Comparing the properties of GRB and SN host galaxies

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Open questions

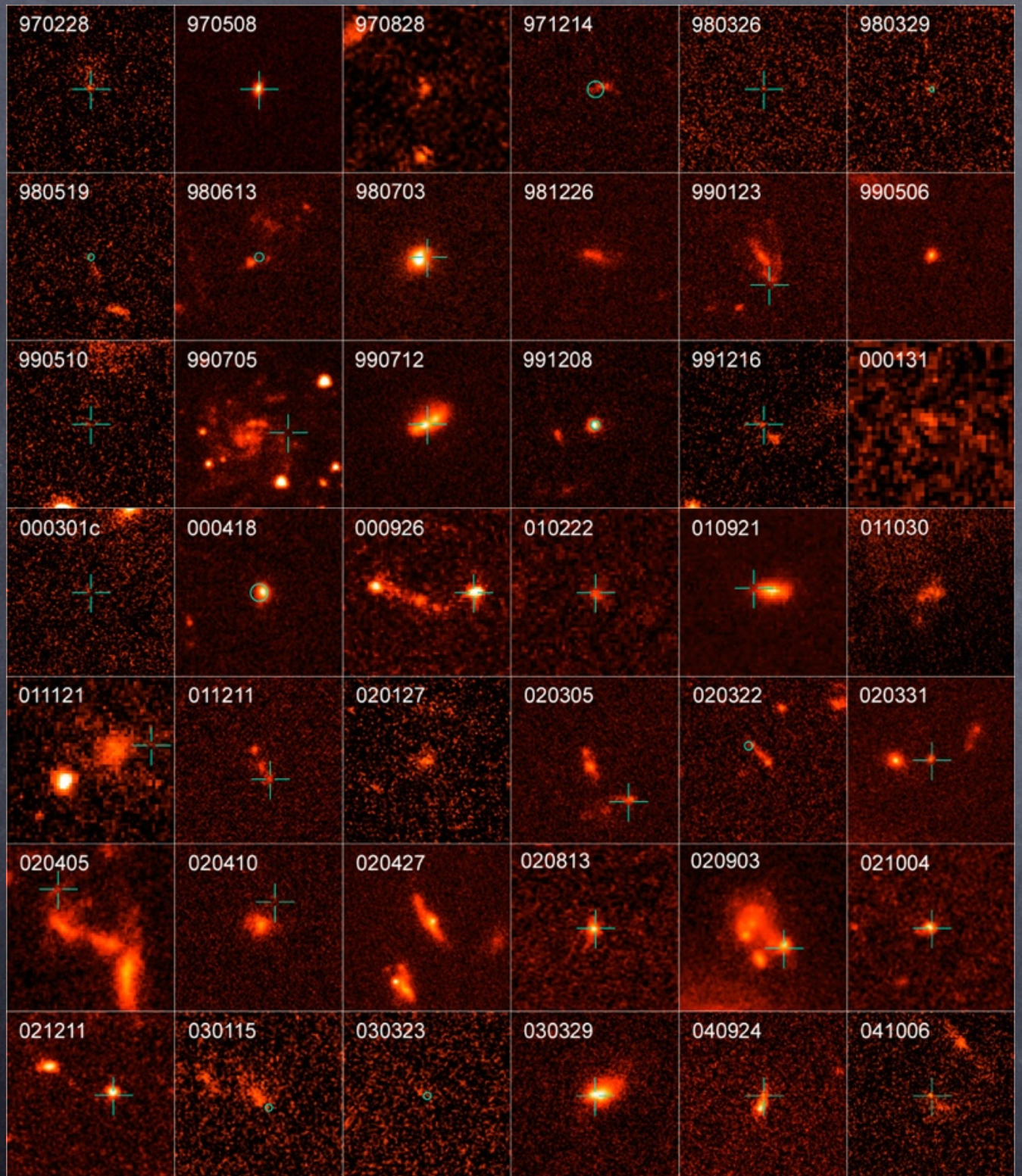
- To what extent do GRBs trace universal star formation?
- Are their biases for GRB formation (e.g metallicity)?
- What is the faint end slope of the LF?
- Massive single stars vs binaries

Why compare to SN?

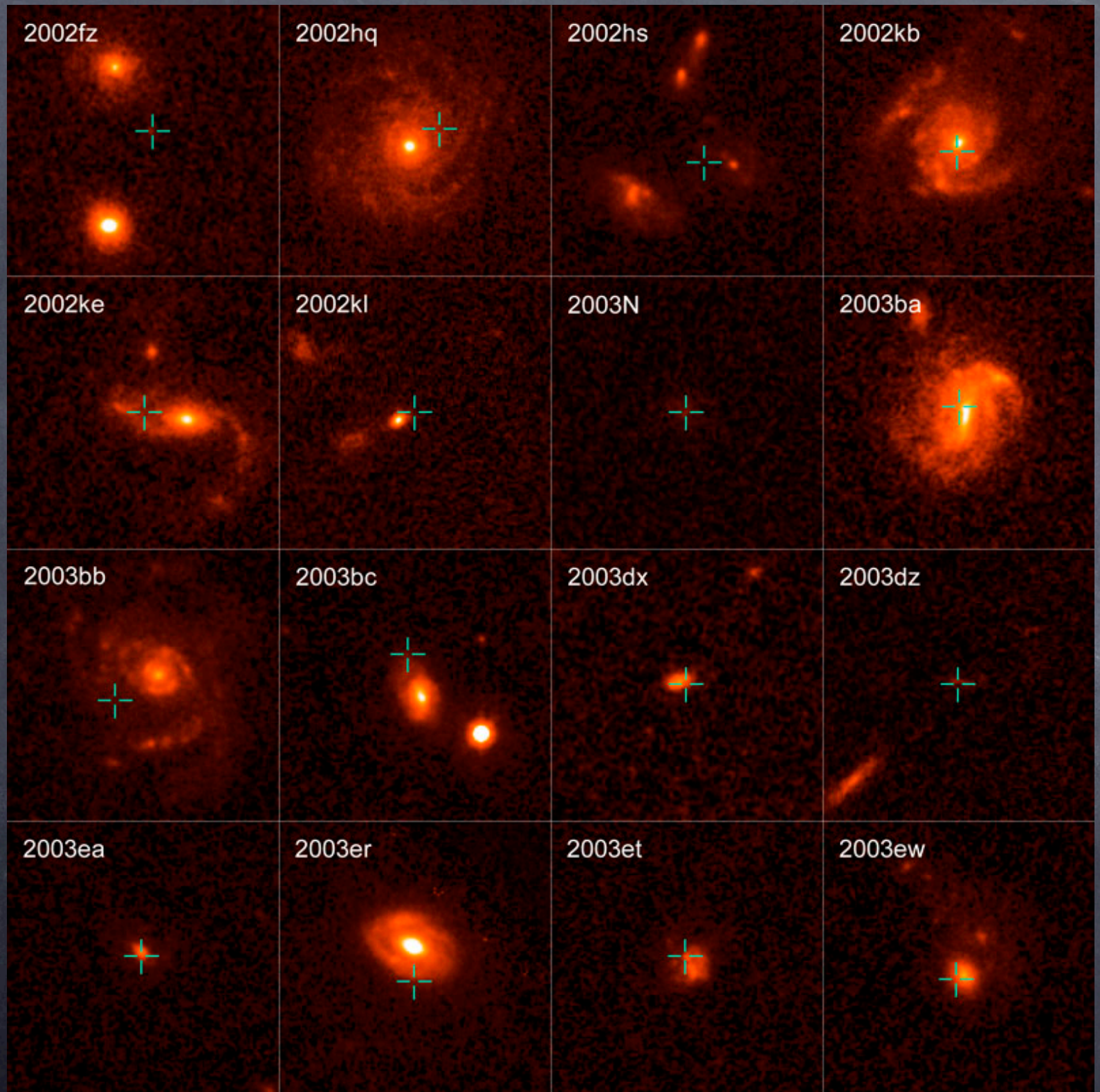
- SN should trace massive star formation globally (i.e. all stars above ~8 Msol form SN)
- Subject to same (similar) selection effects as GRB afterglows (i.e. optical selection)
- Unbiased surveys (i.e. blind sky surveys rather than galaxy biased) necessary (SLOAN, SN Factory, GOODS)

GOODS

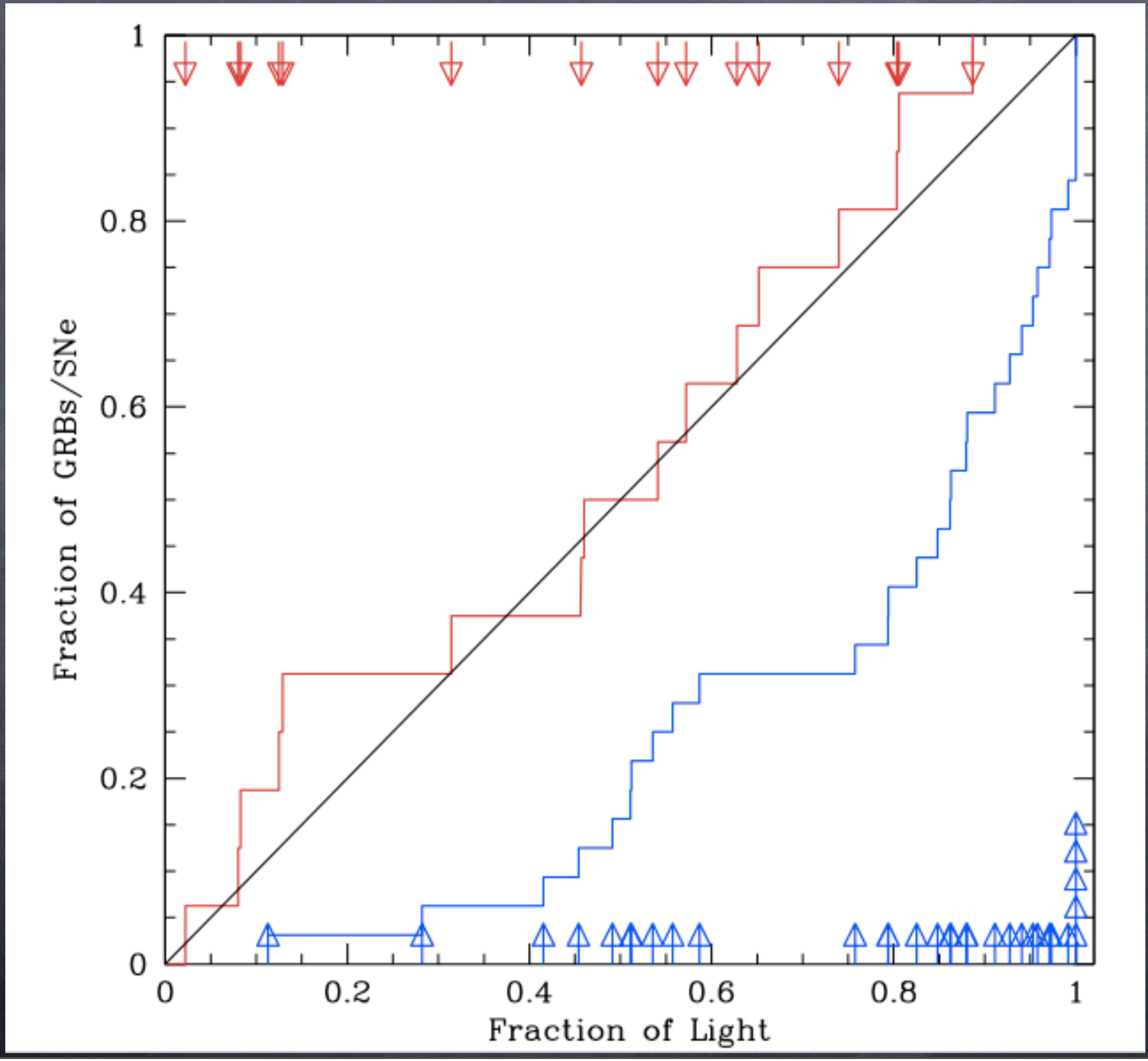
- Great Observatories Origins Deep Survey
  - 5 epochs of HST imaging in B,V,Z - 45 days between epochs
  - Designed to catch SN Ia on the rise
  - SN typed as SN Ia or CC (only Ia followed spectroscopically)
- Total 16 CC in initial survey (more from followup survey should be available soon).
- Redshift 0.3 - 1.1 (mean 0.6). GRBs very similar if z>1.2 excluded.

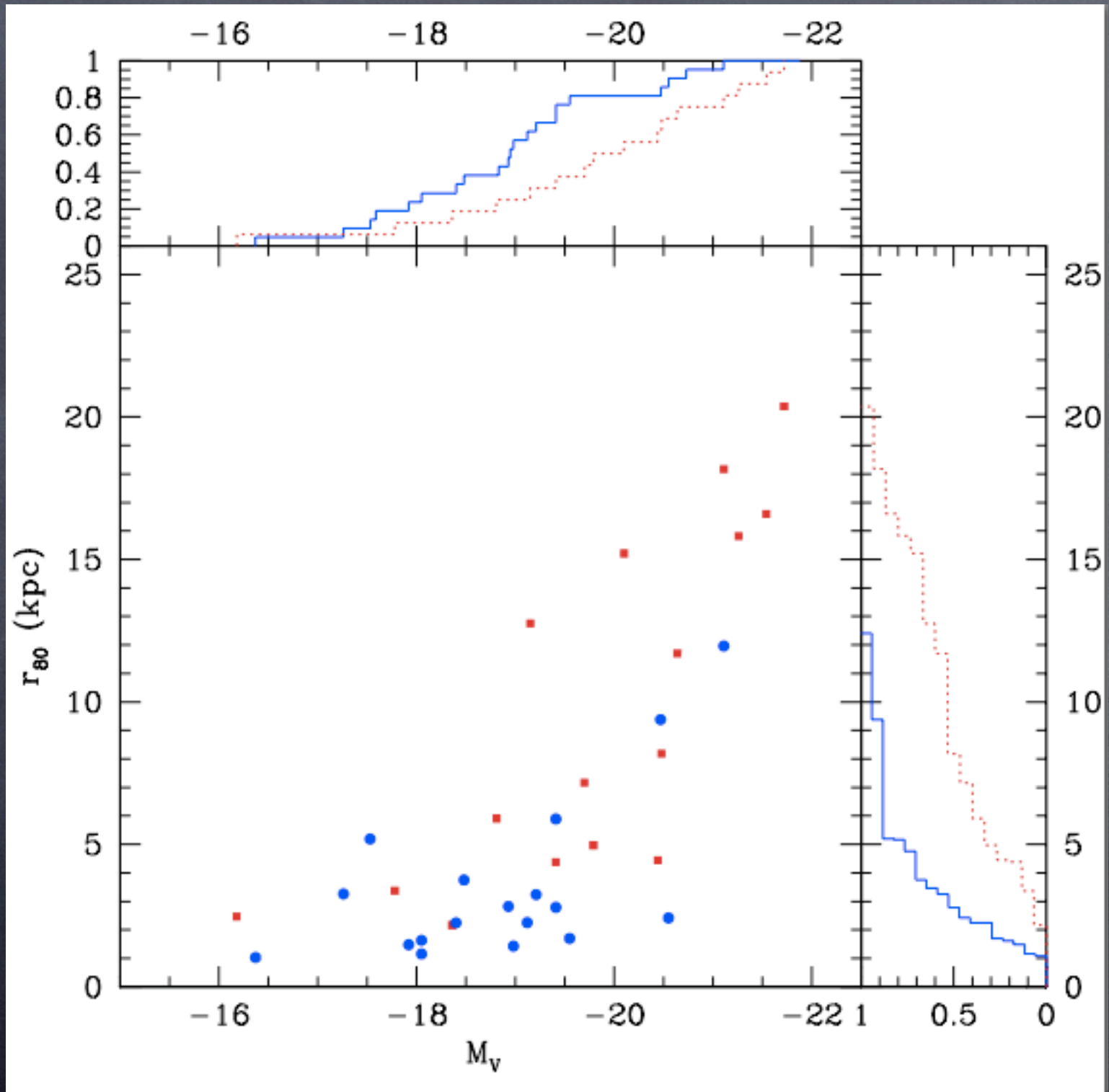


- 42 GRB hosts with late time HST observations as of mid-2005
- Need HST since GRB hosts are small, morphology



Core collapse SN


Fraction of GRBs/SNe
Fraction of Light
0
0.2
0.4
0.6
0.8
1



18 GRB hosts z<1.2

16 SN CC hosts

Conclusions

- GRBs and SN are distributed differently on their hosts
  - GRBs occur in regions of most intense star formation
  - Most massive (youngest) stars?
- SN hosts are more luminous and larger than GRB hosts.
  - Luminosity-metallicity relationship implies GRB hosts are less luminous than SN hosts -> lower metallicity?
- GRBs not perfect star formation rate traces
  - But if due to metallicity may become better tracers at higher-z