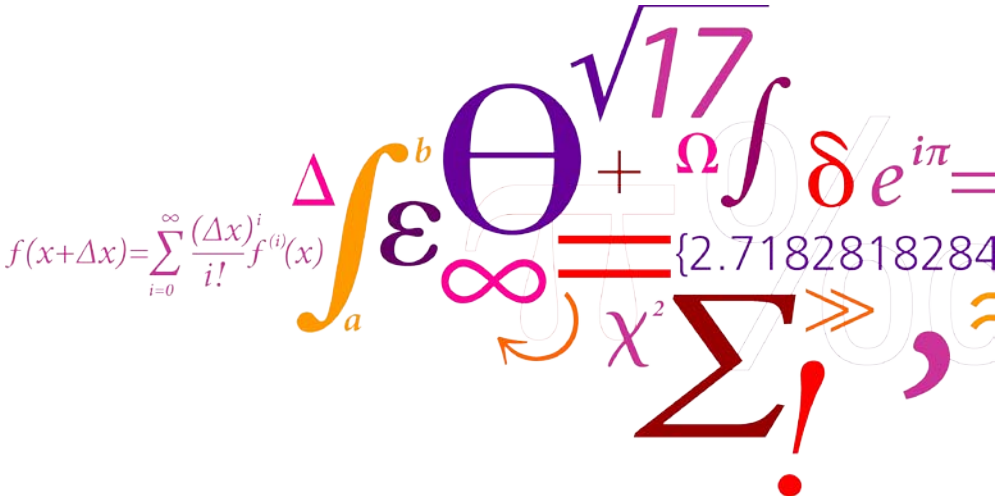
Further Adventures in Gain Calibration

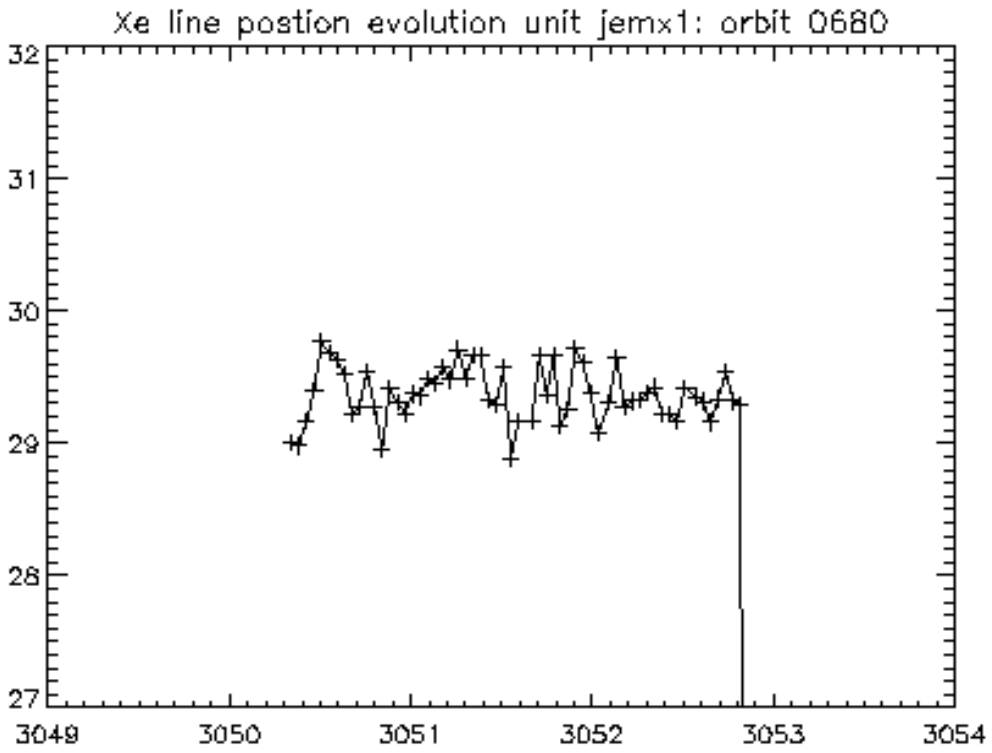
SDAST Meeting #39: DNSI, Copenhagen 9-10th June 2008



DTU Space
National Space Institute

Xe Line position and gain aging

- Generally this is going very well. Both software, instrument and operations have settled into a stable routine.
- Randomly selected example, revolution 680:



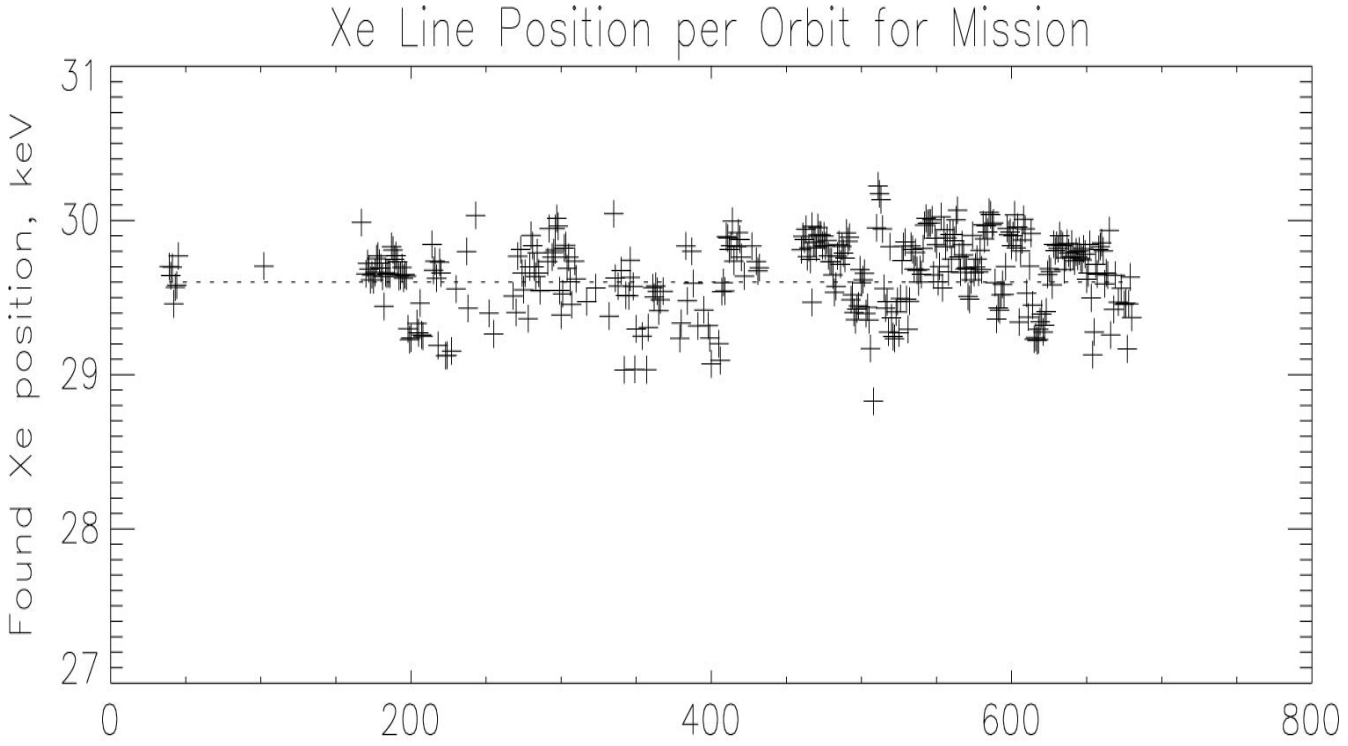
Differential Gain Aging

- No sign of differential gain aging any longer for JEM-X1
- Xe line position seems to have stabilized in JEM-X1
- No need to update reference channels for JEM-X1
- JEM-X2 seems to need new reference channels every time it's turned on and Xe line position is dropping not rising
- This could be due to some intrinsic saturation of the microstrip plate with age or the considerably weakened calibration sources so that there is no longer differential illumination of the plate.
- For most revolutions position of Xe for individual SCWs is with 2% of ideal
- For 'bad' revolutions Xe position is within 3% of ideal
- Biggest problem now is to accomodate temperature dependence in the gain variations.

Xe Line Position – JEM-X1

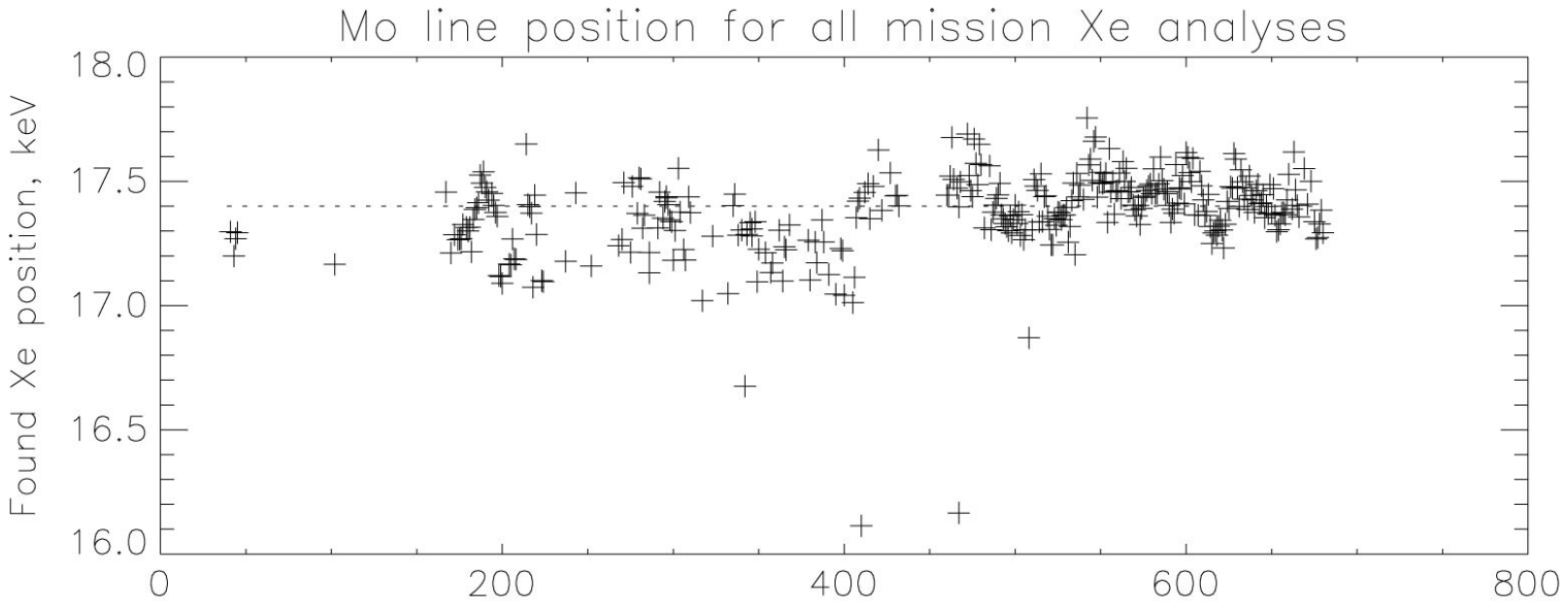
Average Line Position Per Orbit

Last HV step downs in revolutions 533 and 623



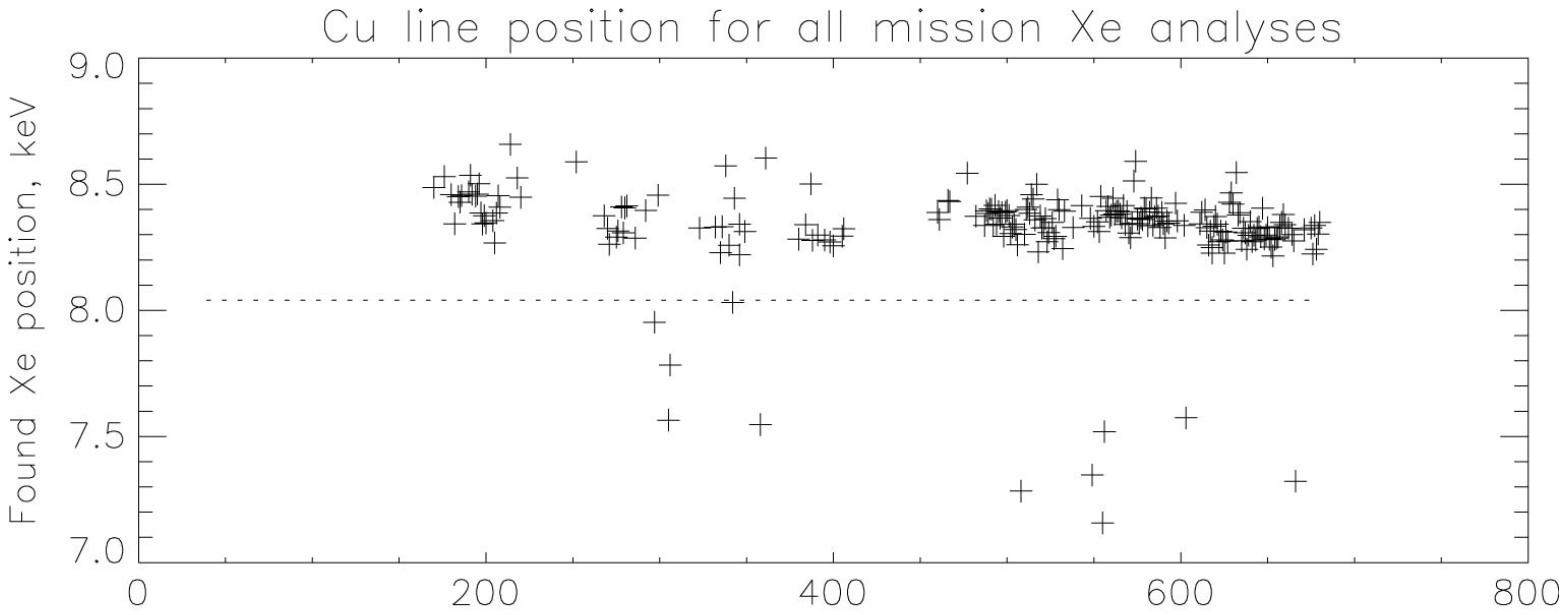
Mo Line Position for JEM-X1

- Average position per orbit



Cu Line Position for JEM-X1

- Average position per orbit

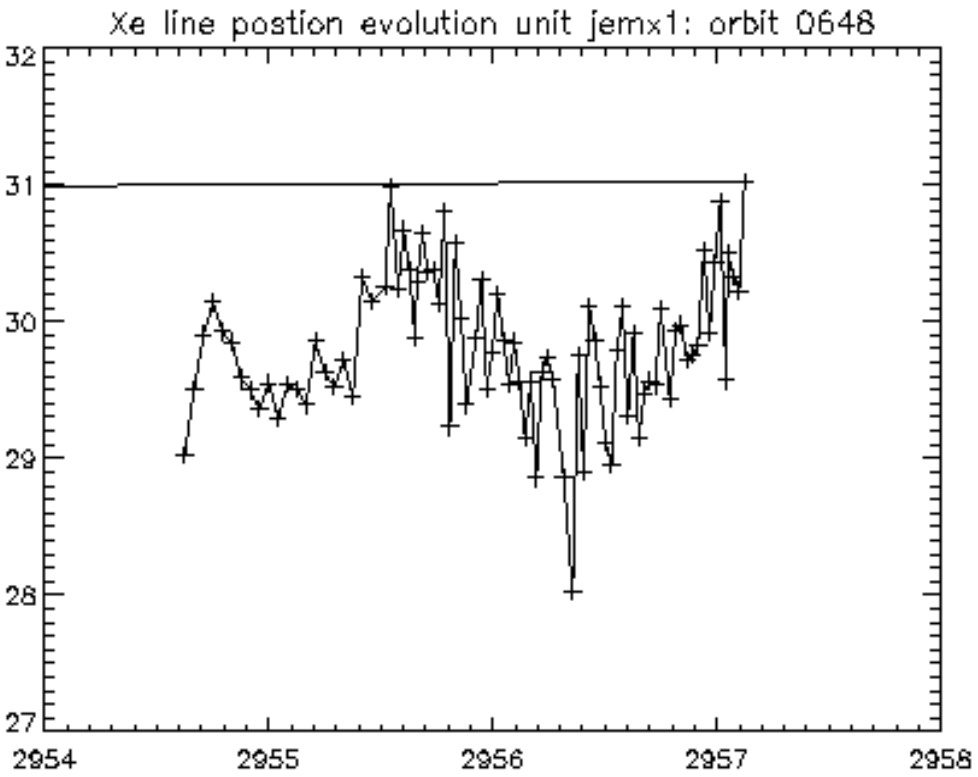


IC Tables and Difficult Revolutions

- No difficult revolutions since last SDAST meeting!
- Only IC tables delivered since then are for JEM-X2 crab calibrations to be placeholders until the update JEM-X2 IMOD tables with the new reference channels are available
- Once temperature dependent gain smoothing is possible there will be a new IC table for each revolution with a strong temperature signal

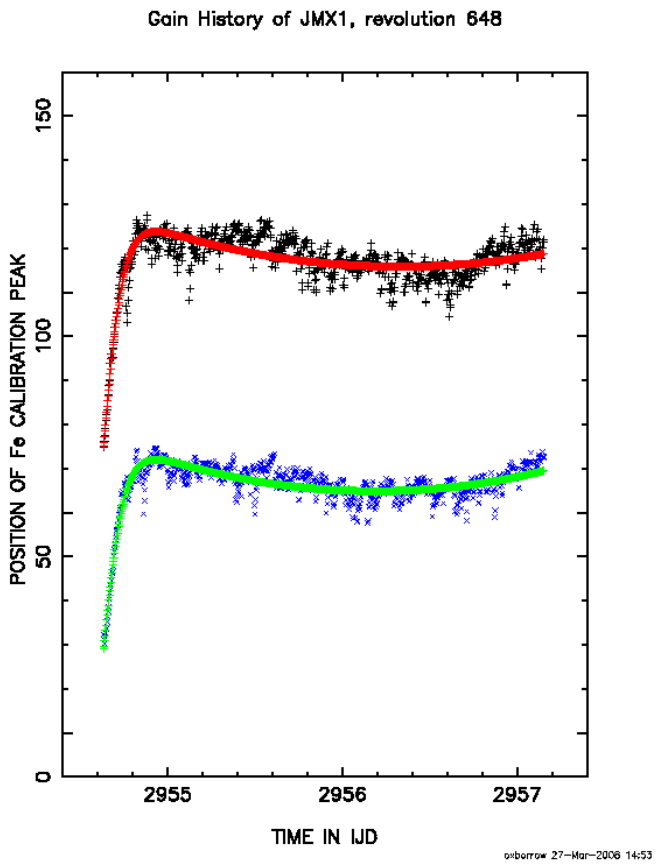
Introducing Temperature Dependence

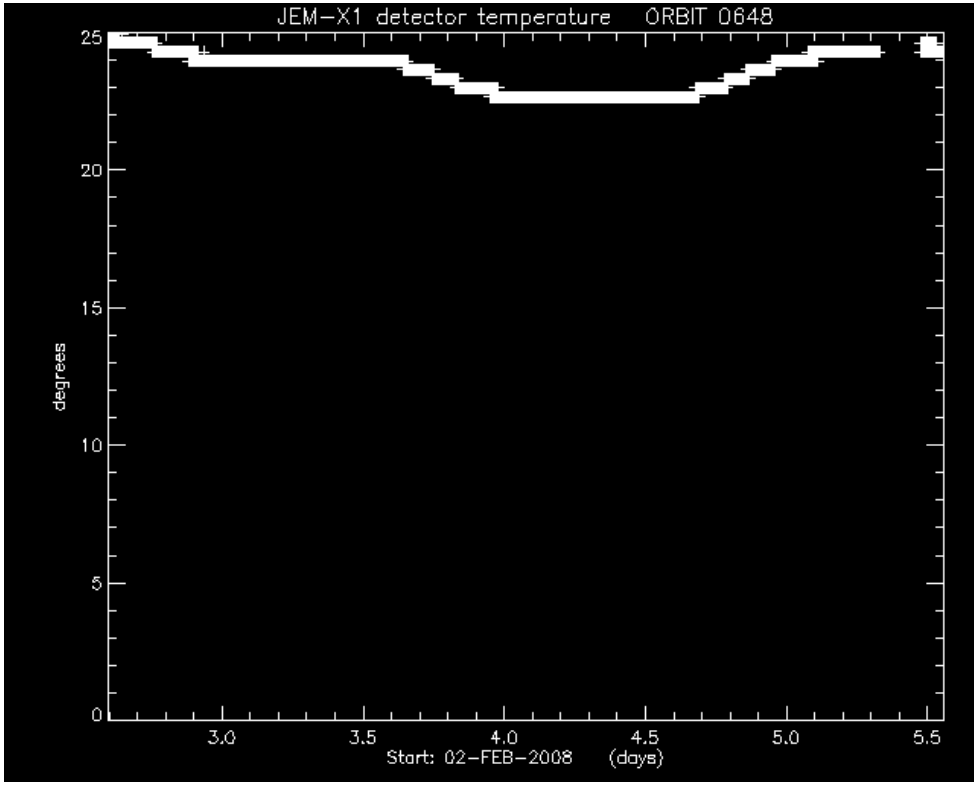
- Increasing temperature dependence in the gain introduces a residual temperature signal in the Xe position e.g. Rev. 648



Temperature Variations and Gain Smoothing

Current smoothing can't match complicated variations in temperature

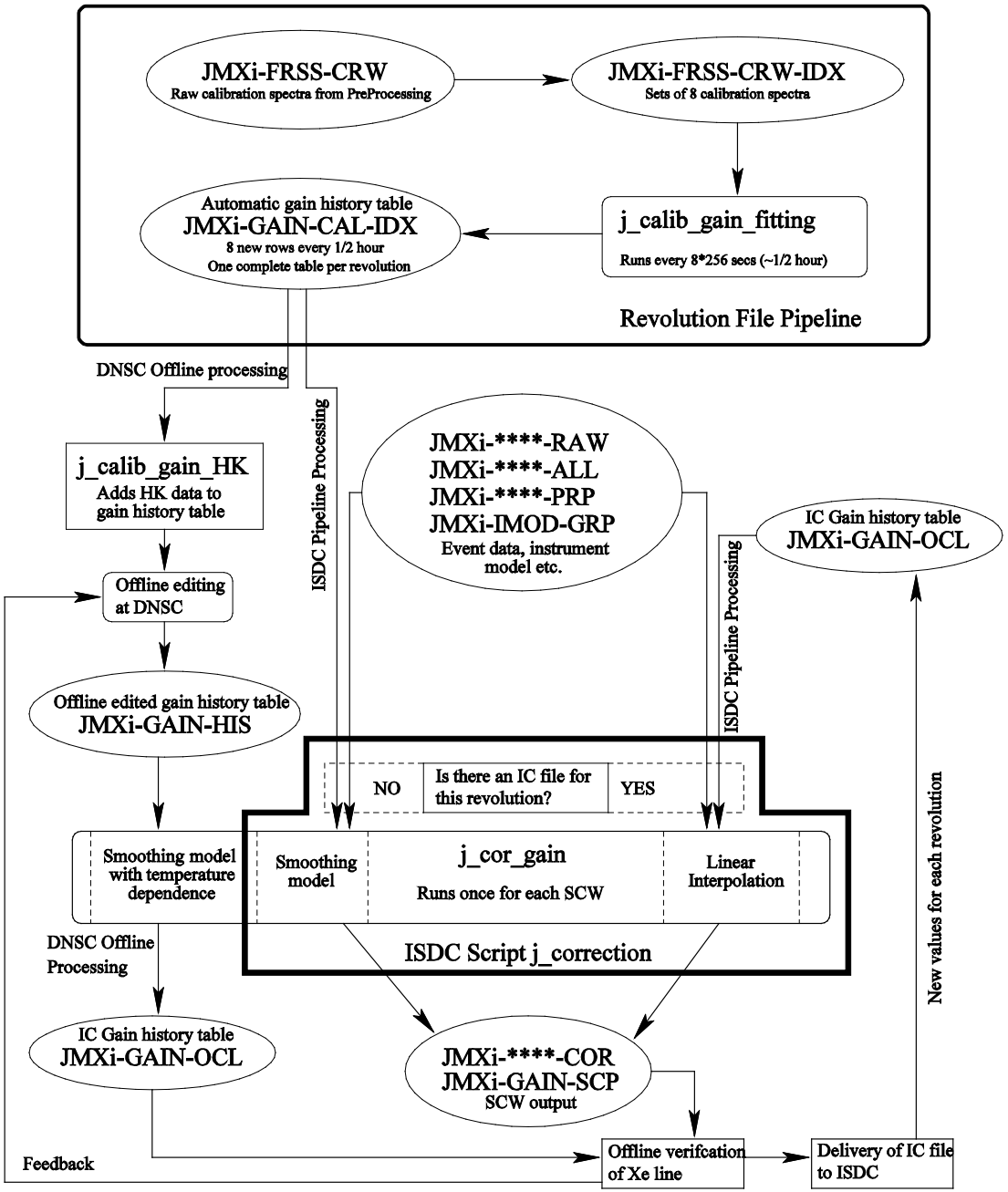




The j_gain_HK tool

- Stage one of introducing temperature dependence is adding HK data to gain history tables.
- Initially this is an offline tool for CAO to make IC gain tables for revolutions that need this extra fitting
- Possibly this could become a tool used only at the end of each revolution to add HK data to the last gain history table produced by the revolution file pipeline.
- This would mean the tool would only run once every 3 days
- Once HK data (temperature, trigger rate etc.) is in place j_cor_gain will be equipped with a new model that includes temperature dependence.
- Inputs to j_gain_HK are:
  - Revolution number
  - GNRL-SCWG-GRP : The master science window list

As offline tool



As part of rev. file pipeline