BRIEF

STARS
World Coordinate System - WCS

Overview

This lesson assumes an understanding of celestial positions described as RA/DEC.

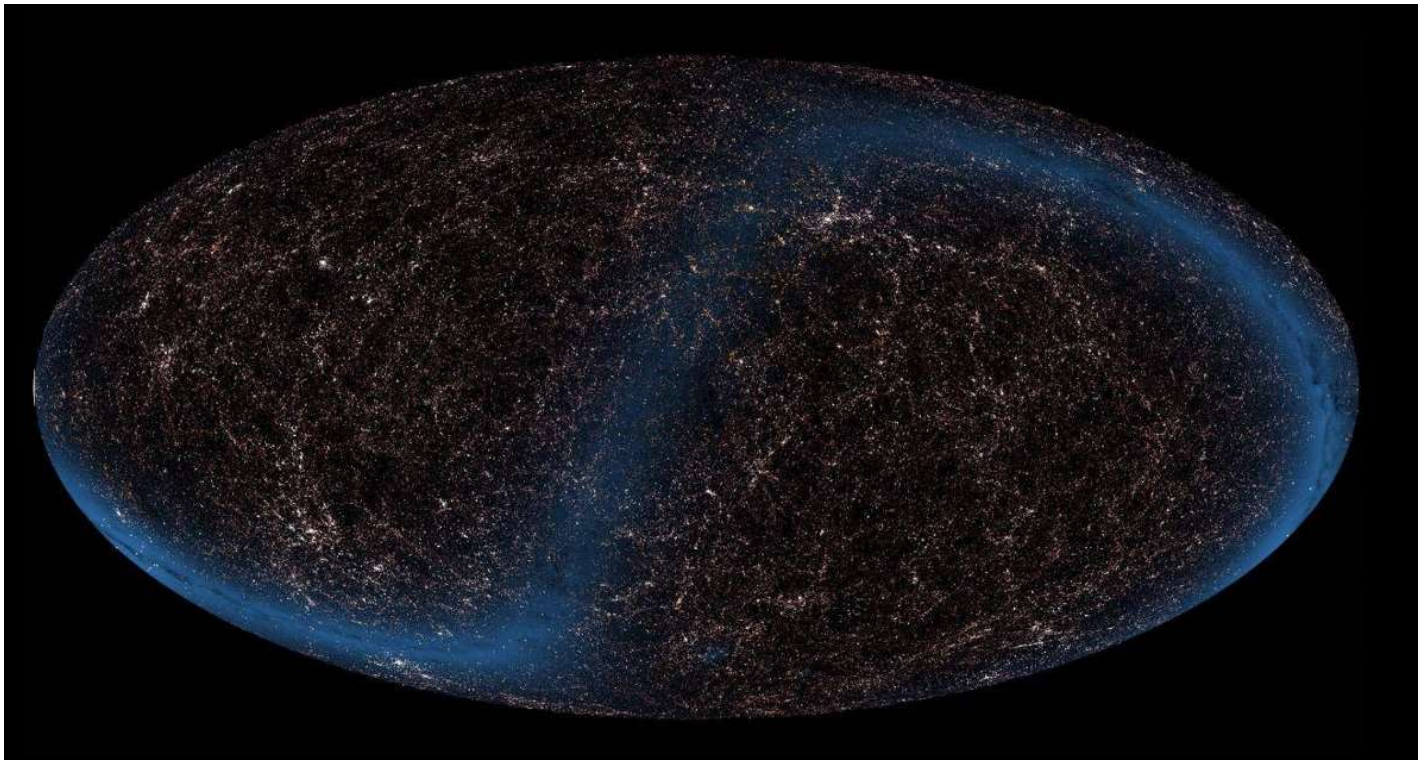
World Coordinate System (WCS) is the position of an image on the sky sphere. It is the RA and Dec imbedded in a FITS image.

When a CCD image is taken, it contains the RA and Dec in the FITS header, but these coordinates are not embedded in the image.

Inserting WCS into the CCD image, specifies the Right Ascension and Declination on the sky associated with a given the pixel location in a CCD image.

World Coordinate Systems - WCS

Where is this picture from?



Telescope to Coordinates

Although you used RA and Dec coordinates to point the telescope at your target, there is no guarantee that the center of the image is that exact RA and Dec that was entered.

Additionally, although the image may be basically centered on that position, it is very difficult to tell an accurate RA/DEC position for each object in the image.

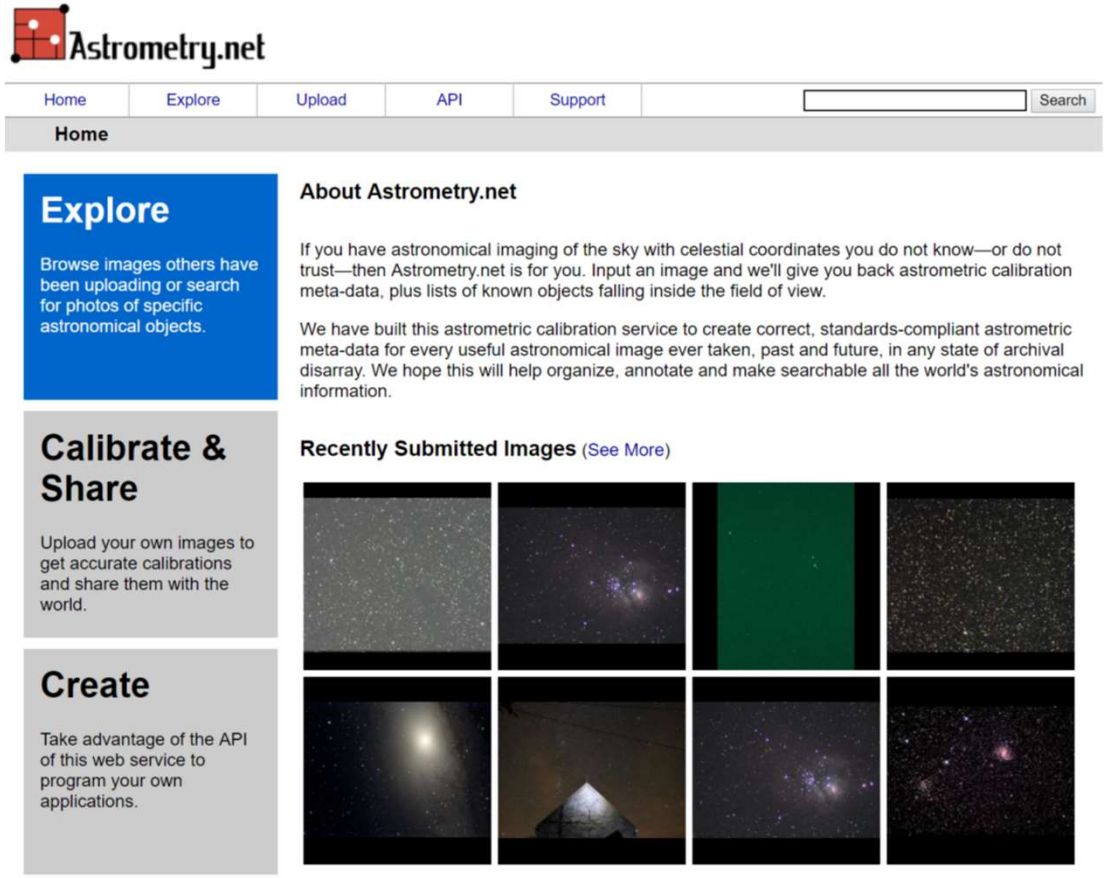
In order to correctly orient the image, you have to use software products to query catalogs and imprint the WCS on the image.

Astrometry.net

Astrometry.Net: nova.astrometry.net

This is an online product that uses an internal astrometry engine that takes a CCD image and return the astrometry world coordinate system (WCS) sky coordinates.

It uses a catalogue of stars in the sky, and from it build an index which is used to solve the input images.

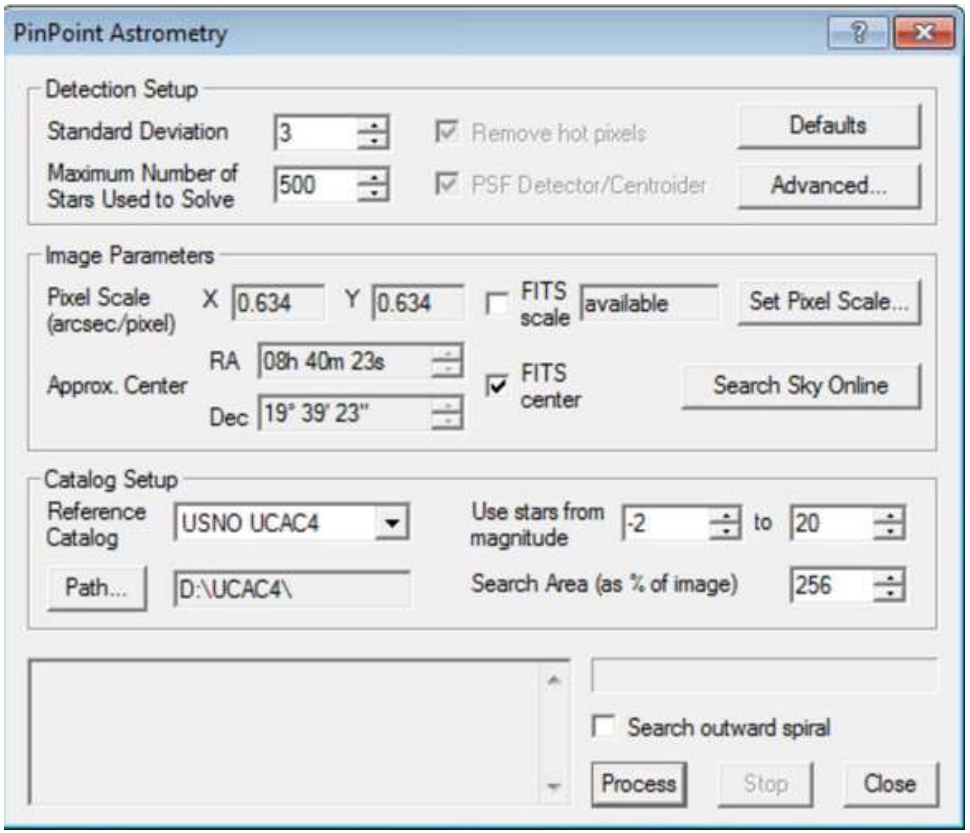


MaximDL

Located on the BARC Server, MaximDL uses an internal plug-in called: PinPoint Astrometry.

This reads the FITS Header for the target location, and then queries the USNO UCAC4 catalog for matches on star positions.

When located, it will insert the WCS coordinates for the image and report how many stars were used in the matching process.



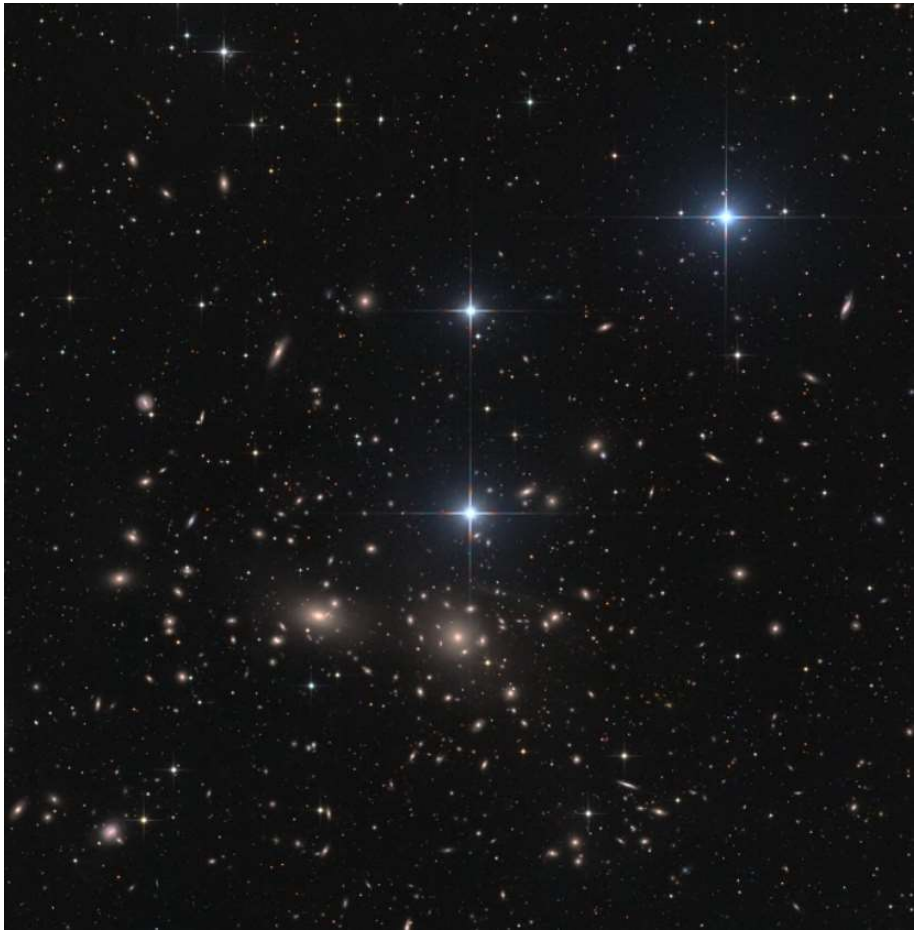
Summary

WCS coordinates are essential to any research.

In short: you have to know where you are looking to ensure you are studying the correct target.

While we use RA and Dec coordinates to point the telescope at a target, these coordinates are not automatically embedded into each image.

Using software products like MaximDL, MIRA, Python scripts, or Astrometry.Net are the best way to input WCS into your images.



Questions?