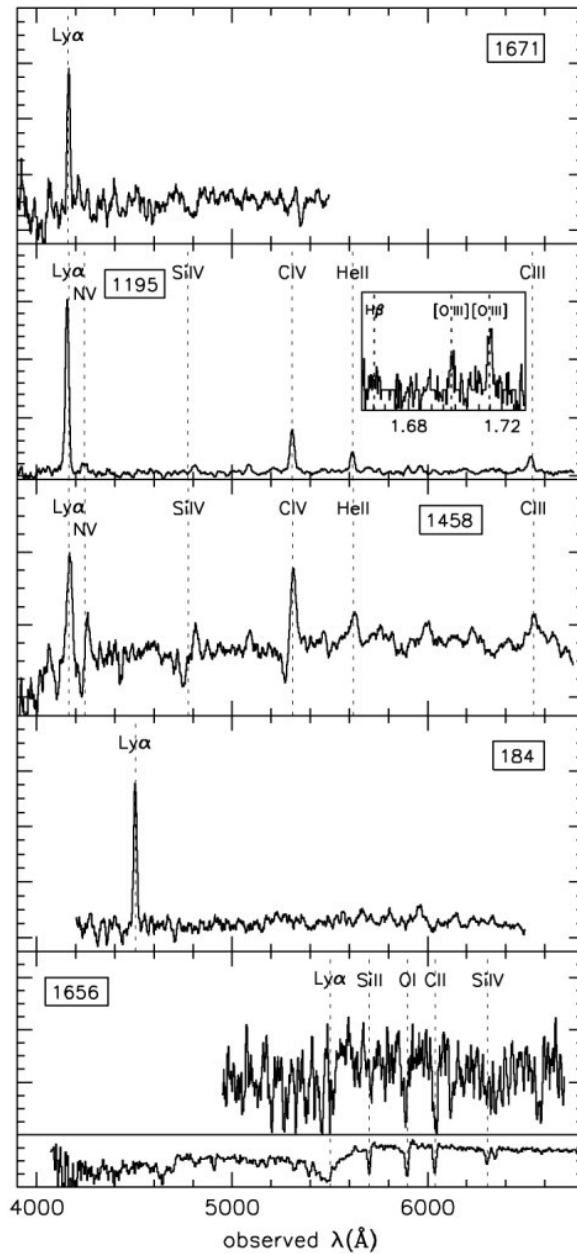
- Distant Red Galaxies
- J-K selected disc-like galaxies from GOODS
- How to obtain $J-K > 2.3$ with models
- Results
- Conclusions

Distant Red Galaxies

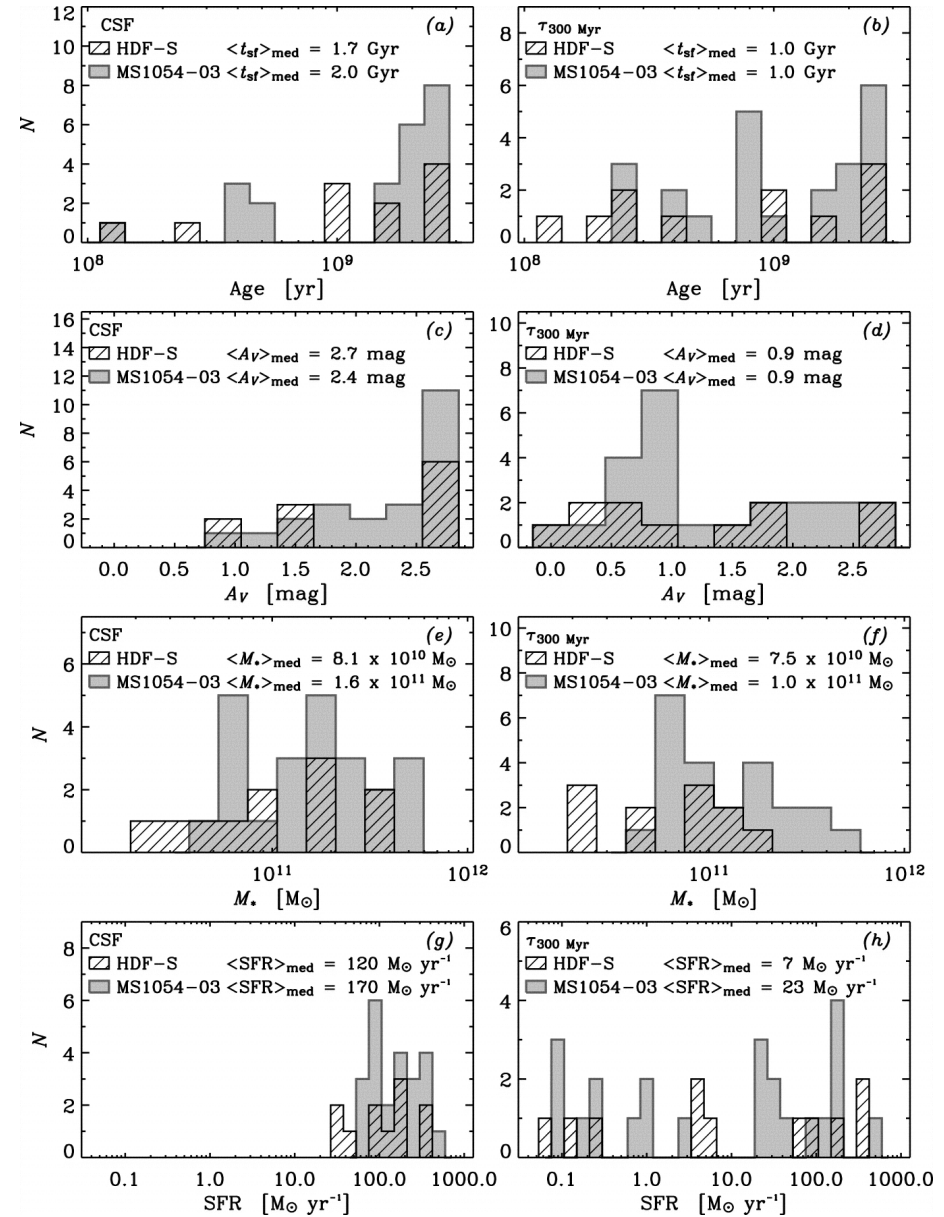
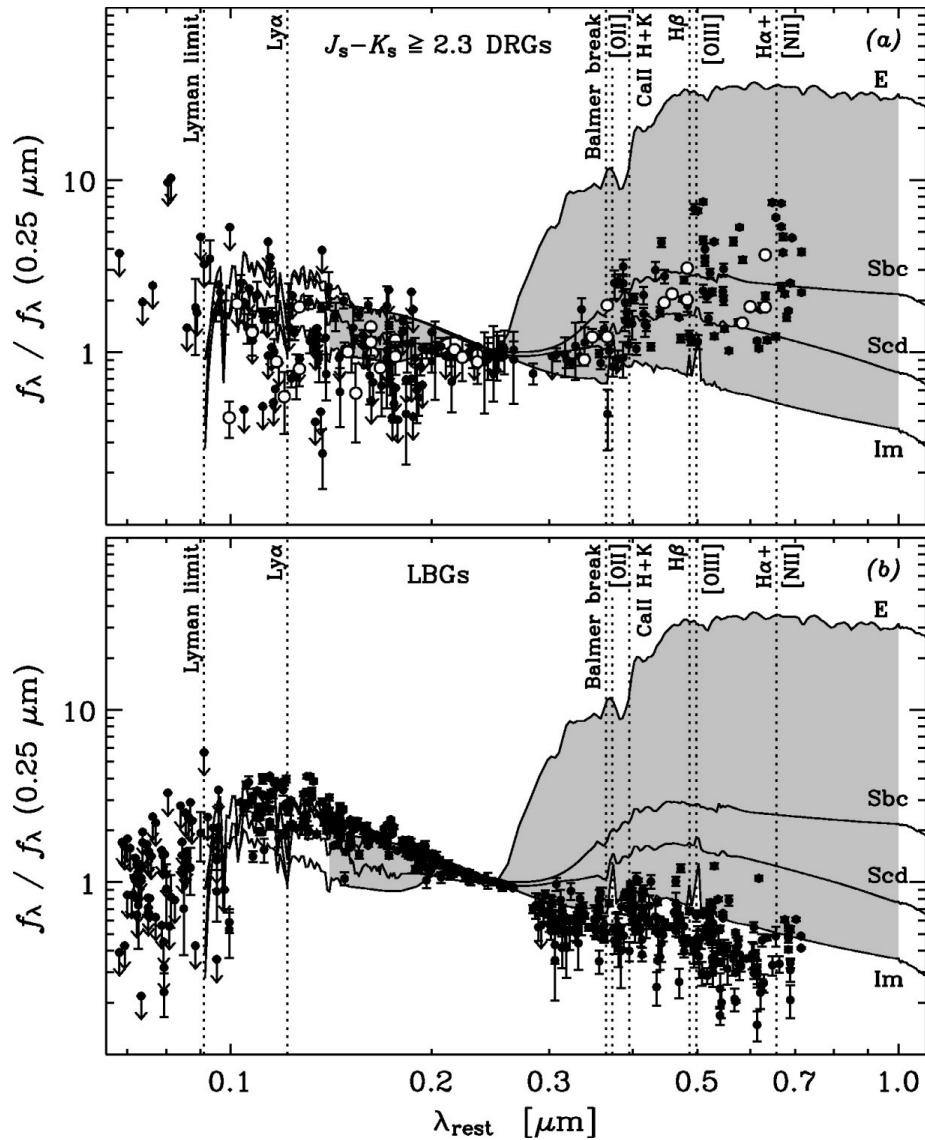
- $J_s - K_s > 2.3$ to select galaxies among the oldest ones at $z > 2$ (Franx et al. 2003)
- $V \sim 26.6$: spec-z hard (van Dokkum et al. 2003)
- the contamination by objects at $z < 2$ can be as high as 50% (Daddi et al. 2004)



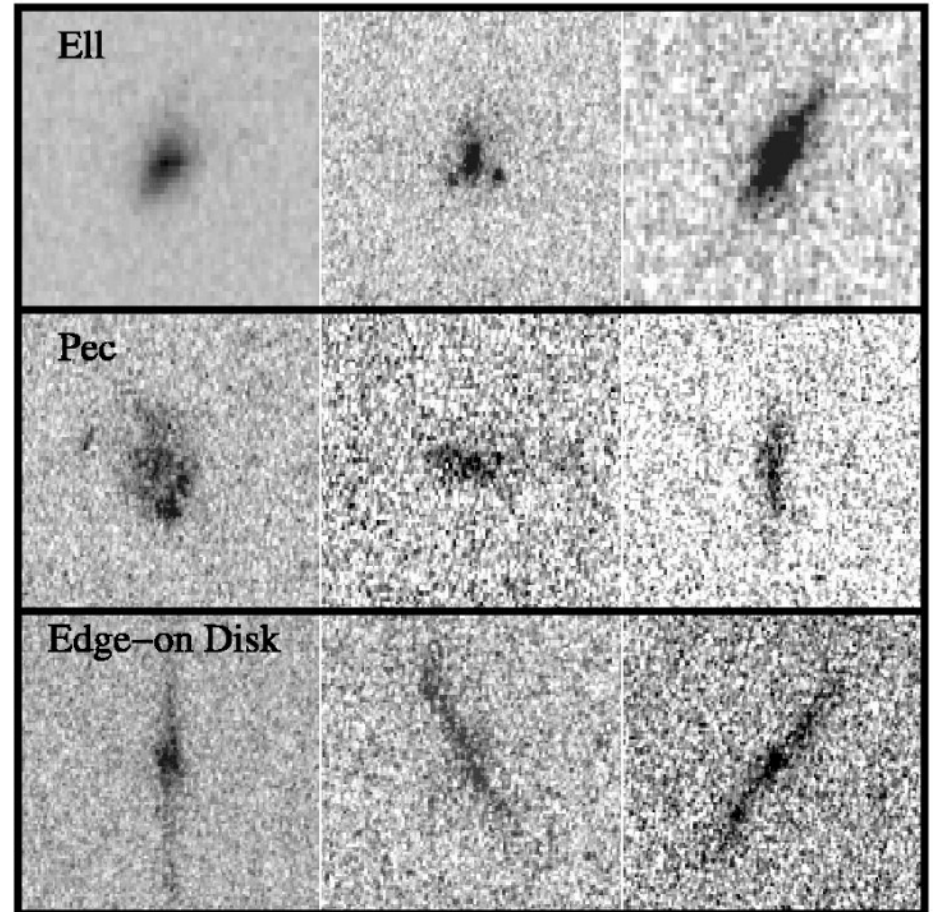
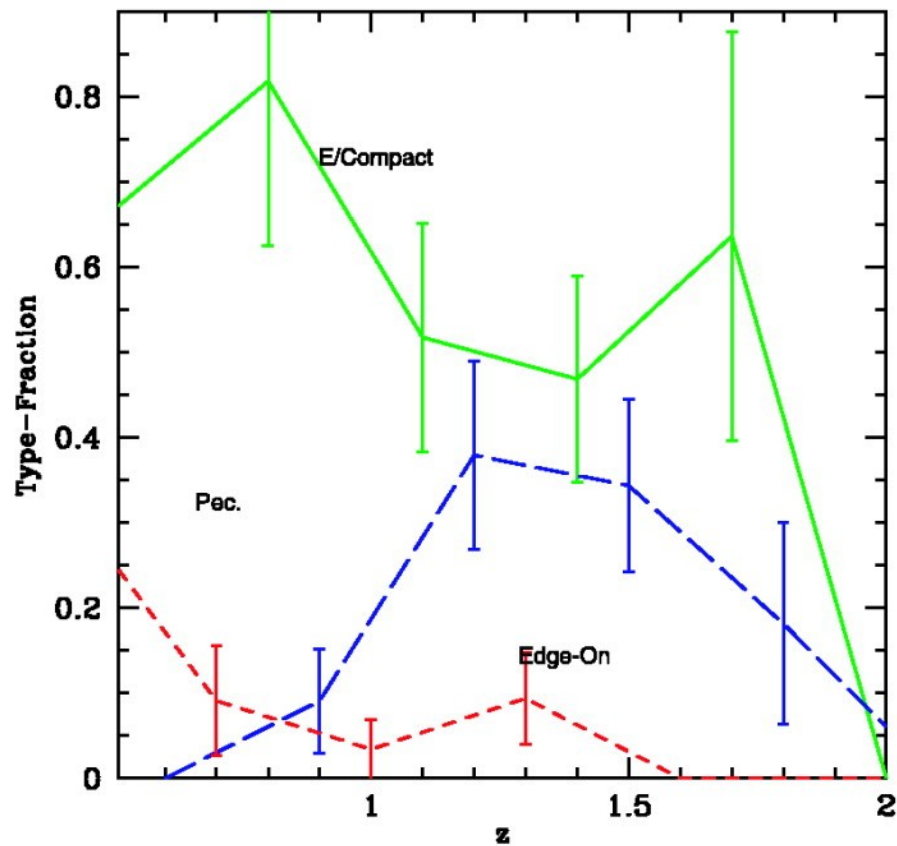
DRGs @ $z > 2$ I. (van Dokkum 2003)



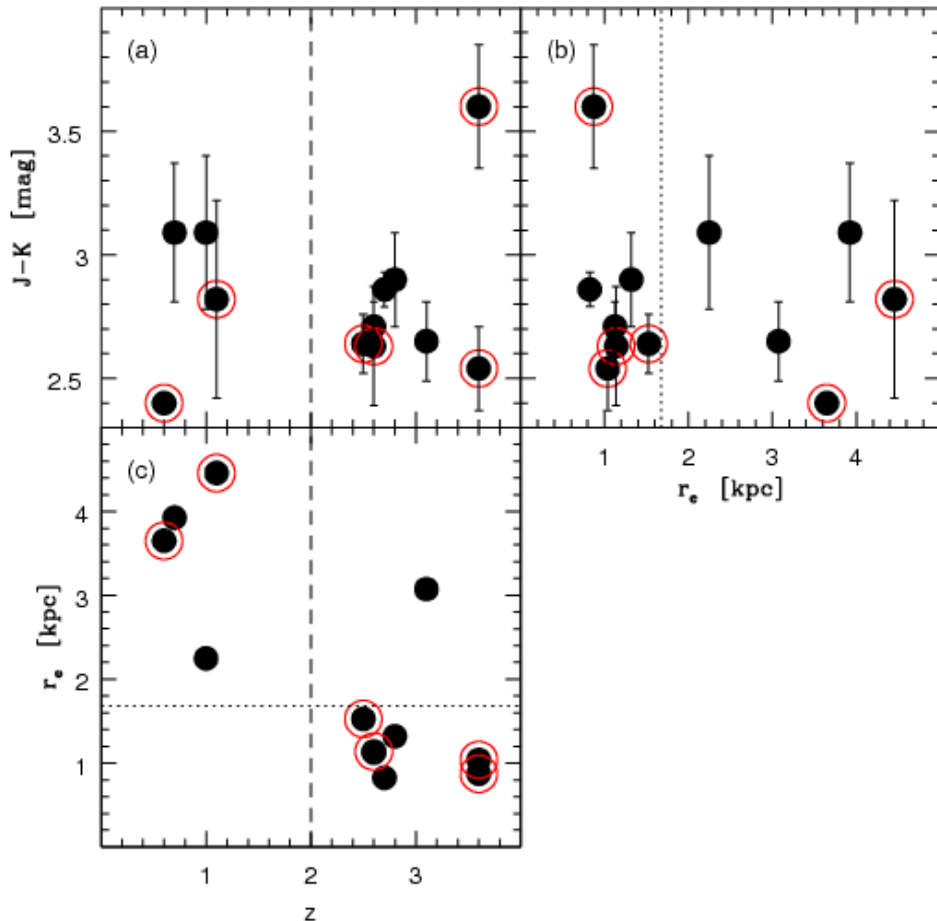
DRGs @ $z > 2$ II. (Förster-Schreiber et al. 2004)



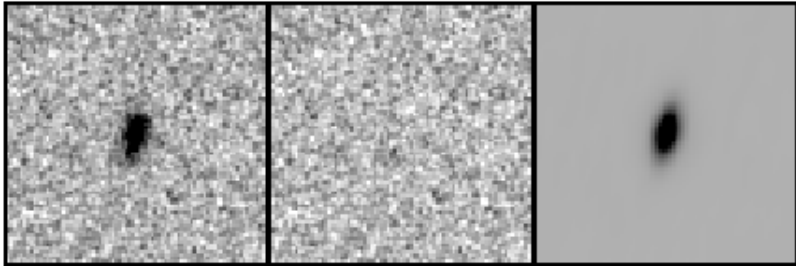
DRGs @ $z < 2$ (Conselice et al. 2007)



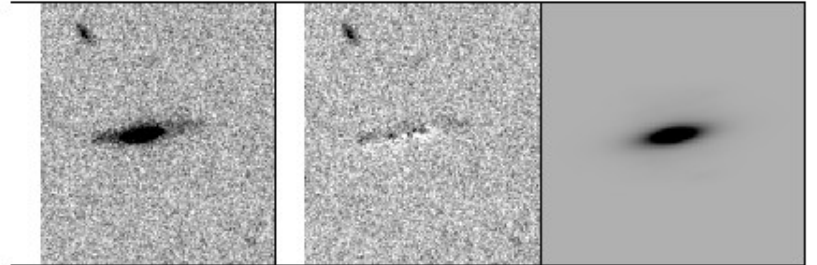
GOODS J-K selected “disc” galaxies



- $J-K > 2.3$ @ > 1 sigma
- ACS imaging
- $0.6 \leq n_{\text{Ser}} \leq 1.6$
- 12 objects (4 @ $z < 2$)
- $18.8 < K < 23.3$
- $3^\circ < i < 75^\circ$



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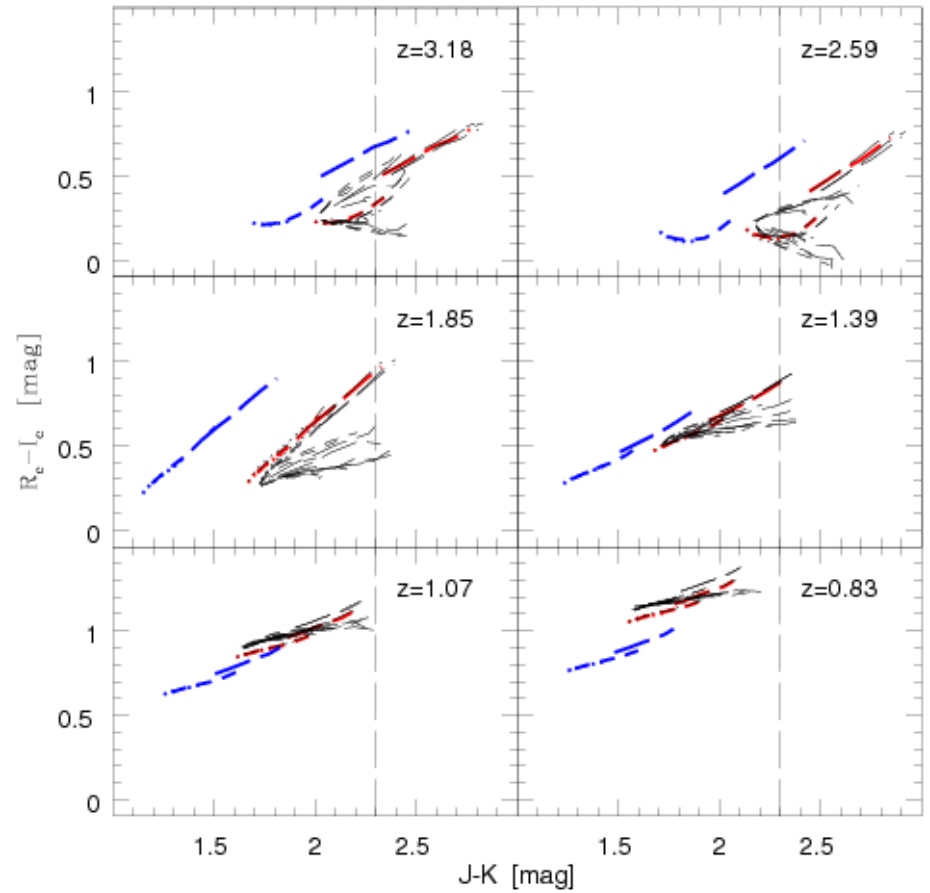
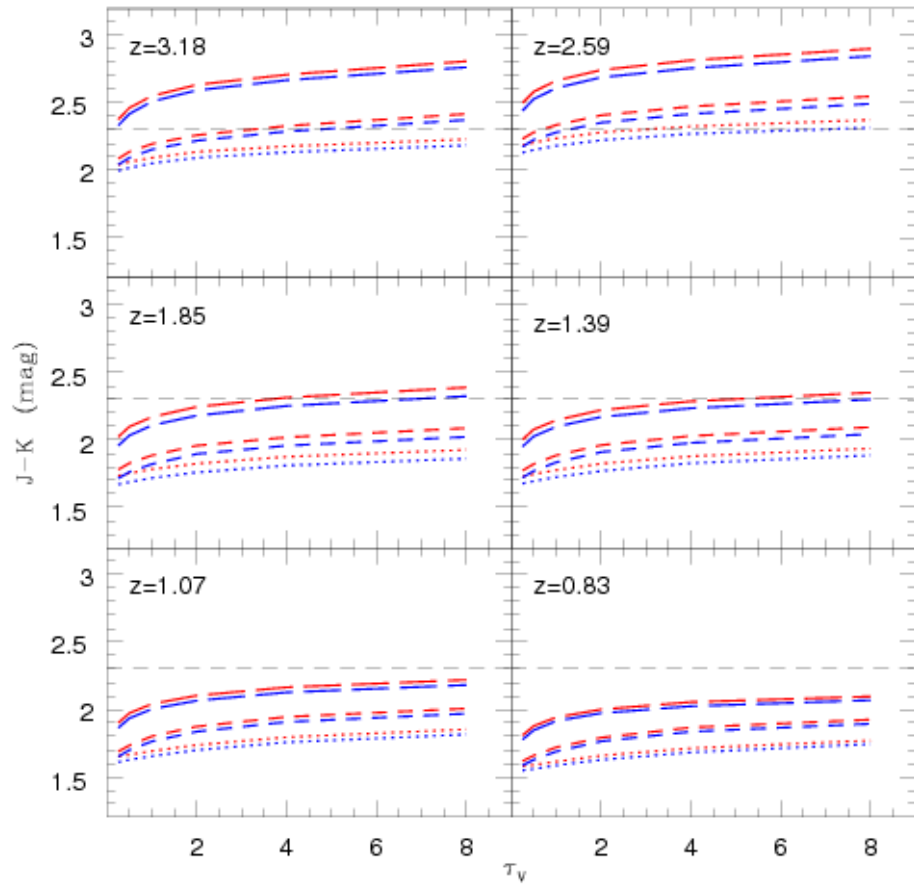


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Models for normal star-forming discs

- composite stellar populations including the TP-AGB phase of intermediate-mass stars (Maraston 2005)
- exponentially declining SFRs with e-folding times of 3--7Gyr
- solar metallicity
- $z_f=10$ (LCDM cosmology) or fixed age (0.6 Gyr)
- dust attenuation for a disc geometry (Ferrara et al. 1999; Pierini et al. 2004)

How to make a DRdG?

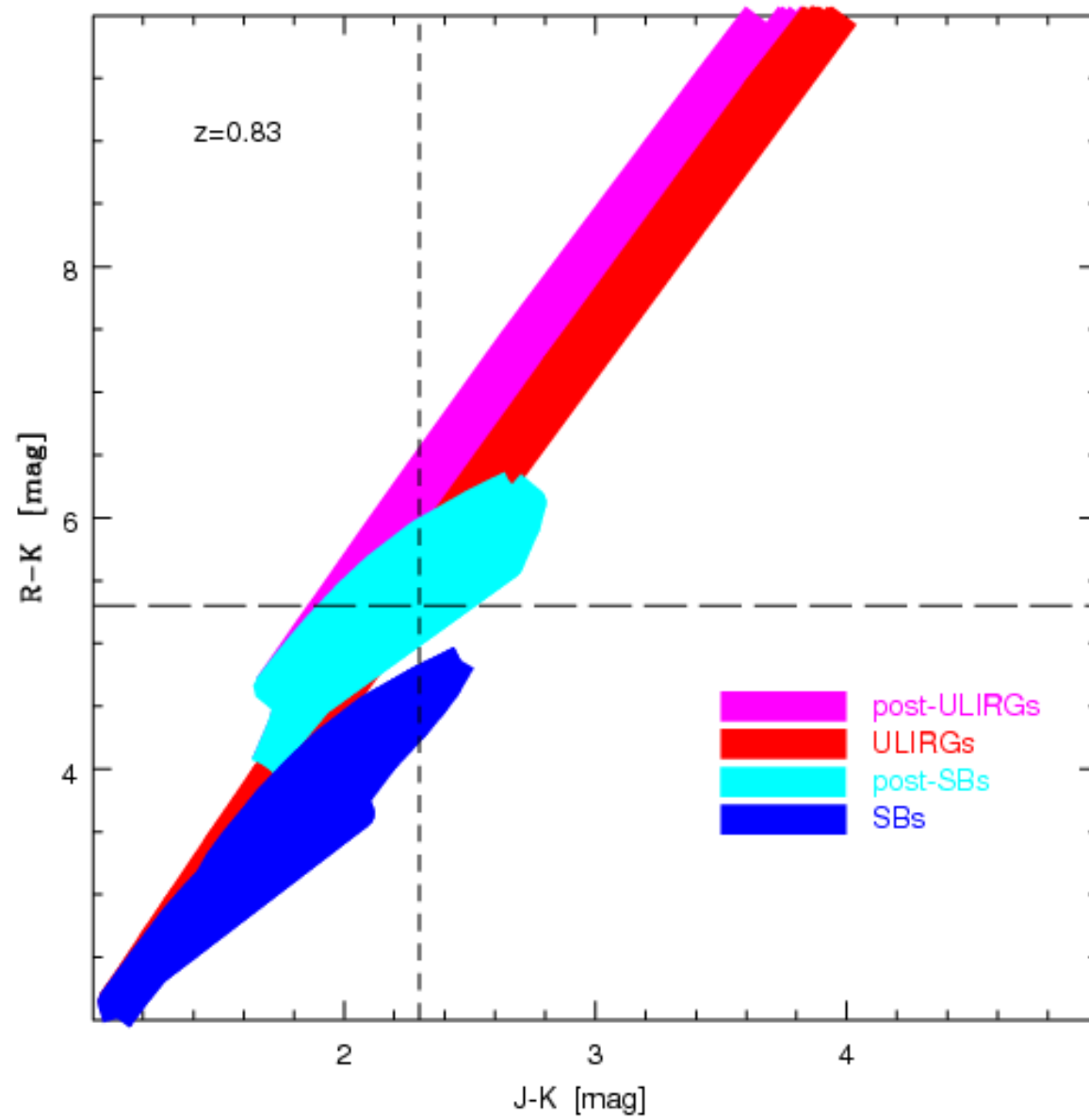


To make a DRdG... (Pierini et al. 2005)

- @ $2 < z < 3.2$: easy
- no need for very large opacities, in excess to those of nearby disc galaxies (from 0.5 to 2)
- continuous star-formation activity for ≥ 1 Gyr
- @ $z < 2$: very difficult
- only very dusty, edge-on models
- only for $1.3 < z < 2$

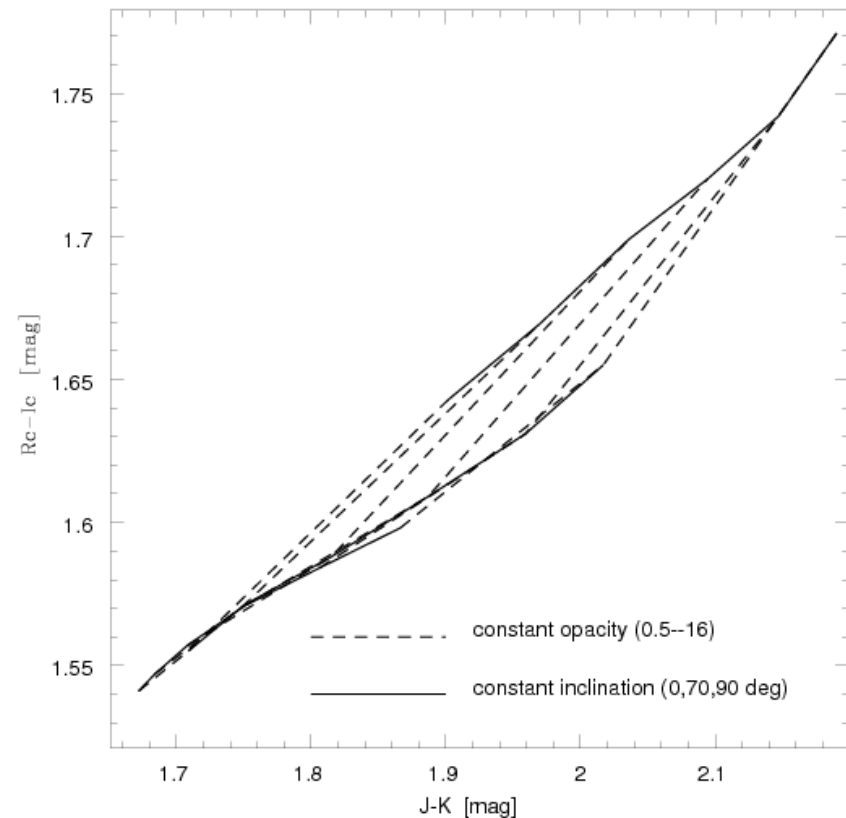
DRdGs @ $z < 2$ as...

- ULIRGs: exp. decl. SFR (e-folding time: 5 Gyr), ages from 0.1 to 1.5 Gyr, homogeneous SHELL models with SMC dust (Witt & Gordon 2000)
- post-ULIRGs: constant SFR for only 0.5 Gyr, ages from 0.6 to 1.5 Gyr, homogeneous SHELL models with SMC dust
- starbursts: as ULIRGs but with a two/phase, clumpy ISM
- post-starbursts: as post-ULIRGs but with a two/phase clumpy ISM



A truncated star-formation history?

- truncation after 4 Gyr
at constant SFR
(Maraston 2005)
- 6 Gyr-old @ $z=0.83$
- DIRTY disc models
(Pierini et al. 2004)



Conclusions

- Need of more complex star-formation histories and dust/stars configurations
- Use of N-body/semi-analytic simulations
(Jonsson et al. 2006; Rocha et al. 2007)