

X18a **ALMA twenty-Six Arcmin² survey of GOODS-S At One-millimeter (ASAGAO):
Multi-wavelength properties of ASAGAO continuum sources**

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We present the results of a multi-wavelength analysis of sub-millimeter continuum sources detected by 1.2 mm deep and wide-field survey named ASAGAO. From $250k\lambda$ -tapered initial ALMA map, we extract 631 continuum source candidates with $S/N > 3.5$ ($1\sigma \simeq 60 \mu\text{Jy beam}^{-1}$). We find that 42 ASAGAO sources have K -band counterparts in ZFOURGE catalog. Their median redshift is estimated to be 1.97 ± 0.16 , which is consistent with results of faint sub-millimeter sources ($\lesssim 1 \text{ mJy}$) detected in recent deep surveys. They generally follow the tight relationship (so-called the main sequence) on the stellar mass vs SFR plane in the range of $M_* \simeq 10^{9-12} M_\odot$ and $\text{SFR} \simeq 10^{1-3} M_\odot \text{ yr}^{-1}$. On the other hand, we find that there are ZFOURGE sources which have similar star-forming properties of ASAGAO sources but are not detected at ALMA wavelength. The $\text{IRX-}M_*$ and $\text{IRX-}\beta$ relations of ALMA selected sources show systematical offset compared to relations of ZFOURGE galaxies, which are not detected at ALMA wavelength. This suggests that properties of dust-obscured star-formation of ALMA detected sources are different from ALMA non-detected sources even if they have similar star-forming properties. We also extract some ASAGAO source, which have very dark or no multi-wavelengths counterparts. This result shows that ALMA continuum surveys can unveil the dust-obscured star formation activities, which are missed in previous deep optical/NIR surveys.