## **Analysis for H1C IDR 3.1** Josh Dillon, 12/19/19 **From Commissioning Team** 1-pol Raw Data Files **List of Bad Antennas RTP Antenna Metrics** zen.{JD}.[pol].HH.uv bad\_ants/{JD}.txt zen.{JD}.HH.uv.ant\_metrics.json Build 4-pol .uvh5: do MAKE UVH5.sh Convert 4 1-pol miriad files to 1 4-pol .uvh5 file. 4-pol Raw Data zen.{JD}.HH.uvh5 Redcal: redcal\_run.py Cuts times based on solar altitude and edge channels Finds delays (firstcal) **FirstCal Calibration Solutions** - Performs redundant calibration per-time and perzen.{JD}.HH.first.calfits channel (omnical) **Extract Autocorrelations:** - Removes antennas with high chi^2 and recalibrates if extract\_autos.py necessary. Extract autos and write to disk. **Run FirstCal Metrics:** firstcal\_metrics\_run.py Assess FirstCal solutions. **Omnical Visibility Solutions Omnical Calibration Solutions** zen.{JD}.HH.omni\_vis.uvh5 zen.{JD}.HH.omni.calfits **Raw 2-pol Autocorrelations** zen.{JD}.HH.autos.uvh5 **FirstCal Metrics** zen. {JD}.HH.first.calfits.firstcal Abscal: omni\_abscal\_run.py **Abscal Visibility Model** \_metrics.hdf5 Use externally calibrated visibilities zen.{JD}.HH.uvRXLS.uvh5 to solve for Omnical degneracies. **Abscal Calibration Solutions** Legend zen.{JD}.HH.abs.calfits **Data with XRFI External Origin** xrfi\_run.py Find and flag RFI based on raw data, Omnical gains and chi^2, Omnical visibility **Visibility Data** solutions, and Abscal gains and chi^2. **Product** Condenses flags to a single waterfall. hera\_cal process **Per-File Flagging Metadata** zen.{JD}.xrfi/\*zen.{JD}.\*.h5 Intermediate data products from **Calibration Data** XRFI (flags and metrics) **Product XRFI Day-Long Thresholding** hera\_qm process xrfi\_run.py All other XRFI flags/metrics Flag entire integrations or entire from the same day. channels based on RFI statistics over a **Metrics Data** whole day. Apply all flags to calibration. **Product XRFI Thresholding Metadata** casa\_imaging zen.{int(JD)}.\*\_threshold\_flags.h5 **Flagged Absolute** process Intermediate results from day-long **Calibration Solutions** XRFI thresholding zen.{JD}.HH.flagged\_abs.calfits **CASA Imaging Data Product** Smoothcal: smooth\_cal\_run.py All other absolute calibration Smooth calibration solutions on a **Analogous Data or** solutions for the same day. desired calibration and frequency scale. **Calibration from** Also selects a reference antenna. **Other Times Temporary Data Smoothed Absolute Product Deleted to Save Space Calibration Solutions** zen.{JD}.HH.smooth\_abs.calfits **Noise Estimation: Update Omnical Visbility Solutions: CASA Imaging:** noise\_from\_autos.py apply\_cal.py sky\_image.py Use calibrated Extract absolute calibration solutions in Produce 4pol multi-frequencyautocorrelations to model the degenerate subspace and apply synthesis images of each data file. per-antenna noise standard them to the omnical visibility solutions deviations on visibilities. to absolute calibrate them. **Per-Antenna Noise Updated Omnical Visibility Solutions** 4-pol MFS Images **Standard Deviation from** zen.{JD}.HH.calibrated.uvh5\_image/ **With Absolute Calibration Autocorrelations** {multiple CASA files} zen.{JD}.HH.smooth\_abs\_vis.uvh5 zen.{JD}.HH.noise\_std.uvh5 **LST-Binning Pipeline LST-Binning with Foregrounds** Istbin\_run.py All other data (and calibrations) from Combine together data from different days a given group of days to LST-bin at the same LSTs using MAD clipping. **Standard Deviation of LST-Binned LST-Binned Data with Foregrounds Data with Foregrounds** zen.grp{N}.of{M}.LST.{LST in zen.grp{N}.of{M}.STD.{LST in radians}.HH.OCRSL.uvh5 radians}.HH.OCRSL.uvh5