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New constraints on the co-moving star formation rate in the redshift interval $6 < z < 10$

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Abstract. Recent progress in measuring the optical depth of neutral hydrogen in distant quasars and that of electron scattering of microwave background photons suggests that most of the sources responsible for cosmic re-ionisation probably lie in the redshift interval 6 to 10. We present two new observational results which, together, provide valuable constraints on the contribution from star-forming sources in this redshift interval. First, using a large sample of v-band dropouts with unconfused *Spitzer*-IRAC detections, we determine the integrated stellar mass density at $z = 5$. This provides a valuable 'integral constraint' on past star formation. It seems difficult to reconcile the observed stellar mass at $z = 5$ with the low abundance of luminous i-, z-, and J-band dropouts in deep *Hubble Space Telescope* data. Accordingly, we explore whether less luminous star-forming sources in the redshift interval 6 to 10 might be the dominant cause of cosmic re-ionization. In the second component of our research, we report on the results of two surveys for weak Lymanα emitters and z- and J-band dropouts highly-magnified by foreground lensing clusters. Although some promising $z = 8-9$ candidates are found, it seems unlikely that low luminosity sources in this redshift interval can dominate cosmic reionization. If our work is substantiated by more extensive and precise surveys, the bulk of the re-ionizing photons may come from yet earlier sources lying at redshifts $z > 10$.

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