30 Years of Photodissociation Regions:
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Large Scale Surveys of [CI] and [CII] from the HEAT & STO Telescopes in Antarctica

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The largest scientific impact of photodissociation regions may be still to come, even after 30 years of study. If star formation in dense gas is relatively prompt on average, then *cloud formation* may be the rate-limiting process governing star formation in galaxies. The construction of (giant) molecular clouds from lower column, diffuse components lies firmly in the PDR regime. It is especially remarkable that this process has yet to be identified observationally!

Observing the principal forms of gas-phase carbon (C^+, C, and CO) at terahertz frequencies provides a more complete census of material in PDRs and molecular clouds, and therefore probes the full life cycle of interstellar clouds. Here, we report on two dedicated spectroscopic mapping missions with the express goal of exploring the full carbon life cycle over large swaths of the southern Milky Way.

(1) The High Elevation Antarctic Terahertz (HEAT) telescope is a pioneering, robotic, 0.6-meter observatory near the 3-mile-high summit of the Antarctic plateau at a site called "Ridge A". The unparalleled stability, exceptional dryness, low wind and extreme cold make Ridge A a site without equal for astronomy at infrared and submillimeter wavelengths. In its first three years, HEAT's pilot surveys have focused on the 370 μm [CI] line and high-J CO and [NII] emission at 200-205 μm. In this contribution, we will showcase new openly-available products from HEAT's Galactic Plane Survey, new catalogs of clouds and PDRs, candidate cloud formation regions, and exciting prospects for observing [CII] from the ground!

(2) Providing a rapid mapping capability for terahertz [CII], [NII] and [OI] line emission is the principal goal of the Stratospheric Terahertz Observatory (STO), a 0.8-meter telescope on a long duration stratospheric balloon launched from Antarctica. STO is scheduled to perform a 2-4 week science mission in December 2015, providing spectroscopic mapping of $\sim$30 square degrees of the Galactic Plane from 63 to 205 μm. A preview of expected data products from STO and their impact on our understanding of the cold ISM and PDRs will be discussed.

REFERENCES