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Ratner, Margulis, Dani and many others, showed that the horocycle flow on homogeneous spaces has strong measure theoretic and topological rigidity properties. Eskin-Mirzakhani and Eskin-Mirzakhani-Mohammadi, showed that the action of $SL(2, \mathbb{R})$ and the upper triangular subgroup of $SL(2, \mathbb{R})$ on strata of translation surfaces have similar rigidity properties. We will describe how some of these results fail for the horocycle flow on strata of translation surfaces. In particular,

1) There exist horocycle orbit closures with fractional Hausdorff dimension. 2) There exist points which do not equidistribute under the horocycle flow with respect to any measure. 3) There exist points which equidistribute under the horocycle flow to a measure, but they are not in the topological support of that measure.

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