The International LOFAR Telescope (ILT)

ILT-JIVE Workshop

C. Baldovin

The LOw Frequency ARray

Low-band antenna

30 - 80 MHz
48/96 antennas per station

Technology pathfinder for the SKA

High-band tiles

120 - 240 MHz
48/96 tiles per station
4x4 antennas per tile

Replace big dishes by many cheap dipoles.
No moving parts: electronic beam steering.
Flexible digital beam forming

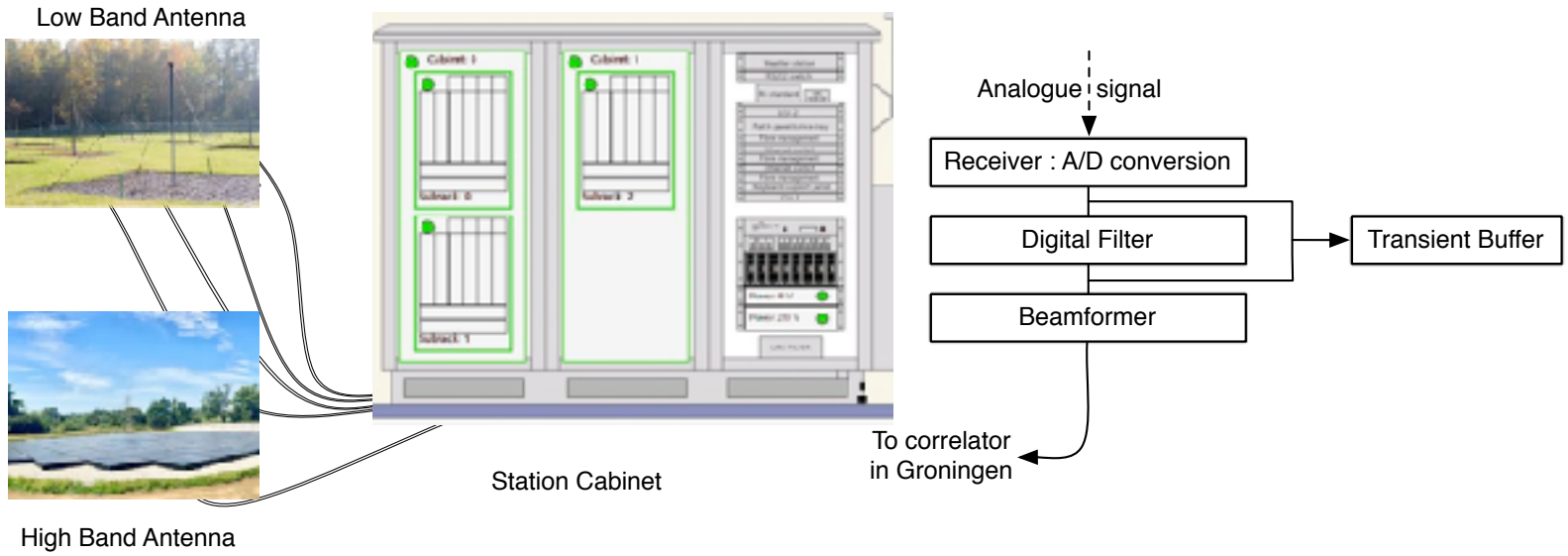
The International LOFAR Telescope

38 stations in the Netherlands
13 international stations: from Birr (Ireland) to Lazy (Poland)

Longest baseline ~2000 km

Soon Latvia and Italy will join

LOFAR data flow



Station level processing: Amplification, digitisation, filtering, beam-forming, transient ram buffers
Central Processing: Delay compensation, correlation, calibration, data reduction, pipelines

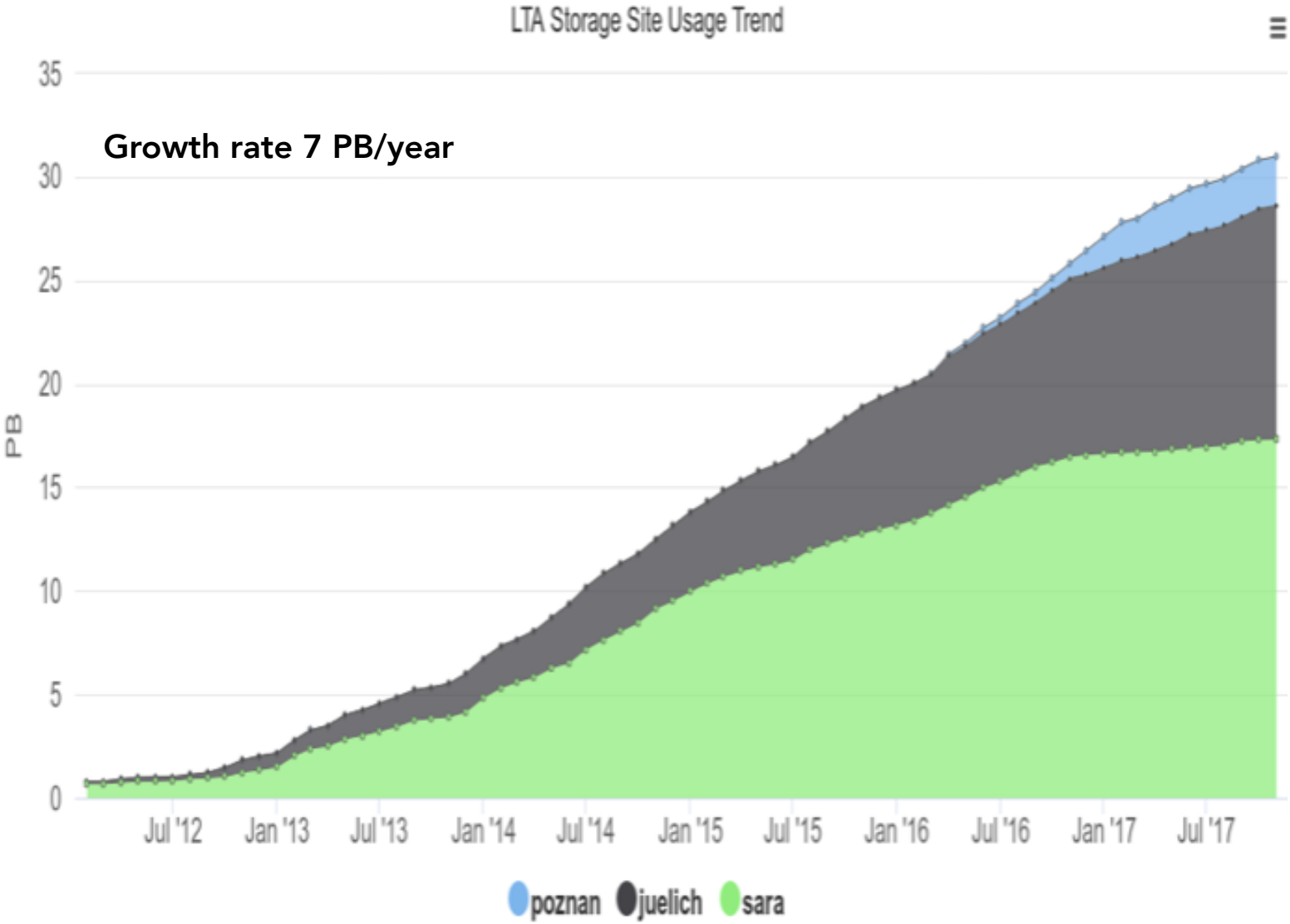
150 Gbps sustained data inflow

LOFAR data flow

Correlator in Groningen

Centrally operated from Dwingeloo

Long Term Archive: SURFSara (NL), Juelich (DE), Poznan (PL)


LTA Storage Site Usage Trend
Growth rate 7 PB/year
PB
35
30
25
20
15
10
5
0
Jul '12
Jan '13
Jul '13
Jan '14
Jul '14
Jan '15
Jul '15
Jan '16
Jul '16
Jan '17
Jul '17
poznan
juelich
sara

OPERATIONS

ASTRON Radio Observatory

Operations & Maintenance
Marco Drost

Operations
Richard Blaauw
Paul van Dijk
Henk Mulder
Jurjen Sluman

Maintenance
Peter Gruppen
Lule van de Ruit
Boudewijn Hut
Joeri Klaassens
Henri Meulman
Menno Norden
Jan-Pieter de Reijer

Head of Radio Observatory
Hans Jense

Secretariaat
Marjan Tibbe
Liesbet Elpenhof

Observatory Astronomers
Michiel Brentjens (50%)

Science Operations & Support
Roberto Pizzo

Marco Iacobelli
Vanessa Moss
Emanuela Orrù
Antonis Polatidis
Sander ter Veen
Matthijs van der Wiel
Pietro Zucca

Software Support
Jasper Annyas

Kuud Beukema
Reinoud Bokhorst
Roy de Goei
Leon Grit
Ramon Holties
Thomas Juerges
Auke Klazema
Jasmin Klipic
Mattia Mancini
Jan David Mol
Adriaan Renting
Jorrit Schaap
Arno Schoenmakers
Nico Vermaas
Jacob Ziemke

Also operates WSRT

Operations & Maintenance

Head: M. Drost

Provides maintenance for both, NL and international stations.
4 operators, 6 maintenance eng., 2 system level eng.

Work organised in cycle of 6 weeks (2 LOFAR, 2 WSRT, 2 gral.)

Team works on shifts from Mon-Fri.

The system is tested every week for all stations.
O&M team decides which stations in the network need a visit that is scheduled for warm seasons.

Science Support

Head: R. Pizzo

Provide internal support to operations, maintenance and external support to scientists.

8 FTE on LOFAR

T. Scientists have 50% of time for science.
Part of the team will become permanent (30/70) in a near future, part will remain temporary (50/50).

Support users at all stages of research projects: from planning a project to data analysis.
Each LOFAR project gets assigned 1 telescope scientist.

Involvement in education and training of users (Status Meetings, Data schools, Busy Weeks, etc.)

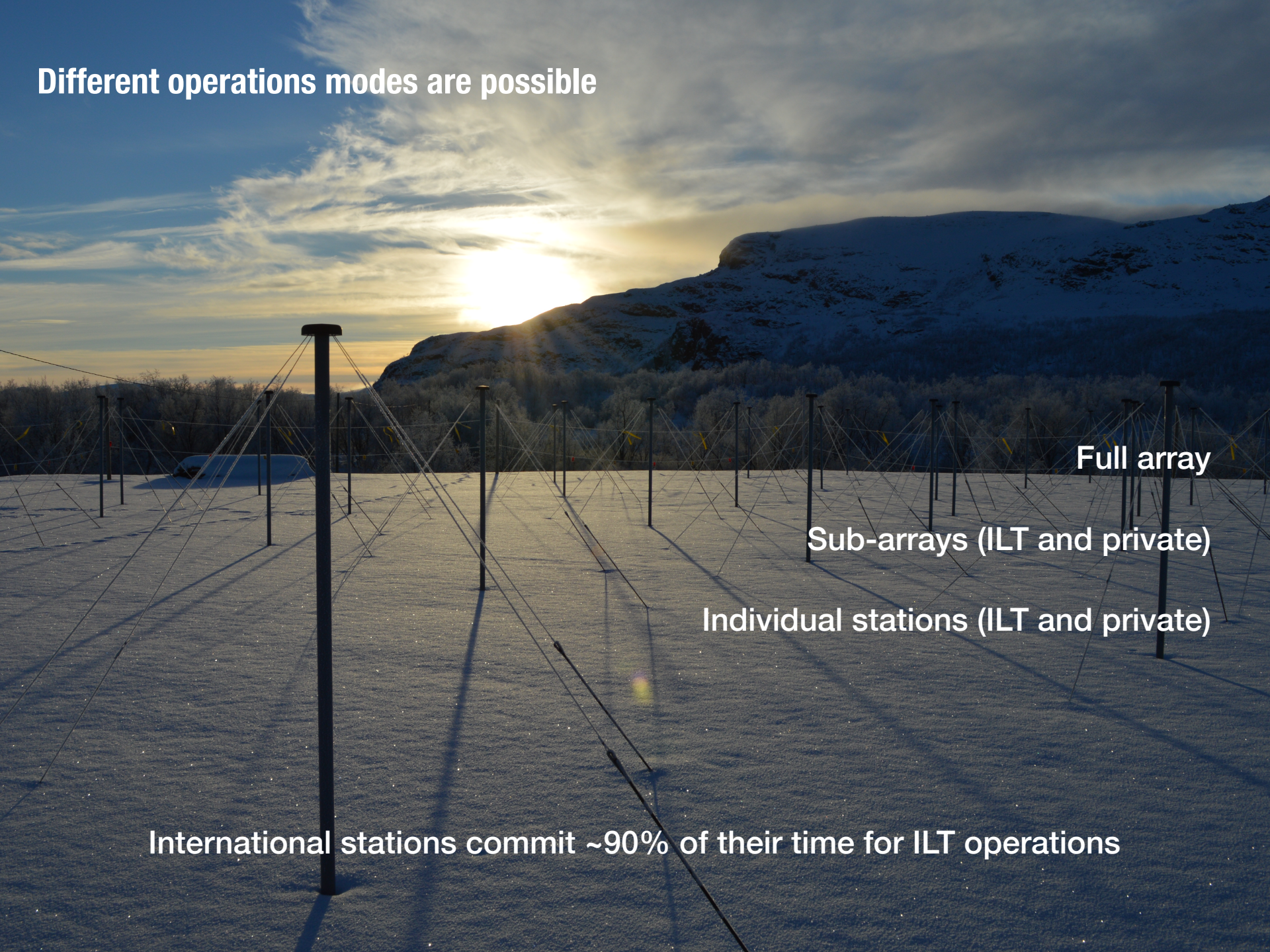
Software Support

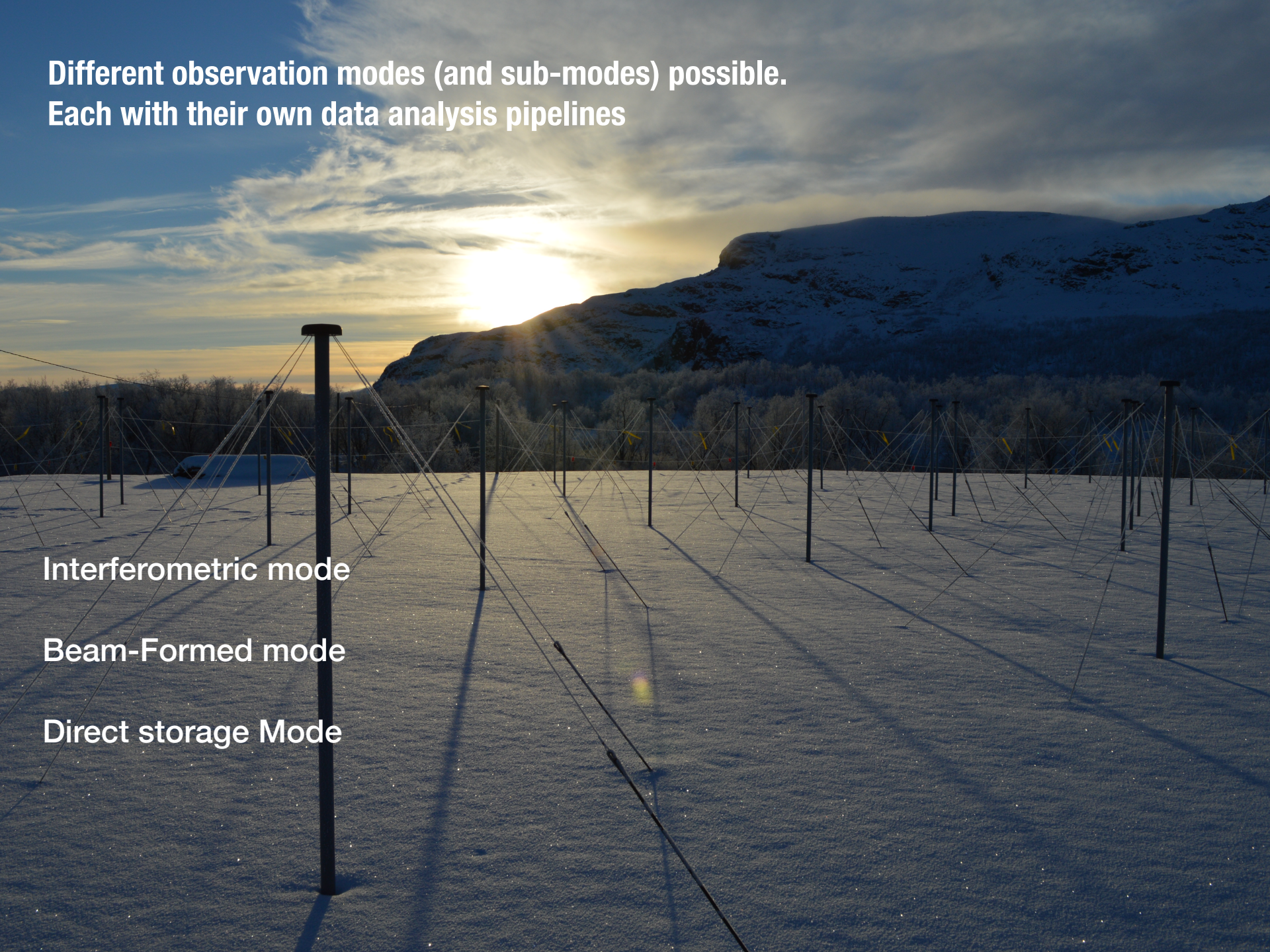
Head: J. Annyas

15 FTE on LOFAR
Team includes software developers and system administrators.

Support the software to run the telescope and local stations.
Administrate software and std. releases.
Does not provide scientific pipelines.
Coordinate relations with CIT Groningen.

Team works following SCRUM method with projects assigned to small teams with a coordinator and work is organised in short time slots (~3 weeks)


Different operations modes are possible
Full array
Sub-arrays (ILT and private)
Individual stations (ILT and private)
International stations commit ~90% of their time for ILT operations



Different observation modes (and sub-modes) possible.
Each with their own data analysis pipelines

Interferometric mode

Beam-Formed mode

Direct storage Mode

The life cycle of a LOFAR project

Call for proposals every semester regular and archive

DDT proposals at any time

Commissioning proposals at any time

PC and technical review

Reviewed by ILT director

Reviewed by RO experts

Scheduled prepared by SOS

Projects executed by Operators

Quality check of observations by SOS

PI informed about the outcome of run

Further processing and LTA

Science

Time Allocation

All proposals are independently reviewed by the PC

Regular call for proposals March and September: scientists request observing and processing resources

Mixed Open Skies and Reserved Access

New scheme

Single-cycle projects

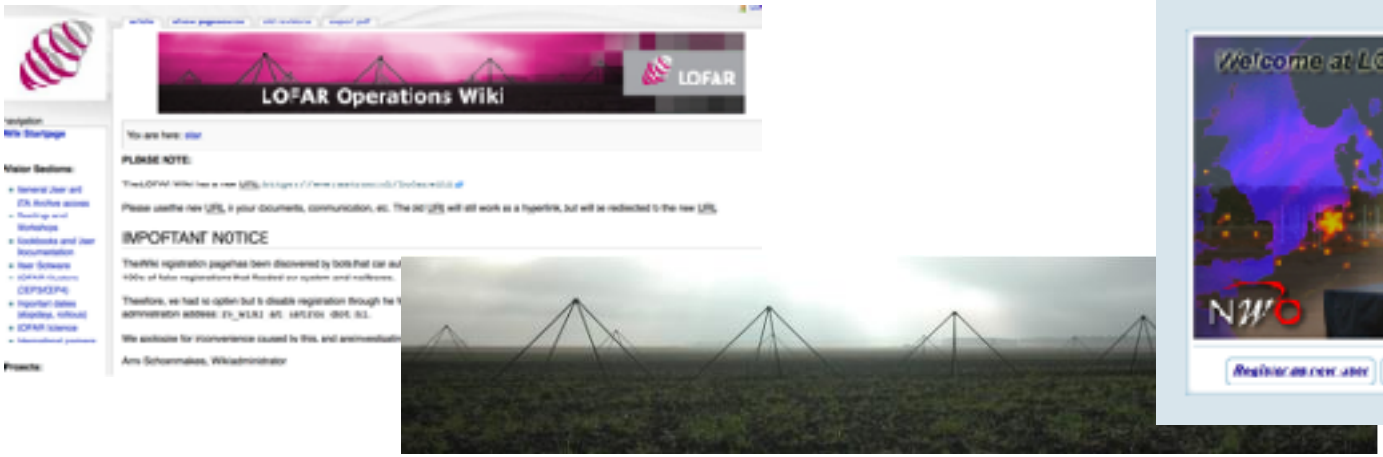
Long-term projects, from May 2018 - May 2020 (Cycles 10-13)

Consortia get a minimum amount of reserved hours per semester according to the number of stations and number of years in the ILT

# stations	t<5yr	t≥5 yr
1	32	12
2	48	24
3	64	32
4	80	40
5	96	48

Tools available to users

- LOFAR wiki pages
- LOFAR tools including proposal submission tool, management of measurements, calculator, system validation plots
- Mailing lists, newsletter (monthly), LOFAR Google Calendar for important events



LOFAR NEWSLETTERS JANUARY - FEBRUARY 2018

The ILT governance

LOFAR-SE | FLOW | GLOW | POLFAR | LOFAR-UK | NL-LAC | I-LOFAR | ASTRON Director

ILT executive board

International LOFAR Telescope | ILT Director

ASTRON Radio Observatory

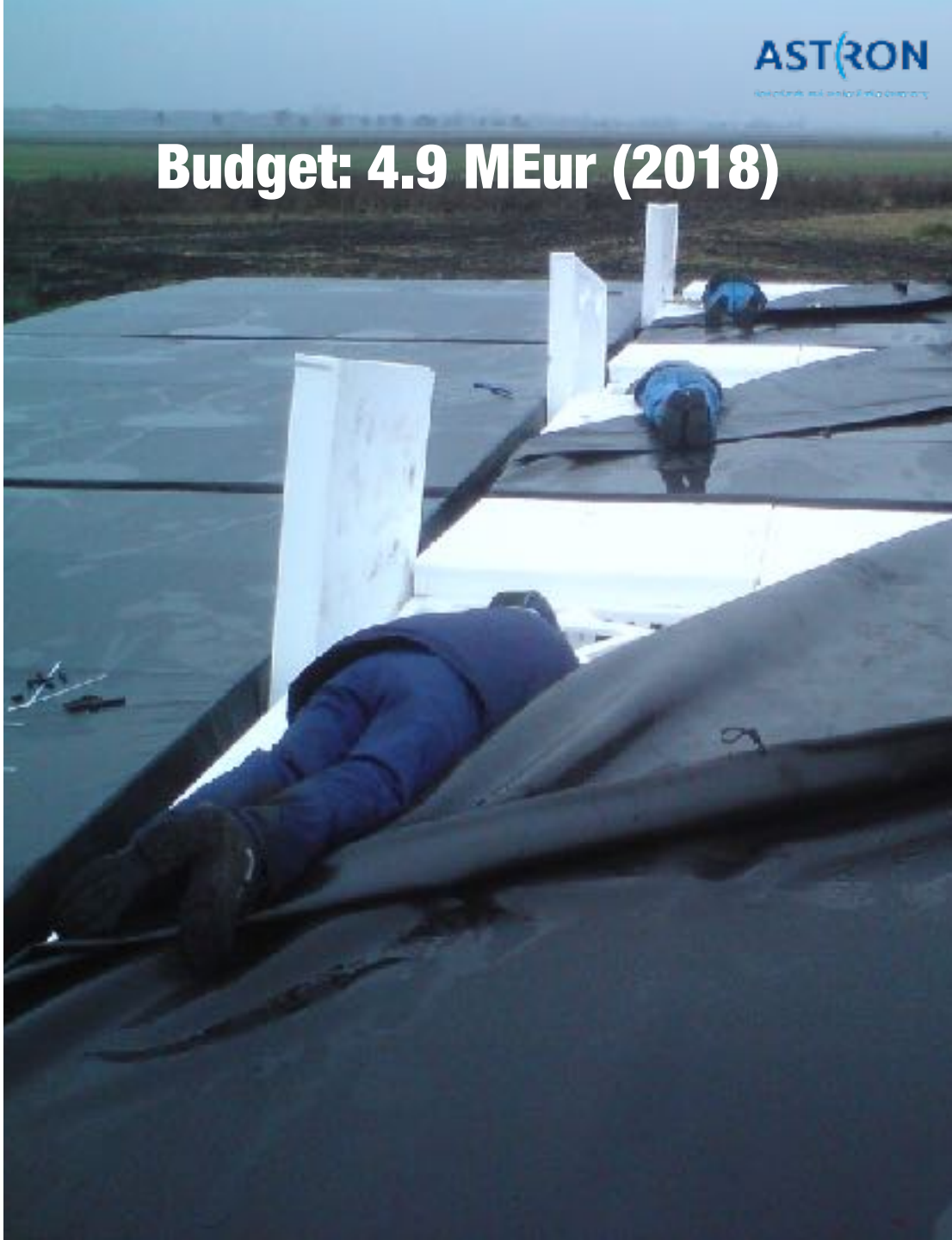
Astronomical Community

LOFAR

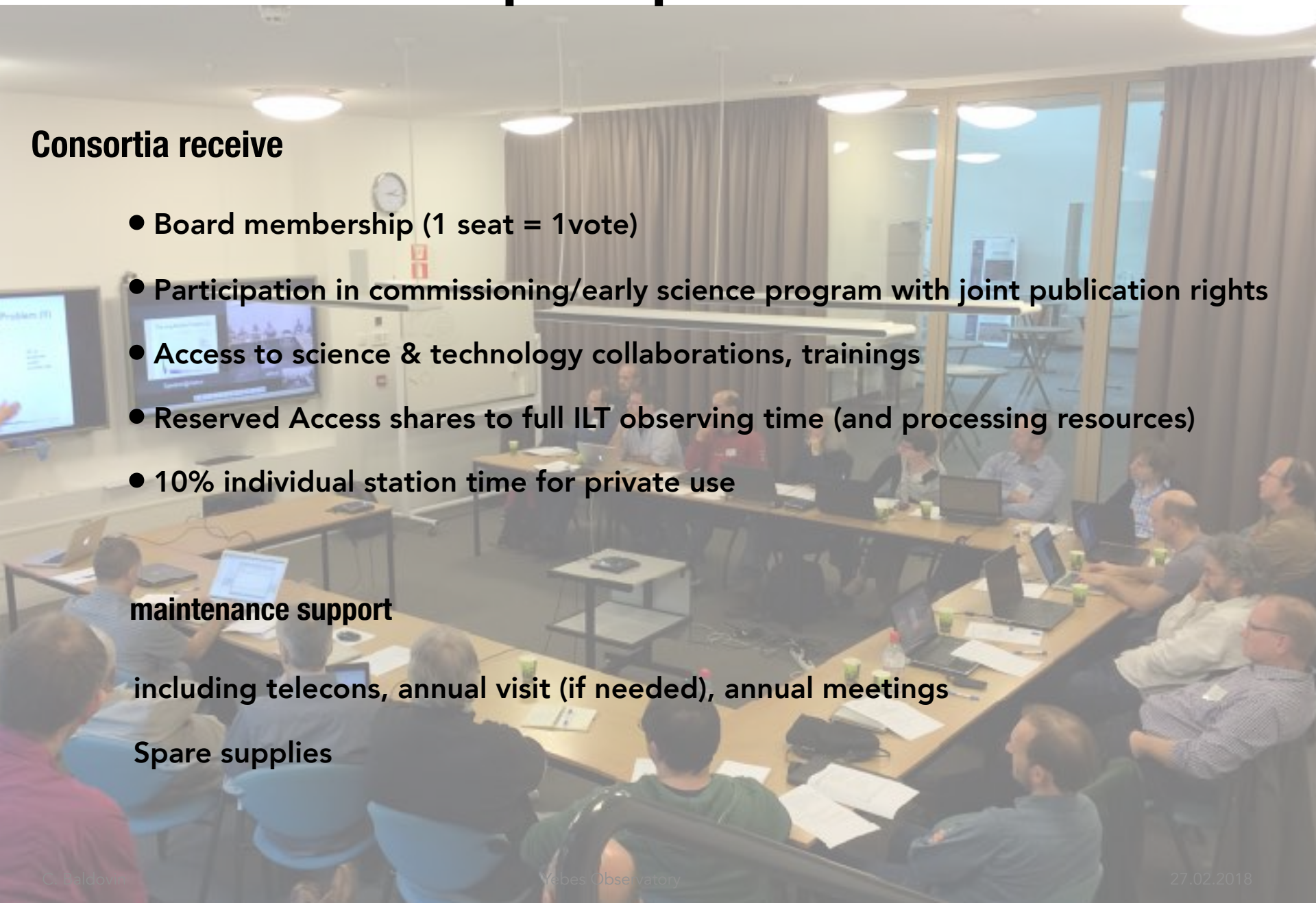
Funding mainly comes from partner's annual contribution: 92.5 kEur/station/year.
Also from externally funded projects (JJ, Aeneas, LOFAR4SW, RadioNet).

Partners (ASTRON extensively) contribute with infrastructure, personnel, archive, and processing.

ILT does not own facilities, has no employees.



ILT participation



Consortia receive

- Board membership (1 seat = 1vote)
- Participation in commissioning/early science program with joint publication rights
- Access to science & technology collaborations, trainings
- Reserved Access shares to full ILT observing time (and processing resources)
- 10% individual station time for private use

maintenance support

including telecons, annual visit (if needed), annual meetings

Spare supplies