



JUMPING JIVE

WP6 – Geodetic capabilities

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Objectives of WP6

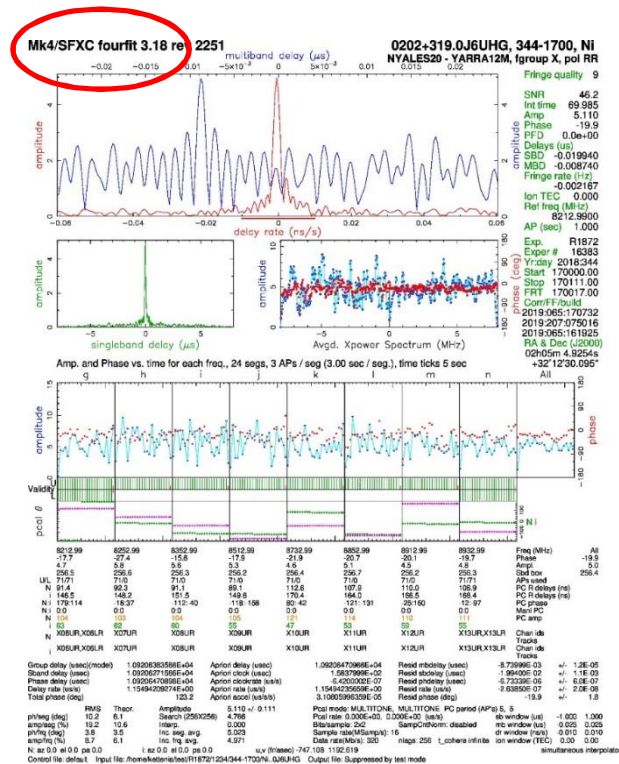
- “ Enable the use of the EVN software correlator at JIVE (SFXC) for geodesy (and astrometry)
- “ Work split in 3 tasks
 - . Task 1: develop the appropriate data interface for geodesy
 - . Task 2: make the EVN processor able to process sub-netted observing schedules
 - . Task 3: conduct a geodetic session and end-to-end processing to estimate EVN station positions
- “ All three tasks accomplished



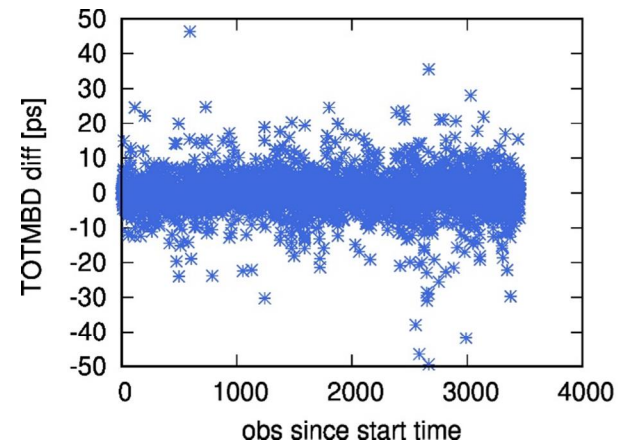
Tasks 1 and 2

IVS experiment R1872 (Dec. 10, 2018) successfully correlated with SFXC and post-processed through standard geodetic path

Mk4 fringe plot



Results of Bonn correlator reproduced within a few ps



Validates the geodetic capability of the SFXC correlator



Task 3

Measuring EVN station positions

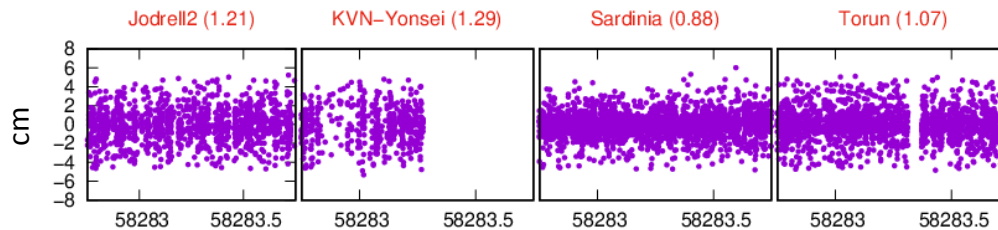
EVN experiment EC065 conducted on 13 June 2018



- “ 14 EVN telescopes
(4 non-geodetic)
- “ Duration of 24 hours
- “ Frequency: 22 GHz
(K band)
- “ 62 ICRF3 sources
observed



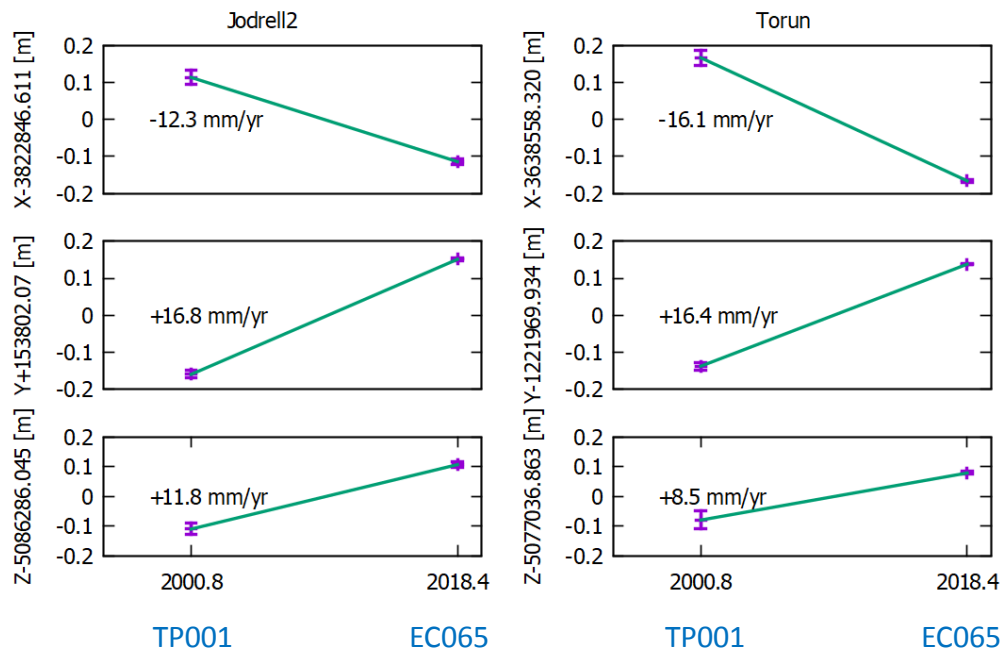
Station position estimation



Data analyzed with VieVS
VLBI delay residuals around 1 cm

Results

- “ Precision of station coordinates (X, Y, Z) at the 1 cm level
- “ 3D station velocities derived by comparing positions at epochs 2000.8 and 2018.4 (from TP001 and EC065 experiments)
- “ In agreement with motions from plate tectonic models for Europe





Beyond EC065

- “ Follow-up experiment (EC076, Oct. 23, 2020) aimed to
 - . Measure the positions of two additional non-geodetic telescopes (KVN-Tamna and KVN-Ulsan) which did not participate in EC065
 - . Measure the positions of the four e-MERLIN out-stations
- “ Analysis of archived EVN data from three geodetic-style experiments conducted in 2005, 2009 and 2016
 - . Including non-geodetic telescopes

Objective

- . Combine all experiments to strengthen the position and velocity determinations for all non-geodetic EVN telescopes
- . Publish the results in a journal paper



Impact of work

- “ Geodetic pipeline already used by other users
 - . ET036 « Cosmological imprint in the VLBI astrometry data » (PI: O. Titov, Australia)
- “ Improved empirical velocities for non-geodetic EVN telescopes to be used at correlation
 - . Will benefit to phase-referencing observations
- “ Opens possibility to correlate next generation geodetic observations (VGOS) in the future



Outreach

WP6 also produced a comic strip about geodetic VLBI (and VLBI in general)

Originally published in French



<https://www.curieux.live/2021/05/28/14035/>

Now also translated in English...



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