Drylabs

By which I mean, using other peoples' data to carry out an AST 244/444 project and write a paper about it.

First, the winter weather was uncooperative. Then the novel coronavirus came along to deprive everybody of a chance to take their own data at Mees, and to reduce the data in groups in the astro lab. Now the pandemic is still here and the weather is still not cooperating: the current forecast has no clear nights before 25 April 2020. If this holds, we will not get Mees data in time for paper-writing. The last day of finals week is 10 May 2020; I really need to have final versions of papers on that day, in order to grade them and to submit final grades.

So it's time to panic. There will still be observing on every clear night, even when it's much too late to use in papers. And there are sufficient data to carry out a couple of the projects: globular clusters, and H II regions. But even for those we had been hoping to improve on those data. **We will therefore, hereby, offer the option to use archival observations from other observatories in your analysis and papers.** The idea is still to choose one of the projects on our list, but to download the data from the observatory archives, do what reduction is necessary, extract the measurements that you need for your analysis, and write a paper discussing your work in which – among other things – you answer the questions set out in the project descriptions.

Here are some suggestions for data sources for each project.

1. **H II regions**, on which we do have some Mees data on M 42/43 but it's not very good: consider instead the extensive integral-field spectra of M 42, in which a zillion spectral lines are detected at visible wavelengths, at 0.2 arcsec resolution over the central 6x9 arcmin of the nebula. Go here for the data: http://muse-vlt.eu/science/m42/ . See also the long-form addendum to the spectral-line imaging lesson, in which these data, and the sort of analysis you can do, are discussed.

For the rest of the projects I suggest getting the data from the Mikulski Archive for Space Telescopes (MAST): https://archive.stsci.edu/.

2. **Exoplanets**: download exoplanet observations from Kepler (under MAST's Legacy Missions) or K2. Choose a couple of your favorite types of exoplanets – hot Jupiters, hot Neptunes, superearths –create phase-folded light curves, measure periods, and describe your targets.

3. **Seyfert nuclei**: download Hubble Space Telescope (HST) observations of NGC 4151, and those for any normal (non-active) spiral galaxy of the same approximate Hubble type, inclination, and distance as NGC 4151 for your analysis. At least you won't have to worry about the seeing.

4. **Globular clusters**: many options exist. You may combine the HST Wide Field Camera 3 (WFC3) observations of M 15 with the Mees observations we have already posted. Or you may ignore M 15 entirely and choose to construct HR diagrams for any other globular cluster that HST has observed with WFC3. These include M 92, M 13, M 5, M 2, 47 Tuc, and many more. (Oddly, not my favorite globular cluster, M 3.) In many cases HST has been used for time-series observations in which the variable stars can be identified, though that's usually done with other HST instruments than WFC3 (e.g. STIS or ACS).

Please send me a message and tell me which project you will choose, and what data you will use, by the end of the day this Friday, 17 April 2020.

