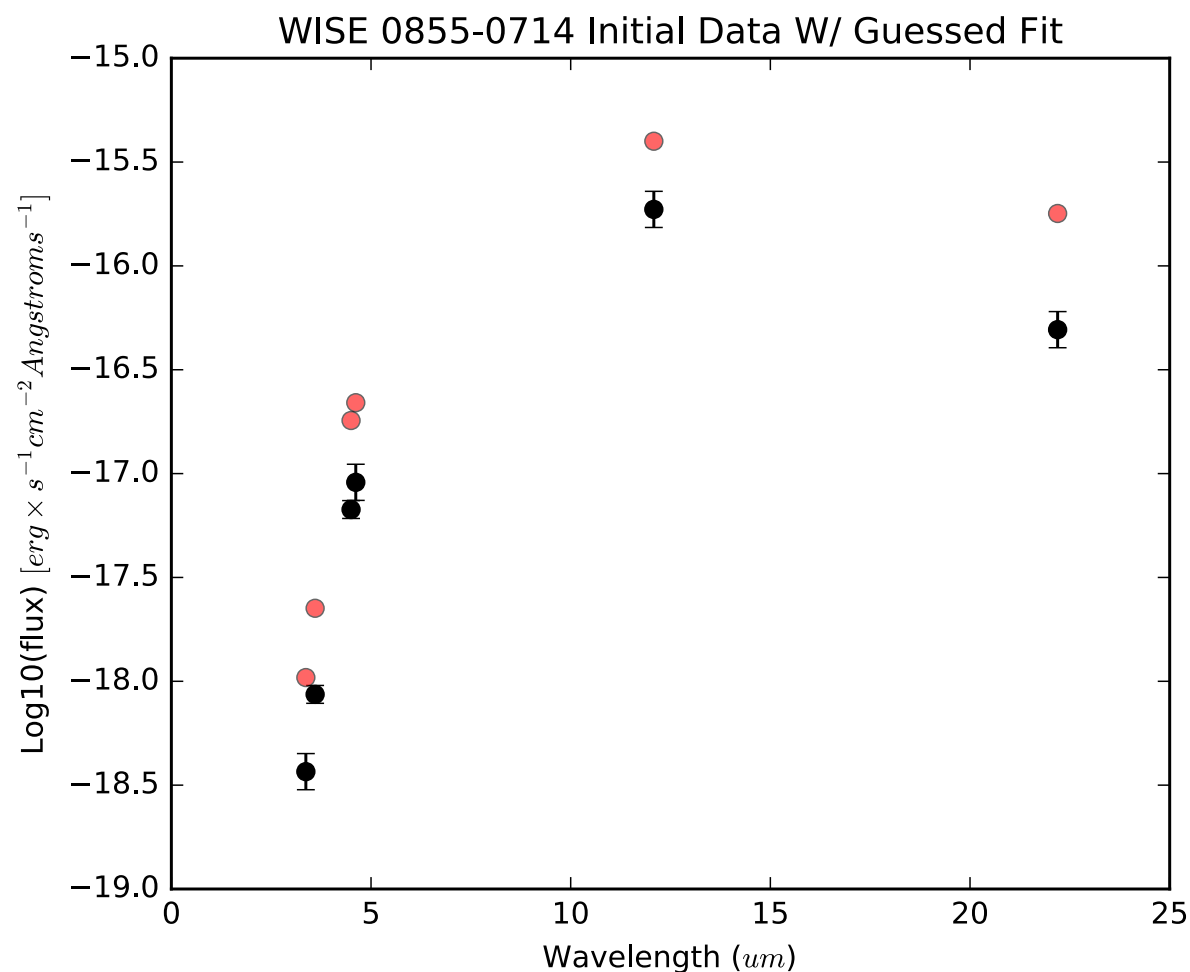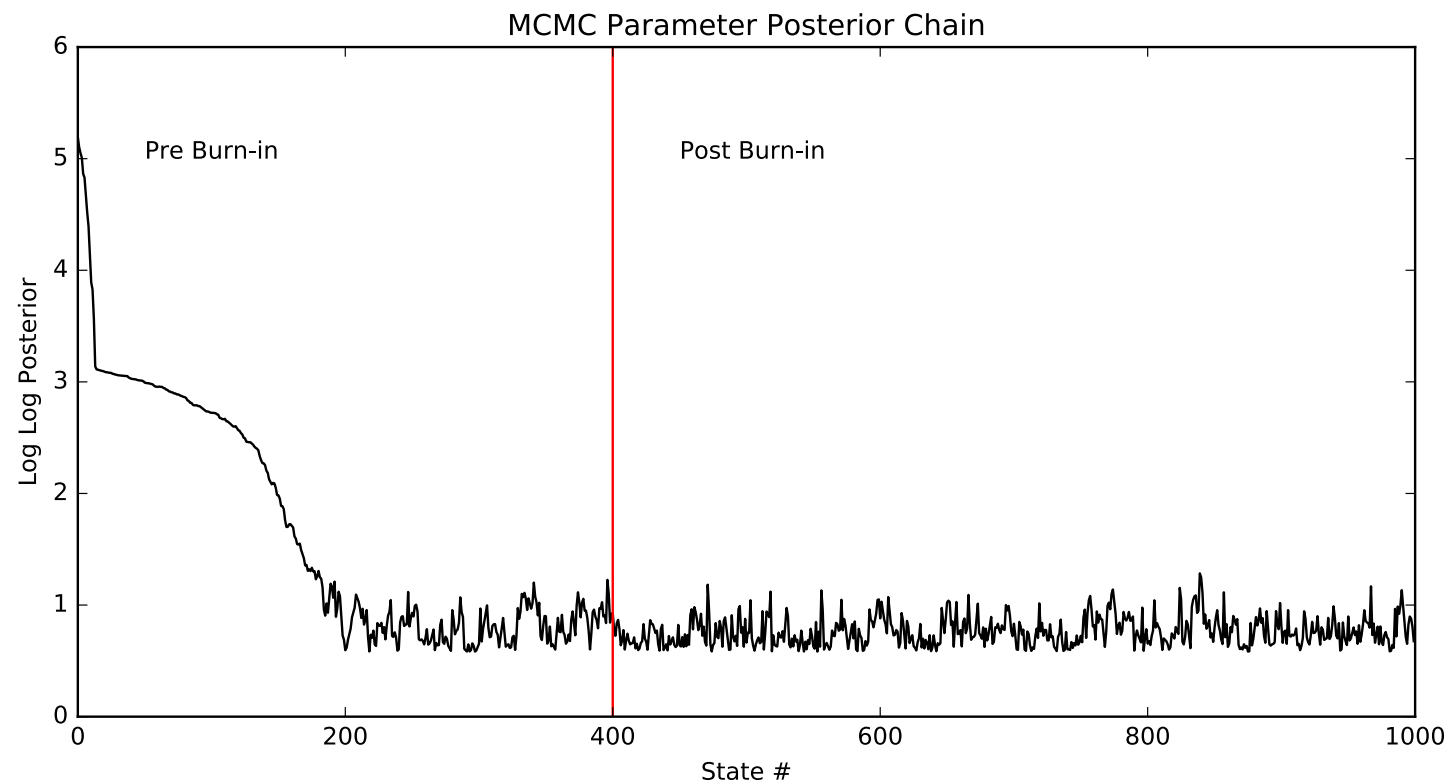# Astrostat Lab2: Cold Brown Dwarf MCMC
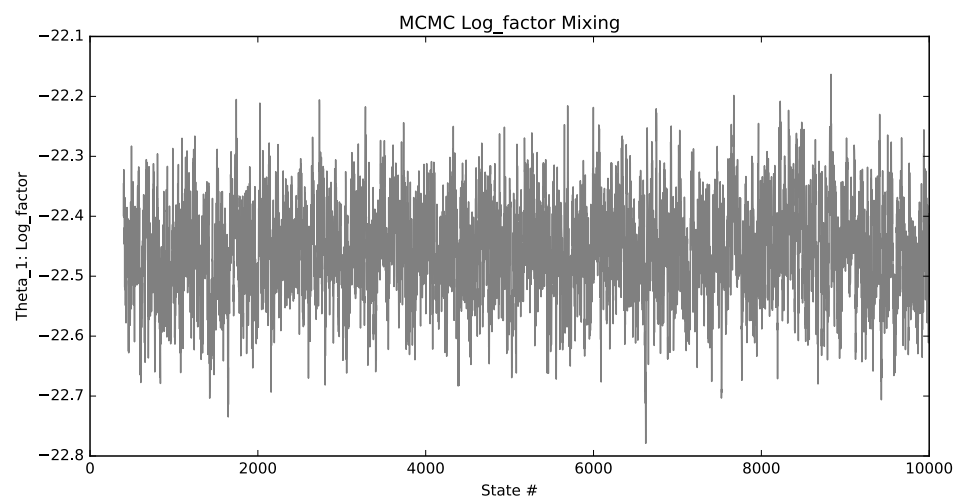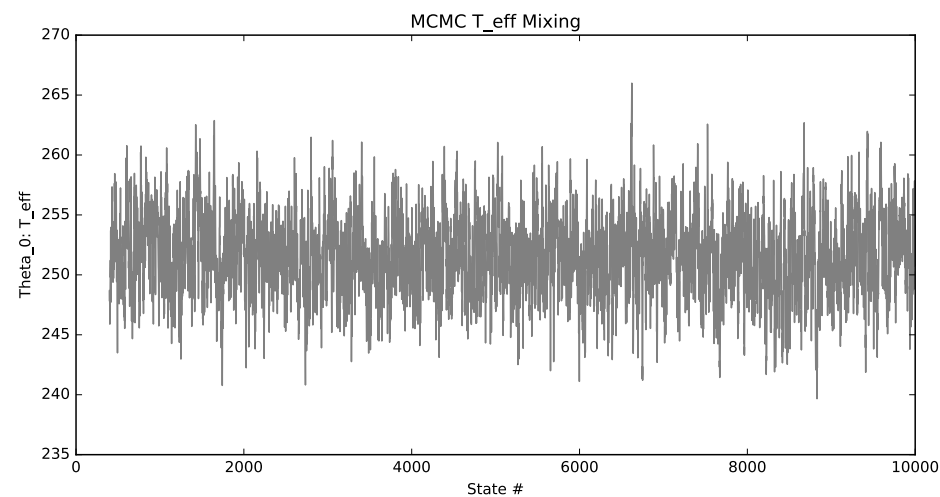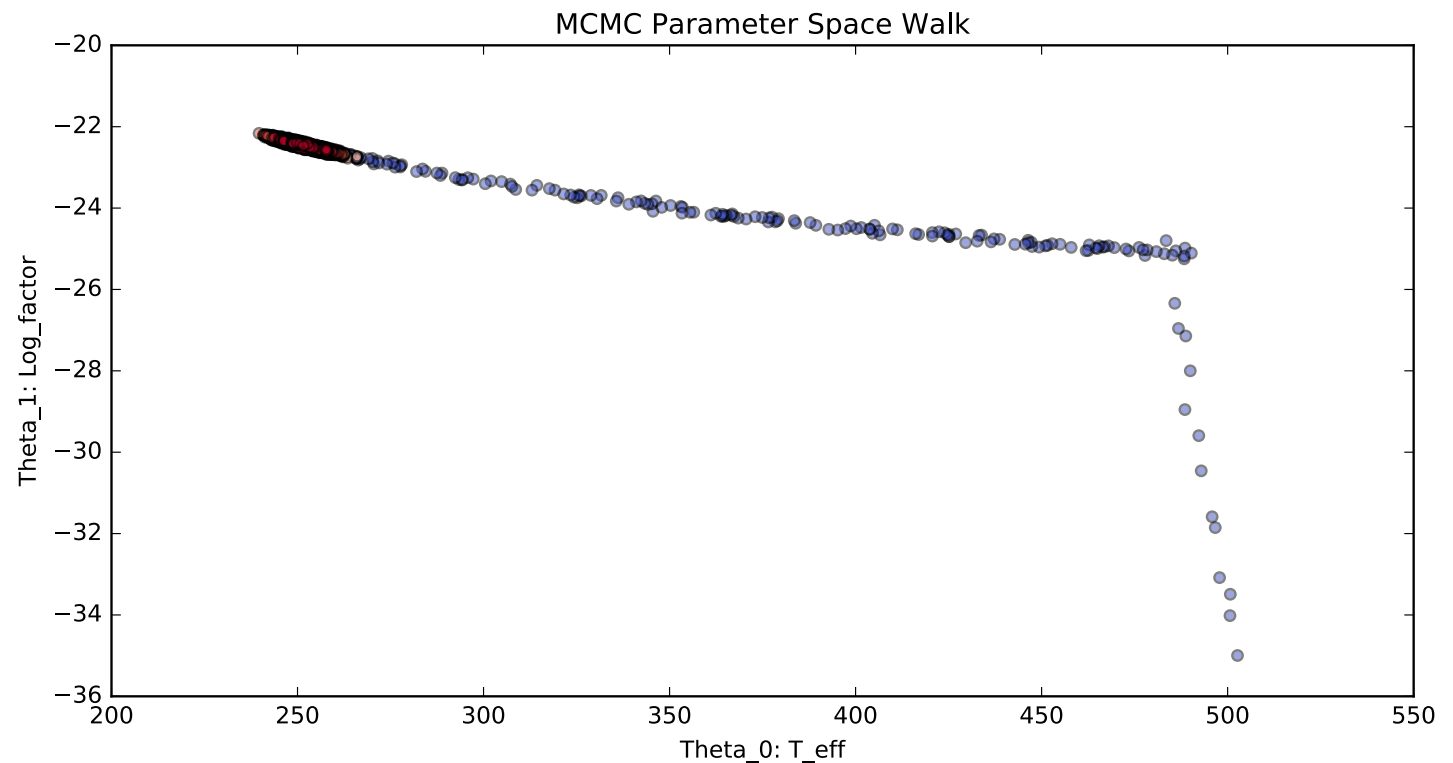
Larry Li (Group: Issac, Larry, Nick)

WISE 0855-0714 Initial Data W/ Guessed Fit

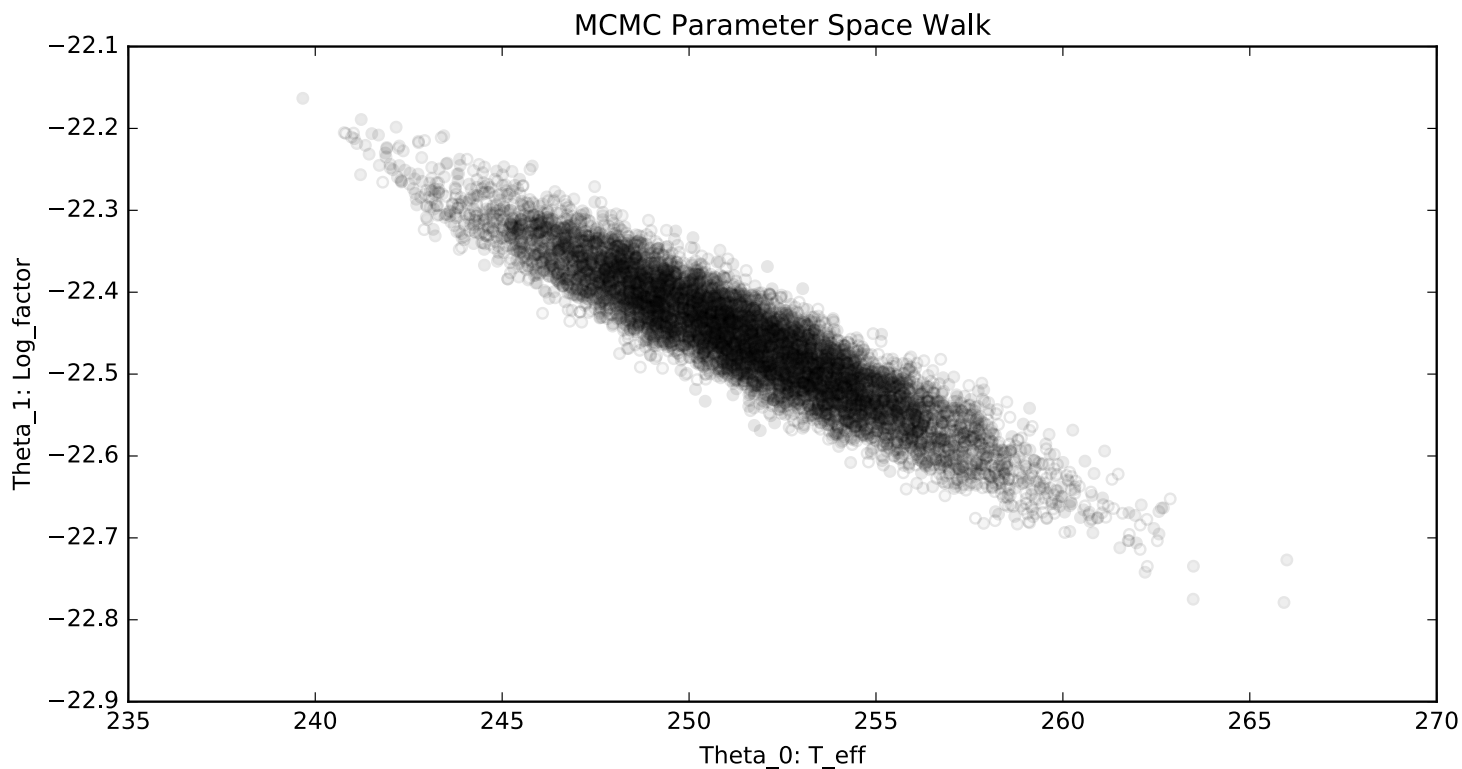Guessed fit at K = 250 & log_factor = -22

- Target cold brown dwarf WISE 0855-0714 found in April 2014 at slightly more than 6 lys away

- We expect cool stellar spectrums to absorption & emission features, but still follow a general black body curve

- Use Markov chain Monte Carlo algorithm to fit the cold brown dwarf's temperature

- Keep flux on log scale for ease of unit and constance conversion

- MCMC:

  - Markov chain: the future is independent of the past, conditional on the present

  - Accept proposals with $P(\exp(-\Delta X^2/2))$

- Used Log Log Posterior to determine proper burn-in

- Assumed a uniform prior (inverse top hat log-like penalization)

MCMC Parameter Space Walk

MCMC T_eff Mixing

MCMC Log_factor Mixing

MCMC Parameter Posterior Chain

- With 10000 jumps the high likelihood region is quite well sampled

- Corner plot shows that the two parameters are each quite normally distribute but are highly correlated with each-other

- Multi-seed MCMC all walk to the same high-likelihood region but seem to all prefer taking initial jumps in theta_1