Evolution of red sequence on WaZP DP0 clusters

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Objectives & Research Question:

- Study the red fraction evolution of members of WaZP clusters on DP0;
- Evaluate the performance of the WaZP algorithm, depending on input data;
- What is the impact of photo-z uncertainties on the red sequence evolution?

Background:

The Wavelet Z Photometric (WaZP) optical cluster finder detects clusters using photometric redshift information. The algorithm can be used to select cluster members to study different aspects in cluster evolution, as the color-magnitude diagram feature named red sequence.

Methodology:

Data:

- Catalogs of WaZP cluster members in DC2 (truth mags, truth z) and DP0 ("observed" mags, photo-z DNF);
- Truth DC2 halo members catalog, used as reference.

Color-magnitude diagram
WaZP members on DP0 with $0.5 < z < 0.6$
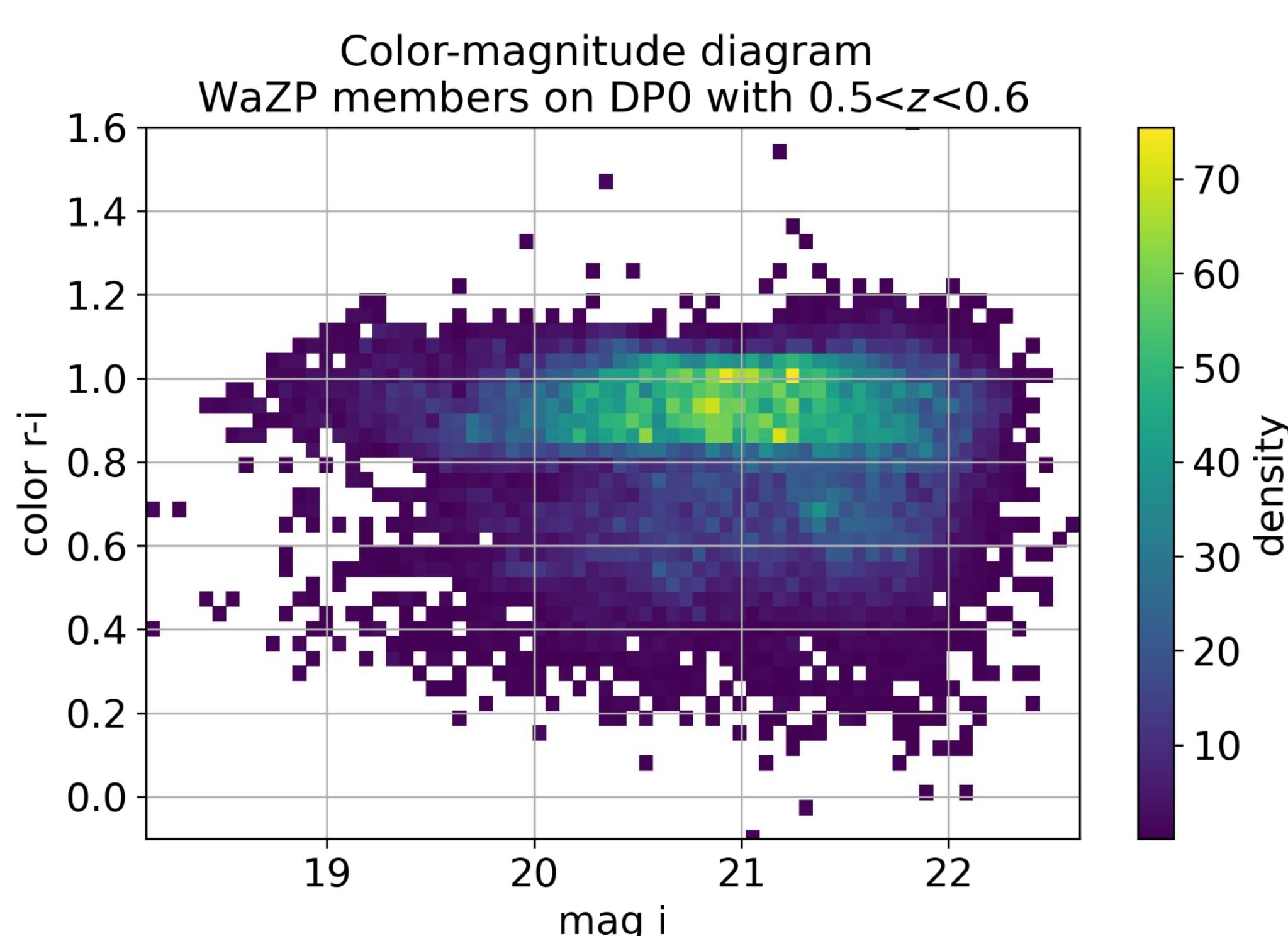
Analysis:

- We selected members from clusters with richness above 25 Ngals and separated the data into redshift bins.
- The red and blue populations were characterized by Gaussian distributions on color histograms. We chose the colors that envelop the 4000 Å break.
- We integrated the curves to find the number of red and total members and calculate the red fraction in each redshift bin.

Color histogram ($0.5 < z < 0.6$ and $Ngals > 25$)
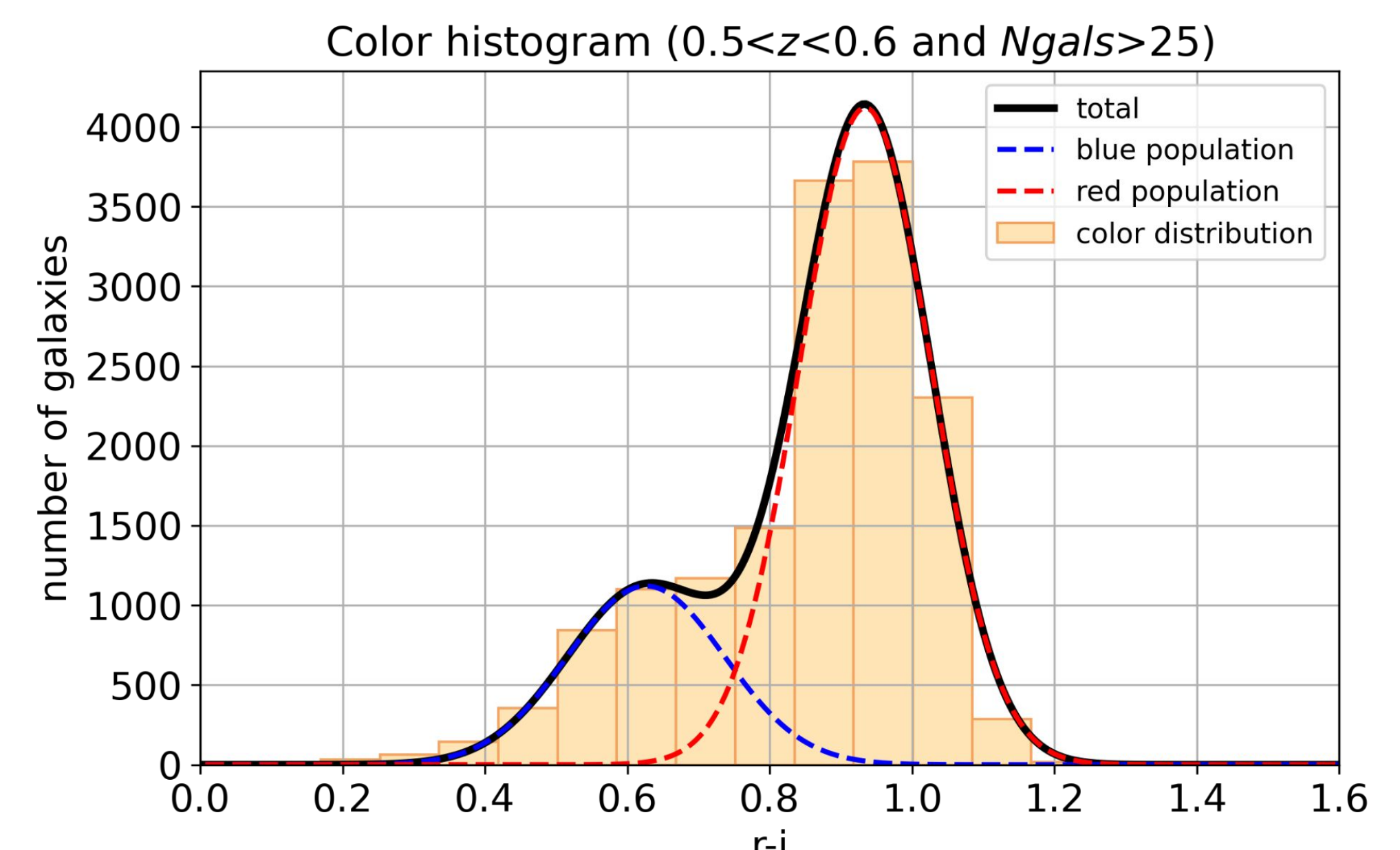
Preliminary Results:

The figure below shows the evolution of the red fraction with redshift for the sample analyzed.

Evolution of red fraction
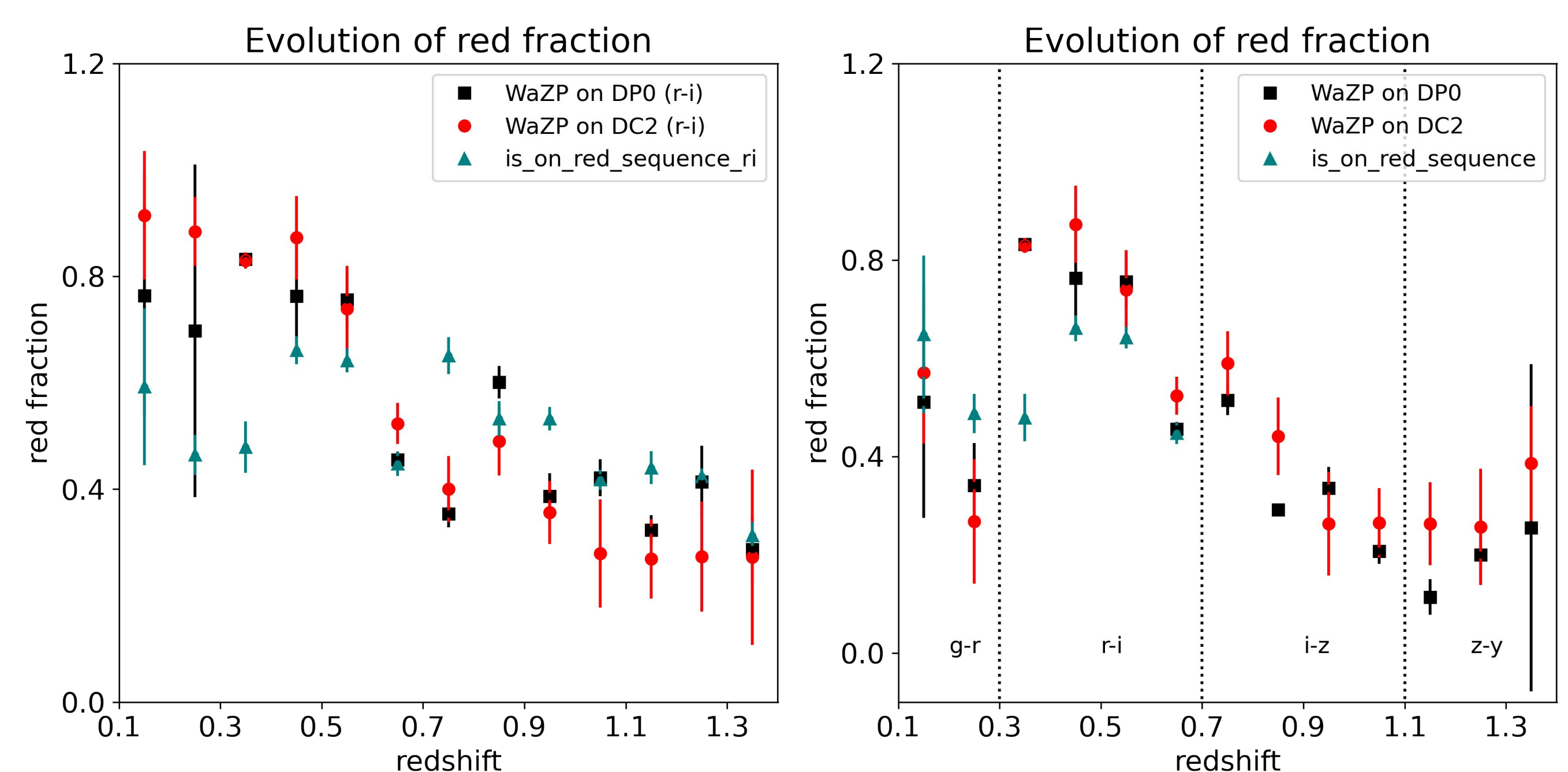
Discussion:

- The first and last redshift bins have larger error bars because fewer objects are selected and the gaussian fit is not so precise.
- The red fraction evolution observed in wazp cluster members recovers the overall trend of the galaxies marked as "is on red sequence" in the truth catalog for color r-i.
- The reasonable agreement between DC2 and DP0 results shows that introducing photo-z-related uncertainties in the WaZP cluster detection does not change the overall trend of red fraction evolution.

Conclusions and Future Work:

- As WaZP does not rely on the red sequence information, its good performance in detecting clusters with a low fraction of red galaxies makes the algorithm suitable for studies of cluster properties at high redshifts.
- In future works, we intend to investigate the evolution of the red slope and study the dependency of the results on cluster richness.