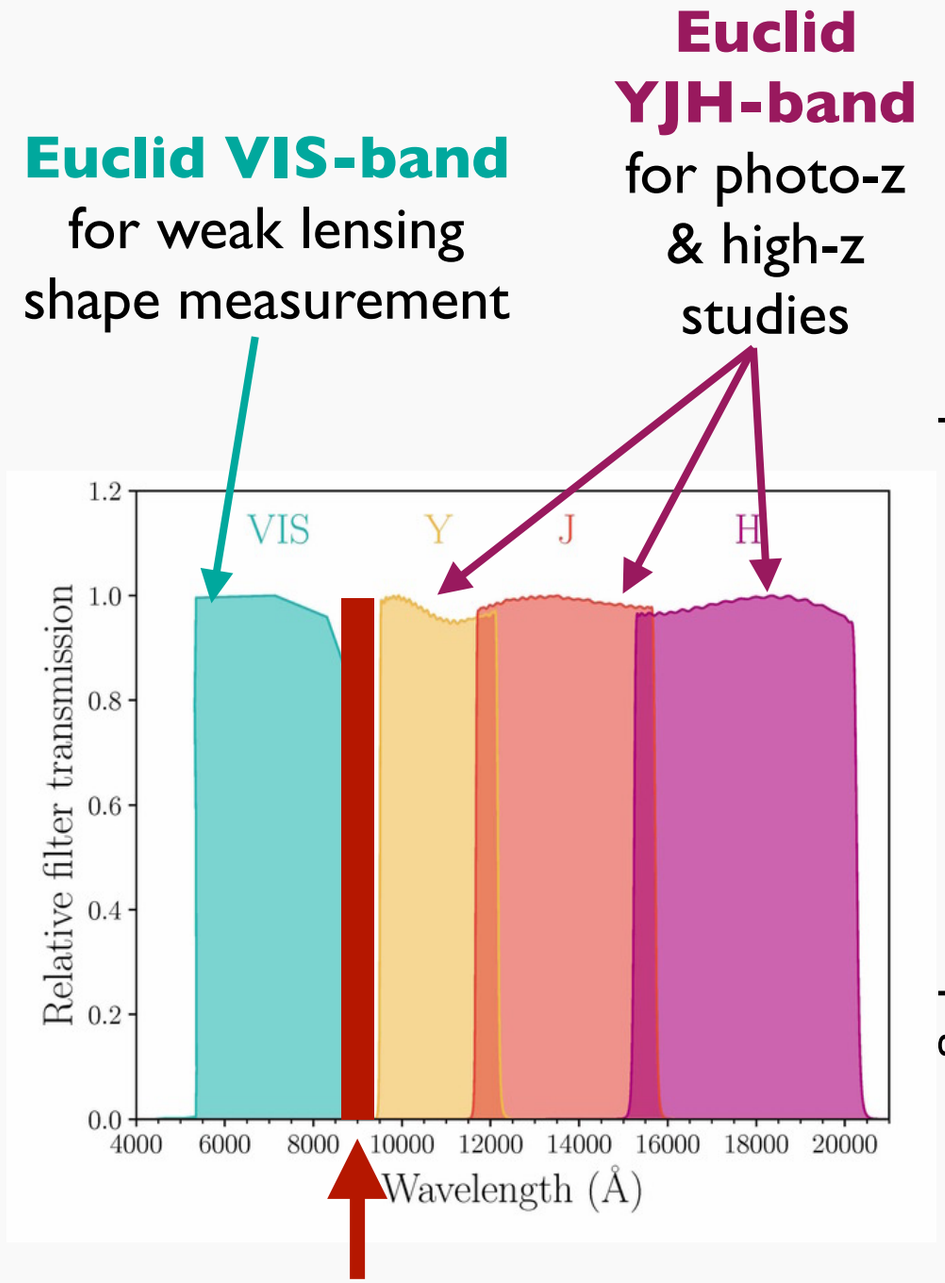
# Status report of WISHES

Masamune Oguri
Center for Frontier Science, Chiba University
on behalf of the WISHES/UNIONS team

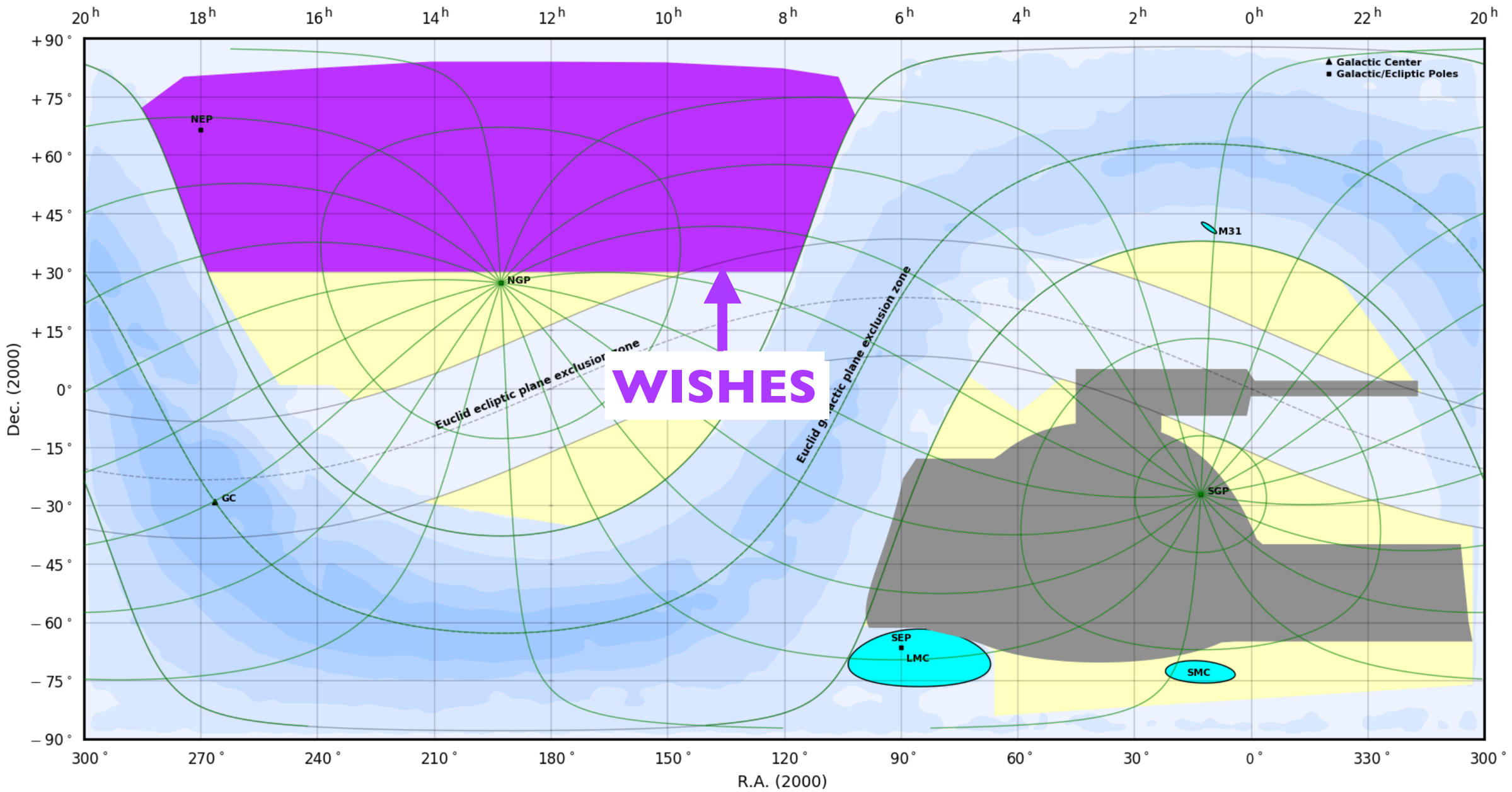
2023/1/25 Subaru UM FY2023@NAOJ

# WISHES for Euclid

- Euclid satellite requires ground-based imaging for mission goal
- HSC z-band imaging survey (**40 nights, S20B-S23A**)
- improve photo-z of galaxies for **cosmic shear** to acceptable level, enable studies of **high-z quasars** and **clusters**



# Survey footprint




HSC Northern-hemisphere Ultra-Wide Survey footprint (HSC-NUWS) over the Euclid Wide Survey

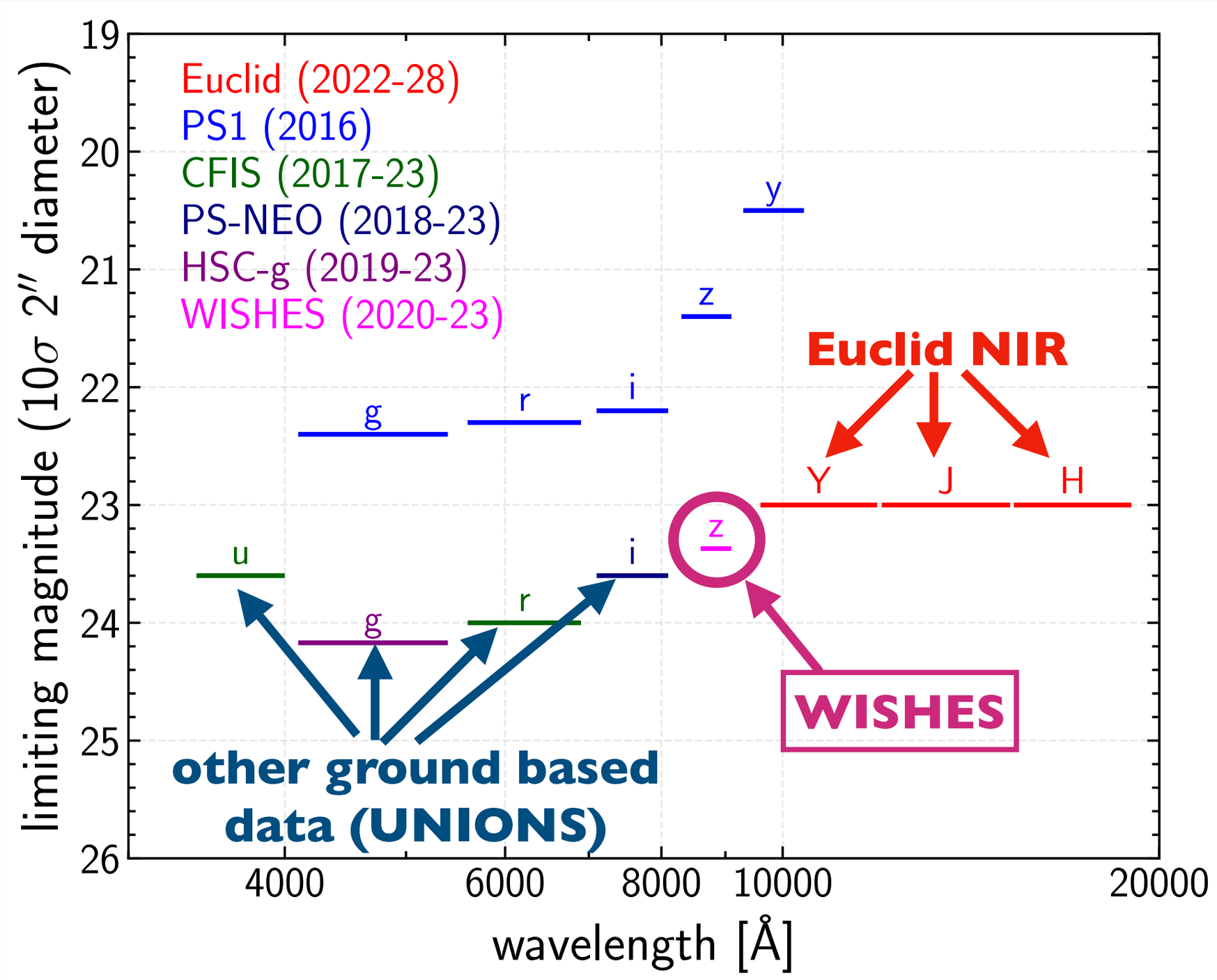
WISHES [z] & UNIONS (CFHT [u,r] + Pan−STARRS [i] + HSC [g]) : 4,500 deg.$^2$

DES [g,r,i,z] : 4,500 deg.$^2$

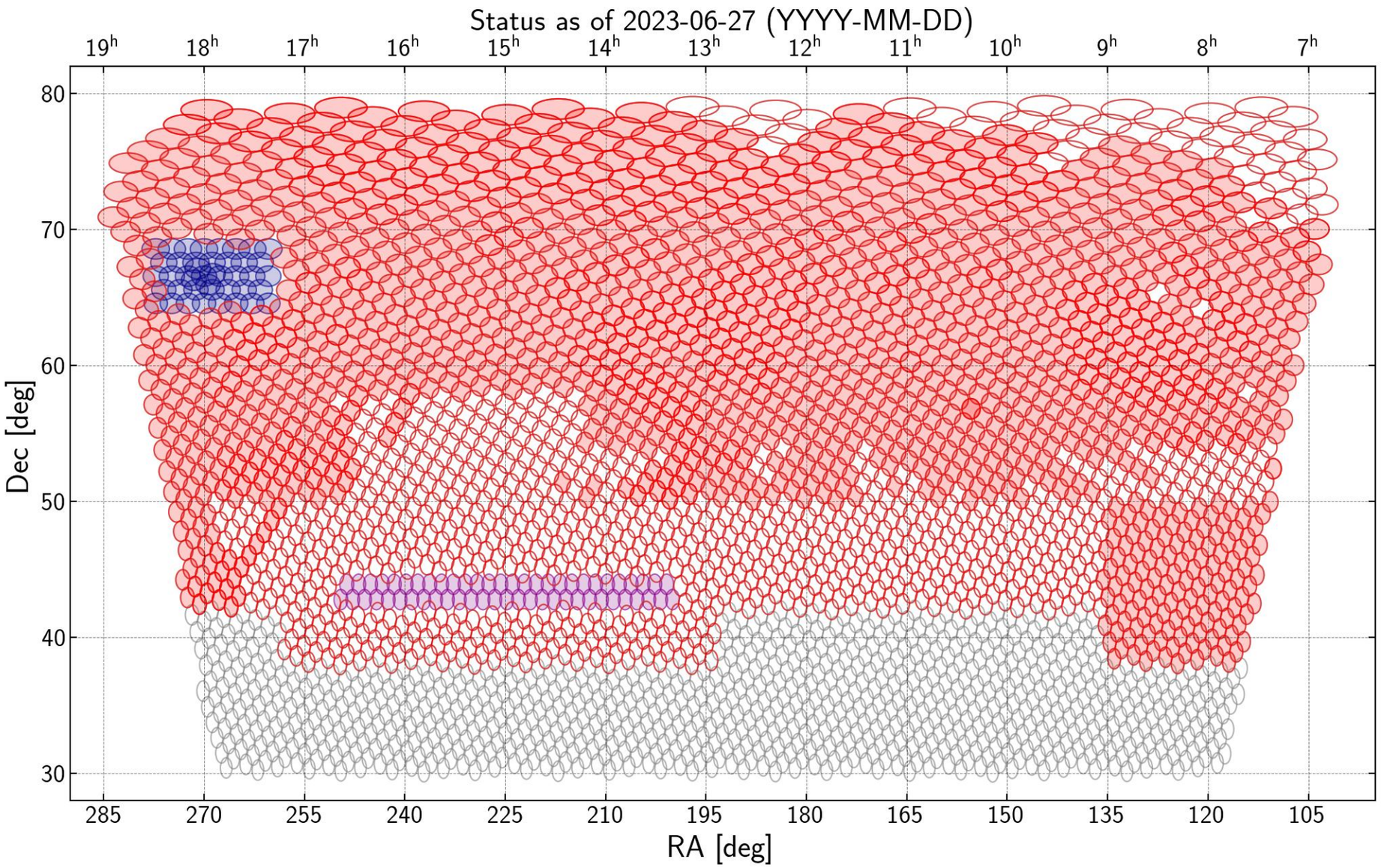
Euclid wide space survey : 15,000 deg.$^2$ [Y,J,H + morphology + spectroscopy]

Euclid exclusion zone : 26,000 deg.$^2$ [galactic+ecliptic planes + dust]

# Target depth



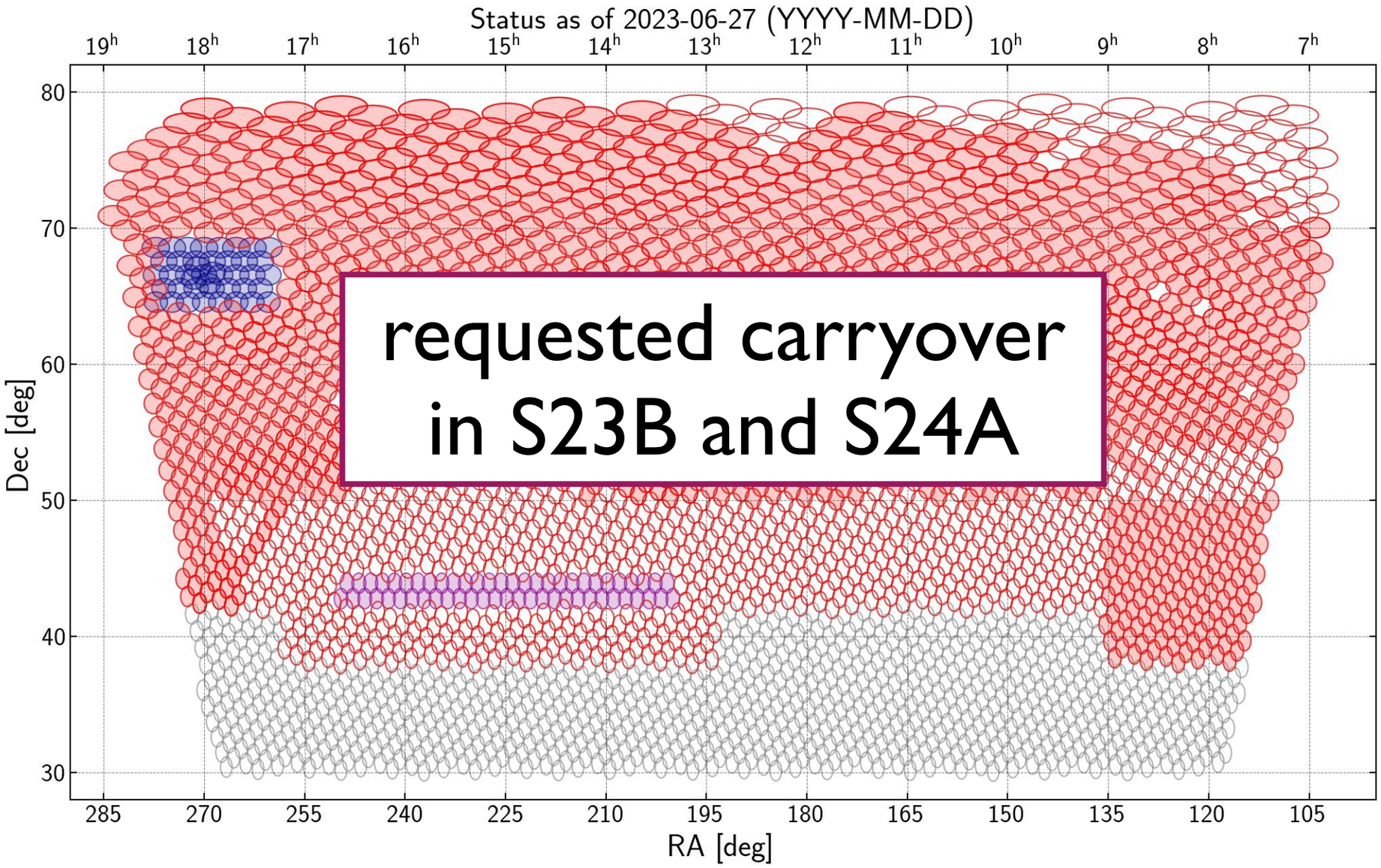
# Status at the end of S23A




red filled circles: observed pointings

completion rate ~46%

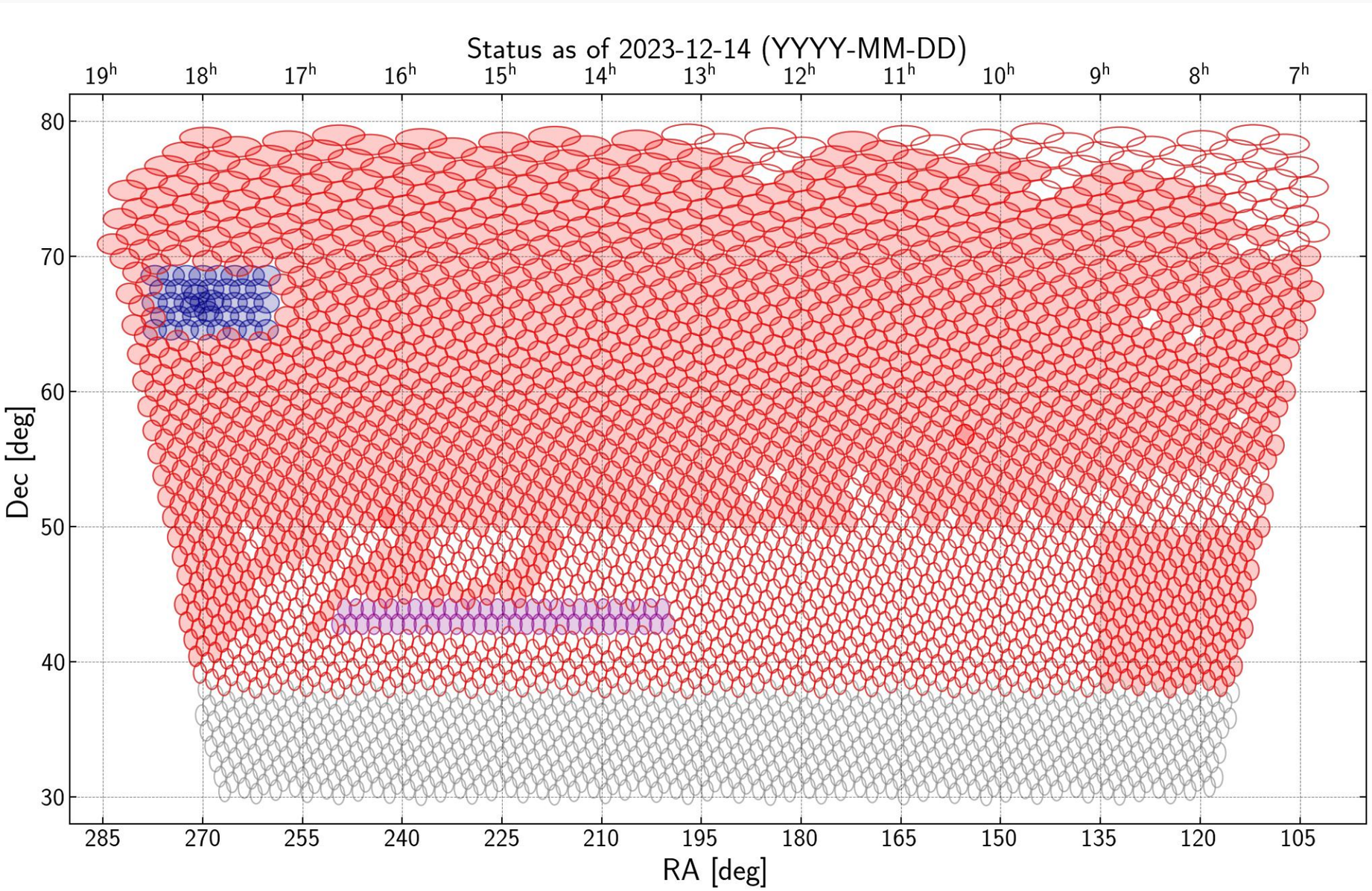
# Status at the end of S23A




red filled circles: observed pointings

completion rate ~46%

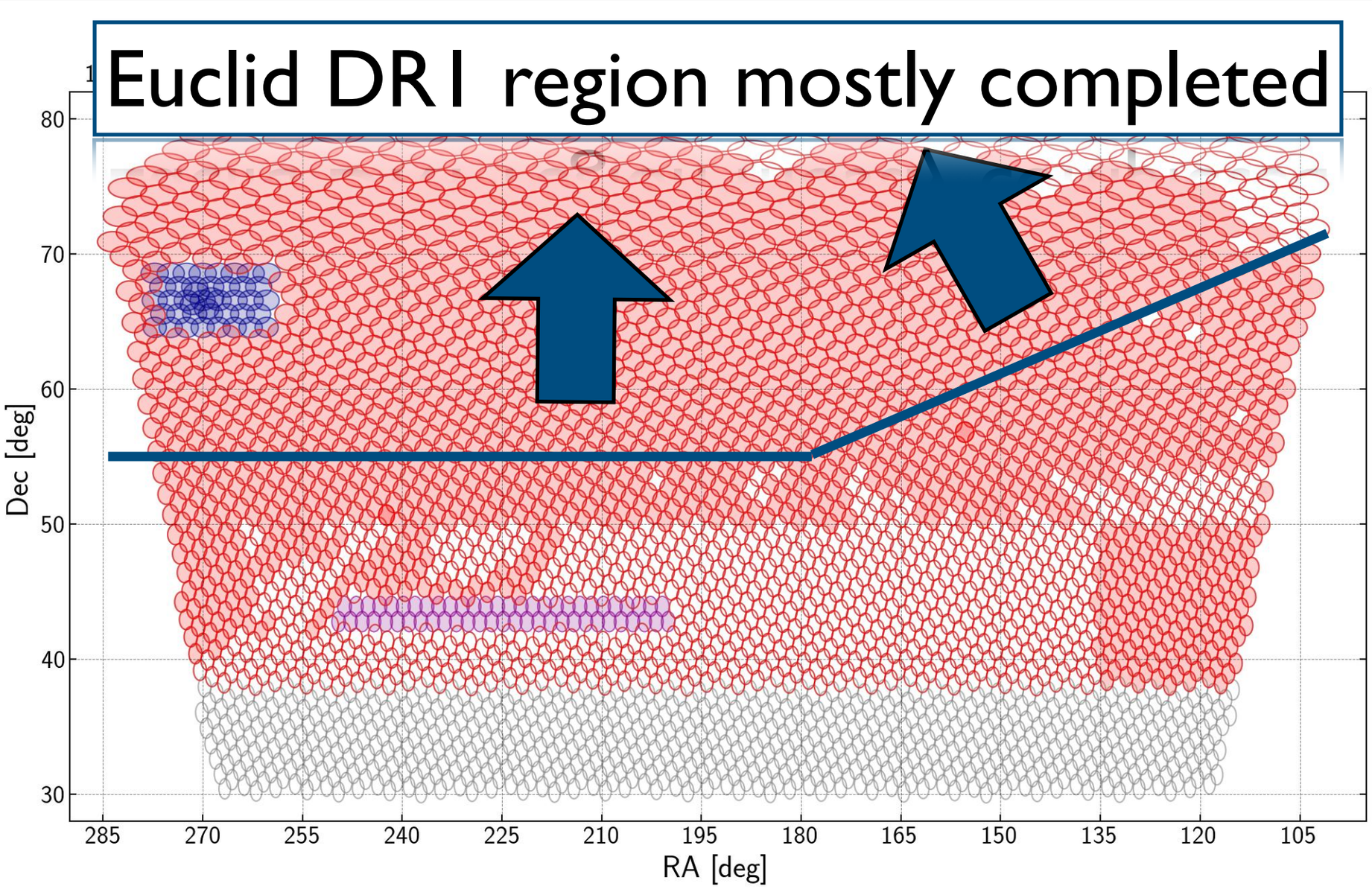
# Current status




red filled circles: observed pointings

completion rate ~52%

# Current status



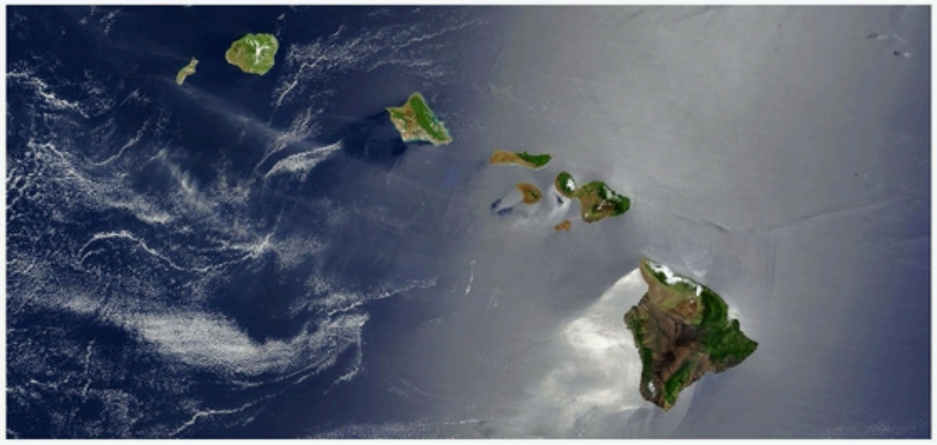

red filled circles: observed pointings

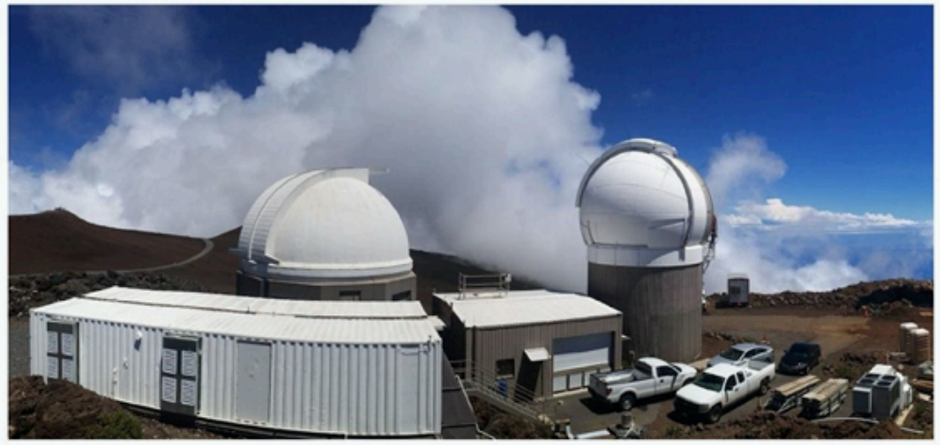
completion rate ~52%

# UNIONS

**(see also Stephen Gwyn's talk, poster P34 by Ichikawa-san!)**

Hawaiian Islands





Pan-STARRS
2 x 1.8m

CFHT
3.6m

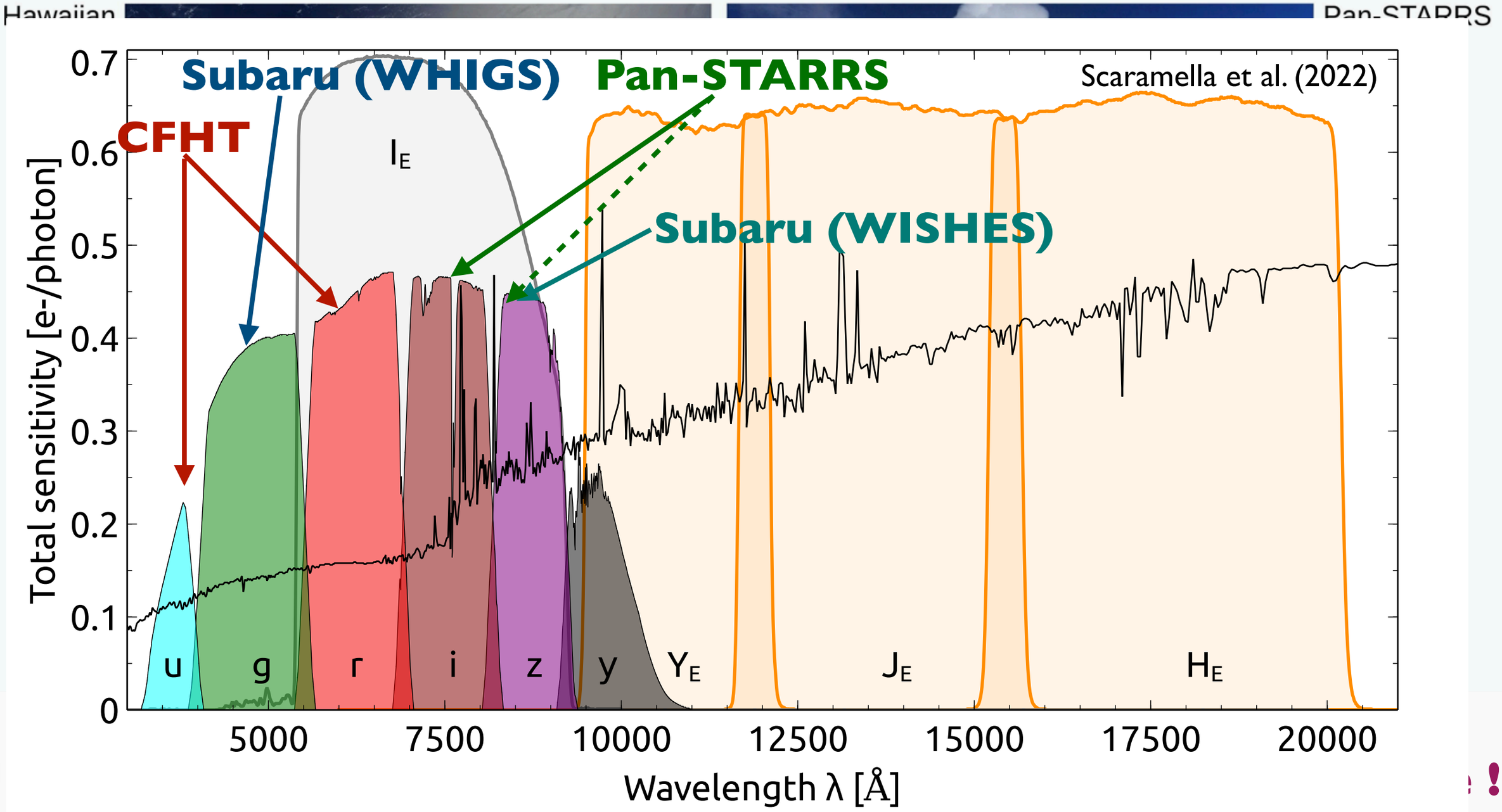
Subaru
Telescope
8.2m

from UNIONS wiki

**UNIONS = CFHT + Pan-STARRS + Subaru = Hawaiian alliance !**

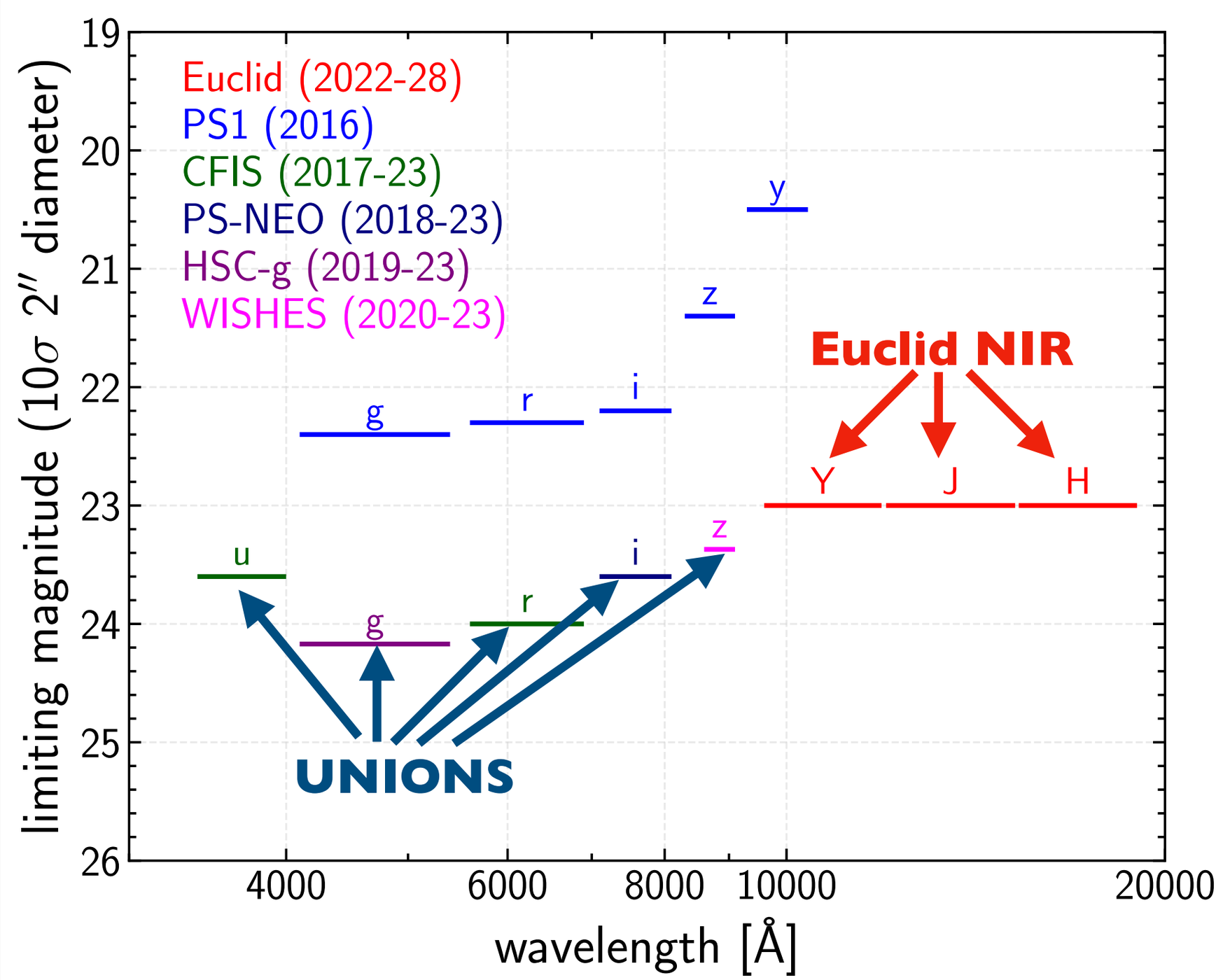
[Euclid Norther Sky (~5000 deg$^2$) multi-wavelength optical images]

# UNIONS




[Euclid Norther Sky (~5000 deg²) multi-wavelength optical images]

# Limiting magnitudes



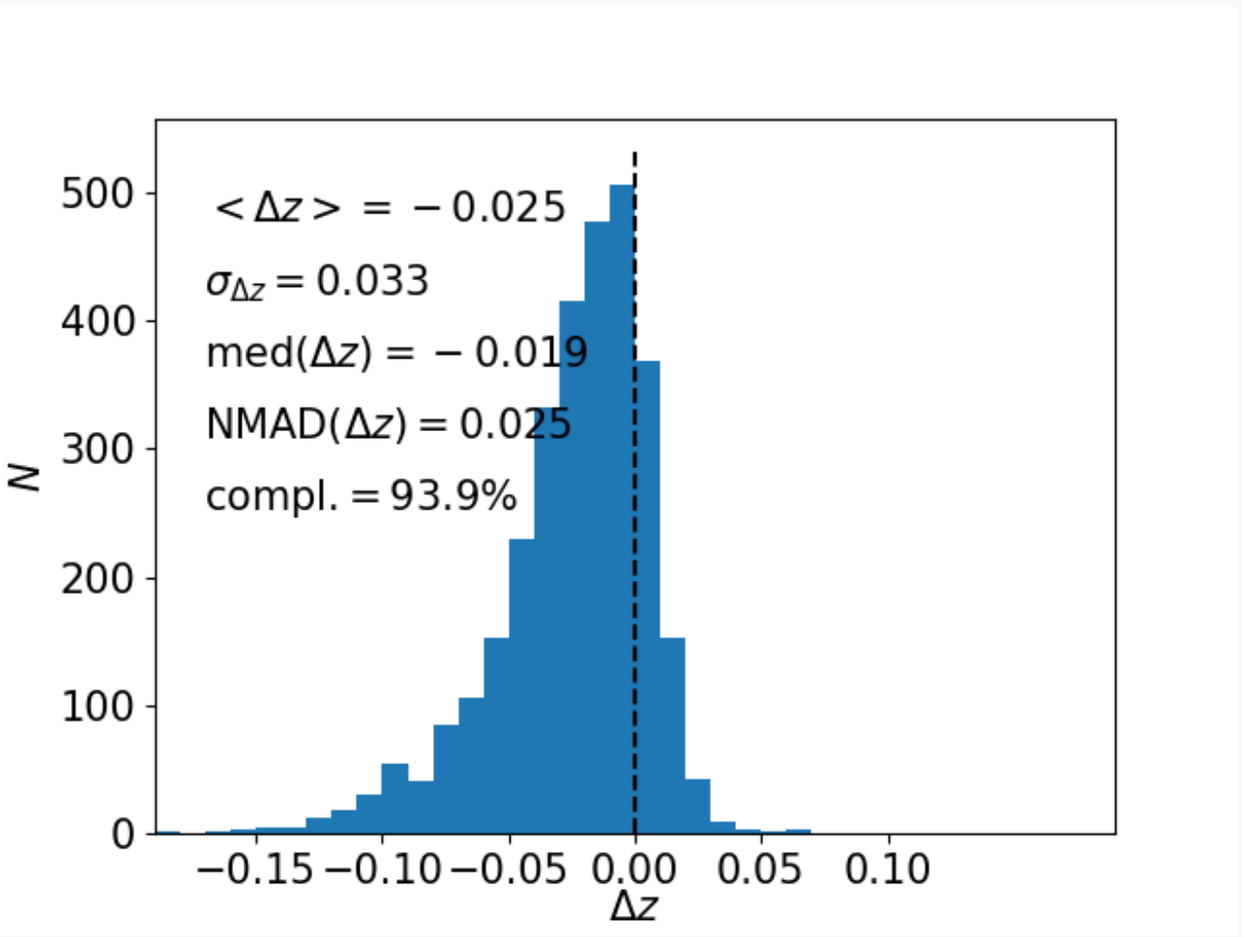
# UNIONS multi-wavelength catalog

- catalogs being created with
  - SourceXtractor++ (R. Gavazzai)
  - GAaP (H. Hildebrandt)

H. Hildebrandt et al.

# Unified multiband catalog

- using GAaP (K. Kuijken)
- forced photometry with r-band catalog as input
- different aperture sizes for different bands, taking account of PSF variation

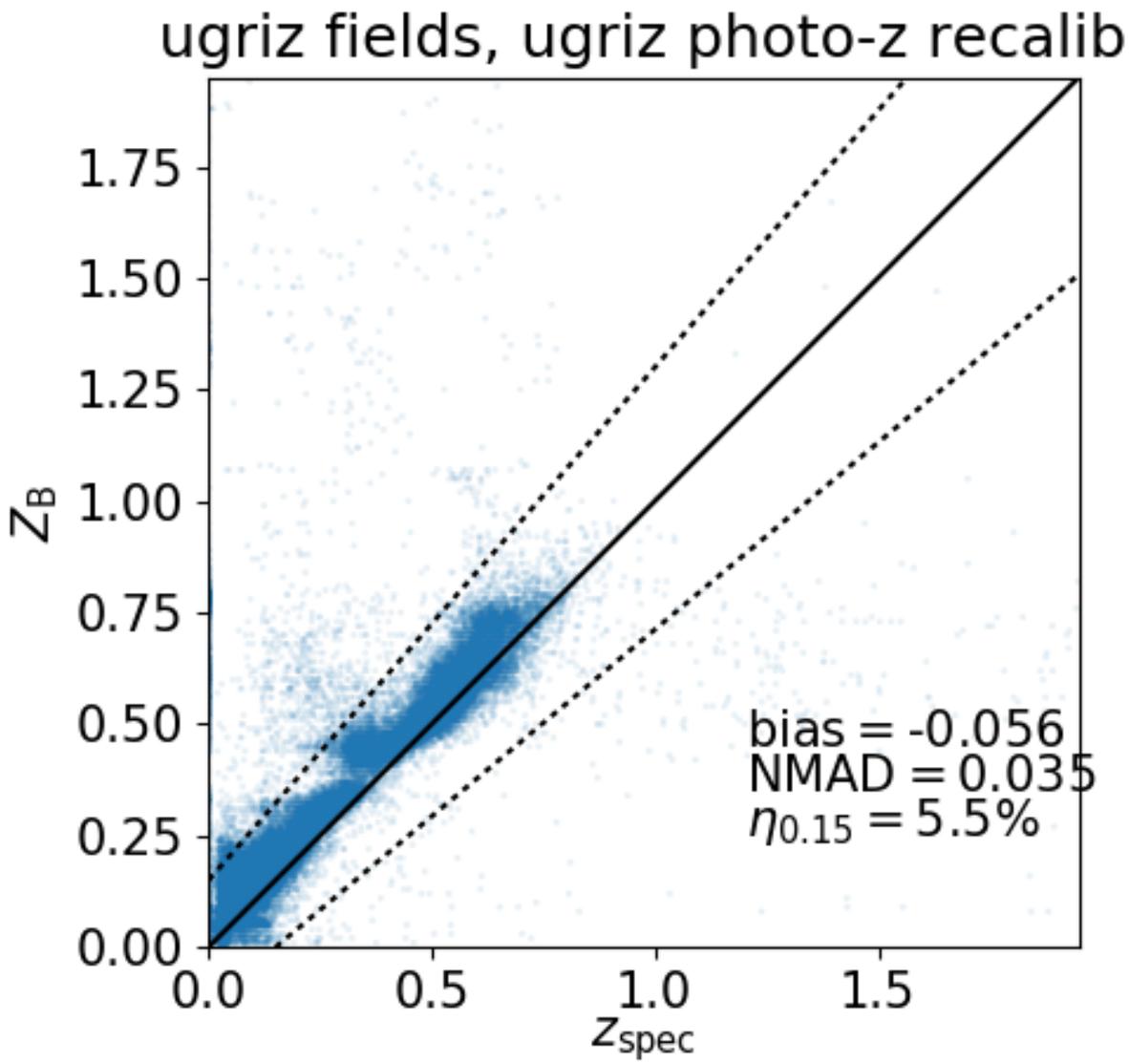



SDSS vs WISHES

consistent on average

# Testing photo-z's

H. Hildebrandt et al.




Looks fine at z<1

need comparisons in deep fields with high-z spec gals

# Status of Euclid

- launched on 2023 July 1st
- with Falcon 9 Space X rocket

https://www.esa.int/Science_Exploration/Space_Science/Euclid/Euclid_s_first_images_the_dazzling_edge_of_darkness

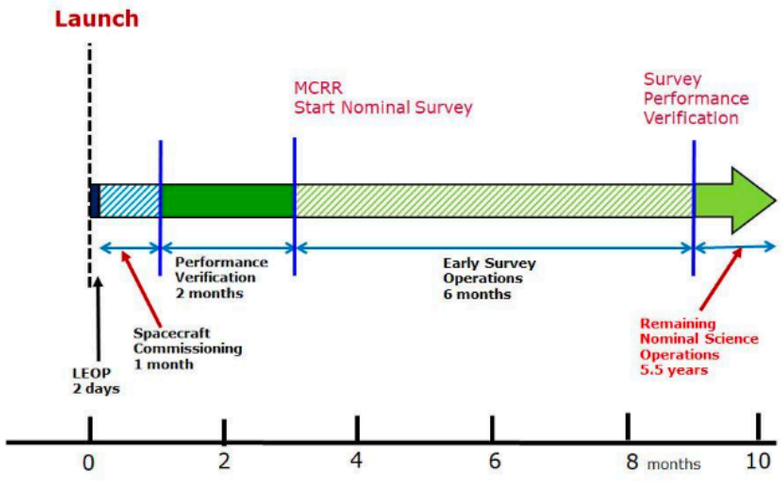
# Early Release Observations

- first set of images released on Nov 7, 2023
  - Perseus Cluster of Galaxies (4 ROS)
  - Spiral Galaxy IC342 (1 ROS)
  - Irregular Galaxy NGC 6822 (1 ROS)
  - Globular Cluster NGC 6397 (1 ROS)
  - The Horsehead Nebula (1 ROS)
  - (some additional clusters not included in this release)

ROS: standard observing block (70 min)

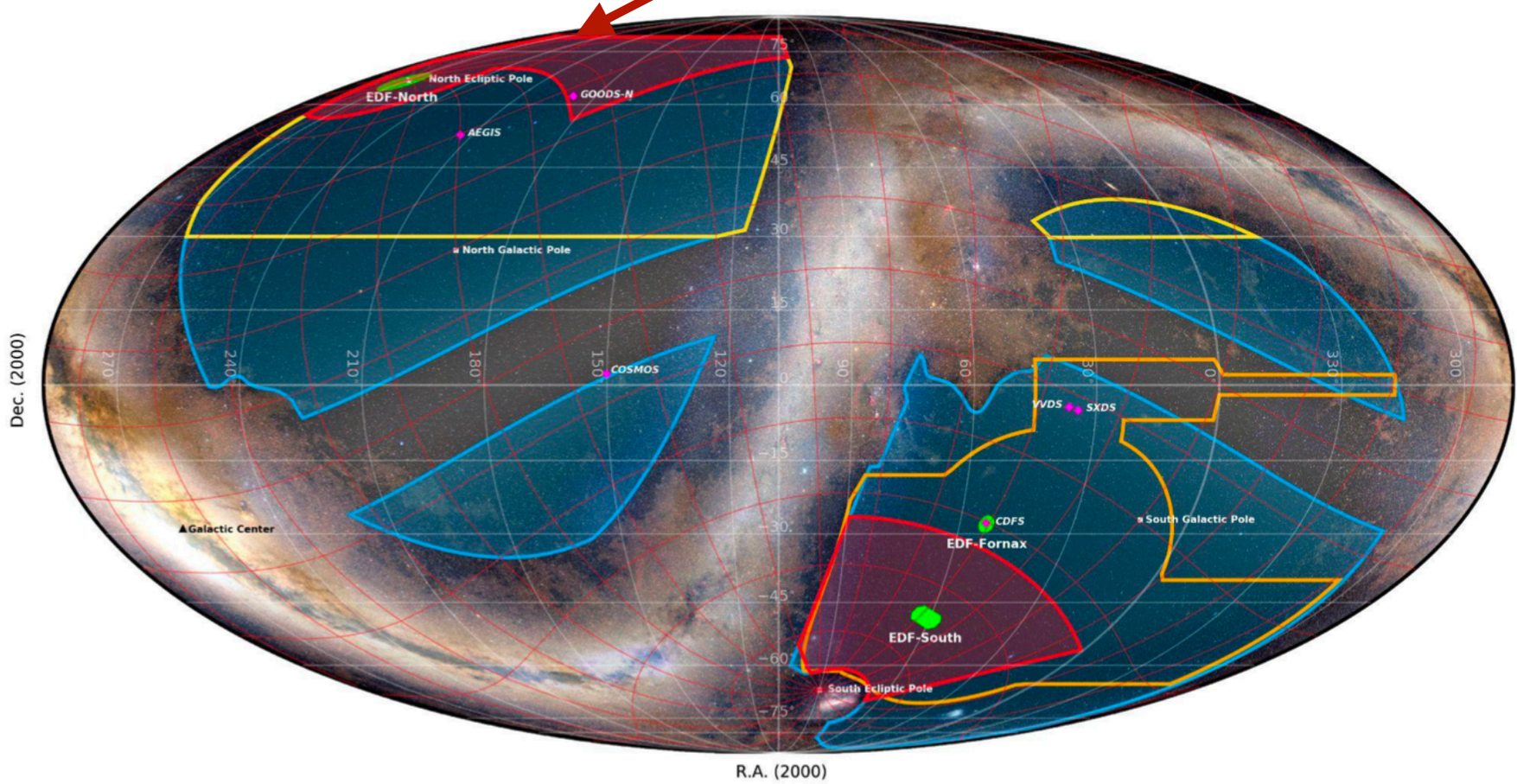
- VIS + NISP (YJH) images, no spectrum
- fits images available for EC members
- public release in 2024

# Euclid survey region


Provided by R. Laureijs, ESA

**DR1 region**
**(Dec ≳ 55 deg)**



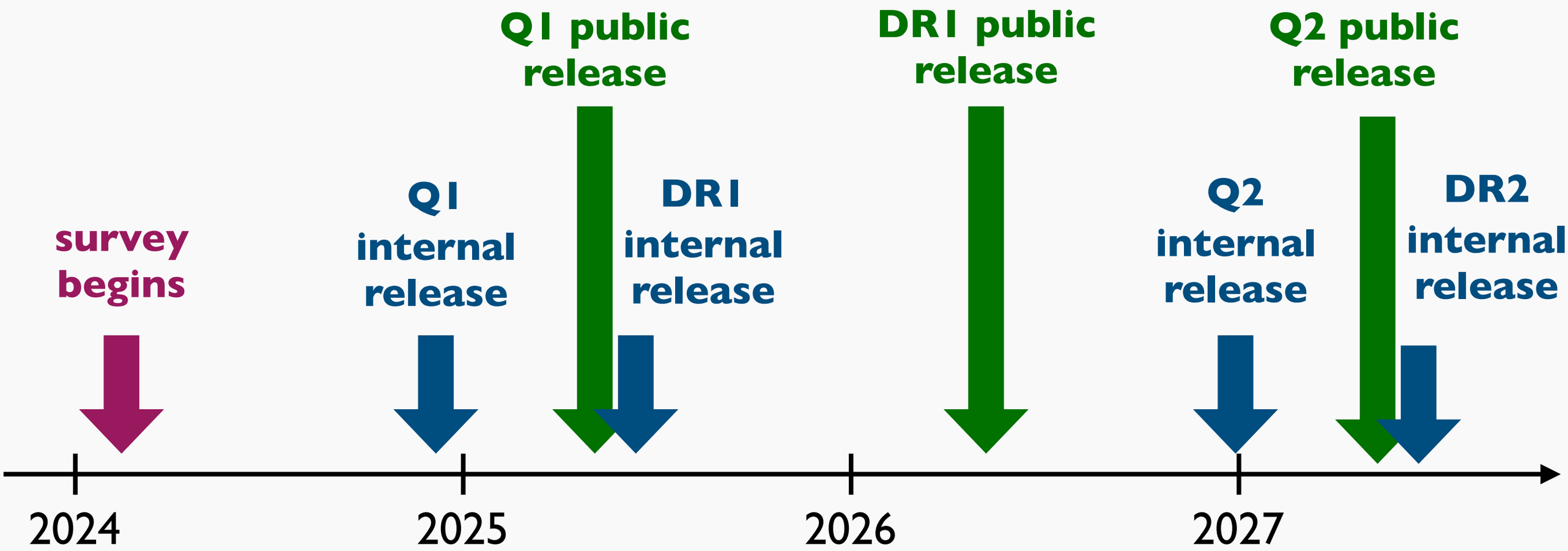

The Euclid Wide Survey DR1 area maximizing the overlap with DES : North = 821 deg$^2$, South = 1657 deg$^2$ [Mollweide Celestial]

- Euclid Wide Survey region of interest : 17,354 deg$^2$
- DES, griz, 2013−19 : 4500 deg$^2$ overlap with the region of interest
- UNIONS, ugriz, 2017−24 : 4861 deg$^2$
- Euclid DR1 area, 2023 : 2500 deg$^2$
- Euclid Deep Fields [total 53 deg$^2$]

Background image: Euclid Consortium / Planck Collaboration / A. Mellinger

courtesy of J.-C. Cuillandre

# Latest schedule




(continue up to DR3)

# Summary

- WISHES is an HSC z-band imaging survey over 4,500 deg$^2$ of the northern sky
- delay of progress of observations, extension requested and ongoing
- multiple-wavelength catalog being created and tested
- WISHES/UNIONS is open to any Japanese researches just like HSC-SSP