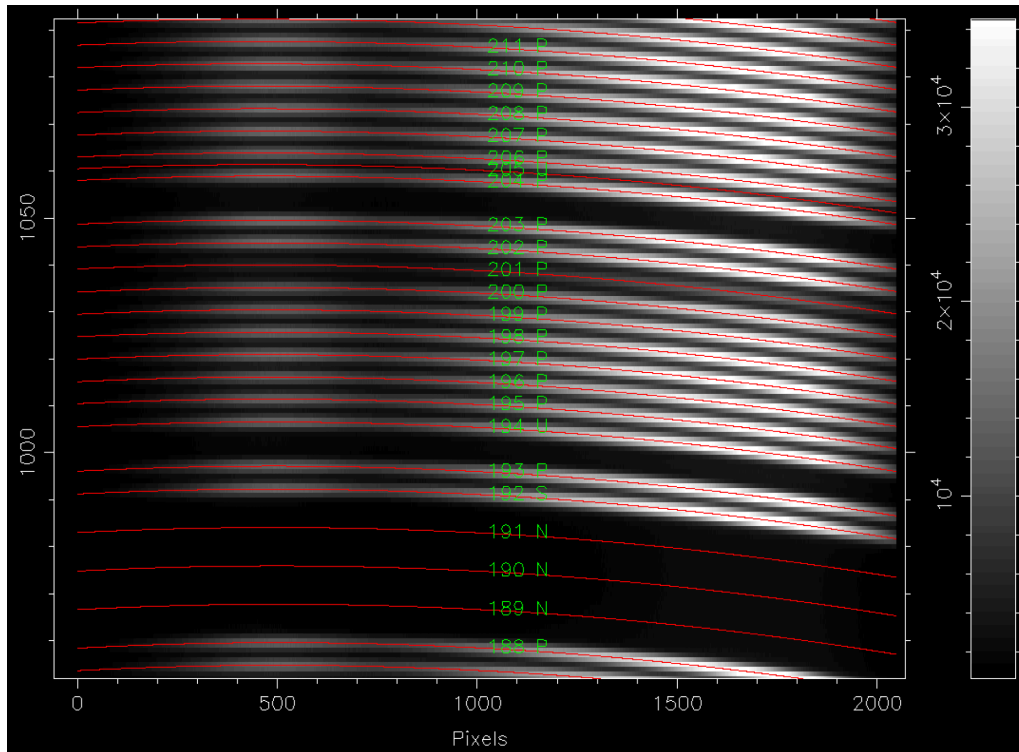


Hector data reduction pipeline

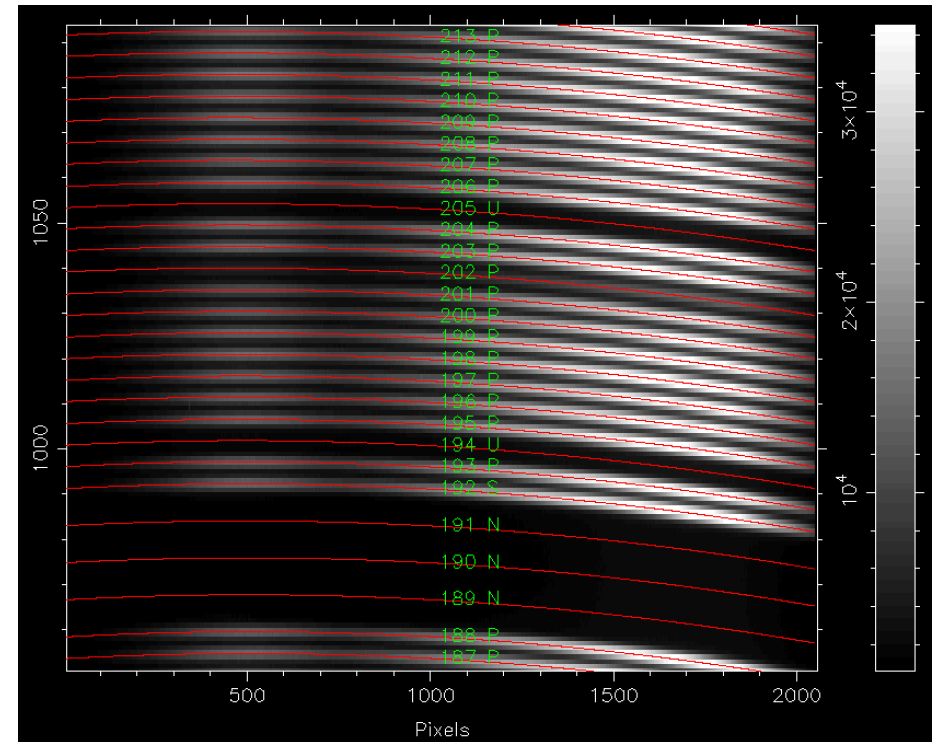
- SAMI reduction pipeline is the backbone
 - preprocessing by calling 2dfdr
 - pre-cubing - sky subtraction, fibre extraction, flux calibration, centring etc
 - cubing
- Hector has four ccds
 - ccd 1 & ccd 2 are same to SAMI
 - need to update the pipeline for ccd 3 & ccd 4
- The pipeline works for preprocessing, but we found some issue on the reduced data

Tramline - 15jan10002

reduced in Jan
shared by Madusha

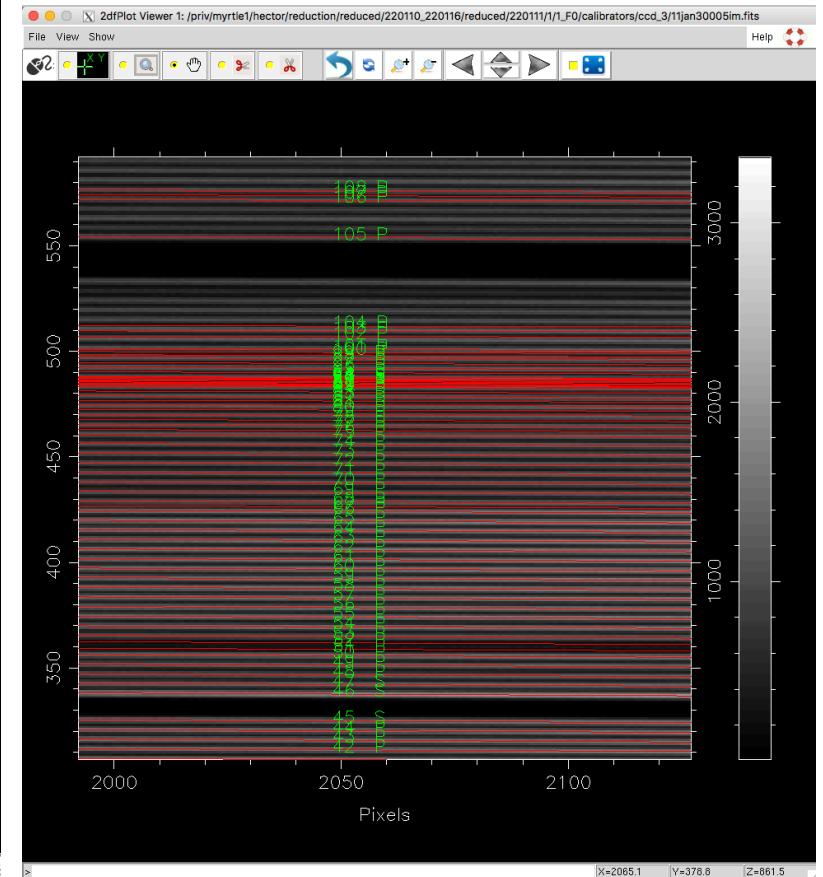
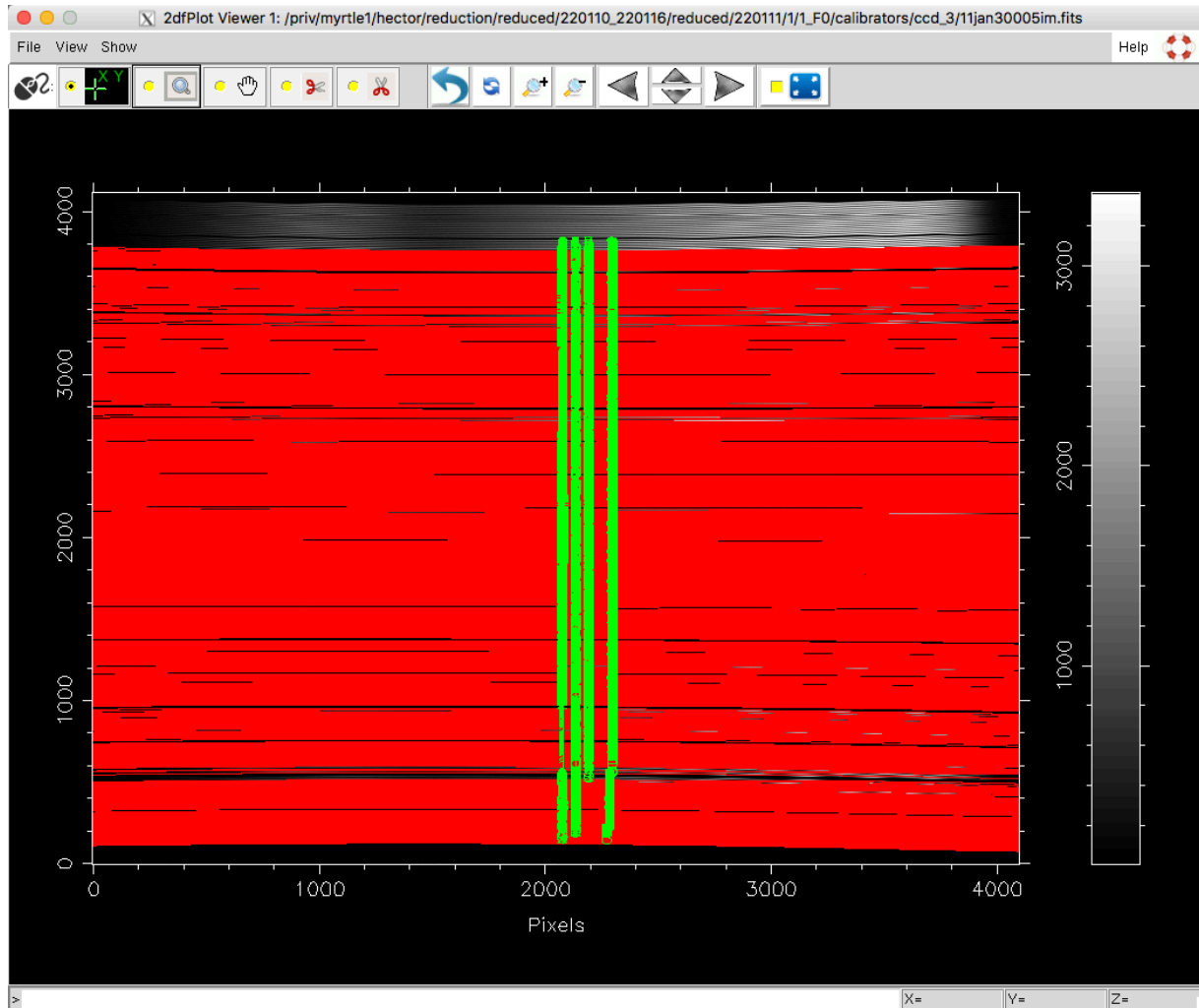


reduced in Feb
after updating 2dfdr



We found an issue that 2dfdr doesn't place unused fibre ('U') well in blank spot
Issue has been fixed when using updated 2dfdr
All tramline fitting for ccd_1 and ccd_2 are visually checked and looks okay

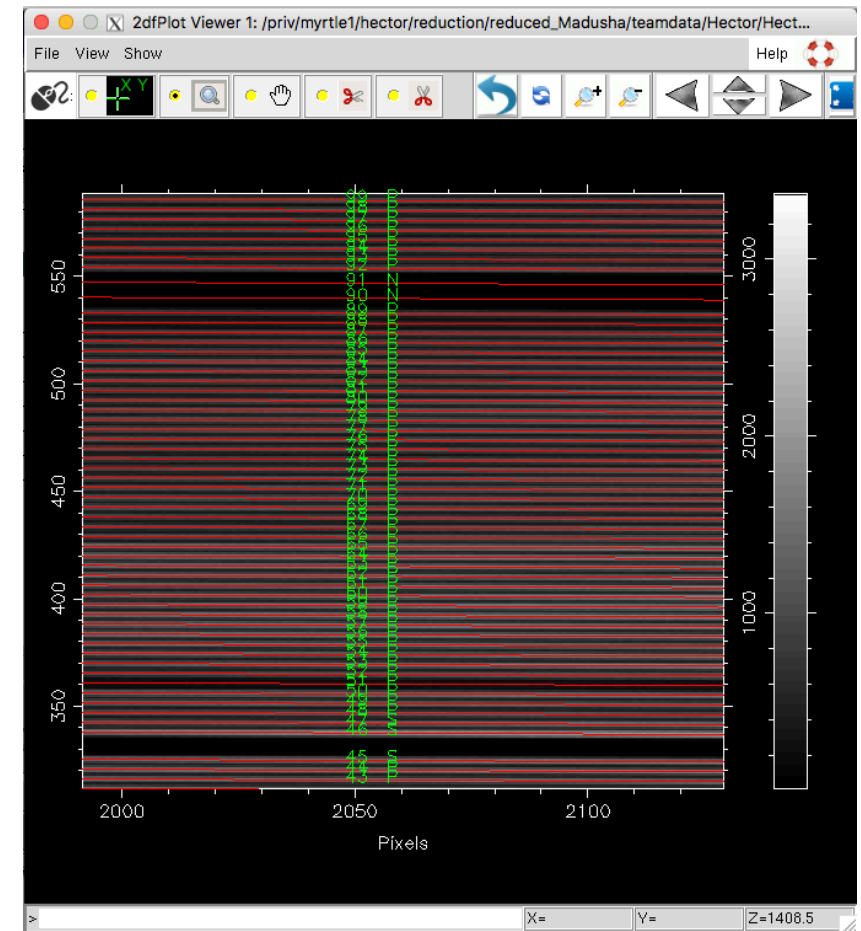
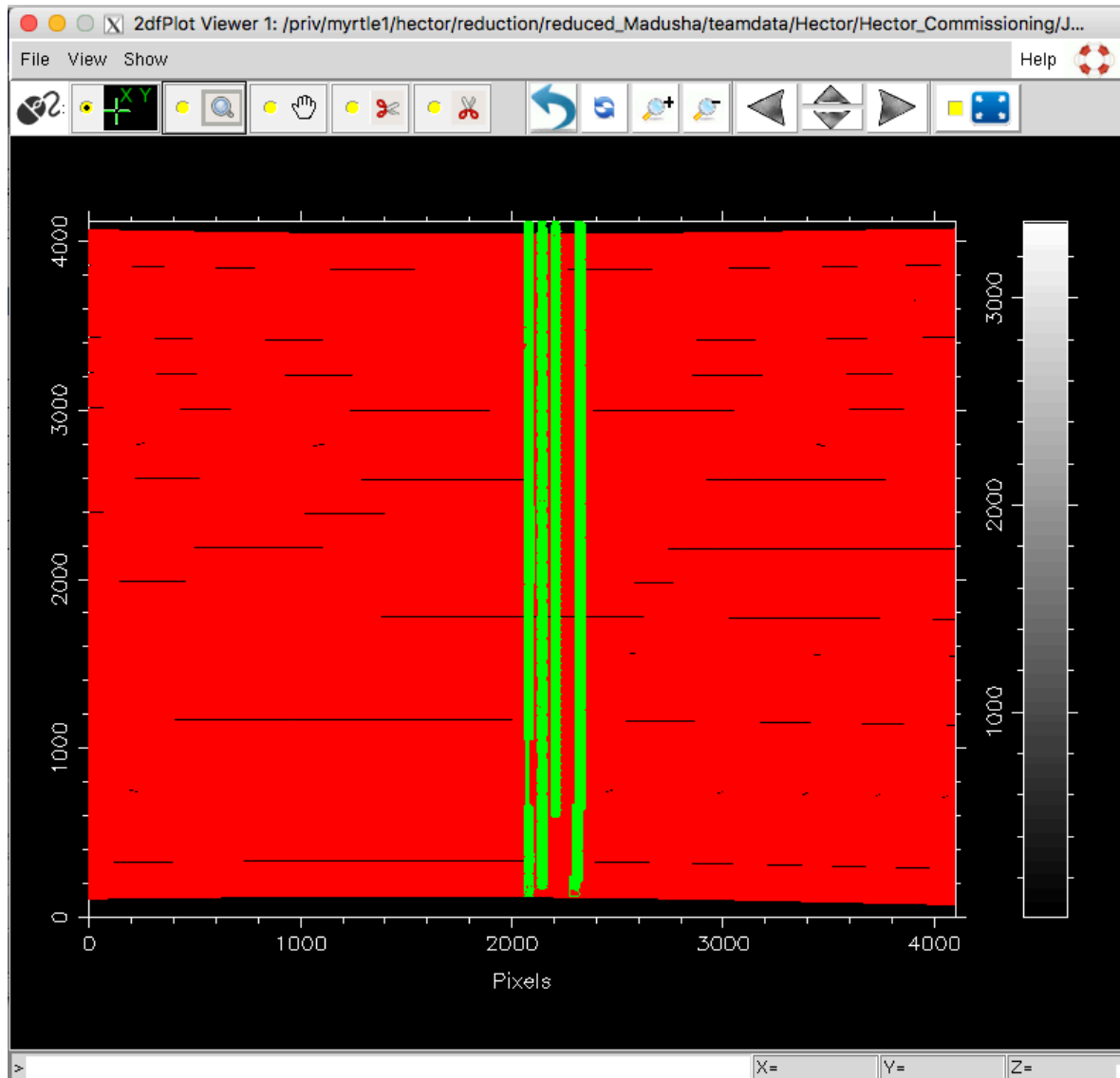
ccd_3 11jan30005 reduced in Feb by Sree
using the pipeline
and up-to-date 2dhdr



There still is an issue when making tramline map when reducing the data using the pipeline

```
aaorun reduce_fflat 11jan30005.fits -idxfile hector3_v1.idx -OUT_DIRNAME 11jan30005_outdir -SKYSCRUNCH 0
-BIAS_FILENAME BIAScombined.fits -DARK_FILENAME DARKcombined1800.fits -USEFLATIM 0
```

ccd_3 11jan30005 reduced in Jan by Madusha
manually reduced
before updating 2dfdr

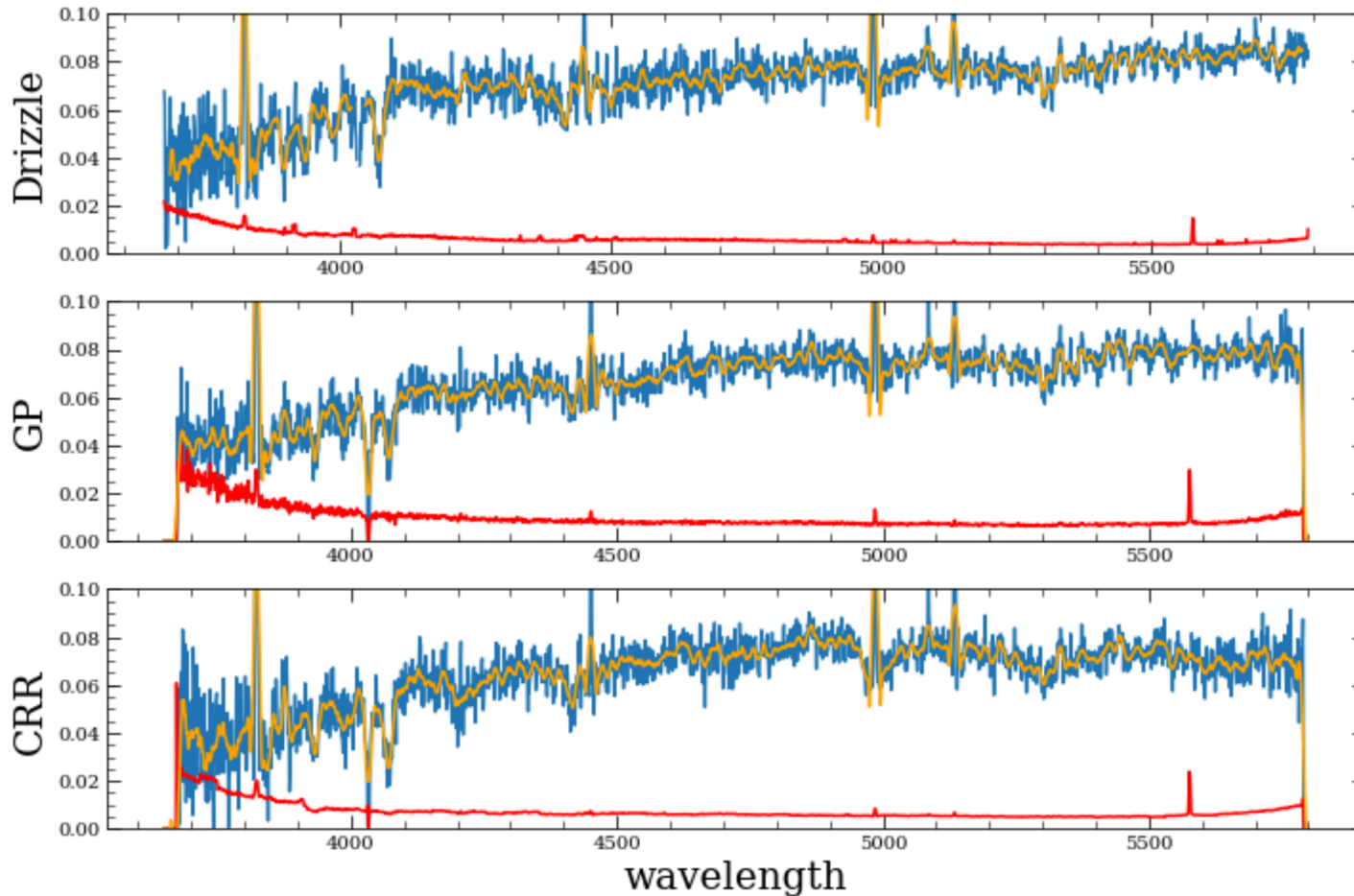


However, the issue has not been found in Jan when Madusha manually reduced the data before updating the 2dfdr. I will figure out what is the difference btw manual and pipeline reductions

Cubing process

- **Drizzle** is a procedure which simply transforms the input data and errors without reference to any model of the sky
 - simple and fast; standard method for SAMI cubing
 - aliasing issue and off-diagonal covariances
- **Gaussian process (GP)** does model each wavelength slice
 - may solve aliasing issue but does not solve off-diagonal covariances
 - it takes long time; ADACS team to optimise the code
- **Covariance-regularized reconstruction (CRR)** suggested by Liu et al. (2020) may solve issue on covariance and generate slightly reduce aliasing issue

Drizzle, GP, and CRR cubes



estimated S/N
based on spectra
12.5 (13.1)

15.7 (9.4)

12.0 (12.3)
(S/N calculated as
flux/sqrt(variance))

GP method seems to generate better quality spectra,
but over-estimates variance

Summary

- Develop Hector pipeline
 - the pipeline works for preprocessing
 - we are examining reduced data
 - should work on pre-cubing and cubing processes
- Cubing methods - drizzle, GP, and CRR methods
 - test cubes from three methods sent to Jesse and Brent to test the impact on stellar kinematics and emission-line fitting
 - email me if you have specific points to consider for testing cubes!
- Hector github repository
- DR meeting in mid-March