JIVE, the EVN and ESCAPE

Arpad Szomoru, JIVE

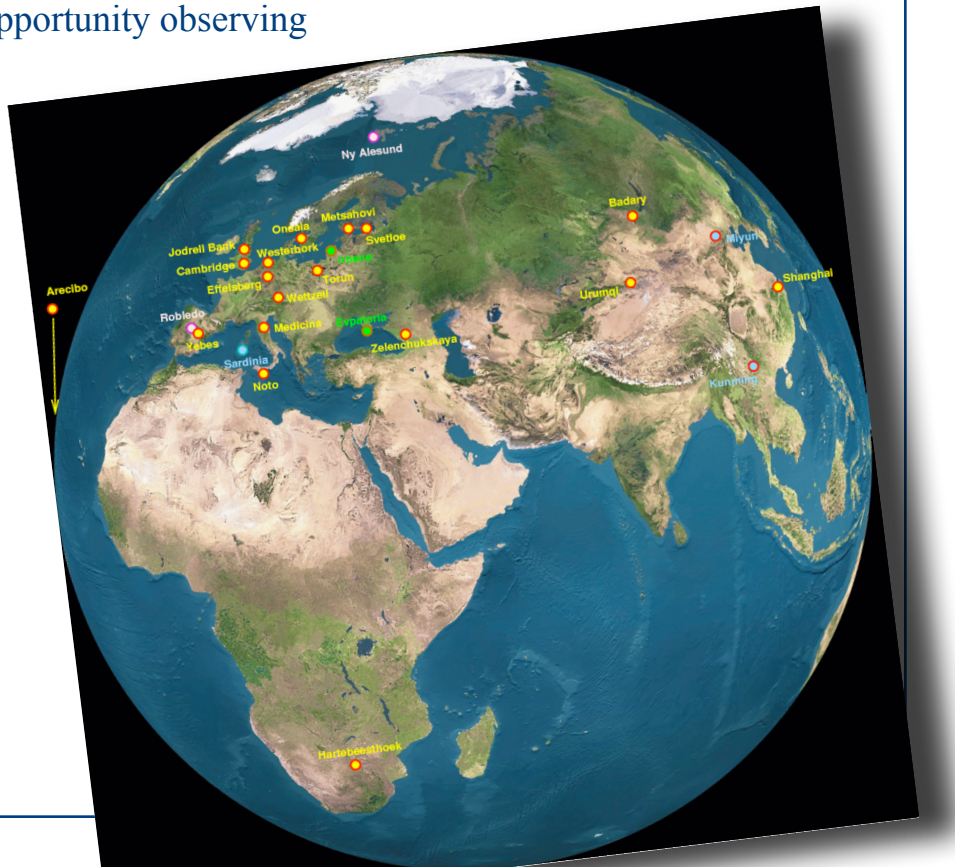
JIVE - Joint Institute for VLBI ERIC -

- Promote and advance the use of VLBI for astronomy
  - Central correlation for European VLBI Network
  - Operational feedback to stations
  - User support
    - Preparation of observations
    - Data reduction
  - Improvement of VLBI technique in general
- The only ERIC in Astronomy, hosted by Astron in the Netherlands
  - 6 partner countries: NL (host), FR, ES, UK, SE, LV
  - 4 associated institutions: INAF (IT), NRF (SA), MPIfR (DE), NAOC (Cn)
  - European Research Infrastructure Consortium (ERIC) since end 2014

EVN: European VLBI Network

- Consortium of radio telescopes
  - Involving 15 different organizations around the world in Europe, China, Puerto Rico, South Africa, Russia, South Korea
  - Optional inclusion of VLBA and LBA antennas, for global observations
  - Space-based VLBI with RadioAstron orbiting telescope
- Covering wide range of frequencies
- Operational approximately 60 days/year
  - 3 sessions augmented with monthly e-VLBI, targets of opportunity observing

First transatlantic VLBI, Onsala, Sweden, 1968



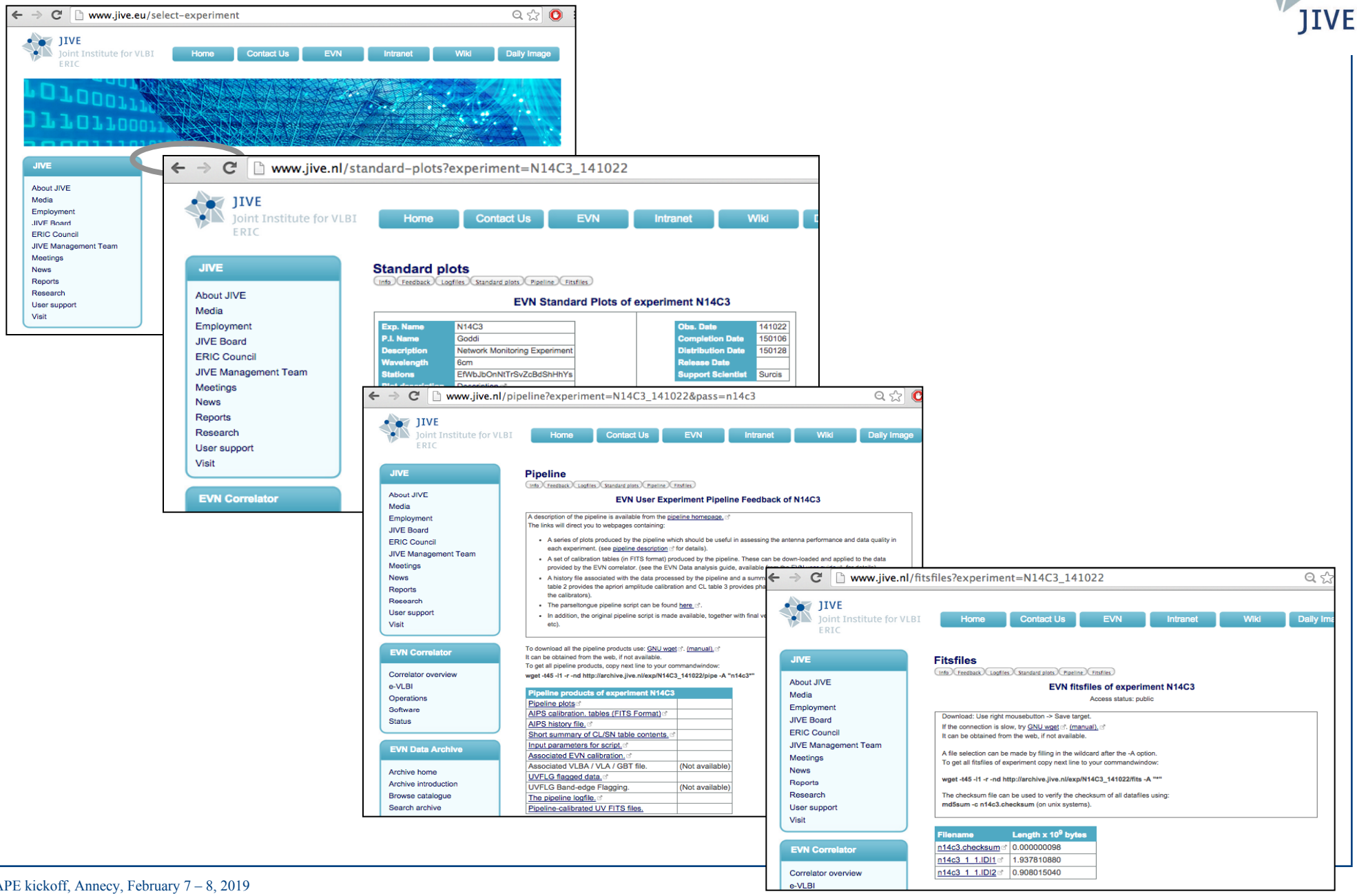
JIVE: User hub of EVN

- User interfaces
  - Proposal tool
  - Sensitivity calculator
  - Data product
    - And related software interfaces
  - Archive
    - Raw FITS: proprietary for one year after distribution of last epoch
    - Pipeline: calibration info & preliminary images
- User support
  - Offer help in all stages
    - Scheduling and data processing
  - Check the correlation of all user data
  - Visitor facilities
    - EVN TransNational Access programme
    - Point of contact various EC funds

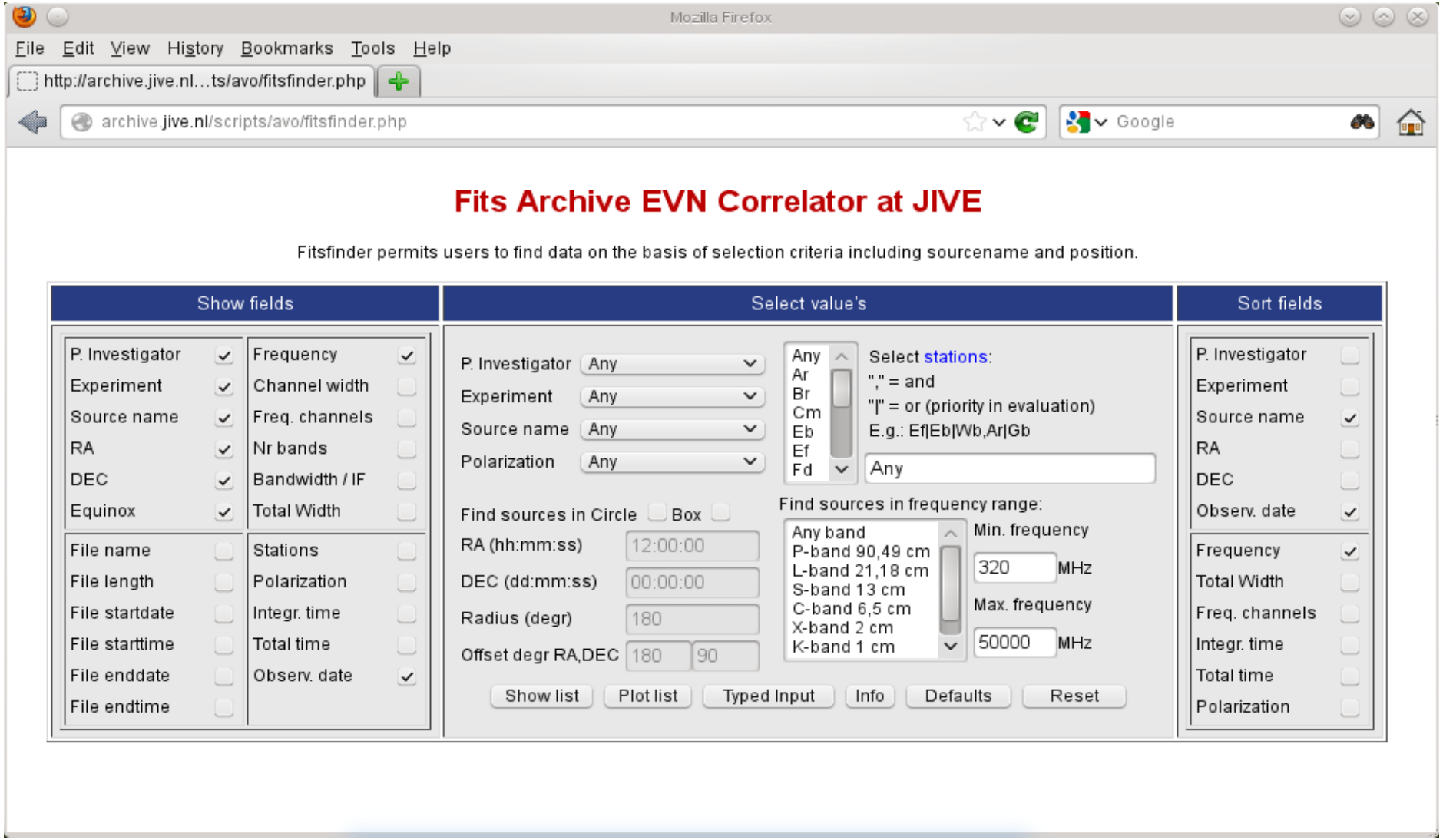
JIVE: Future challenges

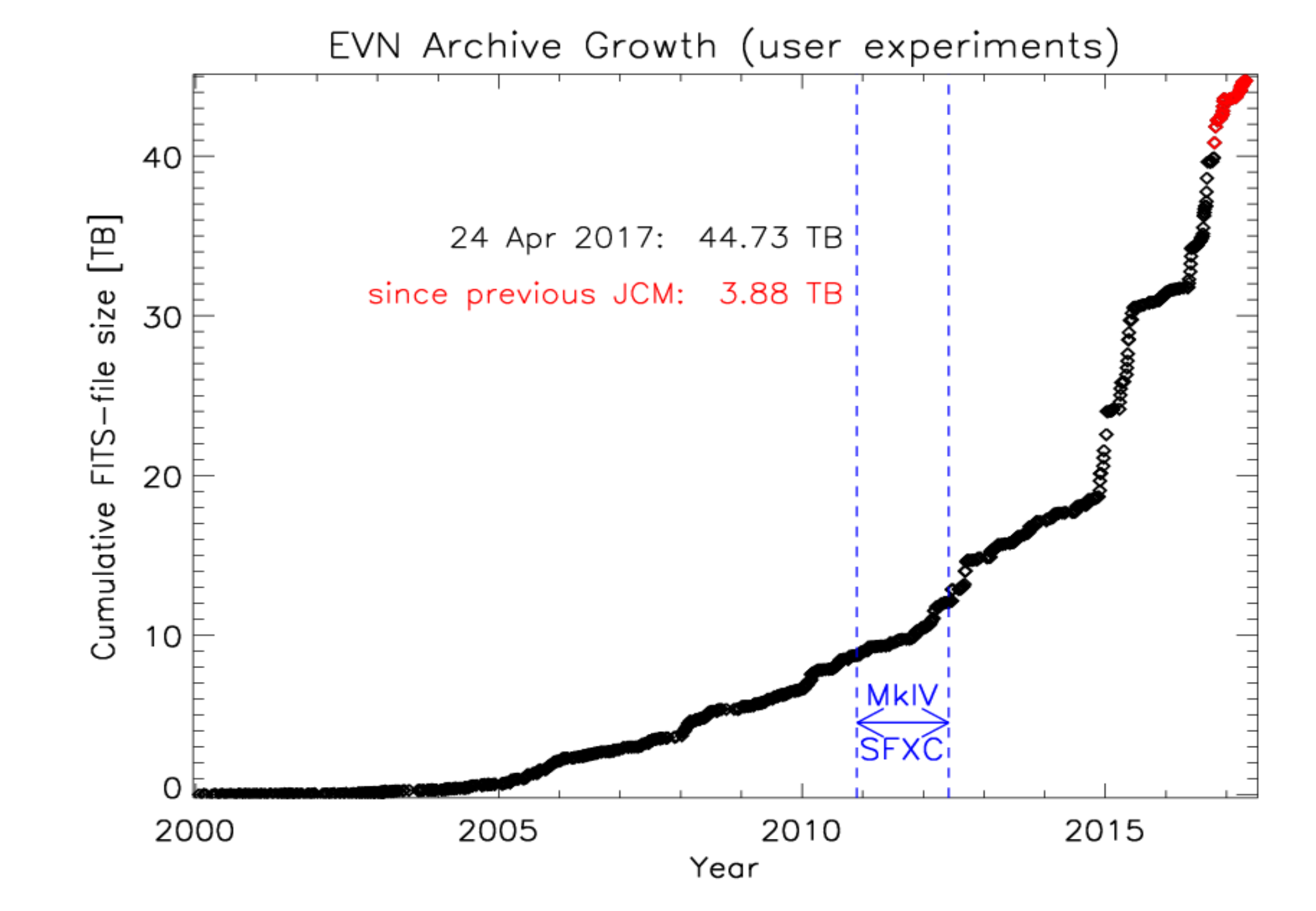
- (Many) more telescopes
  - Refurbished telco dishes
    - African VLBI array
  - Newly built telescopes
    - Thailand, China, UAE (?)
  - MeerKAT and SKA phase 1
- Higher data rates
  - 2, 4, all the way to 32 Gbps/telescope (?)
    - Processing challenges
- Wide-field VLBI
  - Now becoming feasible
    - Archiving challenge
- Archiving of raw data?

EVN Archive


www.jive.eu/select-experiment
JIVE
Joint Institute for VLBI ERIC
Home
Contact Us
EVN
Intranet
Wiki
Daily Image
JIVE
About JIVE
Media
Employment
JIVE Board
ERIC Council
JIVE Management Team
Meetings
News
Reports
Research
User support
Visit
www.jive.nl/standard-plots?experiment=N14C3_141022
Standard plots
Info
Feedback
Logfiles
Standard plots
Pipeline
Fitsfiles
EVN Standard Plots of experiment N14C3
Exp. Name N14C3
P.I. Name Goddi
Description Network Monitoring Experiment
Wavelength 6cm
Stations EfWbJbOnNtTrSvZcBdShHhYs
Obs. Date 141022
Completion Date 150106
Distribution Date 150128
Release Date
Support Scientist Surcis
EVN Correlator
www.jive.nl/pipeline?experiment=N14C3_141022&pass=n14c3
Pipeline
EVN User Experiment Pipeline Feedback of N14C3
A description of the pipeline is available from the pipeline homepage.
The links will direct you to webpages containing:
A series of plots produced by the pipeline which should be useful in assessing the antenna performance and data quality in each experiment. (see pipeline description for details).
A set of calibration tables (in FITS format) produced by the pipeline. These can be down-loaded and applied to the data provided by the EVN correlator. (see the EVN Data analysis guide, available
A history file associated with the data processed by the pipeline and a summ
table 2 provides the apriori amplitude calibration and CL table 3 provides pha
the calibrators).
The parseltongue pipeline script can be found here.
In addition, the original pipeline script is made available, together with final ve
etc).
To download all the pipeline products use: GNU wget. (manual).
It can be obtained from the web, if not available.
To get all pipeline products, copy next line to your commandwindow:
wget -t45 -l1 -r -nd http://archive.jive.nl/exp/N14C3_141022/pipe -A "n14c3*"
Pipeline products of experiment N14C3
Pipeline plots
AIPS calibration. tables (FITS Format)
AIPS history file.
Short summary of CL/SN table contents.
Input parameters for script.
Associated EVN calibration.
Associated VLBA / VLA / GBT file. (Not available)
UVFLG flagged data.
UVFLG Band-edge Flagging. (Not available)
The pipeline logfile.
Pipeline-calibrated UV FITS files.
EVN Correlator
Correlator overview
e-VLBI
Operations
Software
Status
EVN Data Archive
Archive home
Archive introduction
Browse catalogue
Search archive
www.jive.nl/fitsfiles?experiment=N14C3_141022
Fitsfiles
EVN fitsfiles of experiment N14C3
Access status: public
Download: Use right mousebutton -> Save target.
If the connection is slow, try GNU wget. (manual).
It can be obtained from the web, if not available.
A file selection can be made by filling in the wildcard after the -A option.
To get all fitsfiles of experiment copy next line to your commandwindow:
wget -t45 -l1 -r -nd http://archive.jive.nl/exp/N14C3_141022/fits -A "*"
The checksum file can be used to verify the checksum of all datafiles using:
md5sum -c n14c3.checksum (on unix systems).
Filename
Length x 10^9 bytes
n14c3.checksum 0.000000098
n14c3_1_1.IDI1 1.937810880
n14c3_1_1.IDI2 0.908015040

Searching in the EVN Archive




EVN Archive Growth (user experiments)
24 Apr 2017: 44.73 TB
since previous JCM: 3.88 TB
MkIV
SFXC
Cumulative FITS-file size [TB]
0
10
20
30
40
2000
2005
2010
2015
Year

Obelics activities

- Create a system that allows modern notebook-style approach to post-processing of VLBI data
  - Allow users to develop and run their pipelines on remote systems close to data
  - Minimize cost of shipping and processing of large data sets
- Allow easy and transparent sharing of pipelines, specialized for different classes of problems
- Speed up pipeline development
  - Combining re-evaluation inherent in notebook framework with smart caching system
  - Eliminates most redundant re-calculation when parts of a script are changed
  - Re-calculation engine: prototyped as part of our contribution to Hilado (RadioNet3)
- Notebook framework Jupyter
  - Has been adapted to the version of Python used by CASA.

Obelics activities (cont)

- Have plumbed Casa into the Jupyter framework
  - Not trivial
  - CASA has a somewhat idiosyncratic approach to the Python environment
- Had to re-write prototype Haskell recomputation-elimination engine to Python, in order to make it work in CASA
  - Haskell not really a good fit for a production environment
- Scalable cache of intermediate products
  - prototype was not designed to scale to long incremental sessions
- Draft of a paper has been completed

JIVE & ESCAPE: WP3

WP3: mostly provide the tools that will be made available through the EOSC

- Analysis of functionality that is still needed to make CASA a complete VLBI data reduction package
- Implementation of missing functionality
- Integration of CASA6 in Jupyter or similar notebook
- Further work on containerization of software
- Creation of a VLBI data reduction pipeline suitable for the EOSC

JIVE & ESCAPE: WP4

Make radio data (starting with our EVN archive) accessible through the VO

- Investigating the handling of radio astronomical data in the VO
- The definition of a VO interface to the EVN archive
- Determine what metadata will be needed
- The design of a supporting database schema
- The implementation of web services and a database

JIVE & ESCAPE: WP5

Provide the tools and workflows that will make the software developed in WP3 accessible through the EOSC

- Analysis of the functionality of the JIVE archive
- Enable re-running pipelines with different parameters
- Archiving of new processing of data
- Enable feedback from users to archive
- Create a central control of information flows at JIVE