APEX DATA TO PIs WITHIN 2 DAYS

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Outline

- APEX in a nutshell
- Old data flow system: disadvantages
- New data flow system: advantages
- Challenges for the future

APEX in a nutshell

Credit: G. Gillet/ESO

Max-Planck-Institut für Radioastronomie

50%

27%

23%

Host

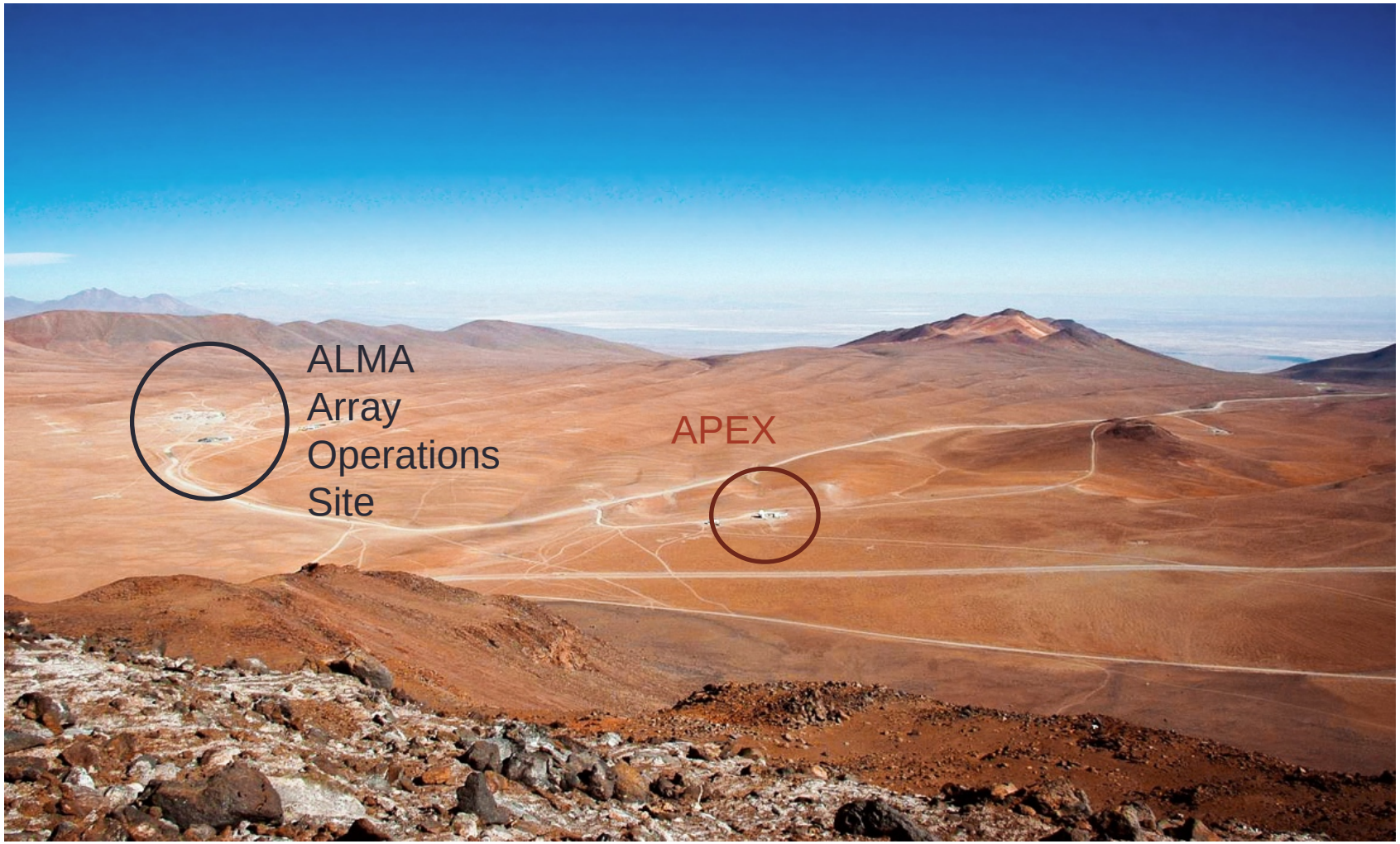
APEX in a nutshell

Credit: G. Gillet/ESO

APEX in a nutshell

- 12-m sub-mm telescope based on ALMA prototype (Vertex)
- Chajnantor plateau @ 5100 m
- Started operations in 2004. Commitment till 2015 (likely 2017)
- Mature project:
  - 24-hours operations (3 shifts)
  - Up to 500 h on-sky / month

APEX in a nutshell



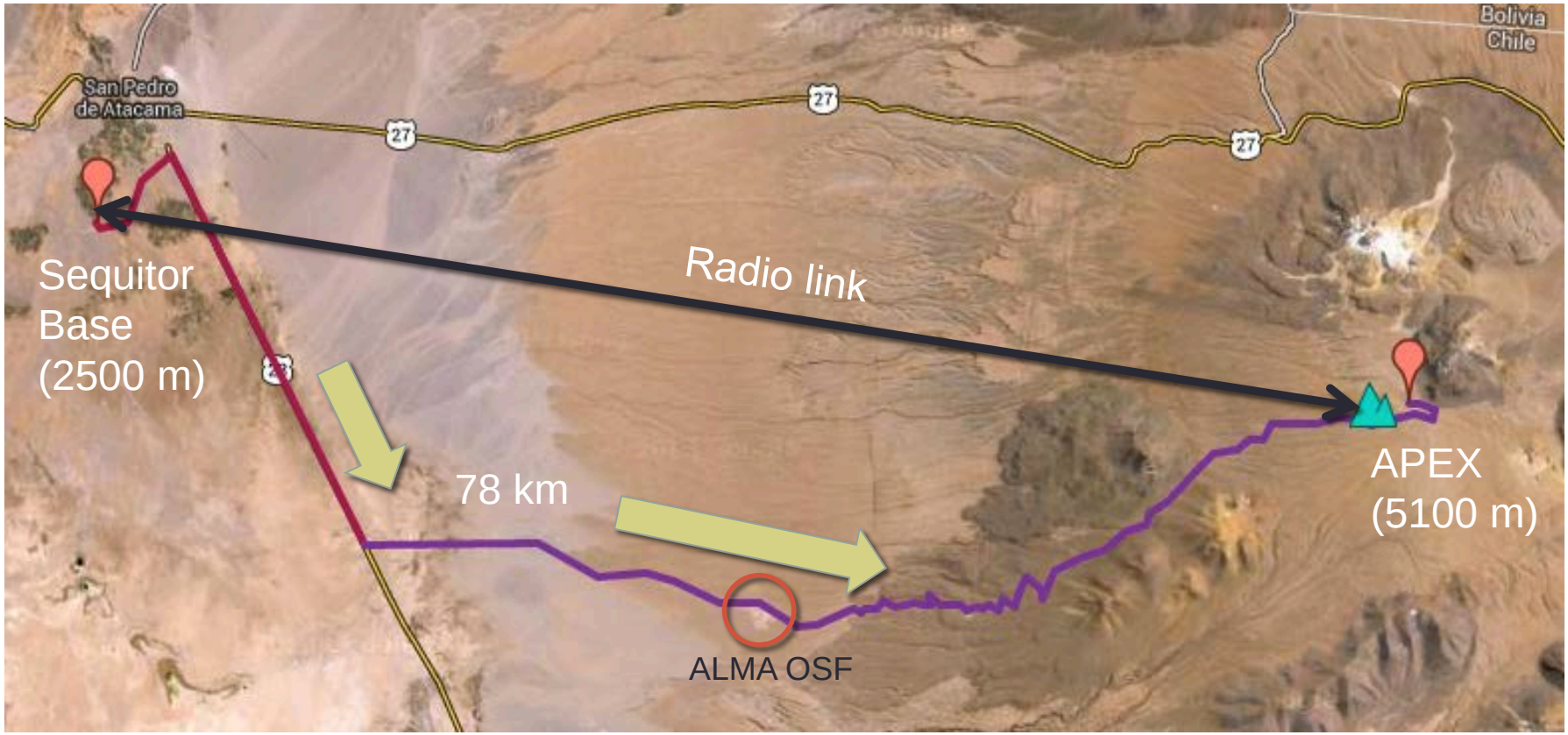
APEX in a nutshell

Sequitor base: San Pedro de Atacama (facilities, night observations)

APEX in a nutshell

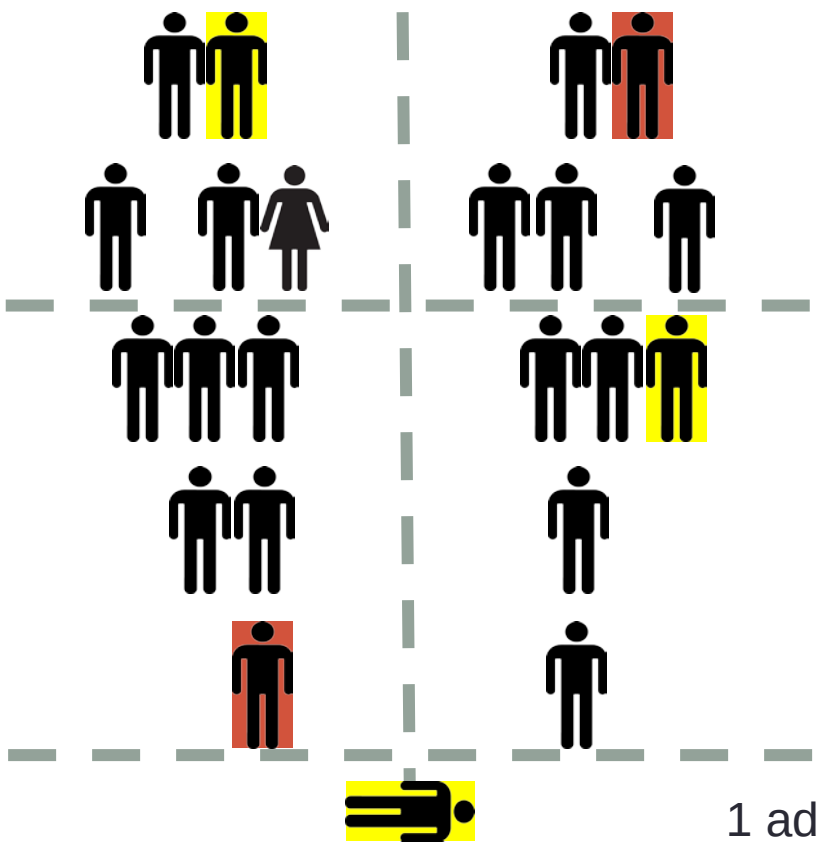
Chajnantor site: Control room + telescope (morning and afternoon operations)

APEX in a nutshell



APEX in a nutshell

Little staff distributed in **2 shifts** (8 days)



4 astronomers

4 operators
+ 2 observing specialists

Sciops

6 mechanical/electrical engineers

3 technicians

2 software engineers

A&I

1 administrative

+ 10 service staff (cooks, cleaning, car drivers, maintenance)

APEX in a nutshell

Instrumentation: Variety of bolometer cameras & heterodyne instruments
Test bed for state-of-the-art instrumentation

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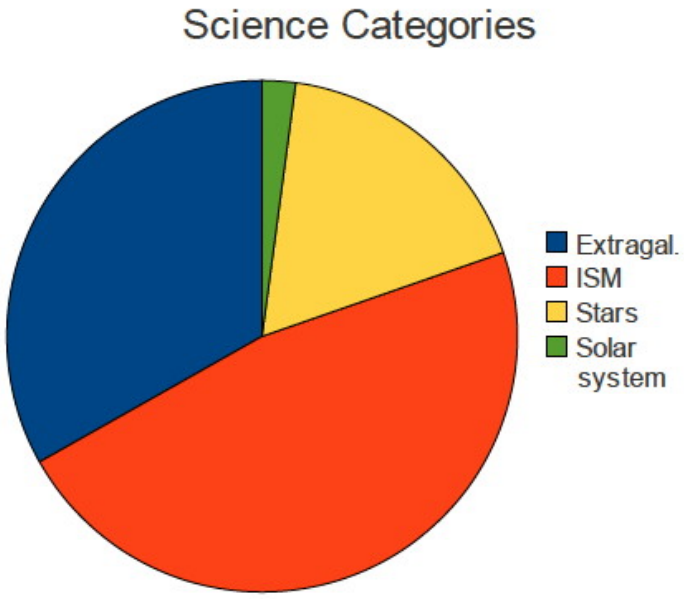
Scientific topics:



Stutz + 2013 ApJ 767, 36

Swinbank + 2010 Nature 464, 733

Important role for:

- ALMA science preparation
- Herschel / Planck science follow up

APEX in a nutshell

APEX data products:

Raw data (Multi Beam FITS)
Calibrated data (heterodyne)
Metadata (logs, twiki)
Quick reduction + scripts

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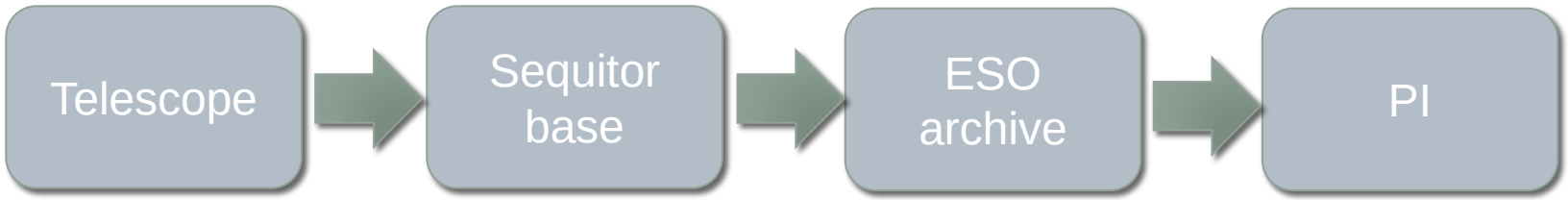
Data flow:



Old Data flow System

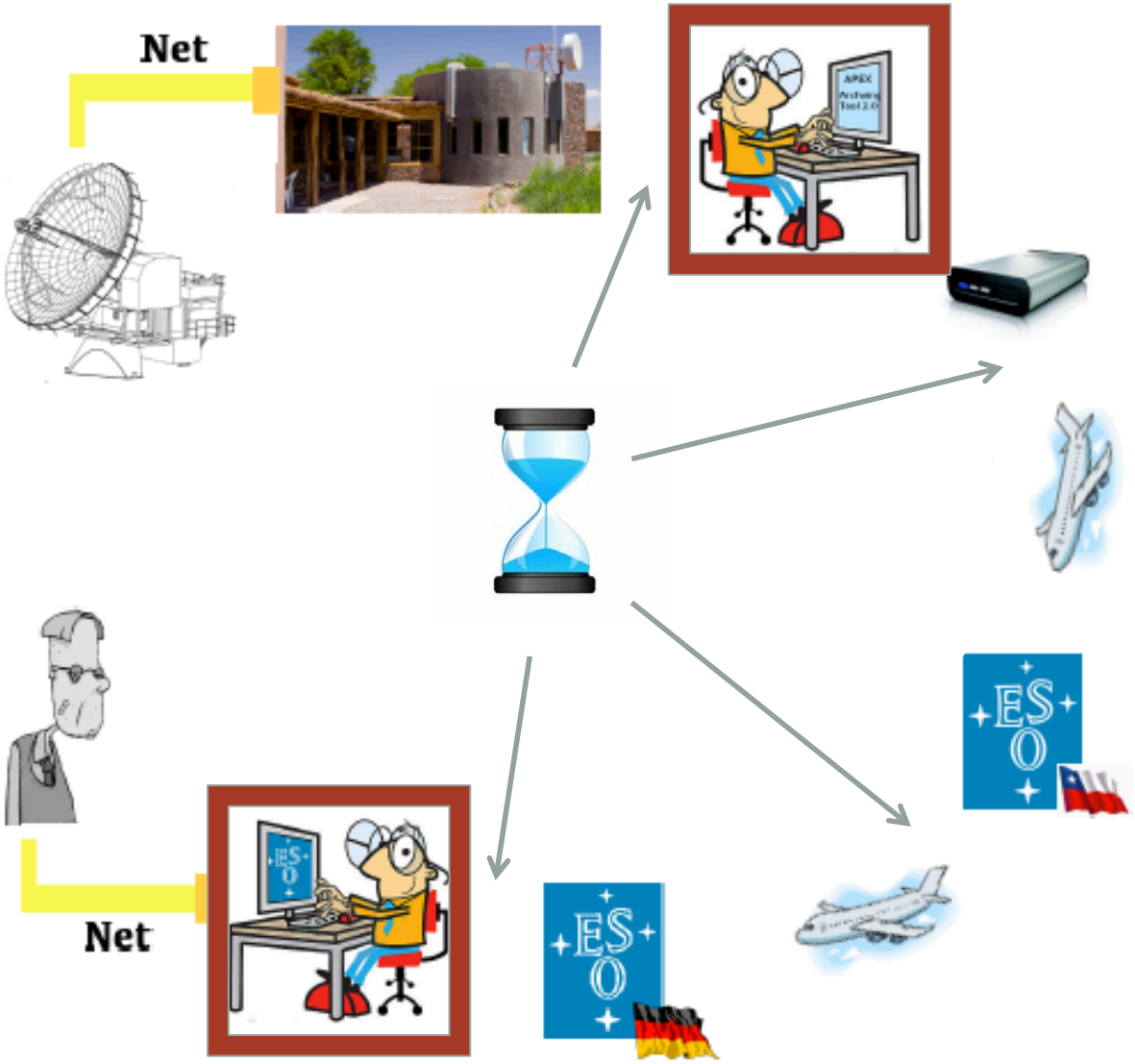
Old Data flow System

- Archiving Data Archiving document (C. de Breuck, 2006)

“provides instructions to both the local APEX staff and the Data Flow Operations group in ESO Garching on how to send, archive and distribute APEX data”

- Some rules to comply with ESO archive standards
- Contents/format of archival data packages
- Describes differences among partners
- Establish delivery procedures (USB disks)
  - **Total** APEX external bandwidth: 1 Mbps

Old Data flow System



Old Data flow System

Disadvantages

- One/two shipments per run
- Manual intervention both at APEX and ESO (manpower, mistakes)
- Travel overhead too long
- PI gets data several weeks after observations
- PI cannot interact to decide while observations are going on
- Short time to reduce/publish data before next call

Improvements?

Improvements?

- 2010: Requirements for new procedures

- Aims:
  - Reduce substantially delivery time (weeks to days)
  - Completely automated system
  - Integrated as much as possible into the ESO data flow system
  - Little resources

- Considerations:
  - Data volumes generated (~ 3TB/year and increasing…)
  - Available infrastructure (renewal IP contract, usage of EVALSO)
  - Resources needed (bandwidth, hardware, software)
  - Advice from other LPO observatories
  - Coordination between APEX and ESO Archive staff

Current Data flow System

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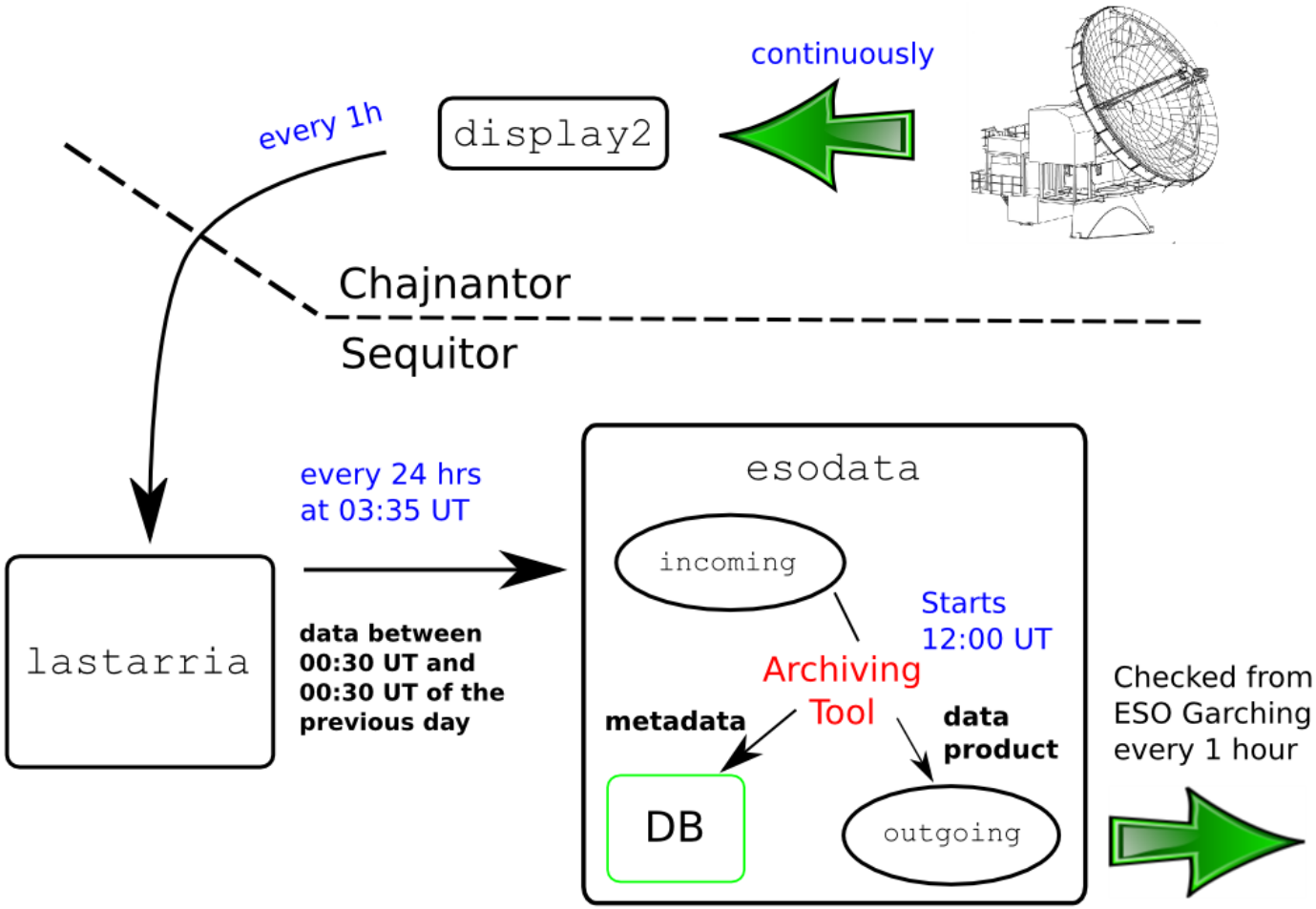
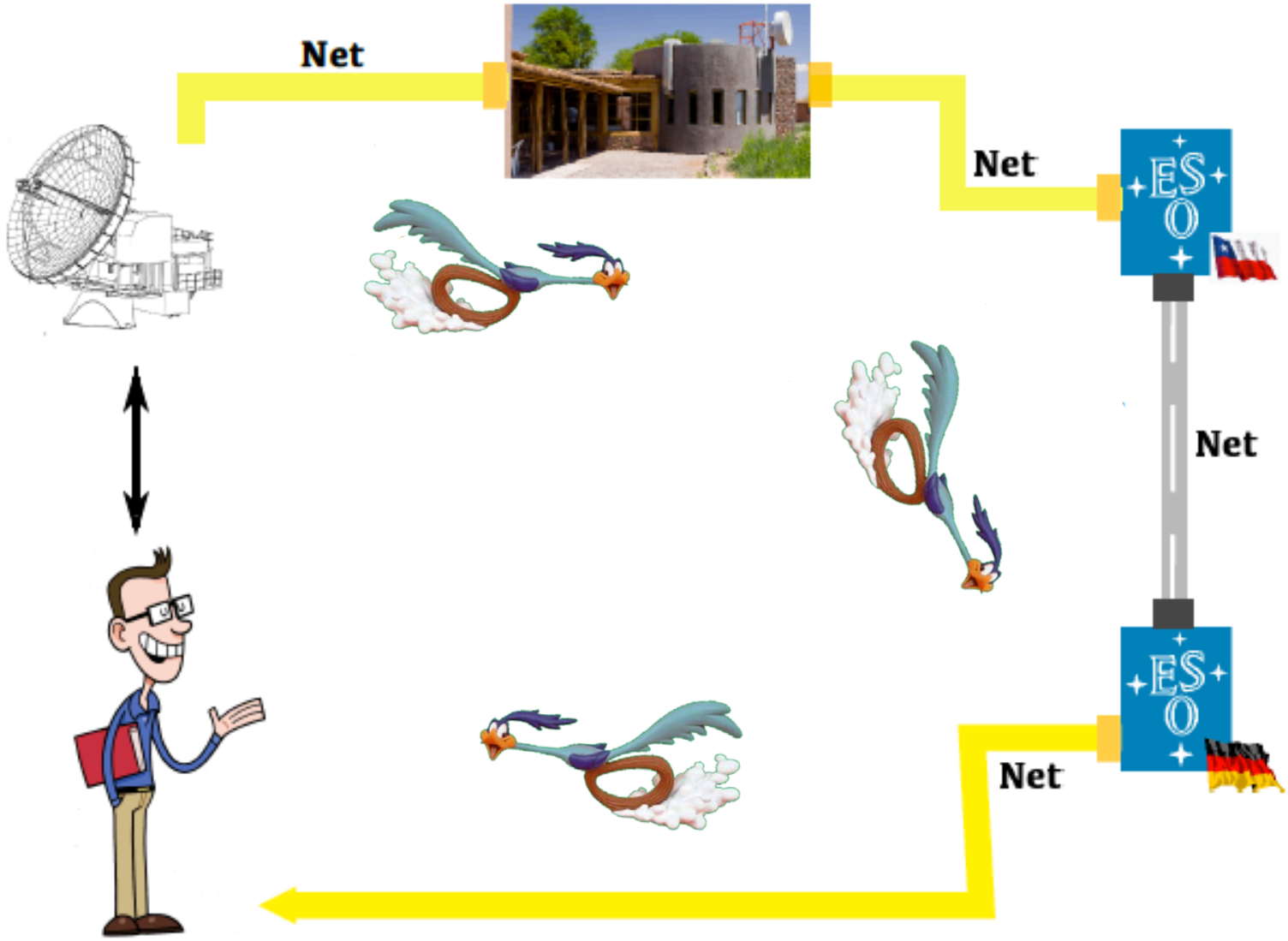


Current Data flow System



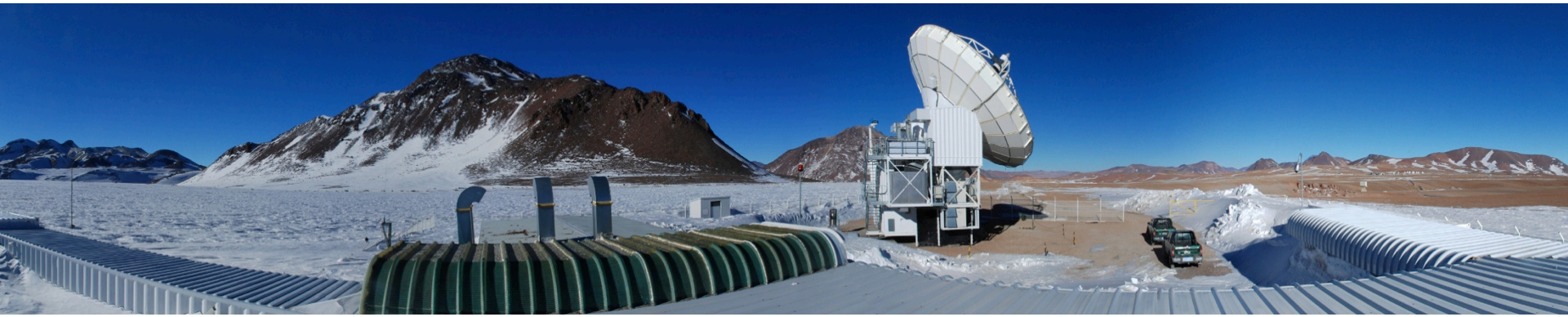
Current Data flow System

Advantages

- One shipment every 24 hours
- Automated transfer: **minimum manual intervention**
- Implemented with **free software** (linux, bbcp, MySQL, Python)
- Fast internet connection APEX - Santiago - Germany
- PI gets data in ~ 2 days in his desk. Propriety period starts
- PI can take decisions before the observing run is finished
- Possibility to get **quick results** and publication!
- Higher possibility to get more time…
- **Community** also gets data earlier

But still some challenges…

- Optimize timings
- Face the imminent increase of data volumes (new generation of instruments)
- Debugging procedures



Thank you!