Vera C. Rubin Observatory

Some comments on behalf of the TAG-Tri Agency Group

The TAG has:

- US Project leadership for Rubin, Euclid, Roman
- Agency reps from NASA, DOE, NSF
- Been meeting informally since ~2012
- Been dark energy focused but it now thinking more broadly

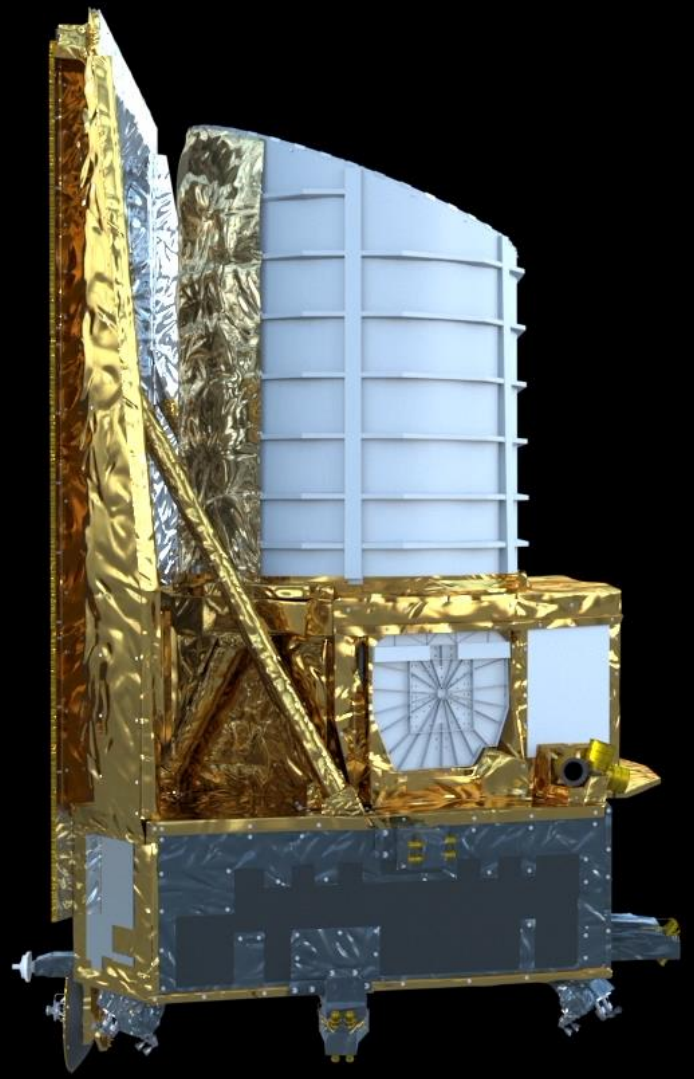
Vera C. Rubin Observatory

TAG has spun up:

- Joint processing pilot study
- Simulation coordination and archiving pilot study
- Survey coordination efforts

Most recently TAG has been forum for project leadership to form plans for joint processing coordination and advocacy

Euclid Science and Euclid Data Products



Jason Rhodes (Jet Propulsion Laboratory, California Institute of Technology)

January 11, 2021 AAS

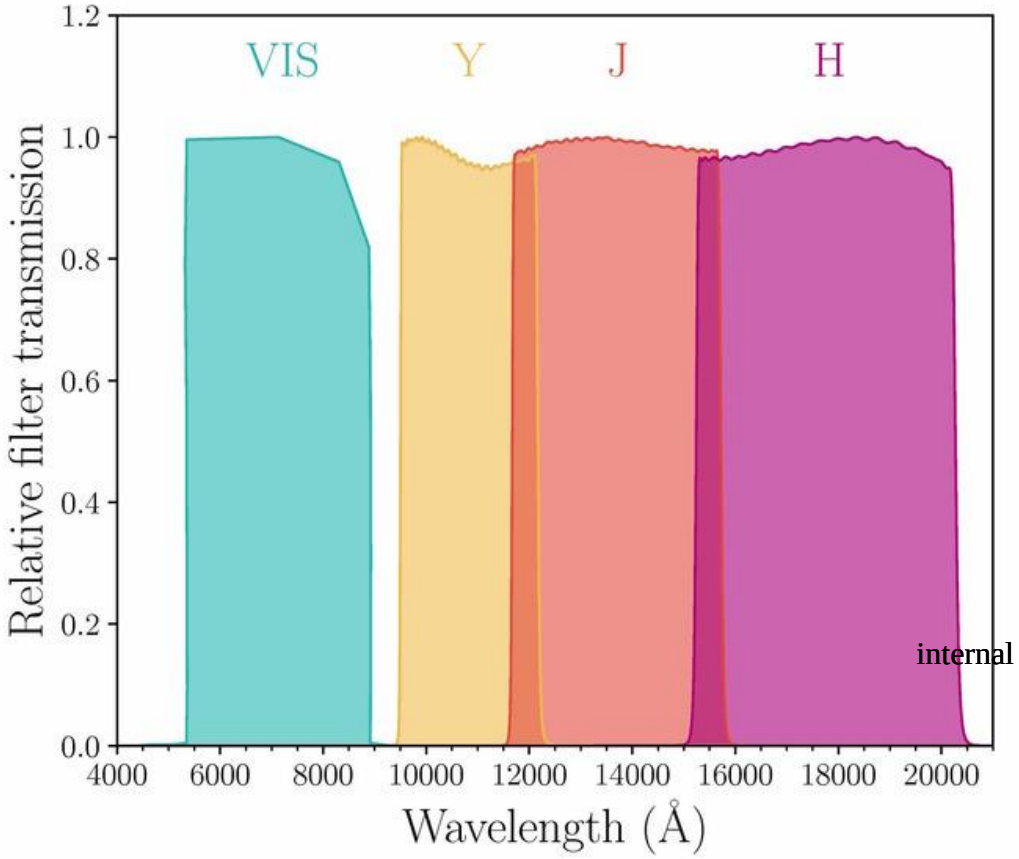
Joint Processing Splinter

Euclid: a survey space telescope led by European Space Agency (ESA) and the Euclid Consortium

Prime Science Objectives: quantify Dark Energy [$w(a)$], Modified Gravity [γ], Dark Matter [m_ν], and the Universe's Initial Conditions [f_{NL}]

make a decisive measurement of the accelerated expansion of the Universe

M3



1 Blue Grism: 0.92- 1.3 µm
3 Red Grisms: 1.25-1.85 µm

internal research grants

Near-Infrared Spectrometer and Photometer (NISP)

FOV:
0.78 x 0.73 deg
16 H2RGs
0.3” / pixel

Visual Imager (VIS)

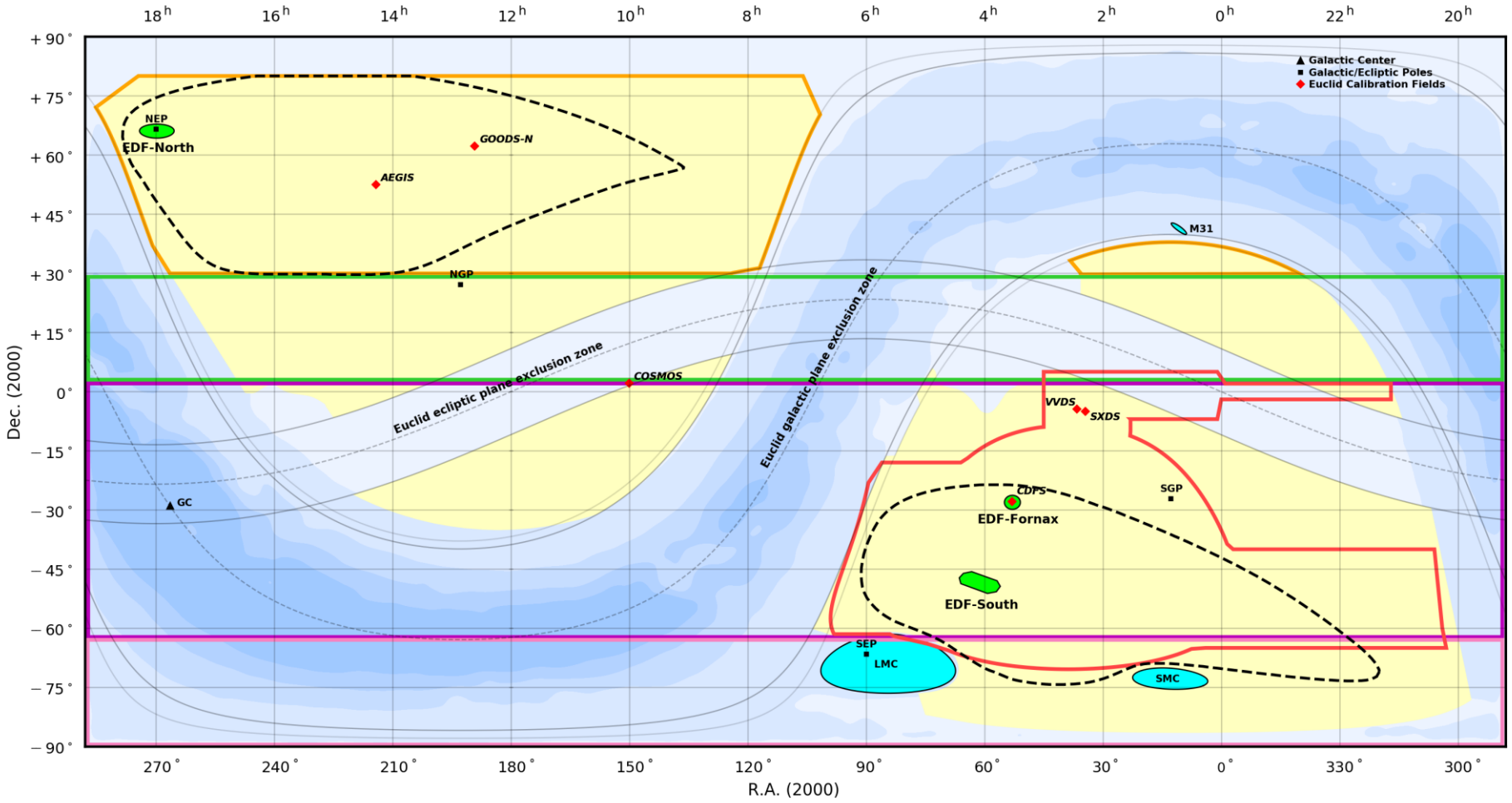
FOV:
0.79 x 0.70 deg
36 4kx4k e2v CCDs
0.1” / pixel

Launch:
on Soyuz
from Kourou,
No earlier
than Oct.
2022

Mission Lifetime:
6+ years
@ L2

Aperture:
1.2m

Euclid Survey



Expected ground−based coverage of the Euclid Wide Survey for DR1/2/3 (2.5/7.5/15 Kdeg.^{2}) [origin/bands/calendar/overlap]

- Euclid Wide Survey : 17 Kdeg.^{2} compliant with a 15 Kdeg.^{2} survey
- DES, griz, 2019 : 4.5 Kdeg.^{2} overlap
- UNIONS (CFHT/JST/Pan−STARRS/Subaru), ugriz, 2027, 5 Kdeg.^{2}
- Rubin LSST WFD, ugriz, 2023 : 8 Kdeg.^{2} overlap
- LSST southern extension, griz, 2027 : 1 Kdeg.^{2} overlap
- LSST northern extension, griz, 2027 : 3 Kdeg.^{2} overlap
- Best 2600 deg.^{2} SNR areas

Near-Infrared Spectrometer and Photometer (NISP)

FOV: 0.78 x 0.73 deg

16 H2RGs

0.3” / pixel

YJH Photometry 24 mag_{AB} 5σ

Red Grism 1.25 – 1.85 μm (R ~ 380; 0.5” source)

Photo-z for ~1.5 billion galaxies

Grism z ~30 million galaxies

Visual Imager (VIS)

FOV: 0.79 x 0.70 deg

36 4k x 4k e2v CCDs

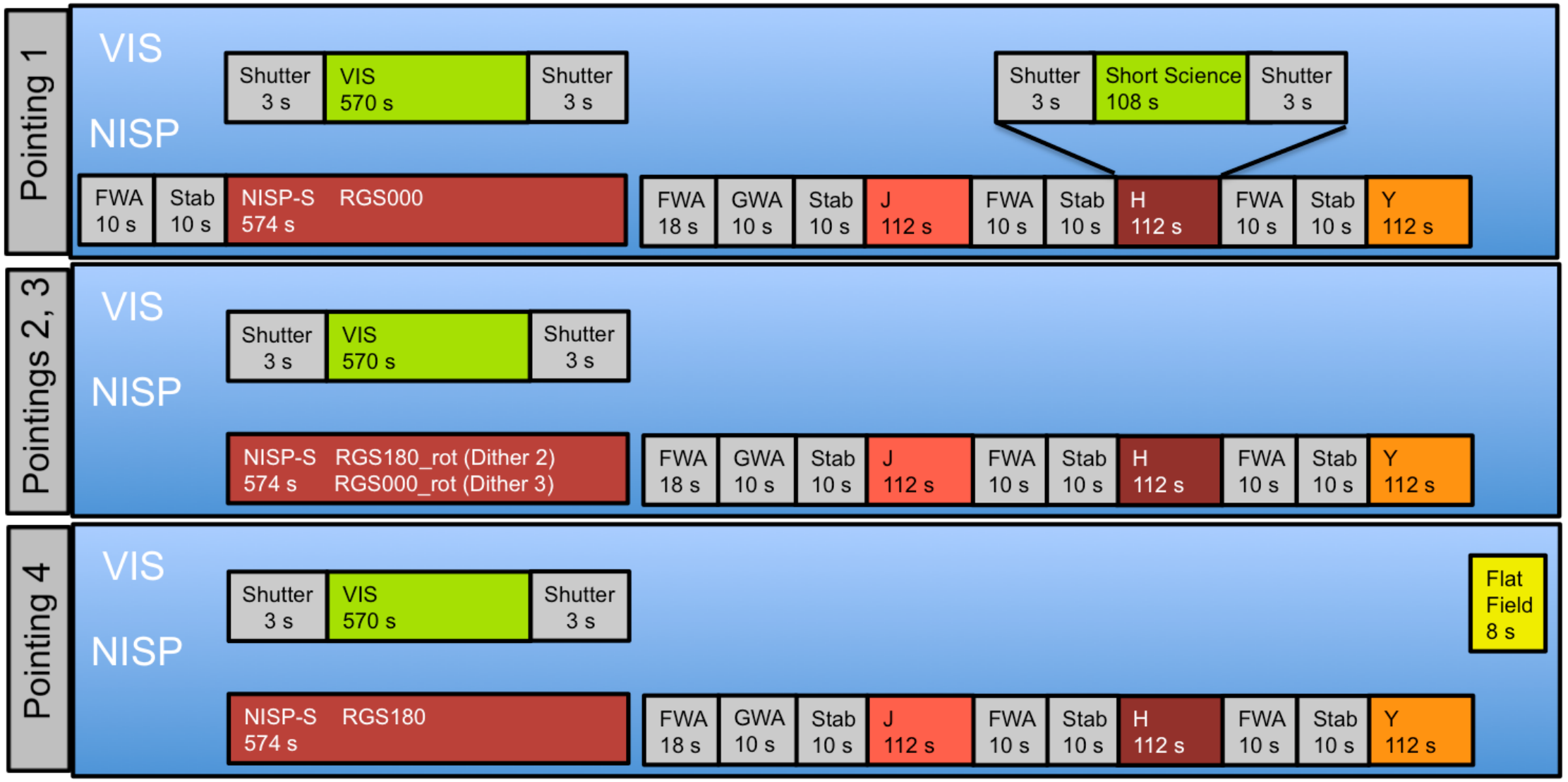
0.1” / pixel

Wide Band: 550 – 900 nm

24.5 mag_{AB} 10 σ

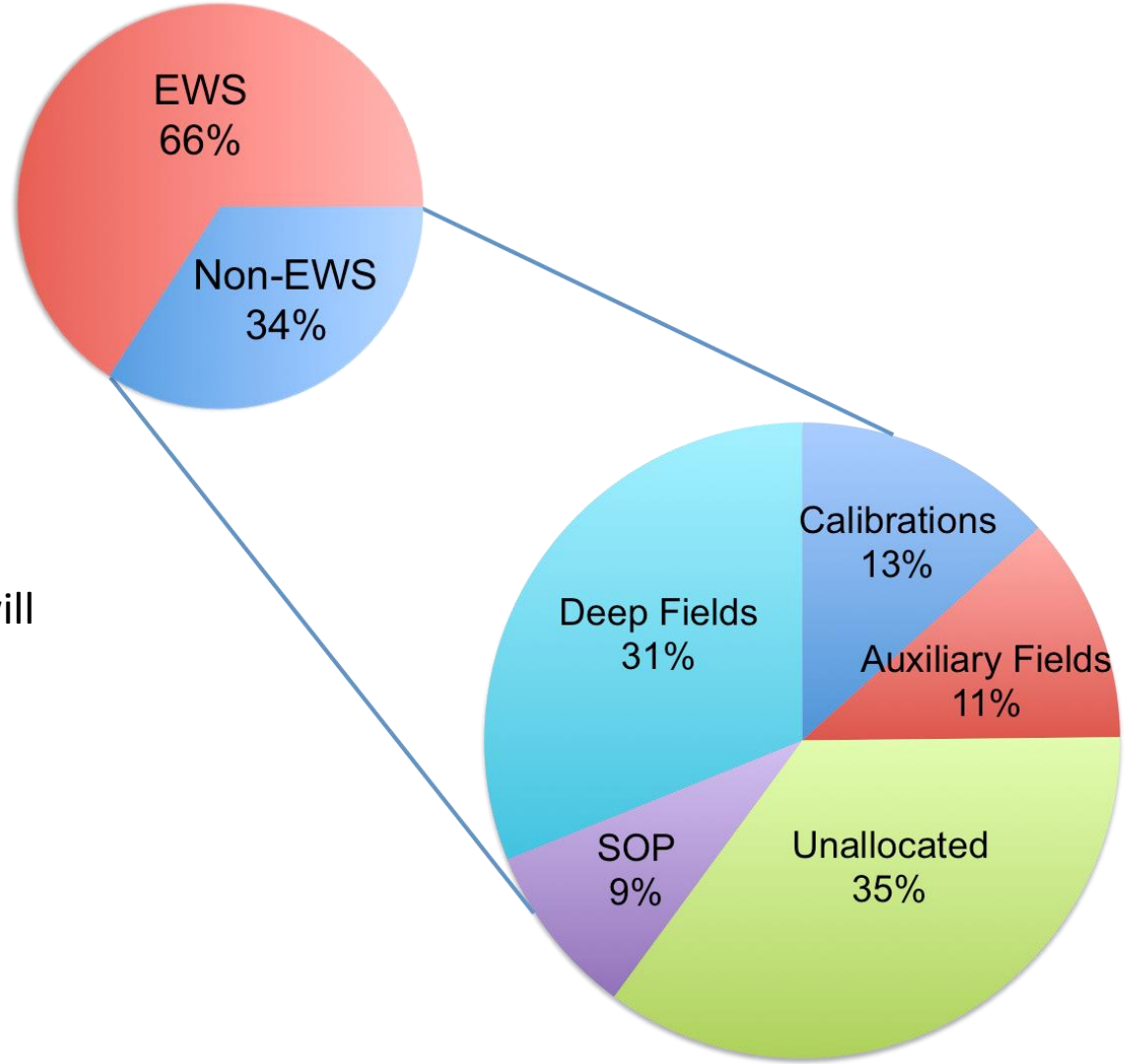
Shape measurements of ~1.5 billion galaxies

Nominal Euclid Survey Exptimes

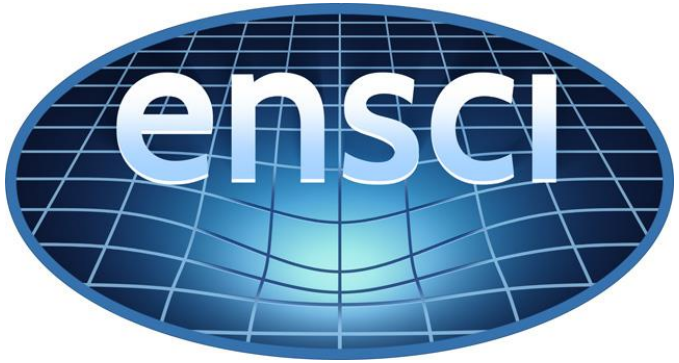


Euclid Wide Survey (EWS) and Other Euclid Surveys

- ~10% unallocated time
- Mostly later in mission
- ESA Euclid Science Team will solicit ideas for this time



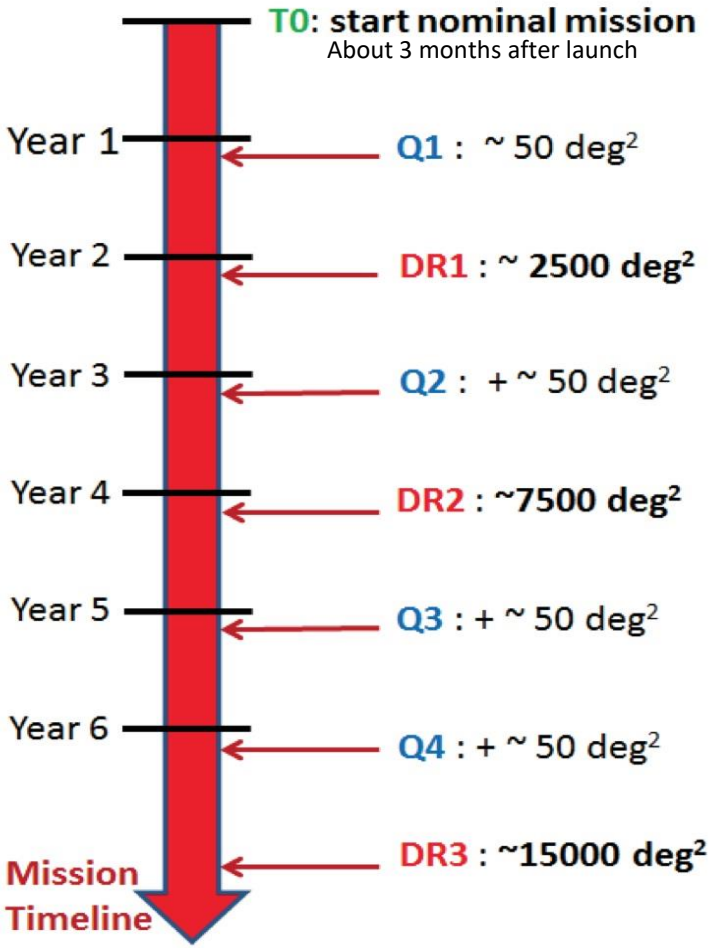
Euclid NASA Science Center at IPAC



- Primary role is supporting US community to do science with Euclid data
- US Node of a distributed (across all Euclid countries) ‘Science Ground Segment’
- Each SGS node is developing specific parts of Euclid pipeline
- ENSCI role is centered on US expertise and NIR detectors (will provide lessons learned to Roman)

Euclid Data Releases

- Data will be public within about 2 years of acquisition
  - ESA will serve public Euclid data through the Euclid Science Archive System
  - The same data (or a subset) will also be available at the NASA/IPAC Infrared Science Archive (IRSA)
  - ENSCI is working with IRSA on archive design
- Euclid will be “big data”
  - Petabyte-scale data products acquired from spacecraft
  - Significant ground-based supporting optical imaging data (release policy is TBD)
- Expect a flood of proposals after first public data release
  - Spitzer and WISE were each ~40% of ADAP in their first year



ENSCI and the US Community

- Web presence
  - Help desk (ensci-support@ipac.caltech.edu)
  - Documents and tutorials
- Support for US Science Teams
  - Meetings, telecons,
  - developer advice; calibration docs/files
- Contact with archival community
  - Conferences/AAS and Workshops
  - Push info to community: newsletters, AAS bulletin, social media, etc.
  - User Panel (starting 1 year before launch)
- Support US research with Euclid
  - Documents
  - Data tools
  - Work with IRSA

- ENSCI support prioritizes US users but is open to all;
  - European researchers will have access to mission knowledge from national centers