

SOFIA

Science e-Newsletter



September 2018

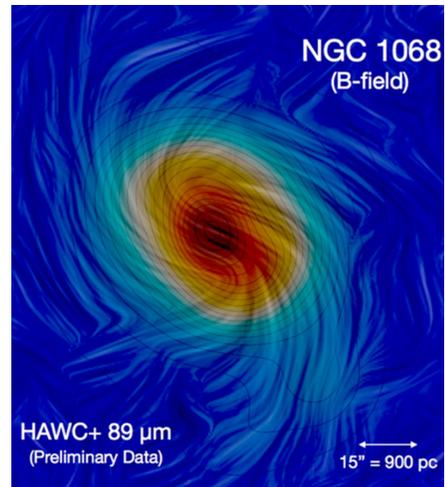
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HAWC+ Data Pipeline Acceptance Completed

Through the collaborative efforts of the High-resolution Airborne Wideband Camera-plus (HAWC+) team and SOFIA Data Pipeline Systems team, the HAWC+ data reduction pipeline is now available for use.

HAWC+ is SOFIA's first polarimetric instrument enabling the study of magnetic fields in a variety of objects, including dark clouds, supernova remnants, young stellar objects, the galactic center, and nearby and gravitationally lensed galaxies.



The instrument offers both total intensity imaging and imaging polarimetry observing options with continuum bandpasses from 50 to 240 micrometers. The pipeline converts raw data from its binary form into Level 3 final calibrated images for total intensity imaging observations and Level 4 calibrated images with overlaid polarization vectors for imaging polarimetry observations.

The HAWC+ data reduction pipeline will enable routine archiving of data within 15 working days from the end of a given flight series. Once past the one-year proprietary period, data products will be publicly accessible on the Data Cycle System Science Archive. As of Aug. 3, 2018, the Data Pipeline Systems team has processed all HAWC+ data from the last year and a half. Cycle 4 data is now publicly available, in addition to the community data set observations of 30 Doradus (see below: *Community Dataset Release: 30 Doradus Polarimetry*). Cycle 5 and 6 data will be available publicly once their proprietary periods expire in June 2019.

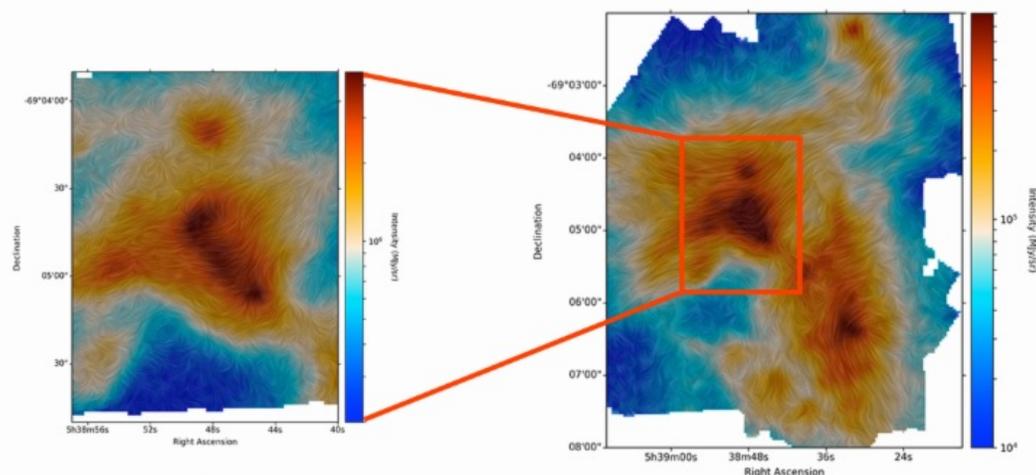
The Data Pipeline Systems team published an associated HAWC+ Data Handbook, which describes both the reduction algorithms used and the data produced by the data reduction pipeline. Questions regarding utilization of HAWC+ data may be directed toward the Help-Desk, and SOFIA will offer opportunities for additional support to further assist those who want to work with SOFIA data in general. Stay tuned.

[SOFIA Help-Desk](#)

Community Dataset Release: 30 Doradus Polarimetry

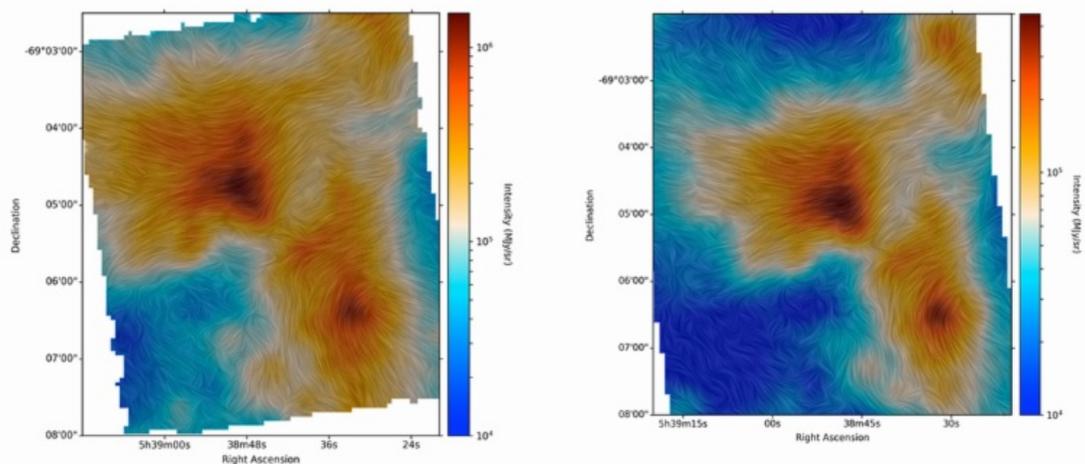
The SOFIA Science Center is introducing a new opportunity to utilize SOFIA data and investigate new frontiers in infrared astronomy. Data from certain recent projects will be processed and released to the scientific community without a proprietary period. The first of these publicly available datasets is from the High-resolution Airborne Wideband Camera-plus (HAWC+).

SOFIA released the data for an unprecedented infrared polarimetric analysis of the 30 Doradus star-forming region in the Large Magellanic Cloud. At the center is a cluster of O-type and Wolf-Rayet stars that heat the surrounding dust, allowing for in-depth total intensity and polarimetry analysis of star formation in the infrared. “Thirty Doradus is so close to us that we can resolve the region down to individual star-forming clusters,” says Enrique Lopez-Rodriguez, instrument scientist for HAWC+. “No other extragalactic star-formation region can be studied in such detail.” In addition, 30 Doradus is in a low-metallicity galaxy, so researchers can study the star-formation phenomenon as it was in the past when the metal content of the universe was much lower.



53 microns

89 microns



154 microns

214 microns

SOFIA compiled polarization maps taken at 53, 89, 154, and 214 microns, revealing dust emission between 10-100 K and allowing for an inferred morphology study of the magnetic field. (<https://www.sofia.usra.edu/multimedia/science-results-archive/sofia-reveals-never-seen-magnetic-field-details>)

Shorter wavelengths reveal hotter dust and yield information critical for studying magnetic field disturbances in dense, compact regions. At 53 microns, HAWC+ has an angular resolution of 4.9" Full width at half maximum (FWHM), a total intensity field of view of 2.8 x 1.7 arcmin², and a polarization field of view of 1.4 x 1.7 arcmin².

Longer wavelengths comparatively indicate cooler dust and provide information about the magnetic field on large scales. At 214 microns, HAWC+ has an angular resolution of 18.2" FWHM, a total intensity field of view of 10.0 x 6.3 arcmin², and a polarization field of view of 5.0 x 6.3 arcmin².

What can *you* do with these data? Principle investigator for the proposal and Director of SOFIA Science Mission Operations, Harold Yorke, has some ideas. "We don't yet know the 3D topology of the magnetic field for 30 Doradus, or how star formation activity affects magnetic field topology in general," Yorke says. "Discovering the role of magnetic fields in regulating star formation activity is another crucial astronomical goal where more research is needed."

What's next?

The next planned observations for a community dataset will target the star-forming complexes DR21 in the constellation Cygnus, W3 in the constellation Cassiopeia, and Orion's Becklin-Neugebauer/Kleinmann-Low region utilizing the Faint Object InfraRed Camera for the SOFIA Telescope (FORCAST). The team will generate imaging maps between 5 and 37 microns of each star-forming complex, as well as spectral maps of the central 2'x2' regions of each complex.

[Link to DCS archives](#)

[Instructions for downloading 30 Dor data](#) (near the bottom of the page)

Tele-Talks

SOFIA Tele-Talks are colloquia presented over the phone, with slides available for download shortly before the talk. The talks are targeted broadly toward members of the astronomy community who are interested in SOFIA science and in the current and potential scientific capabilities of the observatory.

The schedule for the Tele-Talks can be found on the [SOFIA Tele-Talk webpage](#). Call in to a Tele-Talk by dialing (888) 531-9655 from the United States. International call-in information is available on the [SOFIA Tele-Talk webpage](#). Note that the link to the slides for upcoming Tele-Talks is only enabled shortly before the presentation.

The Tele-Talks are always held on a Wednesday at 9 a.m. PST approximately twice a month. The next Tele-Talks scheduled are the following:

- September 12, 2018: Darren Dowell (NASA JPL)
- September 19, 2018: Dan Clemens (Boston University)

Slides and audio recordings of past Tele-Talks are available on the SOFIA website by selecting the link of a past Tele-Talk.

Contact [Dan Lester](#) to be added to the Tele-Talks mailing list.

[Schedule and Past Tele-Talks](#)

[SOFIA Tele-Talk webpage](#)

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Please feel free to direct questions and comments to the SOFIA Science Center help desk: sofia_help@sofia.usra.edu.

