MAPPING THE SPATIAL DISTRIBUTION OF METAL-BERAING OXIDES IN VY CANIS MAJORIS.

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The formation of silicate-based dust grains is not well constrained. In modern gas-grain astrochemical formation models, ice formed on these dust grains are the critical sites for the production of prebiotic molecules. Furthermore, silicates are particularly important for planet formation, as terrestrial planets are primarily composed of the same elements as metal-bearing oxides, the building blocks of silicate grains. In carbon-poor stellar envelopes, such as the red hypergiant VY Canis Majoris (VY CMa), metal-bearing oxides dominate the grain formation, and thus are a key location to study dust chemistry. TiO_2, which was only first detected in the radio recently (Kaminski et al., 2013a), has been proposed to be a critical molecule for silicate grain formation, and not oxides containing more abundant metals (eg. Si, Fe, and Mg) (Gail and Sedlmayr, 1998). In addition, other molecules, such as SO_2, have been found to trace shells produced by numerous outflows pushing through the expanding envelope, resulting in a complex velocity structure (Ziurys et al., 2007). With the advanced capabilities of ALMA, it is now possible to individually resolve the velocity structure of each of these outflows and constrain the underlying chemistry in the region. Here, we present high resolution maps of rotational transitions of several metal-bearing oxides in VY CMa from the ALMA Band 7 and Band 9 Science Verification observations. With these maps, the physical parameters of the region and the formation chemistry of metal-bearing oxides will be studied.