Are you being SERVed? Data mining at the coalface

Mark Lacy ("Science" hat!)

The SERVS survey

* Spitzer warm mission survey of 18 deg^2 of sky to microJy sensitivity in the near-infrared (3.6-4.5 microns)

  * Laughably small data volume (few tens of GB) for SERVS alone

  * But modern astronomy a multiwavelength discipline, and we have multiwavelength complementary data from radio through X-ray wavelengths.

  * A real problem to make sense of objects with 10+ band detections over 10 decades of frequency.

  * Frequency over this range gives a whole new dimension in complexity.

SMALL DATA - 1 DEGREE, WITH Z~1 GALAXY CLUSTERS FOUND USING VORONI TESSELATIONS (SIMPLE TOPOLOGICAL TECHNIQUE, GEACH ET AL 2011)
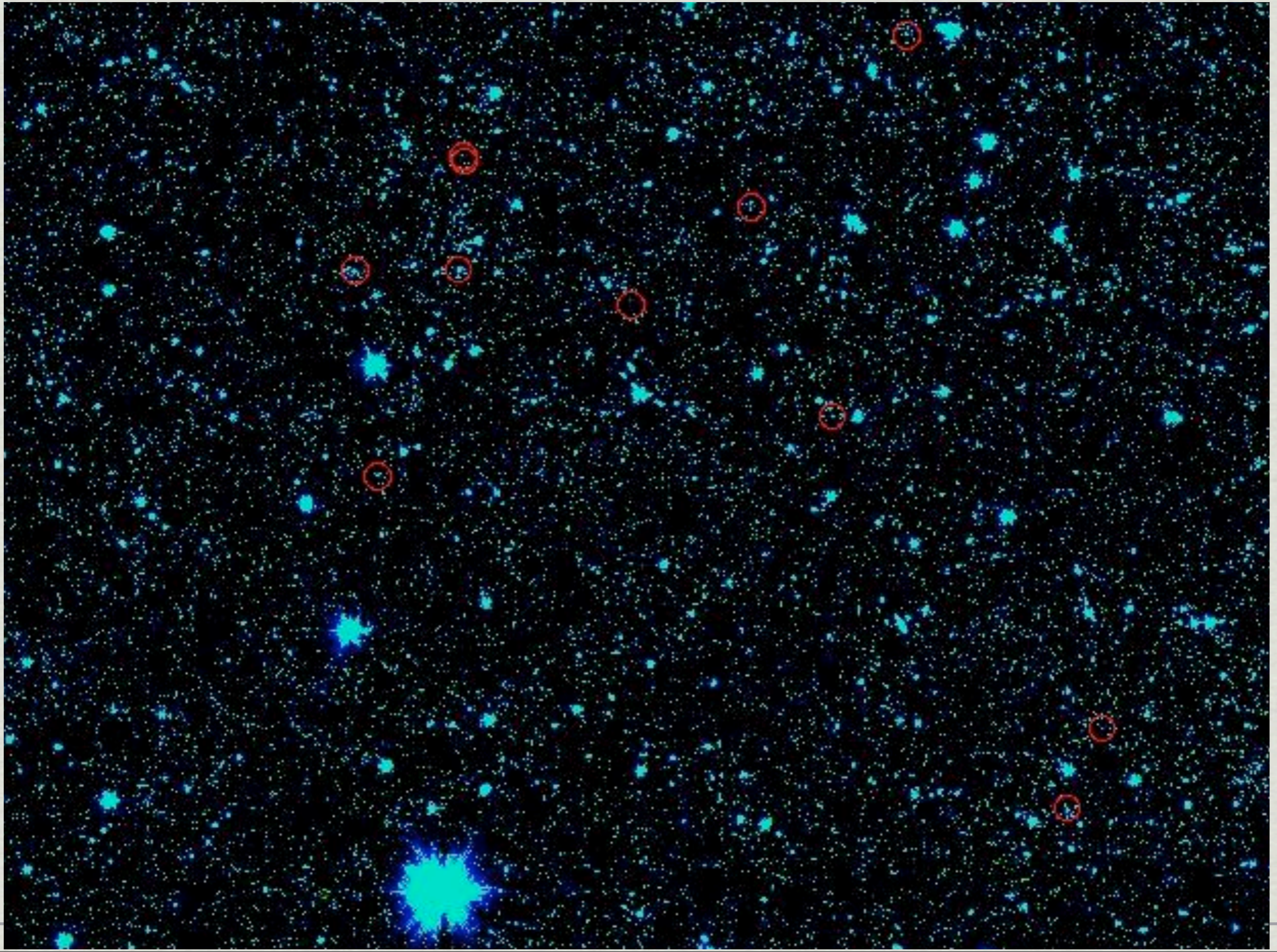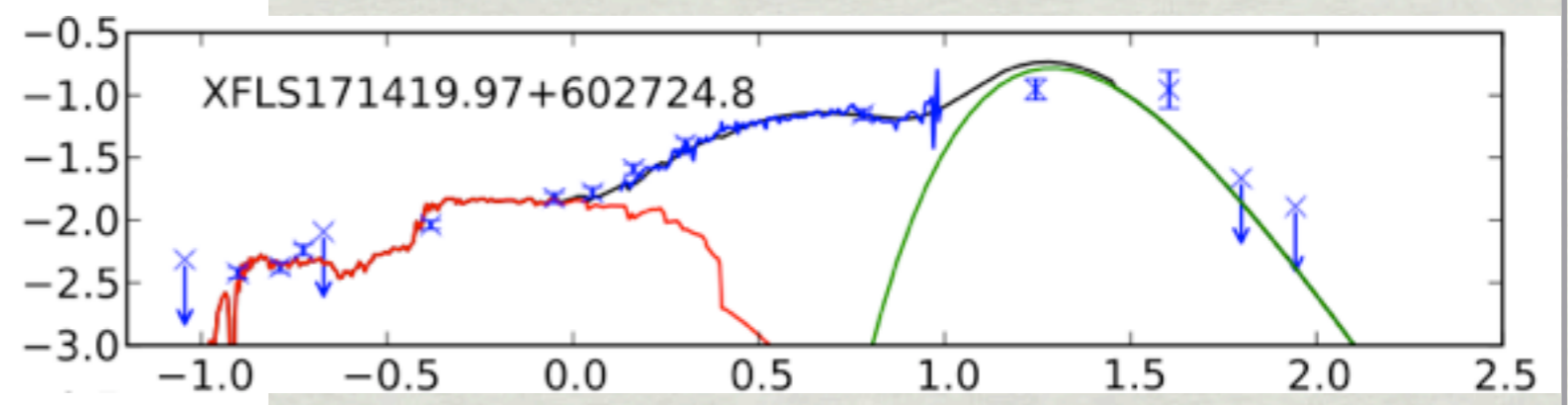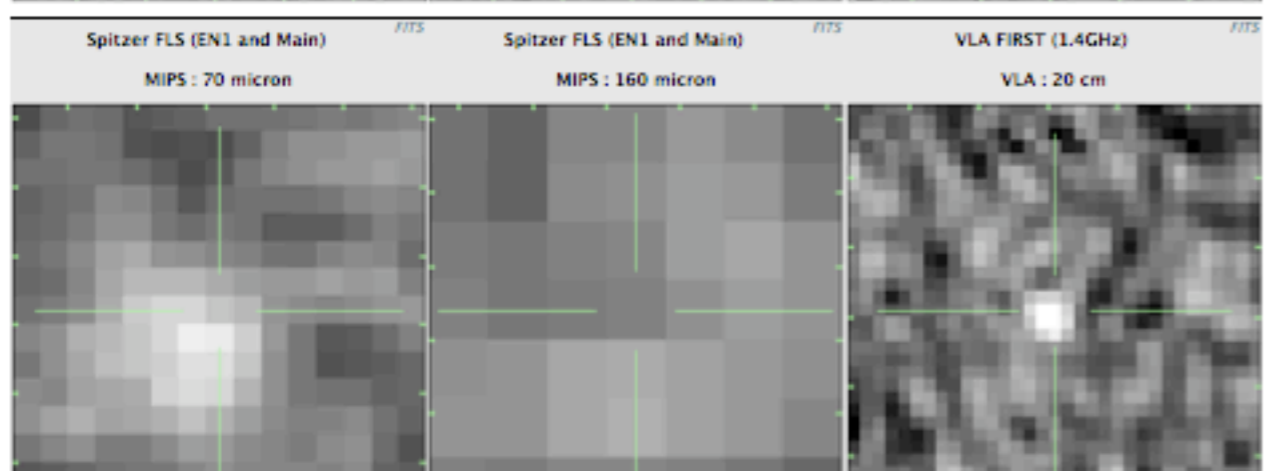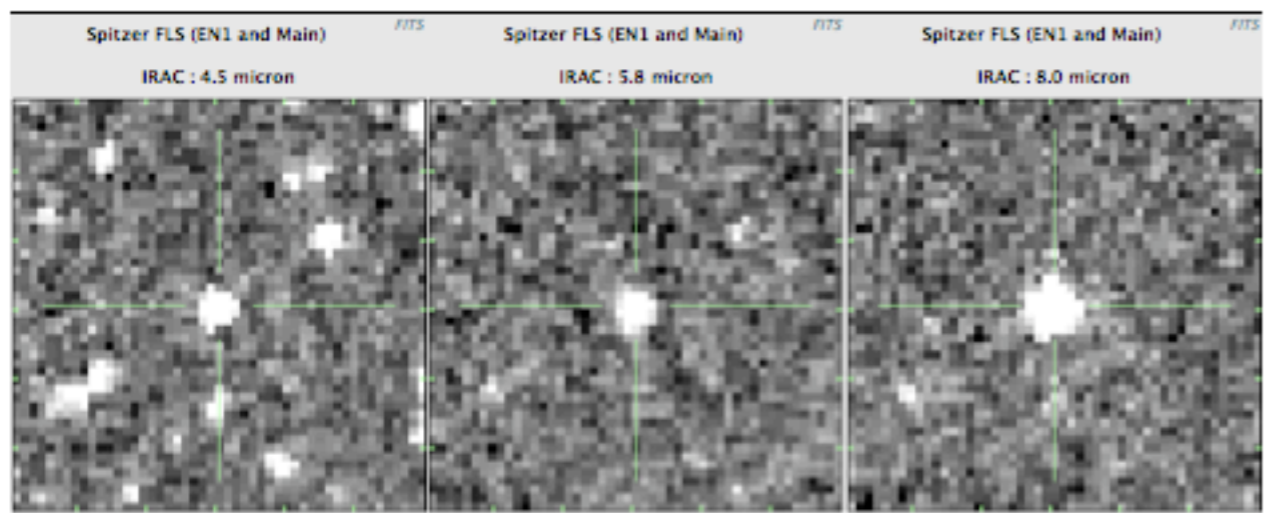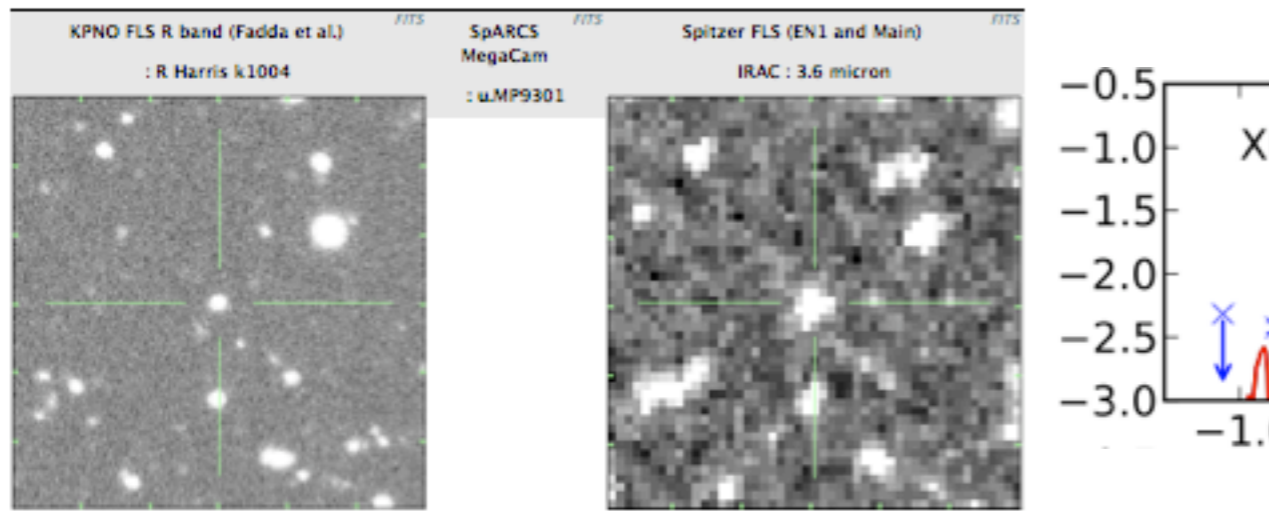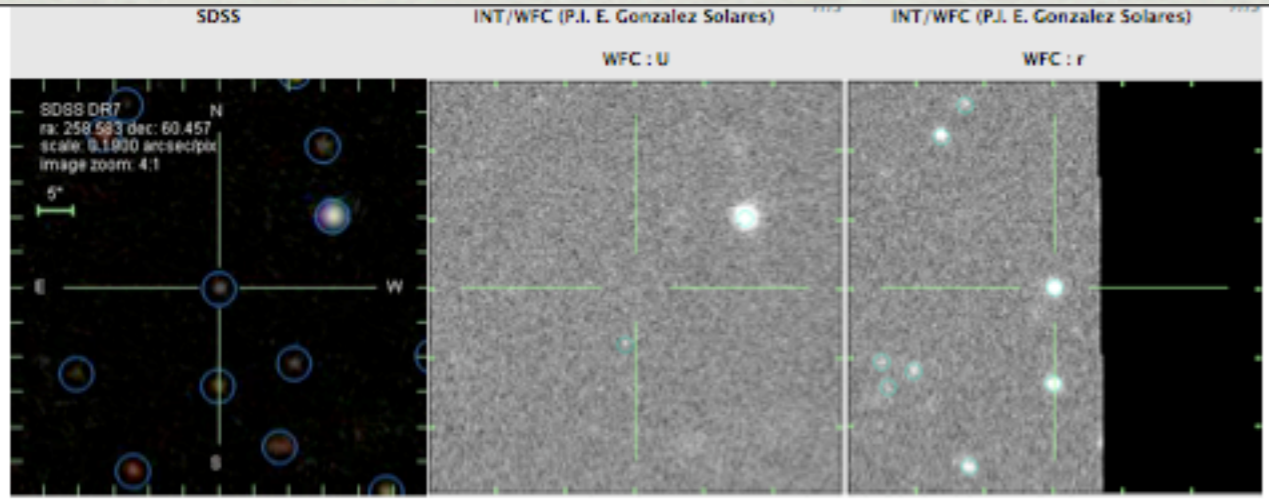
# Image cutouts

* Eduardo Gonzales-Solares (Cambridge) has developed a simple cutout service to look at individual objects.

    * A good illustration of max loading of brain...

   * But very useful for spotting artifacts, determining whether or not an object is truly detected etc.

XFLS171419.97+602724.8

PARALLEL COORDINATES (PETRIC ET AL. IN PREPARATION)

type 1 blue, type2 green, type 4 red
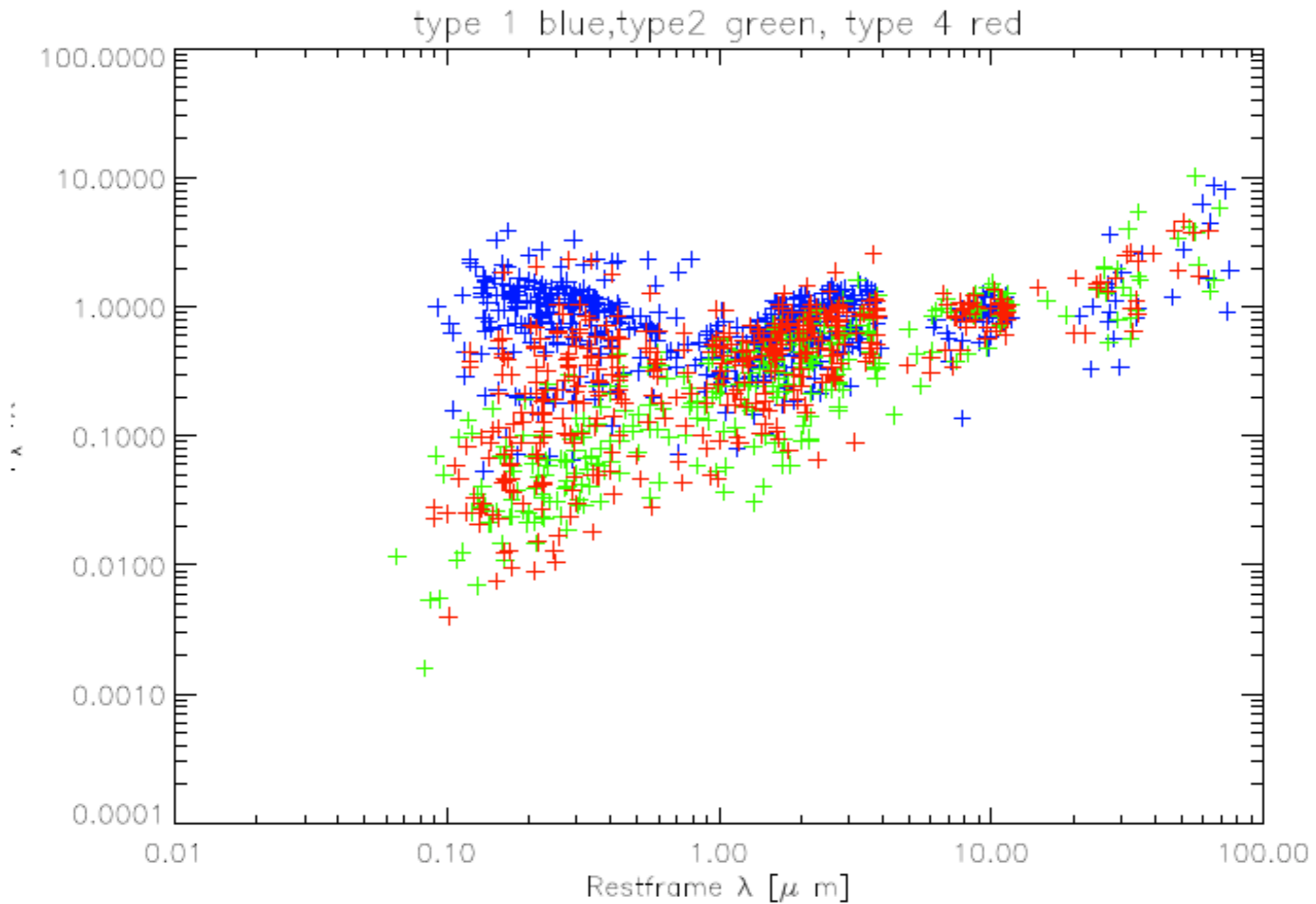
Data fusion (Mattia Vaccari, Lucia Marchetti, Padova)

* Merging catalogs from all these surveys (up to ~10 per field) gives ~1000 column, multi-GB merged catalog for a square degree.

* Client applications such as Topcat can just deal with these now.

* Extremely powerful datasets if they can be understood.
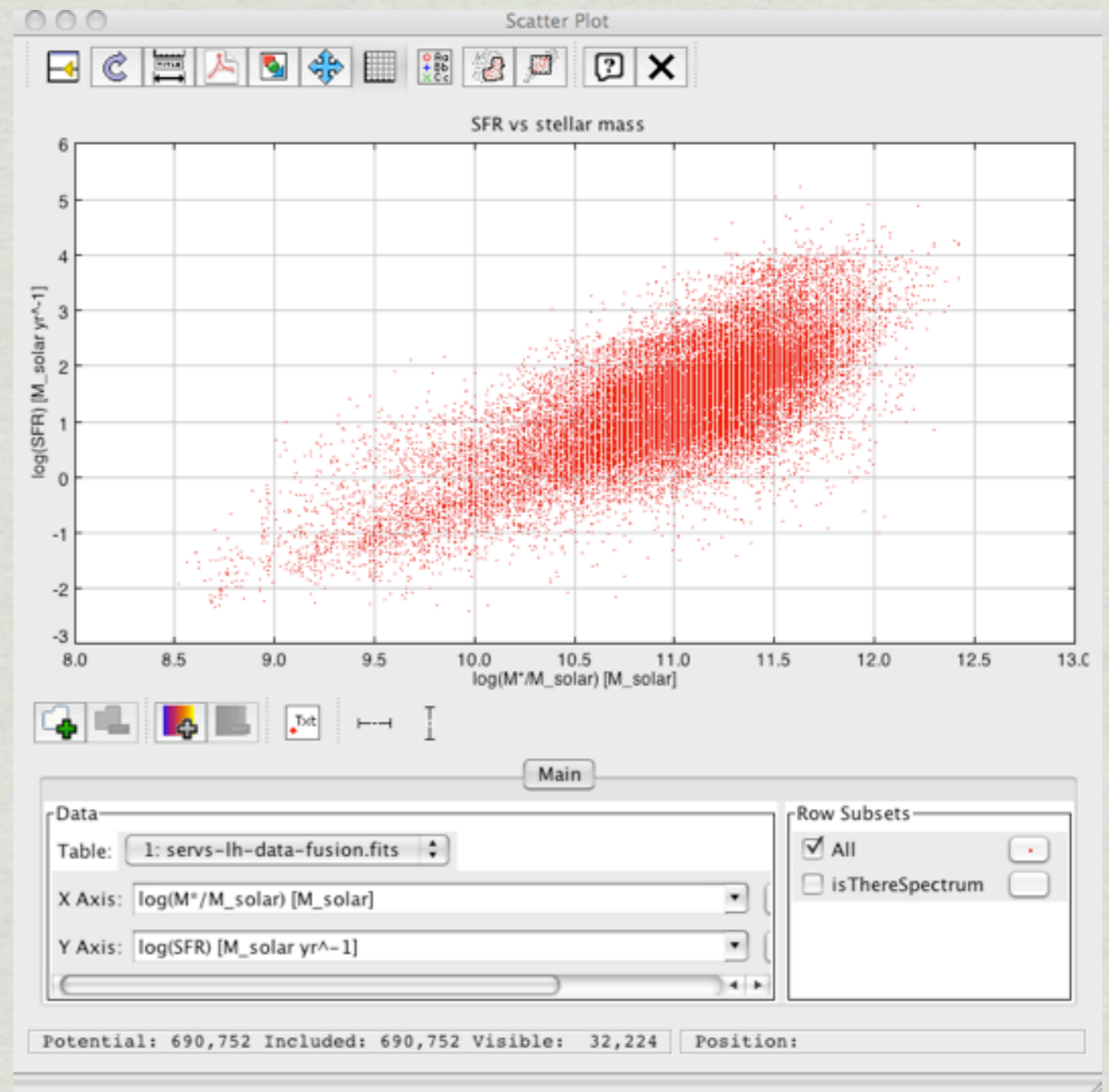
How do we go forward?

✳ Catalogs already almost too large for desktops - may need to move to server-side apps fed by VO queries.

✳ Association algorithms across 10 orders in frequency, widely varying resolutions (spatial and spectral), some surveys confusion limited, are difficult (e.g. GOODS Tfit).

✳ High quality input catalogs are essential as you can't check every data point (or even 1% of them). Particularly important for rare object searches (e.g. distant quasars).

✳ Software to provide quick, robust object characterizations (photo-zs, stellar masses, AGN/starburst breakdown).

✳ Limits as important as detections!