

Future outlook

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Future plans



Immediate near term plans:

- Finish processing the VGOS (broad-band) portion of RD2005 and RD2006.
- Determine logistics of multiple databases per session, release RD2005/RD2006 broad-band.
- Finish processing RD2007 (both mixed-mode and broad-band) and release.
- Clean-up mixed-mode post-processing software and make user-friendly in preparation for release.
- Establish (tagged) DiFX version for use with mixed-mode data.

- DiFX version:
 - We have used 2.5* (patch of 2.5 branch).
 - The DiFX tag 2.5.4 was intended to resolve VGOS processing needs.
 - Need to validate 2.5.4 processing with mixed-mode data.
 - Also need to make sure all features of difx2mark4 2.6.2 are also supported in the 2.5.4 branch.
- Post-processing software:
 - Currently using experimental version of HOPS 3.22*, needs to be tagged/released.
 - Fourfit requires as least one new feature/keyword.
 - Mixed-mode counterparts of familiar VGOS post-processing helper scripts (ffres2pcp, fourphase, batch_fourfit, etc.)

Post-processing software and other improvements



- New fourfit feature needs documentation (extension to CP L-pol?)
- Mixed-mode helper scripts need documentation and should be augmented so that no manual S/X band control file stitching is needed.
- Other diagnostic/plotting tools need to be augmented to support mixed-mode data.
- If/when a stable cadence of mixed-mode sessions occurs, `pc_phases` and Y-X phase delay offsets should be monitored for stability (for VGOS stations in mixed-mode, and VGOS broad-band at SX frequencies).

Resolved issues - post-processing



At EVGA 2021 meeting we reported on the following open issue, which is now most resolved:

- Y-X offset 90 degree phase shift (different value needed on mixed and VGOS-only baselines):
- At the time this is how we processed RD2005
- This is resolved (at least experimentally) with the addition of fourfit keyword `mixed_pol_yshift90`.
- RD2006 was processed with this new feature.
- Question: Should we augment this to support values other than 90° ?

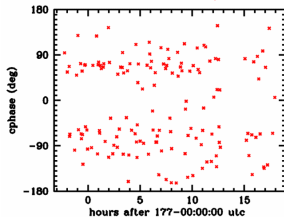
Resolved issues - post-processing



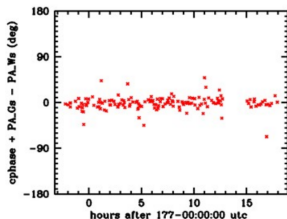
At post-EVGA IVS analysis workshop discussed:

- Non-closure of phases on some triangles in mixed-mode experiments.
- Reference frequency issue causing jumps in cphase
→ resolved through choice of new reference frequencies.
- Mixed LP-LP-CP triangles - dPA rotation on LP-LP baselines is uncorrected by fourfit and is visible in closure phase.
- fourfit is baseline based but cphase corrections would need to be done on per-triangle basis.
→ Leave as is for now, correction can be done in database creation (pre-analysis).

GGAO12M-YEBES40M-WETTZ13S
RD2005 closure phase



(a) fourfit output

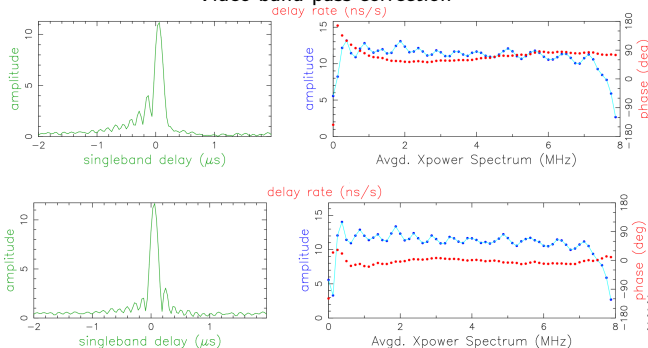


(b) corrected for GGAO12M-
WETTZ13S PA diff

Open issues - post-processing



Video-band pass correction



- As mentioned at EVGA-2021 meeting, but as of yet un-investigated:
- Due to differences in the S/X and VGOS back-end systems the per-channel phase-structure on mixed-baseline data is non-linear.
- Without correction, this leads to a slightly asymmetric SBD function on mixed baselines, correctable with 3rd-order poly.
- Not yet applied in sessions we have processed so far, needs further investigation.

Open issues - analysis



- For each mixed-mode session we can generate two databases: mixed-SX and broad-band VGOS.
- Experimentally, we have done a combined analysis of both databases (RD2005) with VieVs.
- The combined analysis shows reduced uncertainties on site positions.
- How should we go about releasing and/or combining the two DB types?
- A single database with both data-sets does not appear possible (due to dual observations on same baseline and difference in the way dTEC correction is done). Comments?

Future prospects



- A framework with basic functionality in processing mixed-mode sessions is ready.
- More solid documentation/memos needed and some clean up needed before release.
- Most of the open post-processing issues have been resolved with exception of VBP and aforementioned analysis questions.
- Are there alternative methods for processing mixed-mode data (pol-convert)?