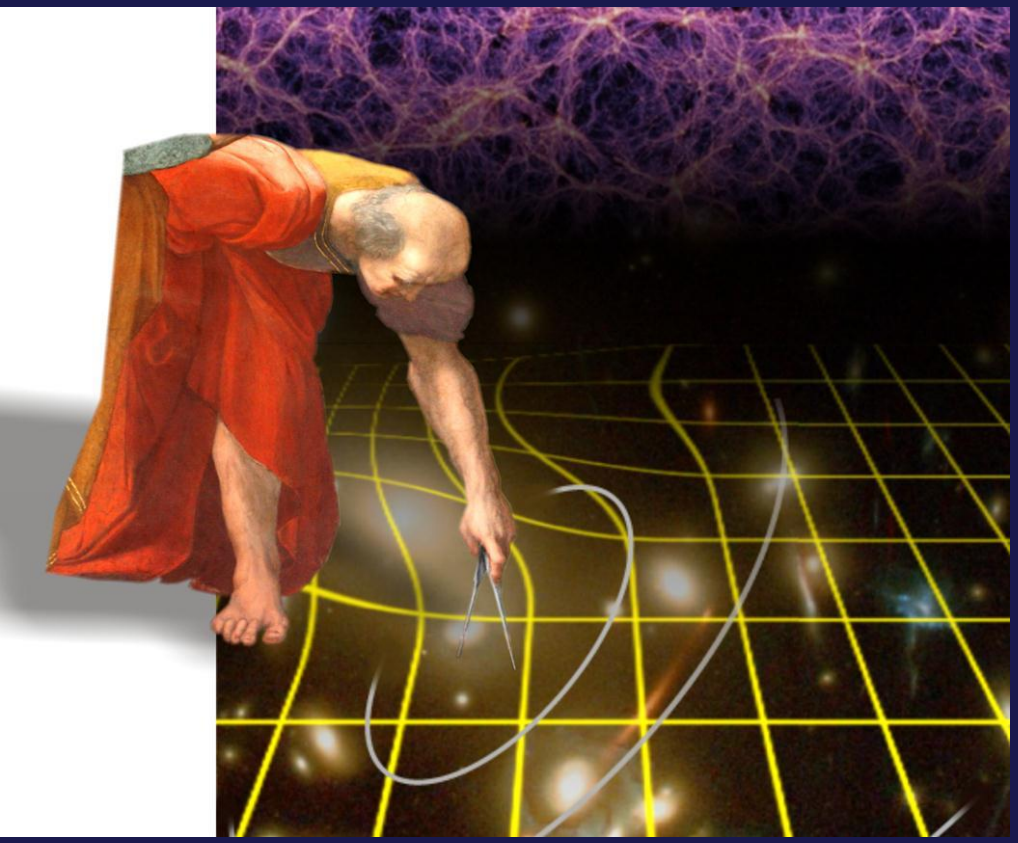


Status on Reference Survey

J. Amiaux

CEA / SAp

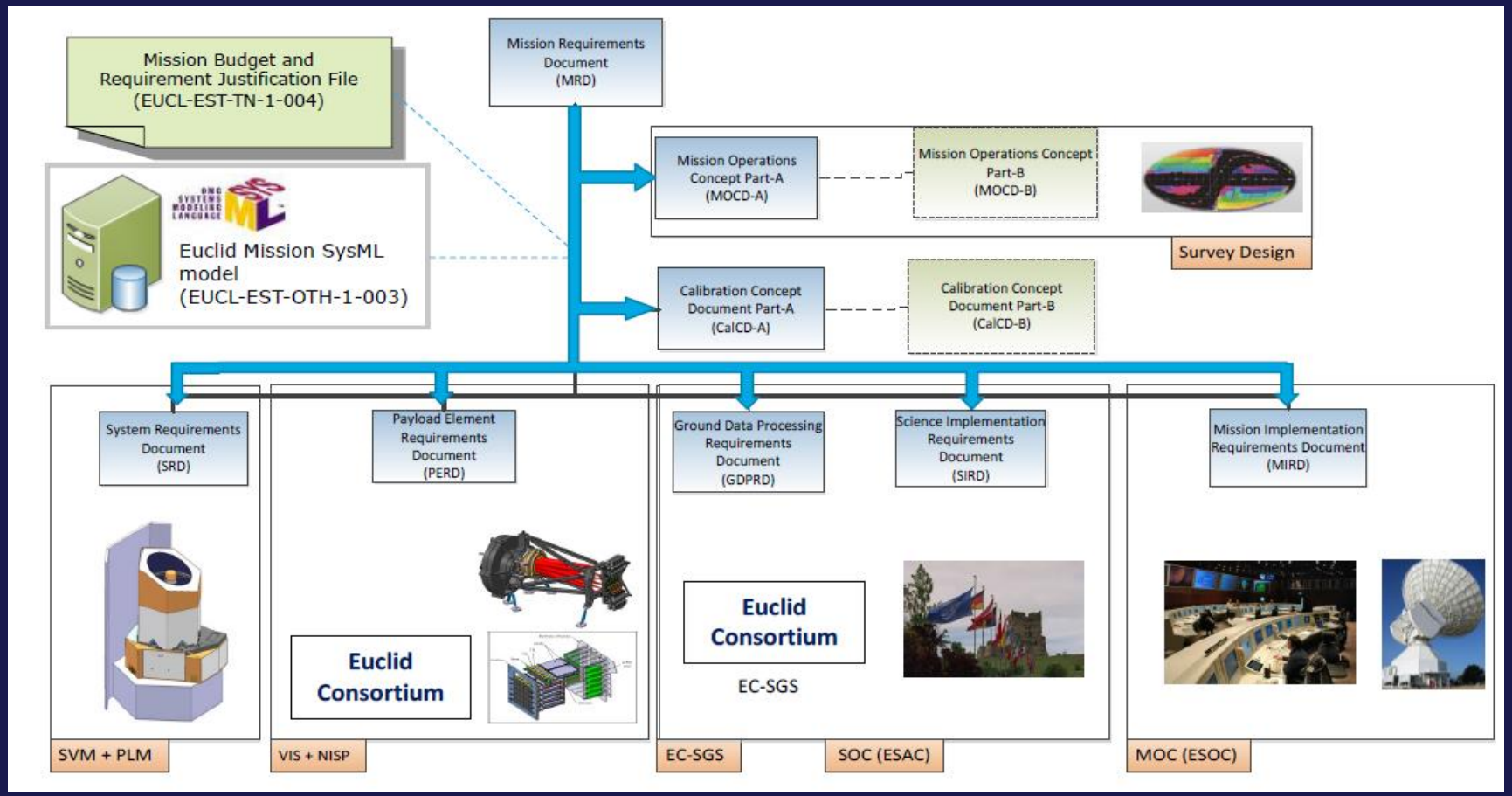
On behalf od the Survey WG

Mission Requirement Review

Euclid Consortium

On-going process at ESA to review the requirement at

- Mission System Level (MRR)
- Spacecraft Level (MRR)



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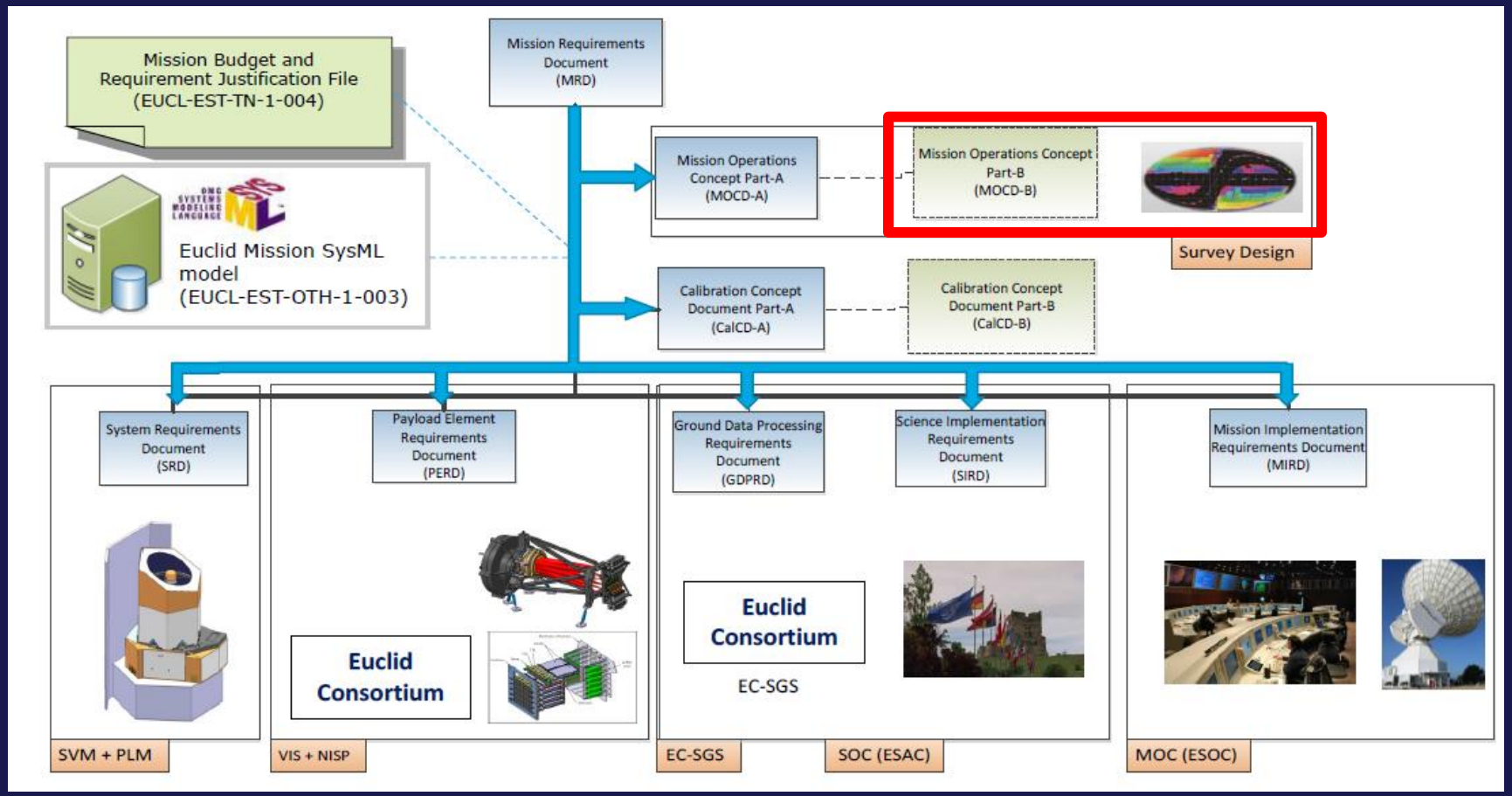

As part of the CalCD part A and MOCD part A justification:

- update of the reference survey MOCD part B

Need for update

- Latest version dated november 2012, in the frame of validation of prime ITT inputs.

Since:

1. Update of the calibration requirements and implementation CalCD part B issue 2.0 april 2013
2. Selection of prime and update of the MOCD part A applicable to the survey.

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Since:

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2. **Selection of prime and update of the MOCD part A applicable to the survey.**

MOCD part A reconciliation

Euclid Consortium

- **Selection of prime and update of the MOCD part A applicable to the survey.**
- This lead to reconciliation of the MOCD part A and the Spacecraft applicable requirements.
- This exercise provided some improvement capability to survey implementation while maintaning margin at S/C level.

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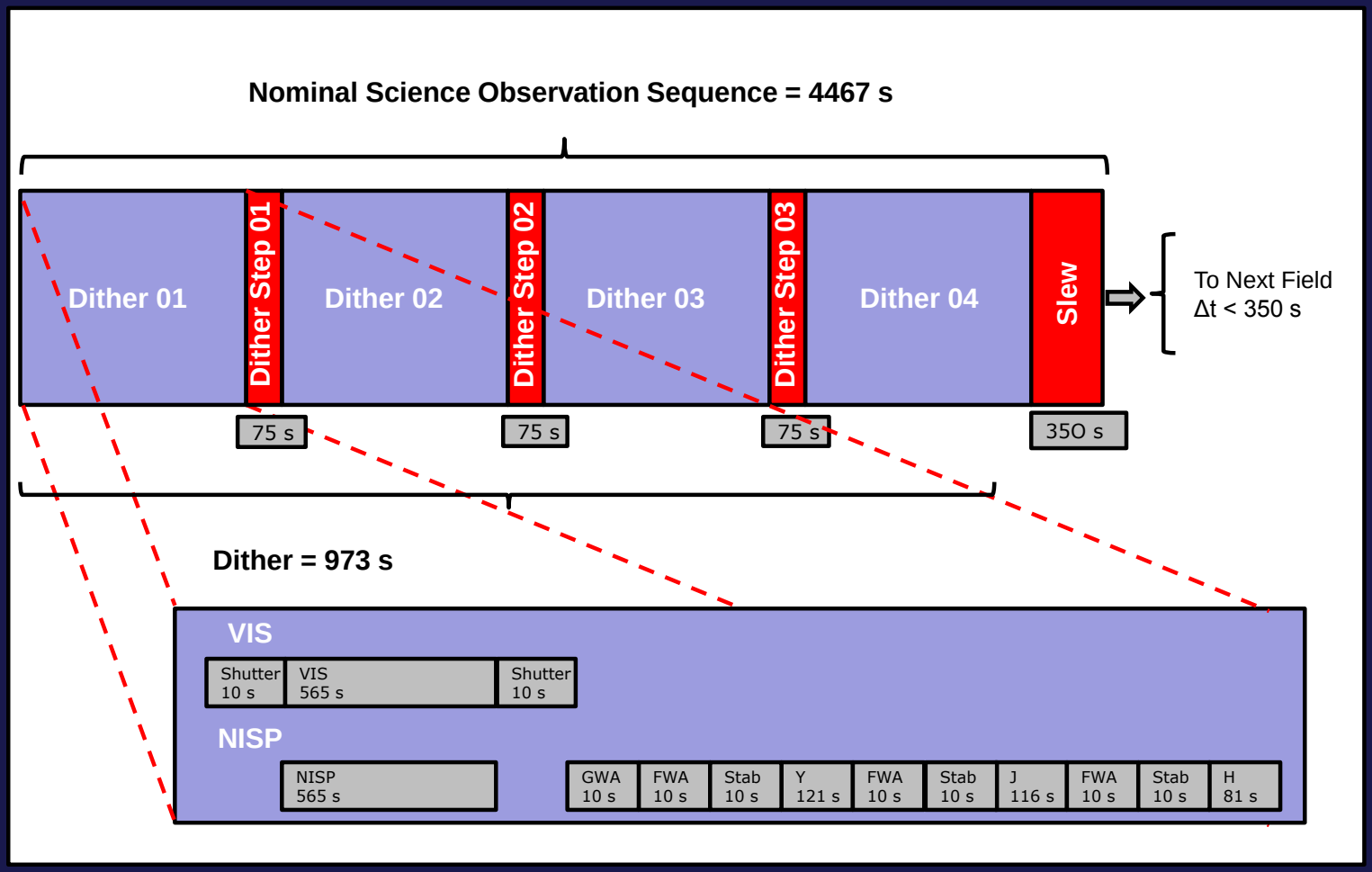
Former reference nominal sequence

Euclid Consortium

- Example of improvement: gain in the assumption on dither and slew time lead to decrease of the reference nominal sequence of observation (with a leverage factor x 45 000…).



Current reference nominal sequence

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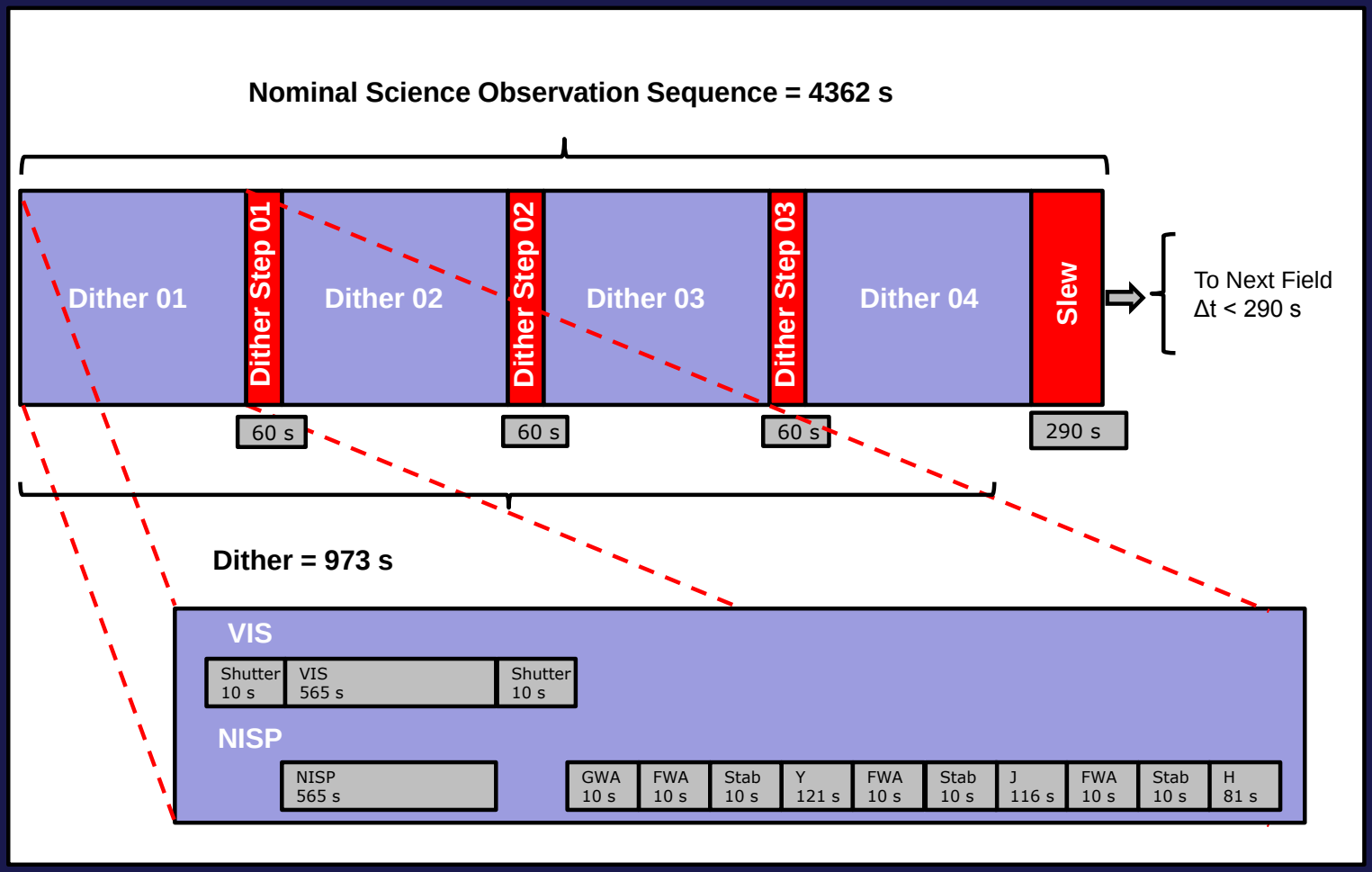
⇔ **2 months of survey (or more ~450 deg²)**



Calibration part B update

- Thorough exercise to define and justify the minimum set of calibration derived from the top-level science requirements.
- This approach of justification is used to try to contain the level of calibration to the need derived from science objectives of the mission.

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- **Calibration = 10 % of Survey duration / Calibration + Deep = 15 % of Survey duration**

key contributors calibration + deep		% of survey duration
P-R-NP-CAL-F-002: NISP-P Survey Self-Calibration	39 days	1,8 %
P-R-NP-CAL-F-005: NISP-P Absolute Standards Observations	4,7 days	0,3 %
P-R-NP-CAL-F-010: NISP-P Photo-z Training Sample	29,95 days	1,4 %
P-R-NS-CAL-F-001: NISP-S Absolute Standards Observations	22,6 days	1,1 %
P-R-NS-CAL-F-003: NISP-S Planetary Nebula Observations	3,25 days	0,2 %
P-R-NS-CAL-F-004: NISP-S Purity Sample	50 days	2,3 %
P-R-VS-CAL-F-004: VIS PSF Model 1	50 days	2,3 %
P-R-VS-CAL-F-005: VIS Noise Bias Calibration Sample	9,8 days	0,5 %
P-R-VS-CAL-F-006: VIS Color Gradient Observations	8,15 days	0,4 %
P-R-VS-CAL-F-009: VIS Absolute Standards Observations	2 days	0,1 %
Deep Field (additional to calibration)	117 days	5,4 %
Total NISP P	73,65 days	3,4 %
Total NISP S	75,85 days	3,5 %
Total VIS	69,95 days	3,2 %
Additional Deep	117 days	5,4 %
Total	336,45 days	15,5 %

Quite stable since the last year implementation

Calibration part B update

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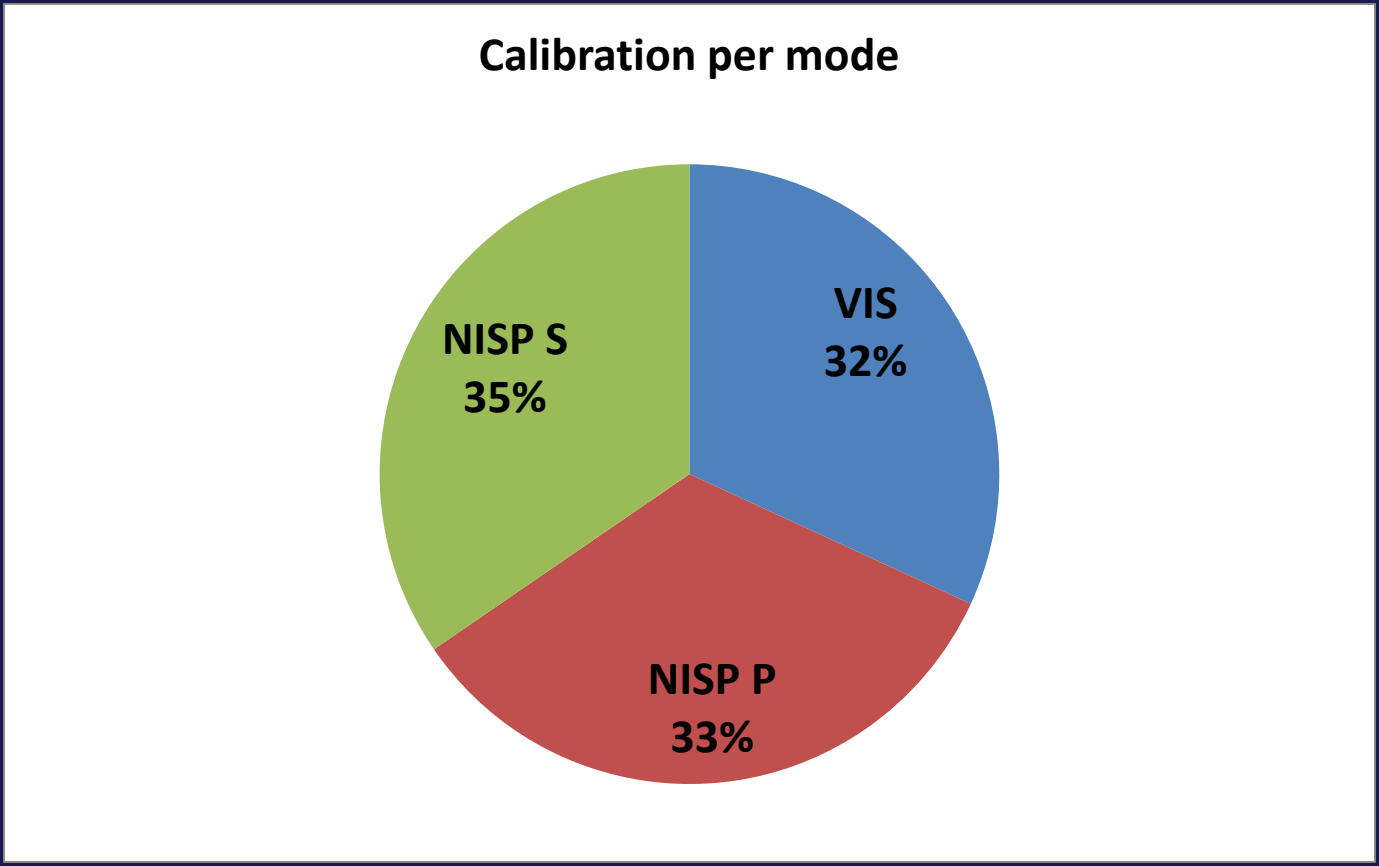
- **Rather Equally distributed between the different modes**



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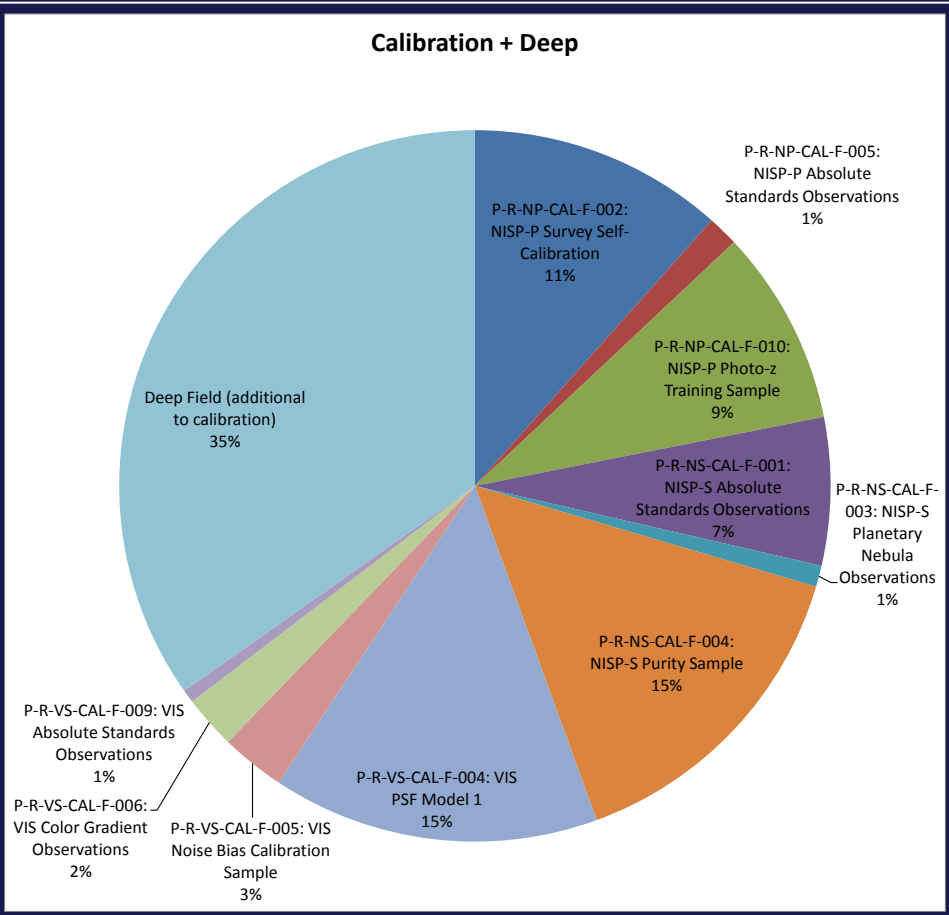
- **Big contributors are today well identified and tracked for optimization exercice**



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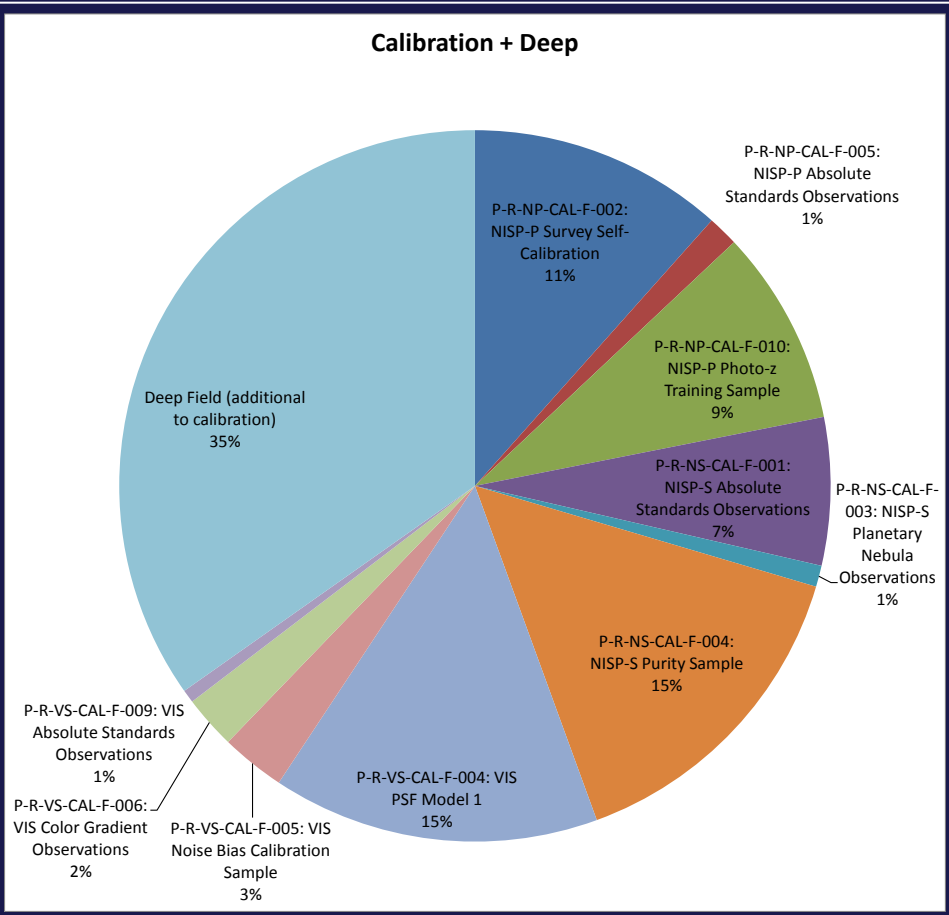
- **Some need to be reviewed: absolute calibrations requirements**

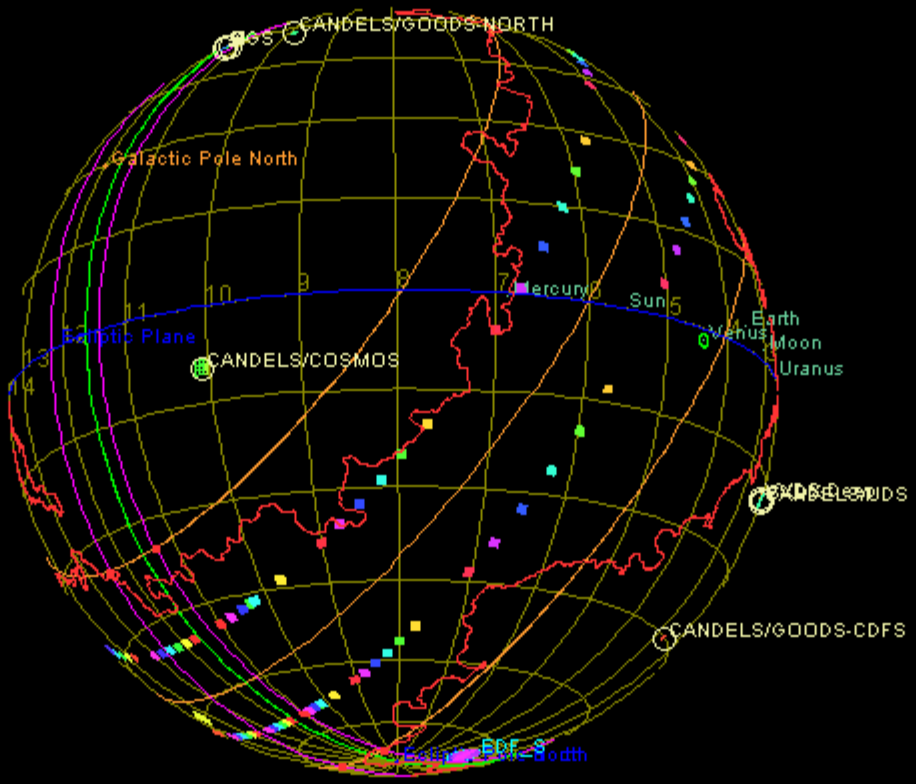


Reference Survey Implementation

- Approach for implementation:
  1. **Implement the Sequence of Calibration**
  2. **Fill-in the remaining time with wide survey nominal repeated sequence**

Calibration Implementation

Euclid Consortium



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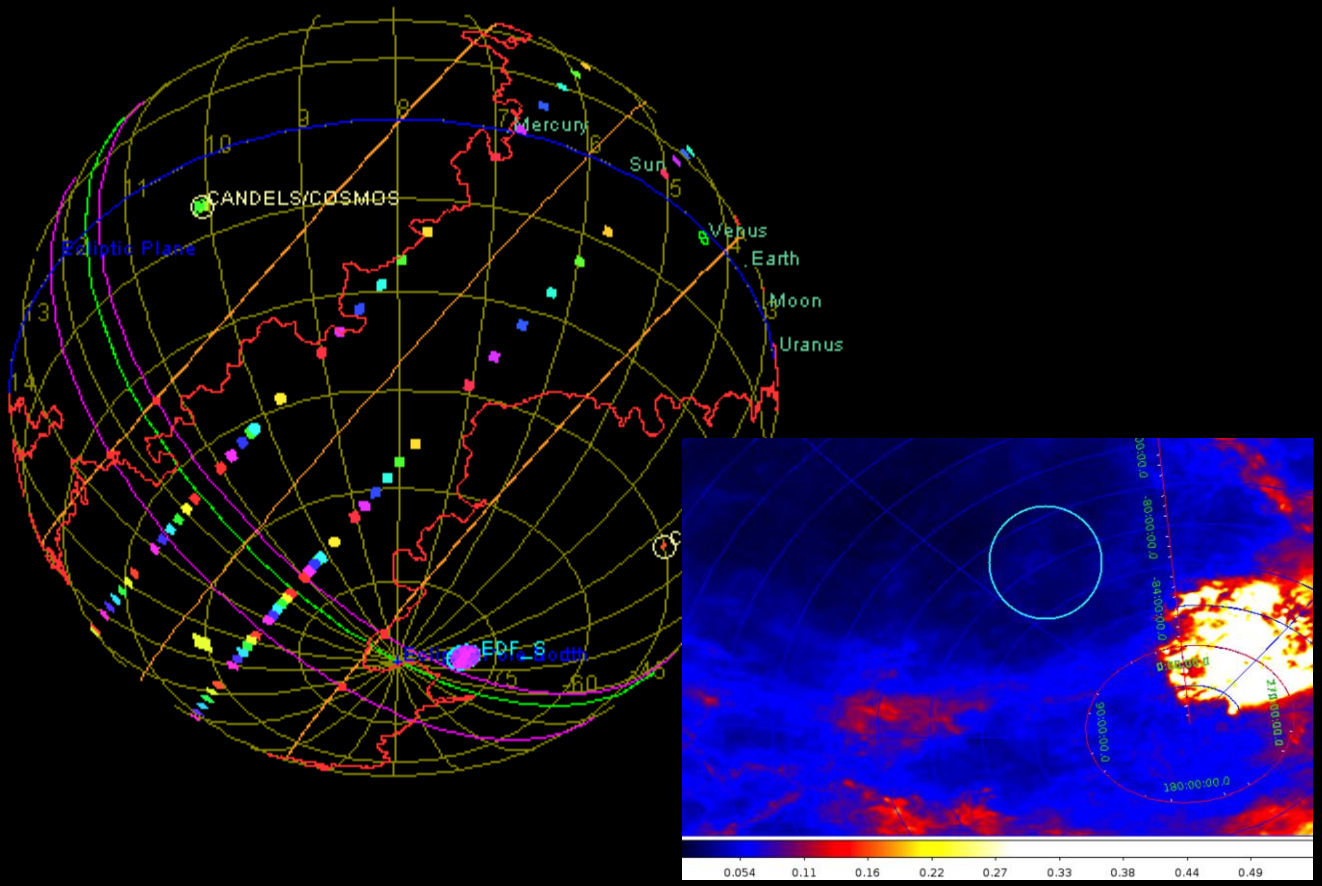

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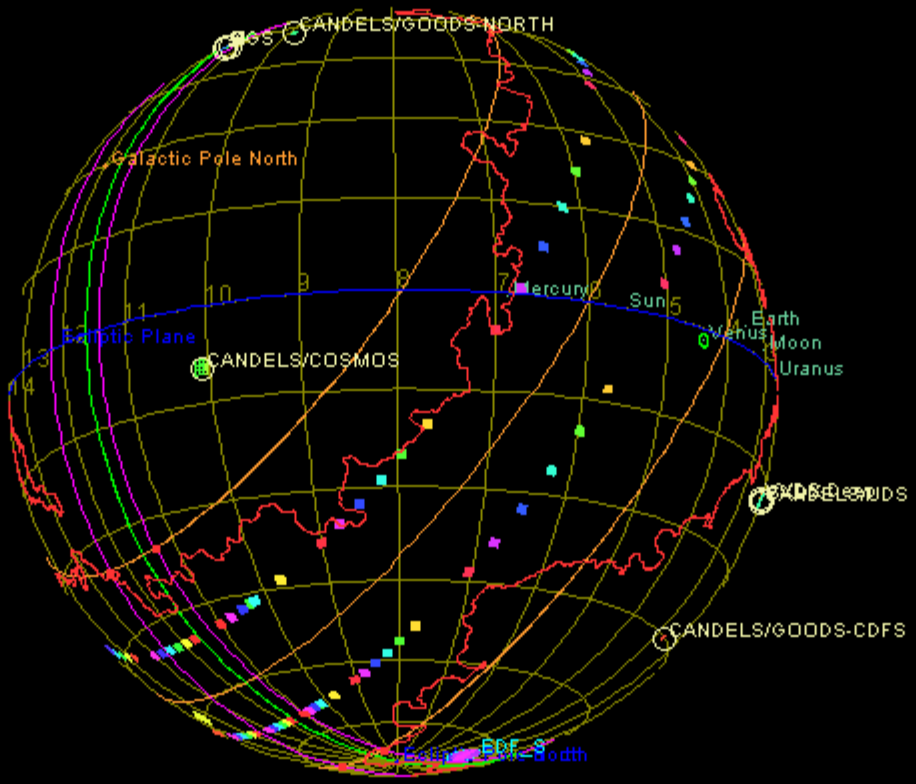

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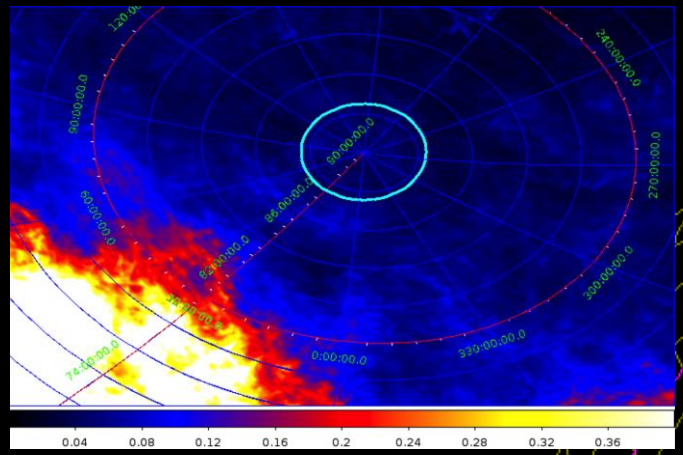
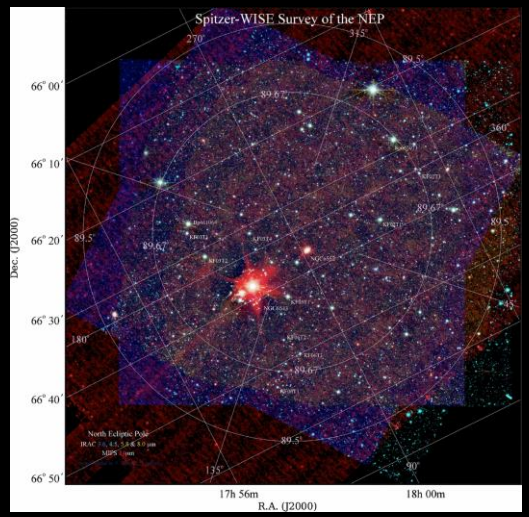
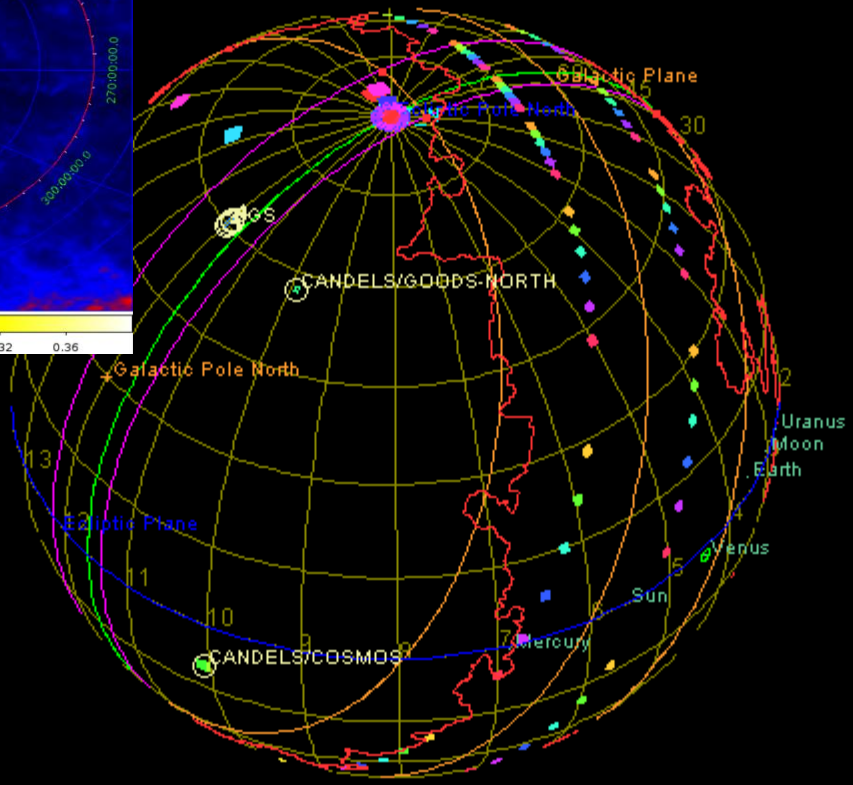
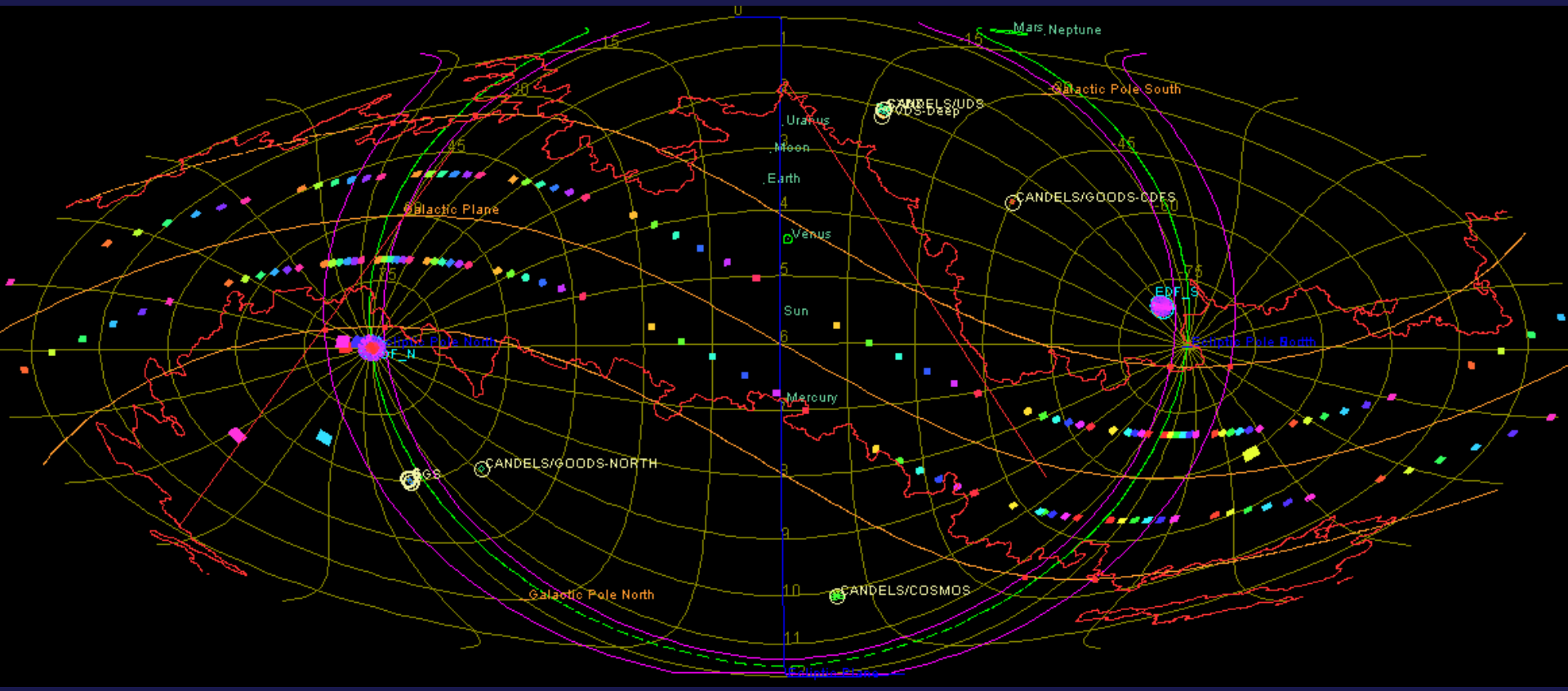






Calibration Implementation

Euclid Consortium



Reference Survey Implementation

Euclid Consortium

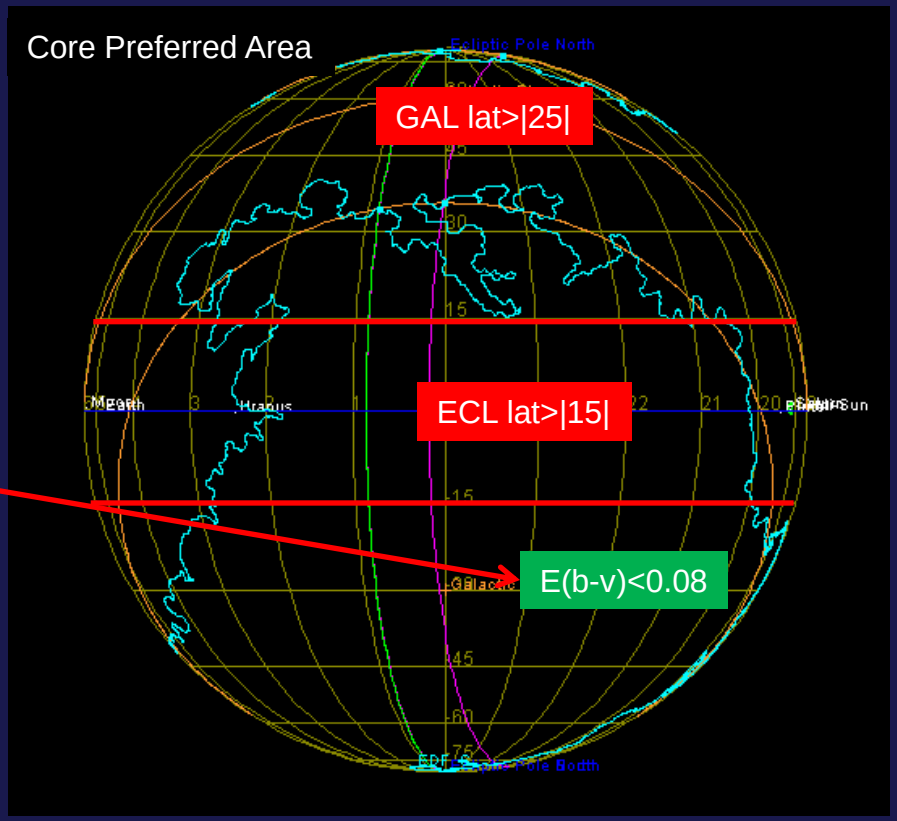
- Approach for implementation:
  1. **Implement the Sequence of Calibration**
  2. **Fill-in the remaining time with wide survey nominal repeated sequence**

Wide Field observations > 0.5 square degrees

Step and Stare mode: 4362 s per fields

Observe « Best Square Degrees » to limit

- Extinction E(b-v)<0.08
- Zodiacal Light ECL lat>|15|
- Star Density GAL lat>|25|



Reference Survey Implementation

Euclid Consortium

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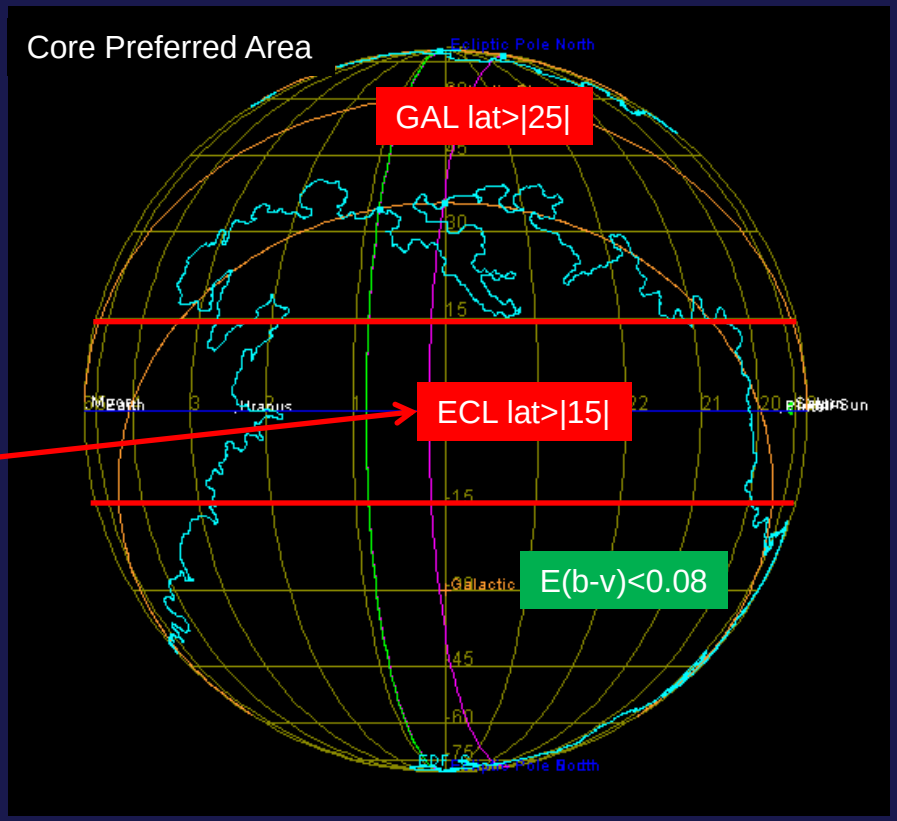

Reference Survey Implementation

Euclid Consortium

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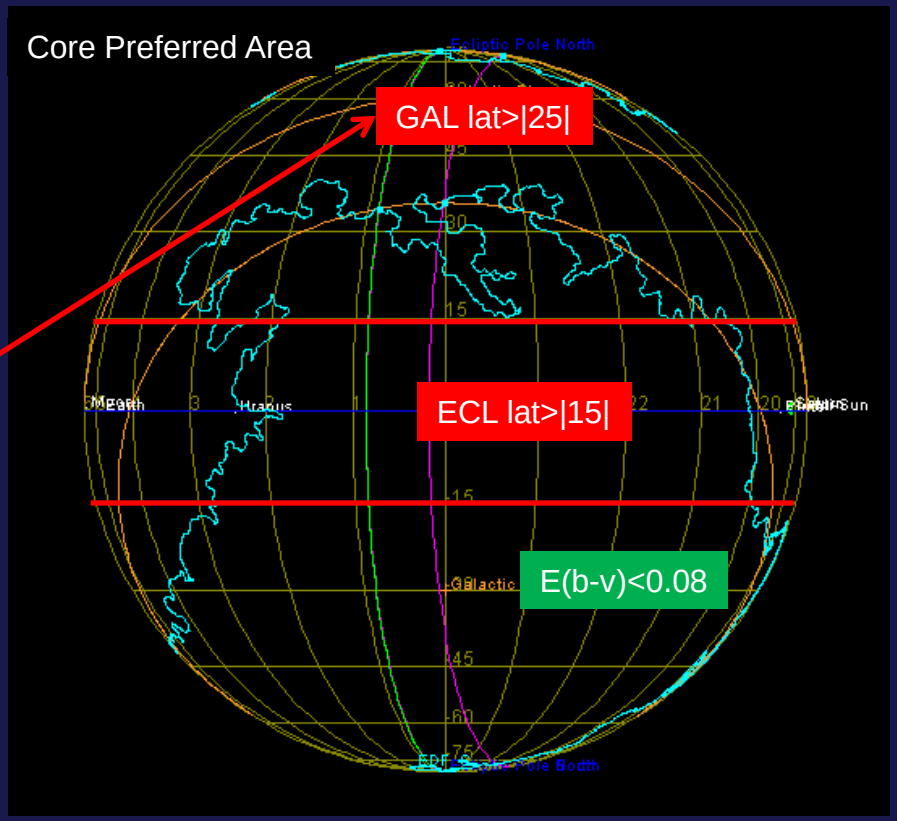

Reference Survey Implementation

Euclid Consortium

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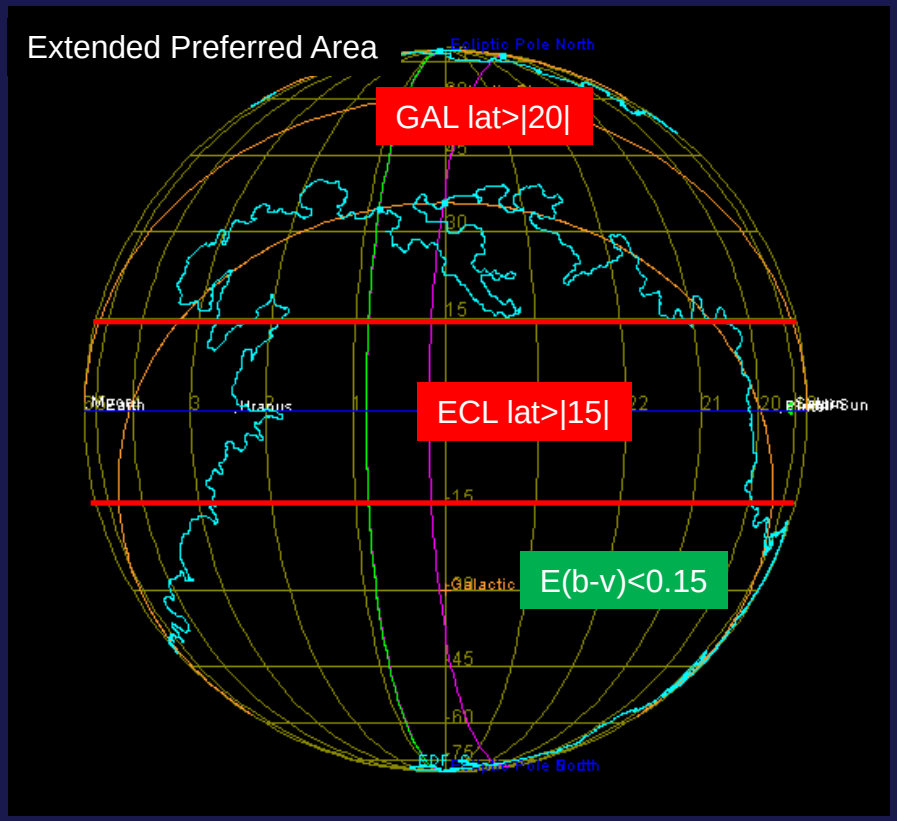
Wide Field observations > 0.5 square degrees

Step and Stare mode: 4362 s per fields

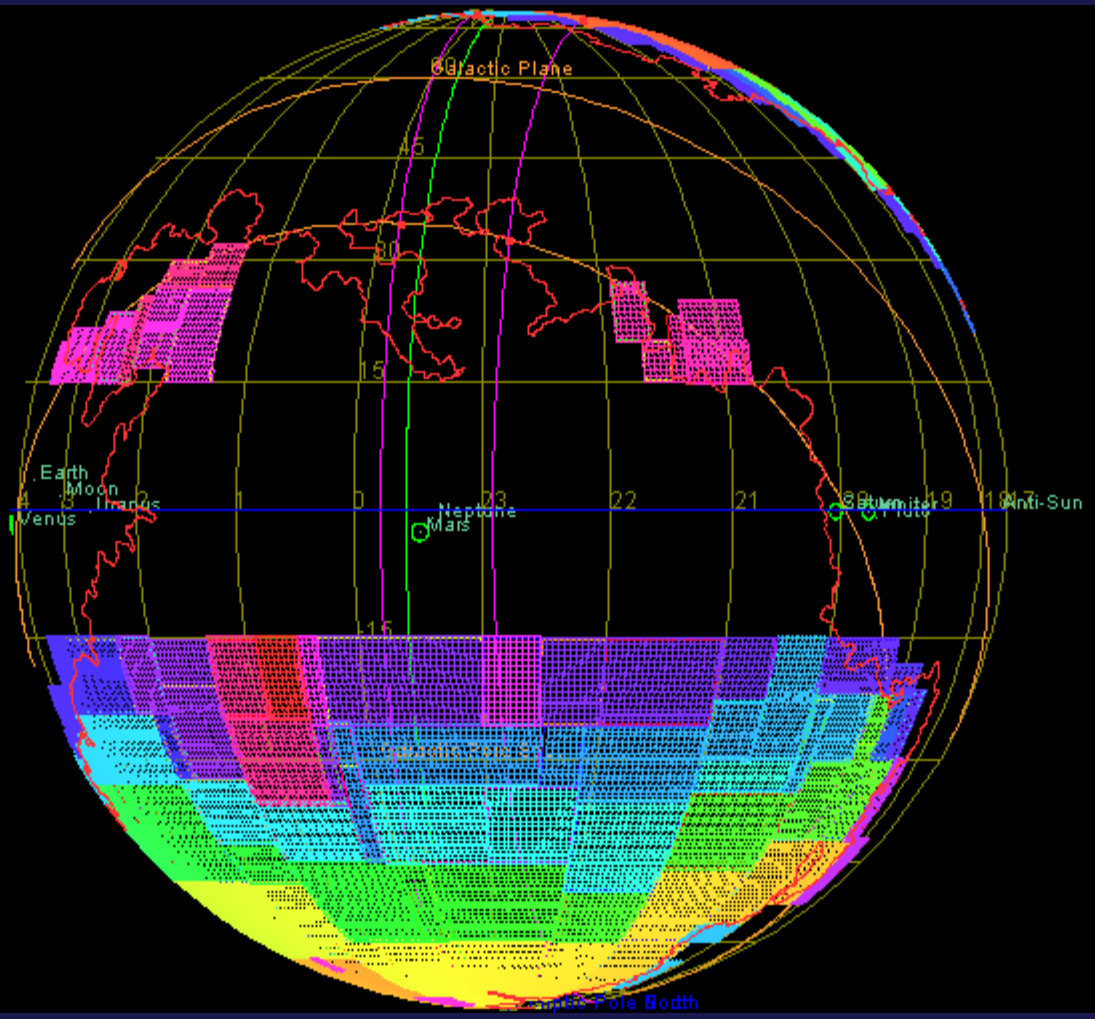
Observe « Best Square Degrees » to limit

- Extinction E(b-v)<0.08 ★
- Zodiacal Light ECL lat>|15| ★
- Star Density GAL lat>|25| ★



Wide Survey Implementation

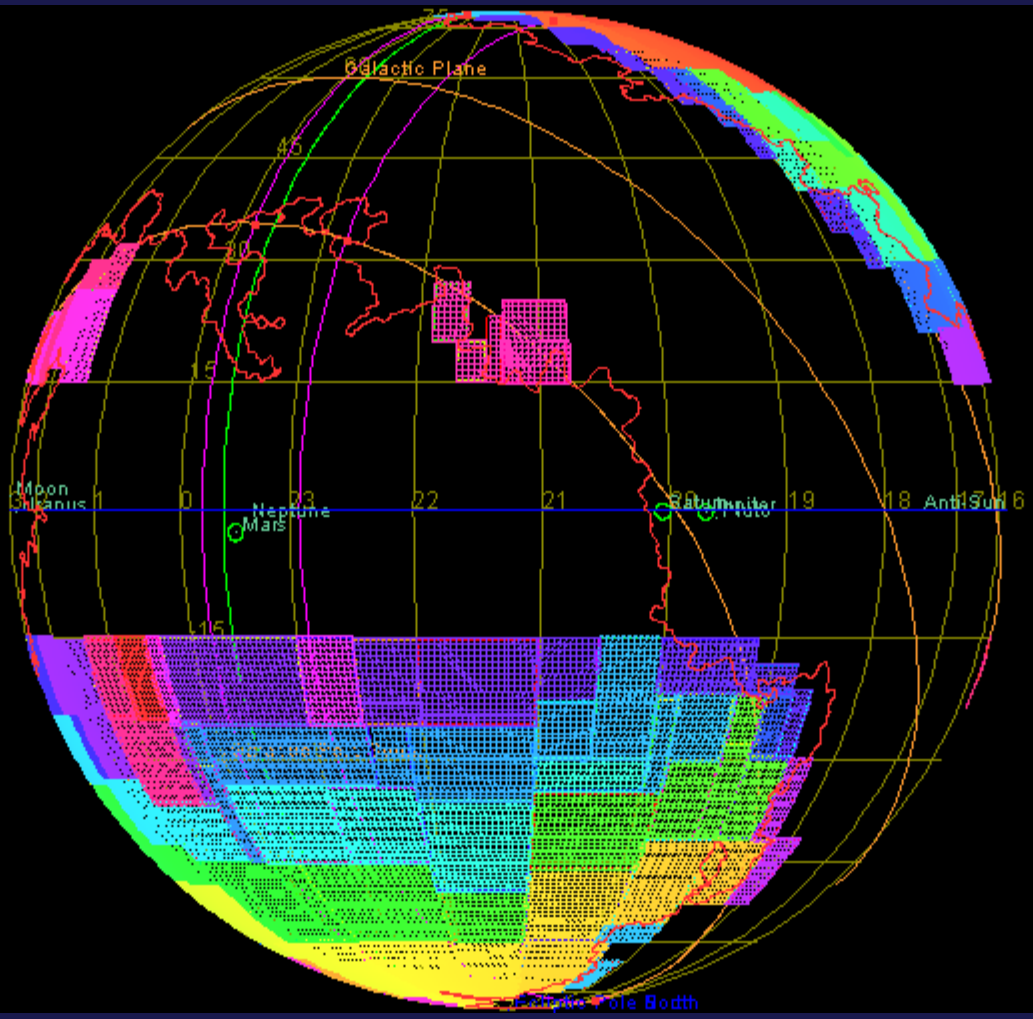
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

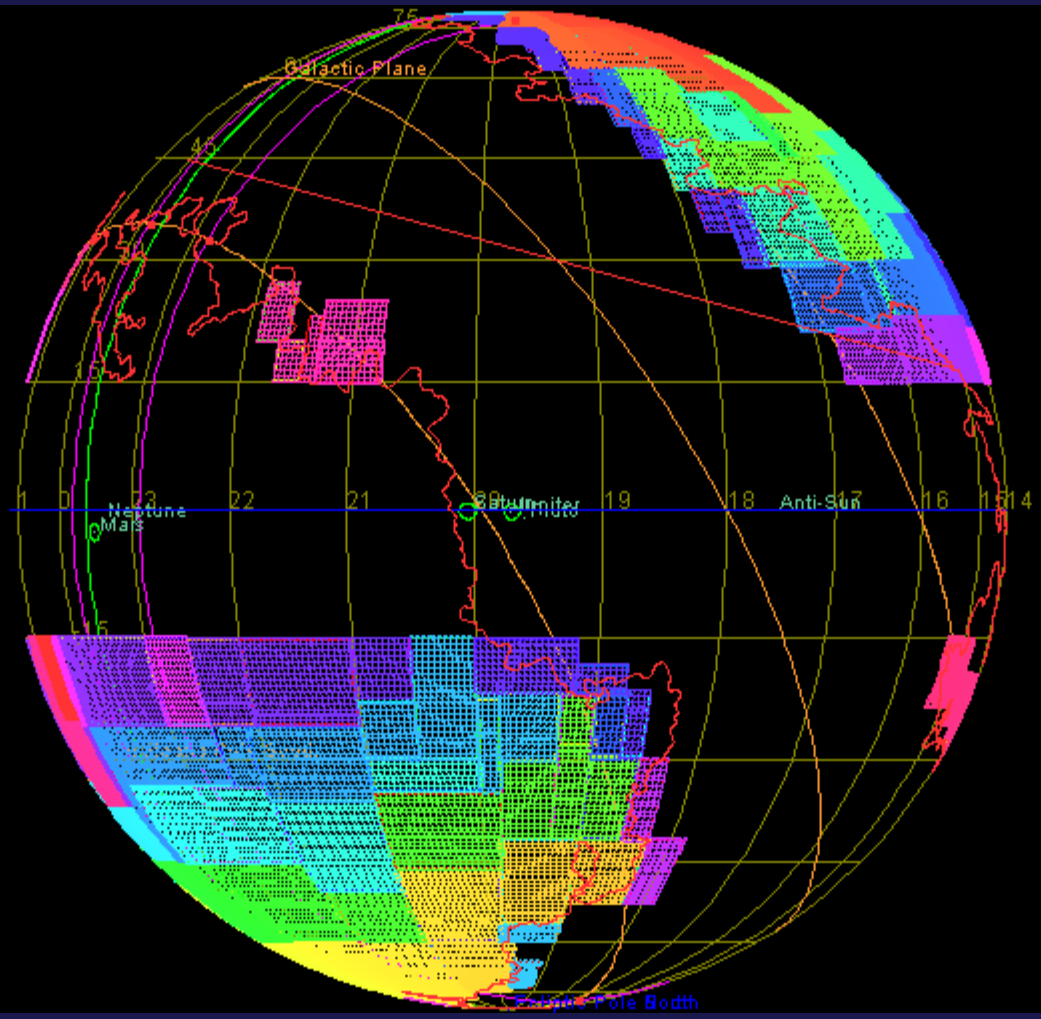
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

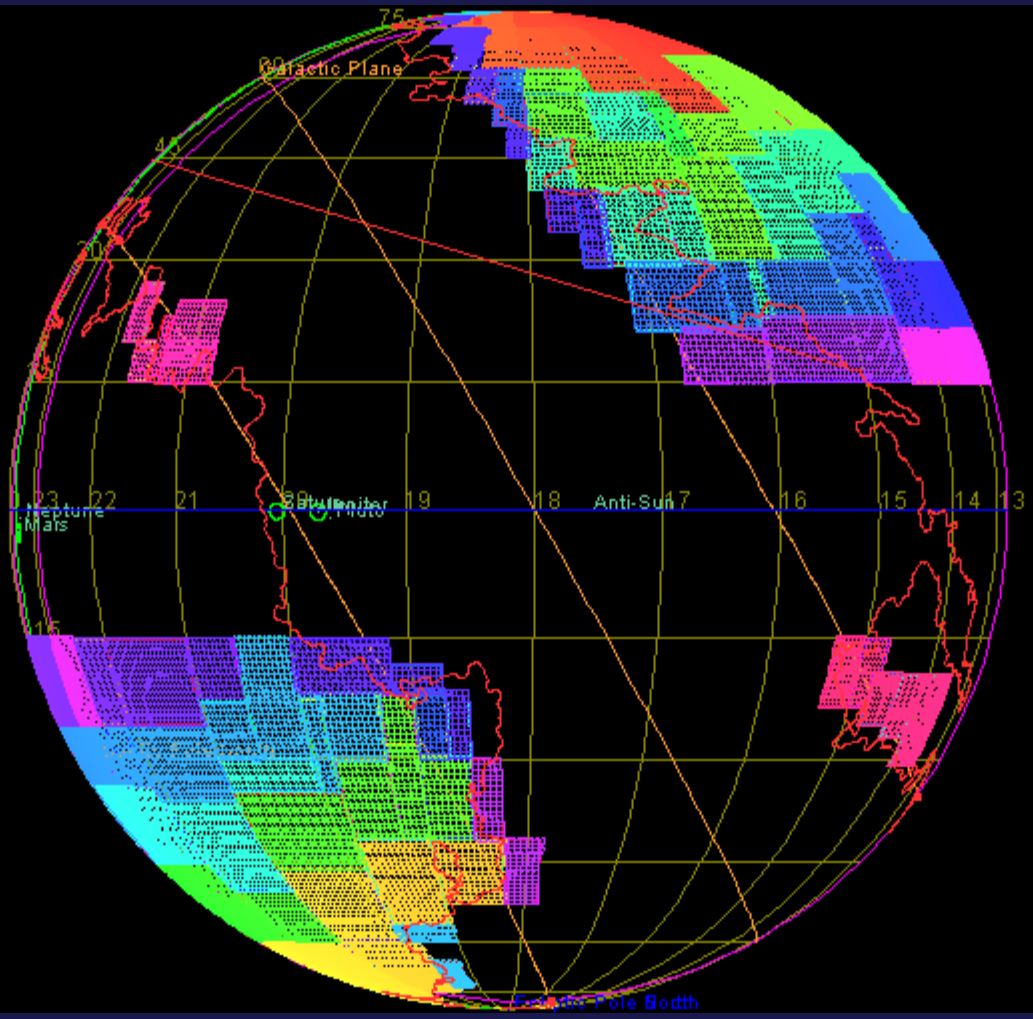
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

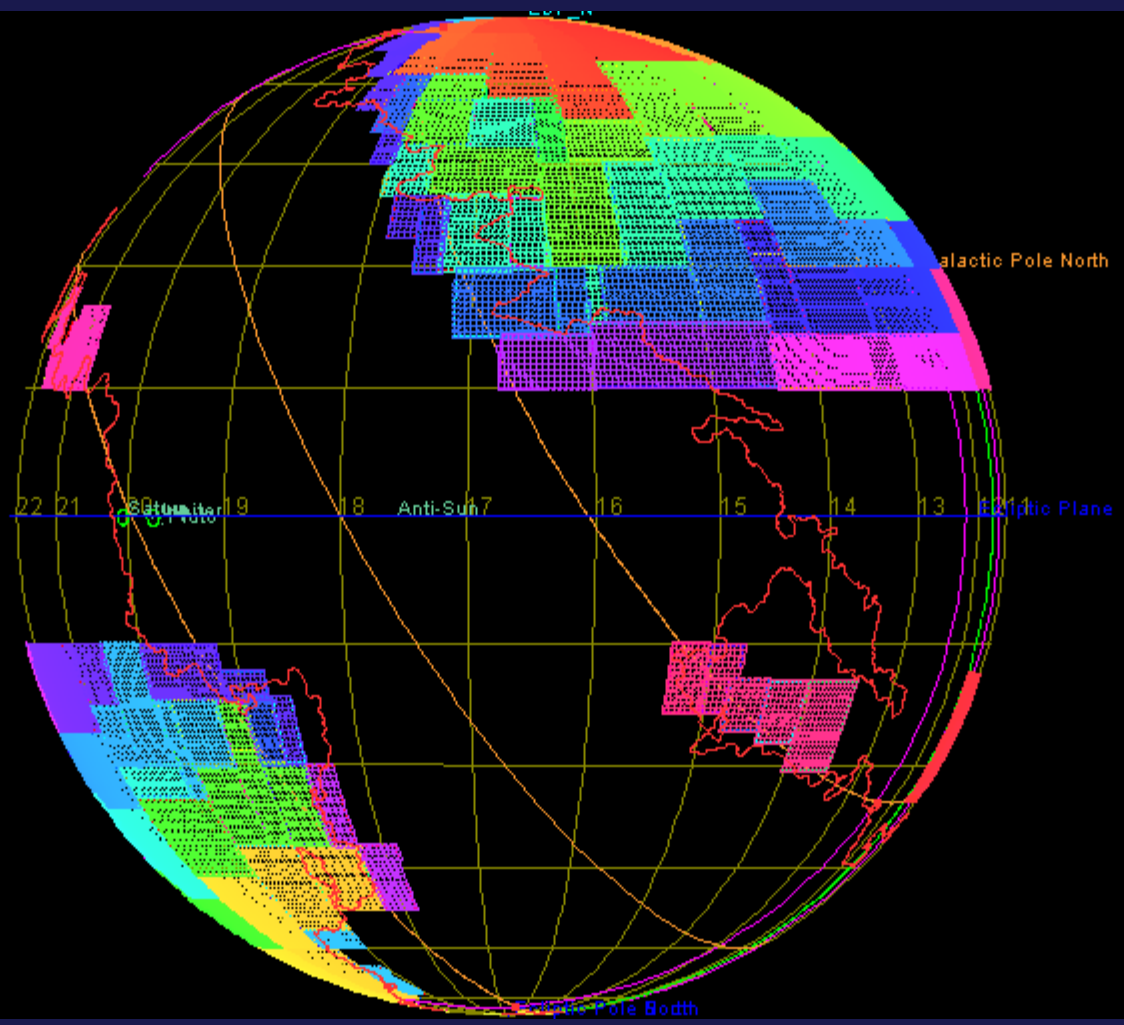
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

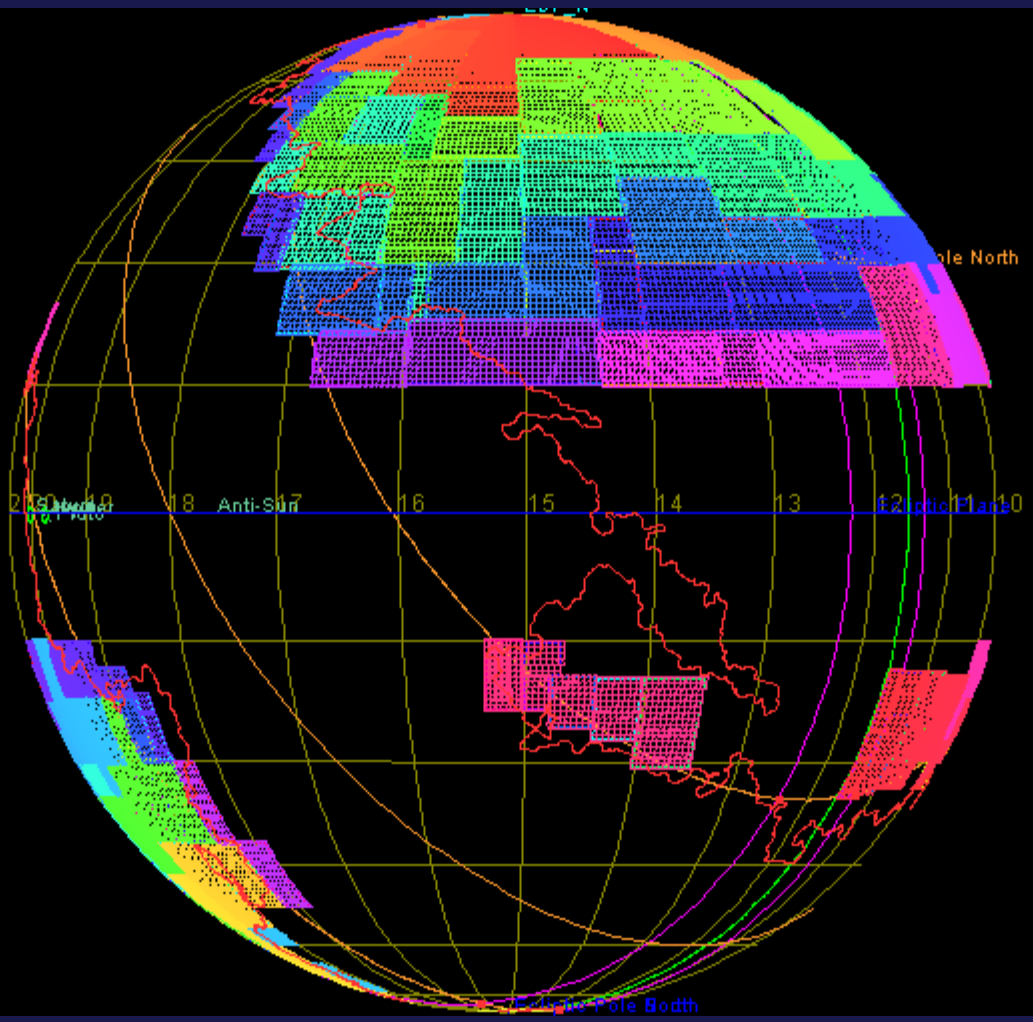
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

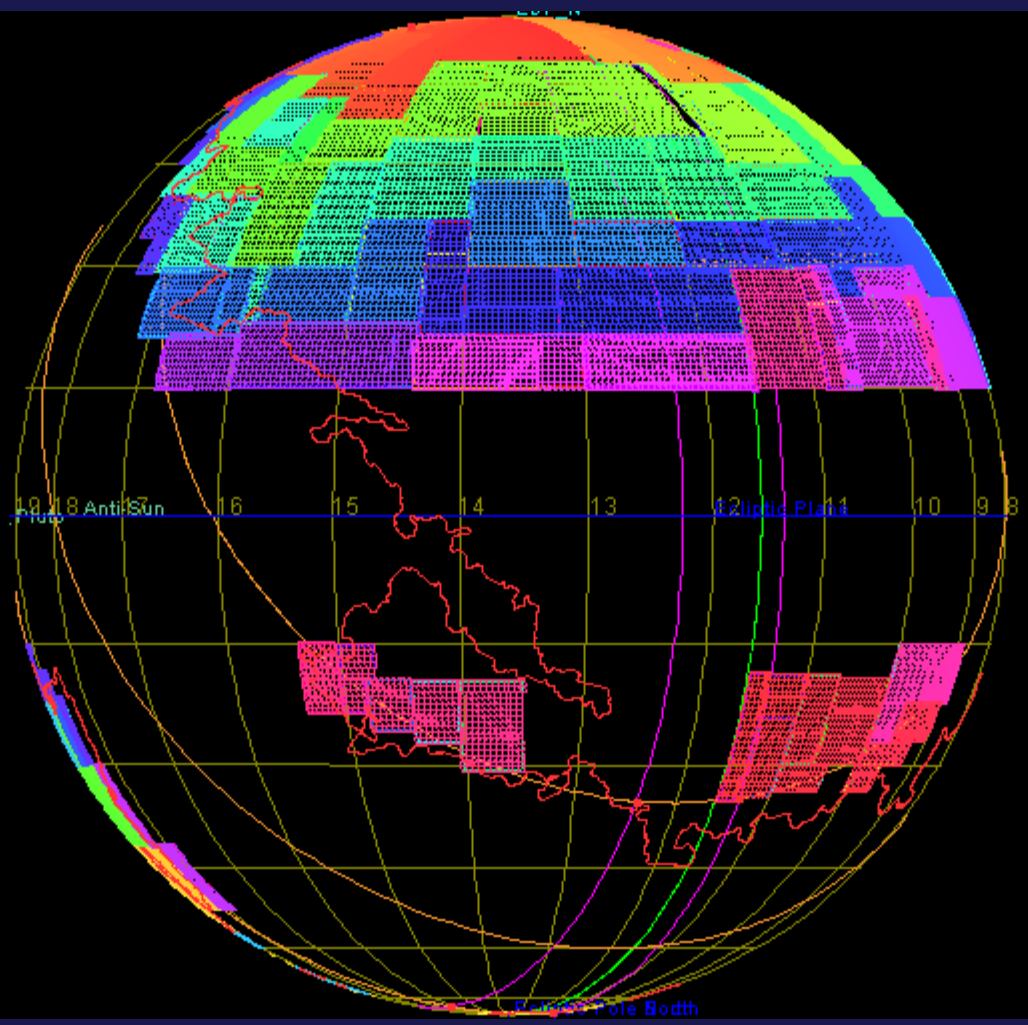
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

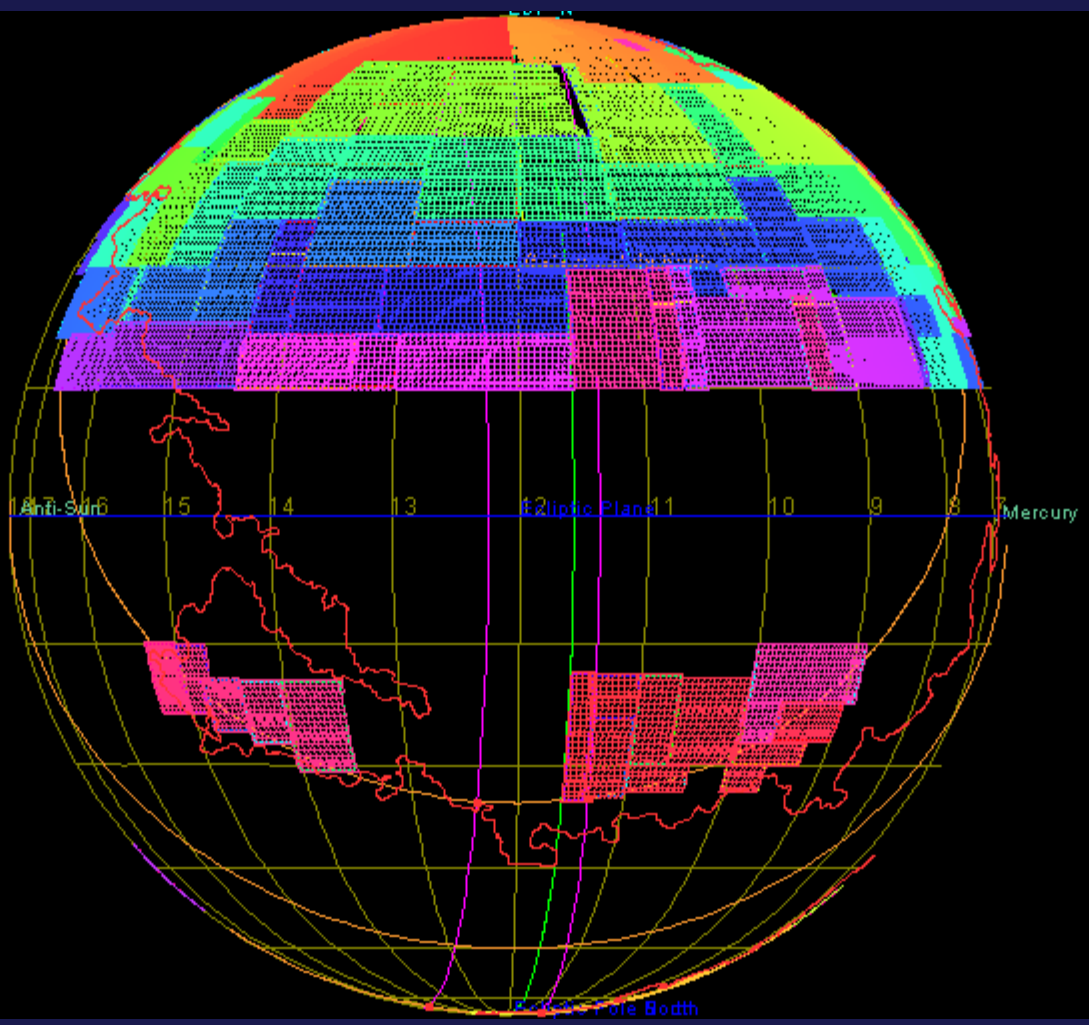
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

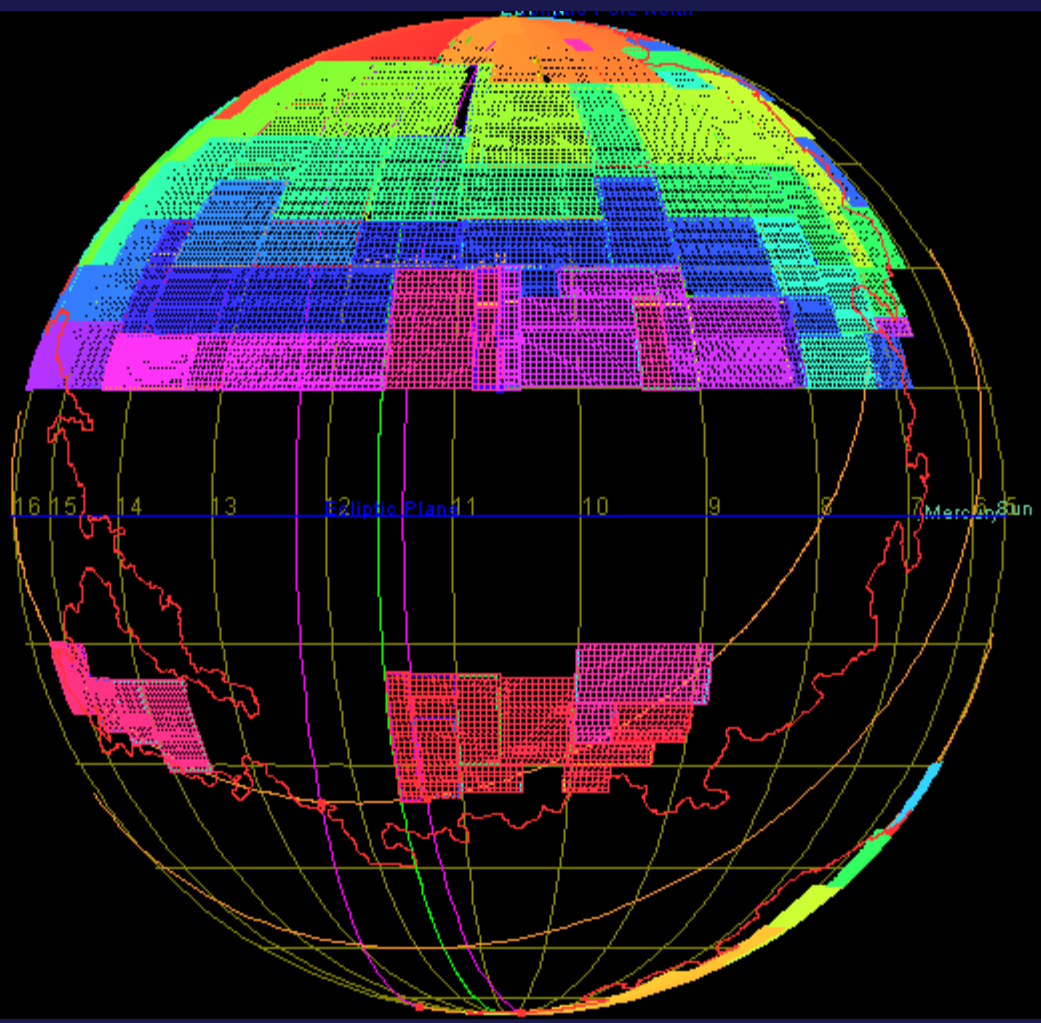
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

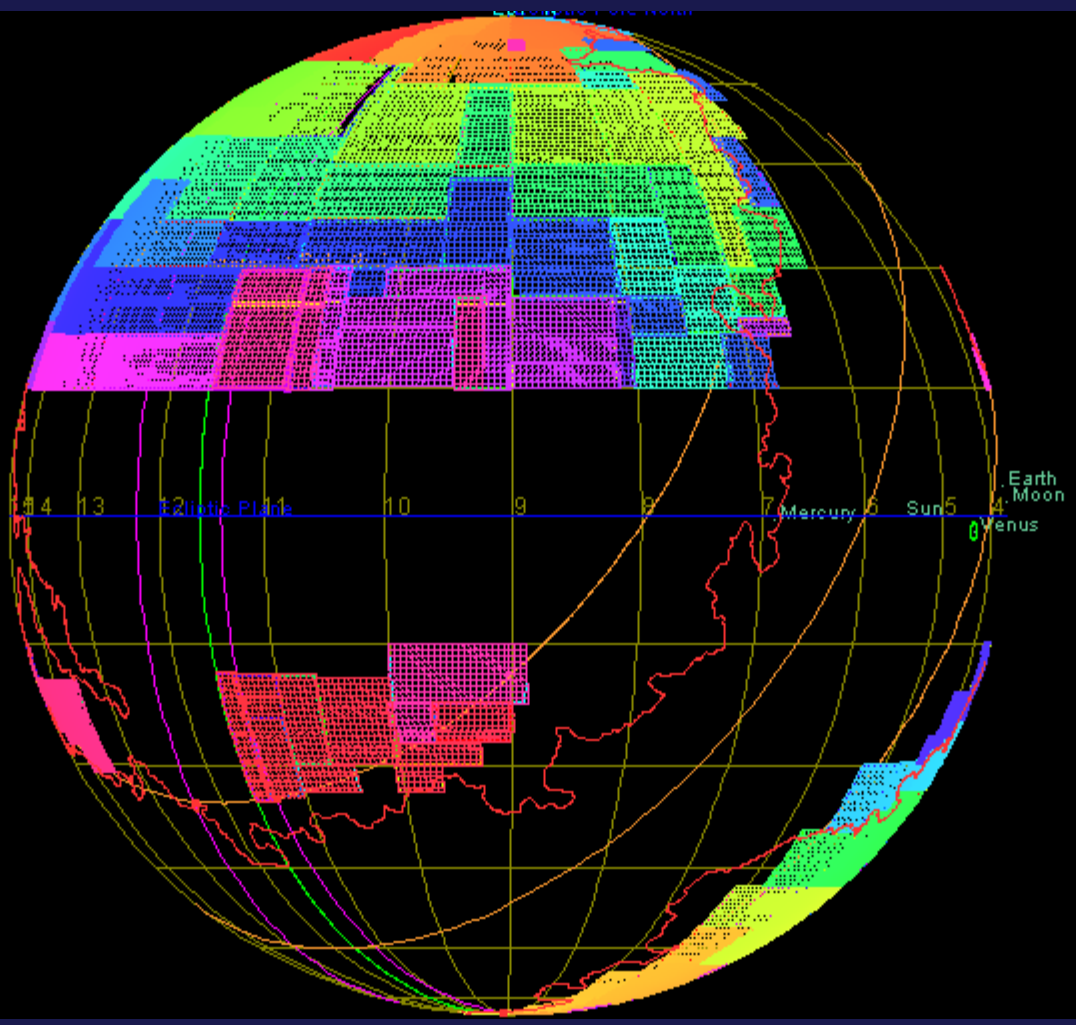
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

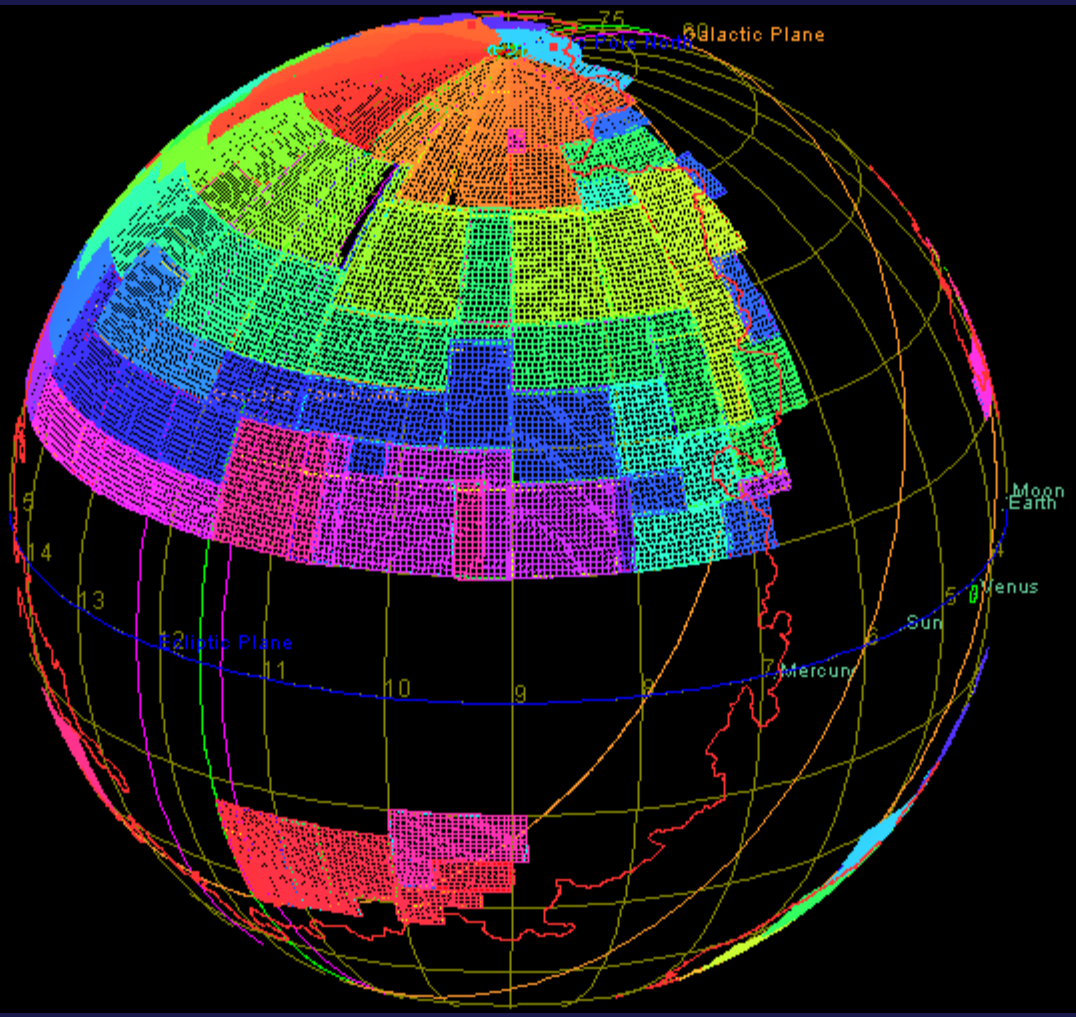
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

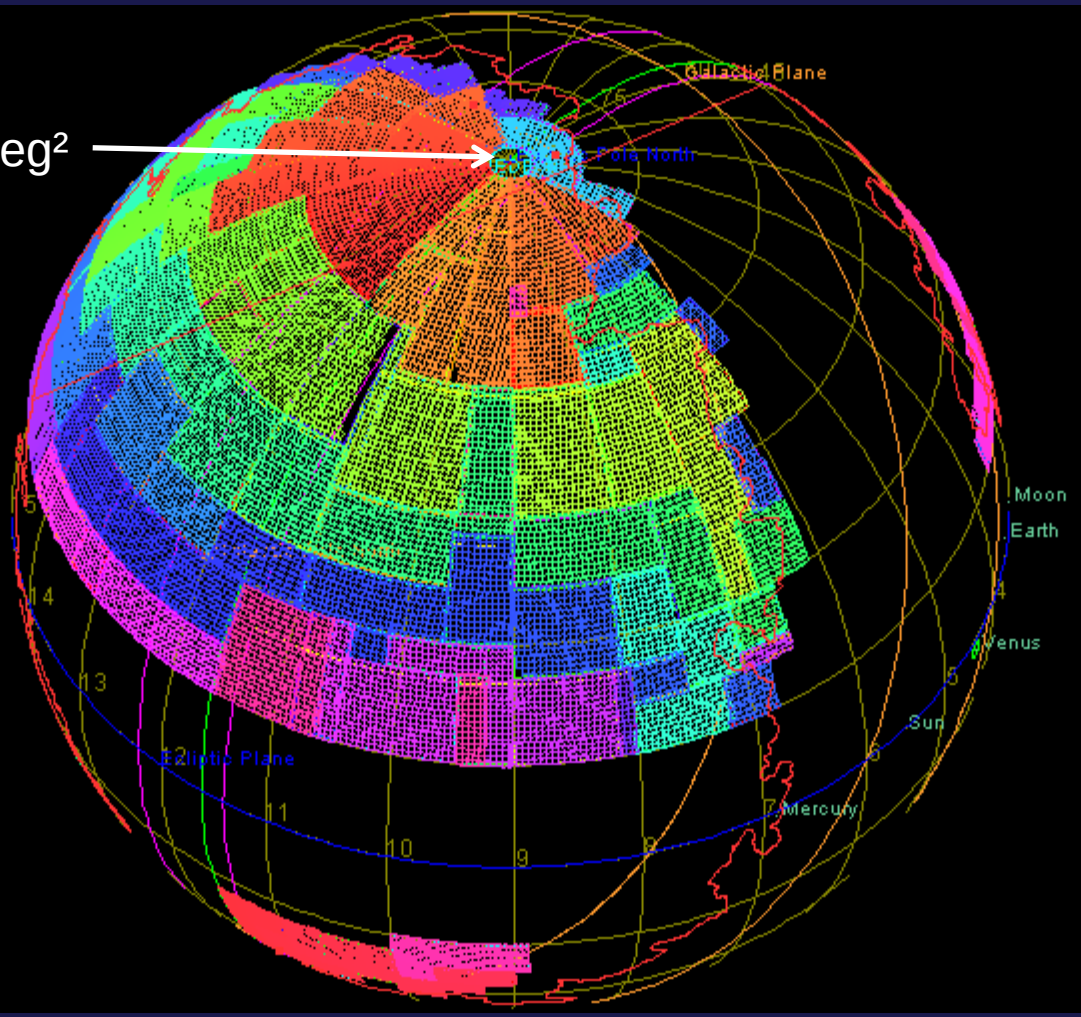
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

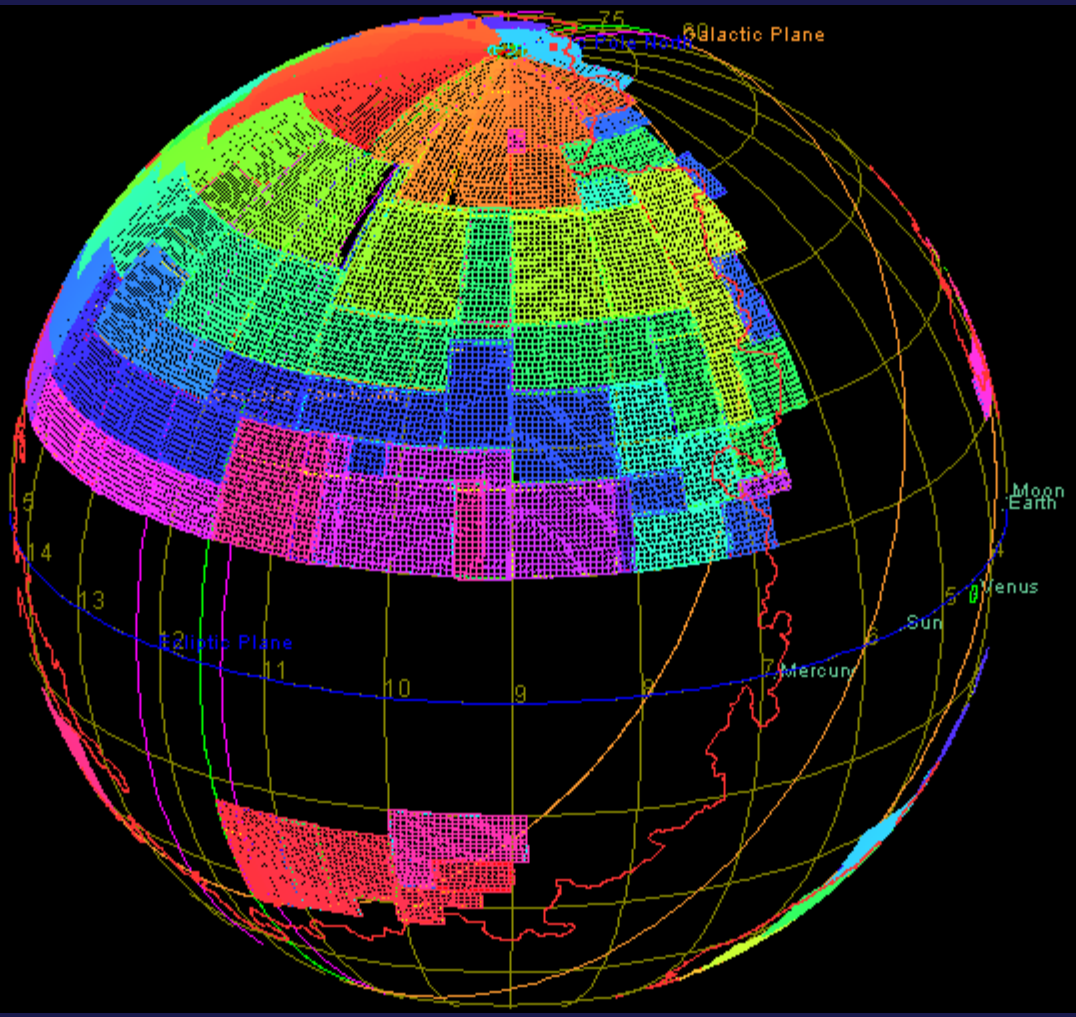
Deep North: 20 deg²



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

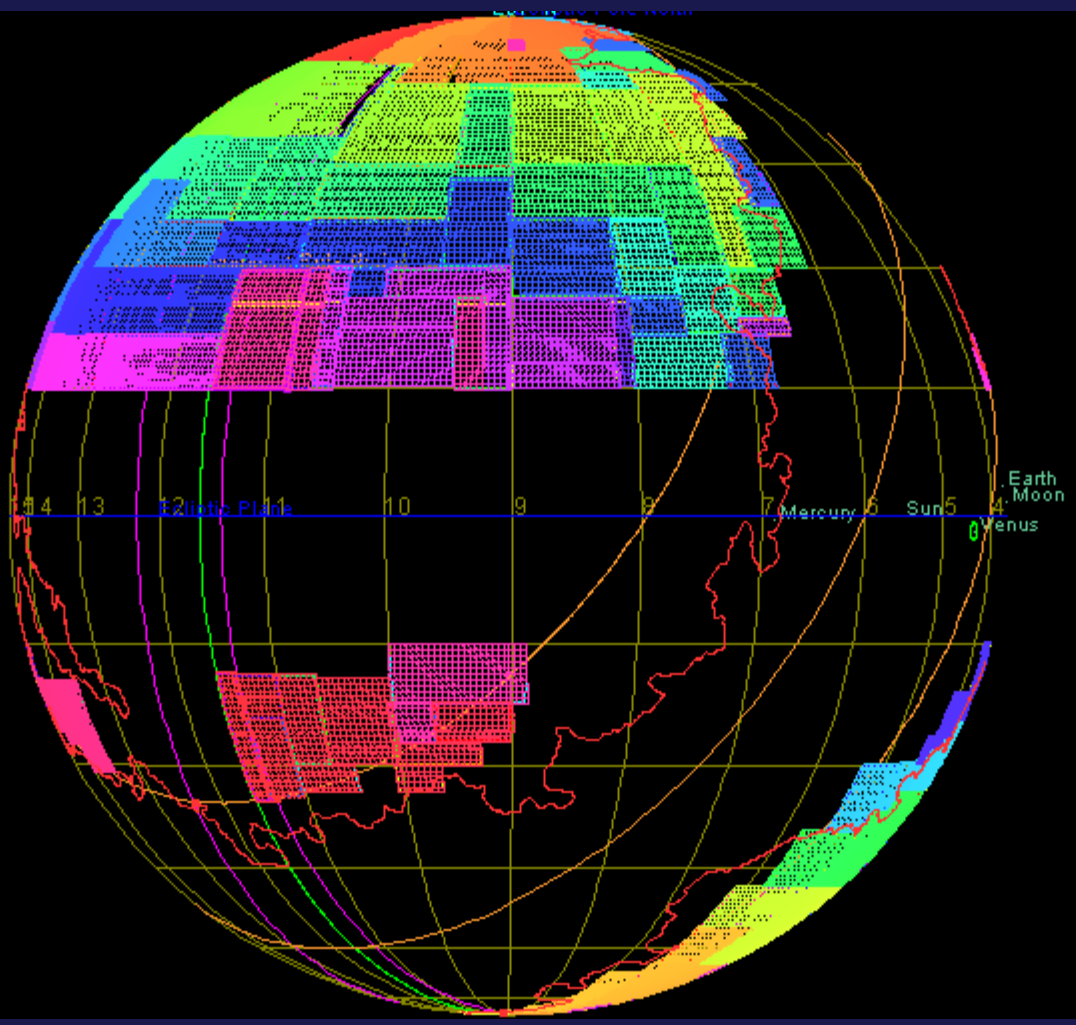
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

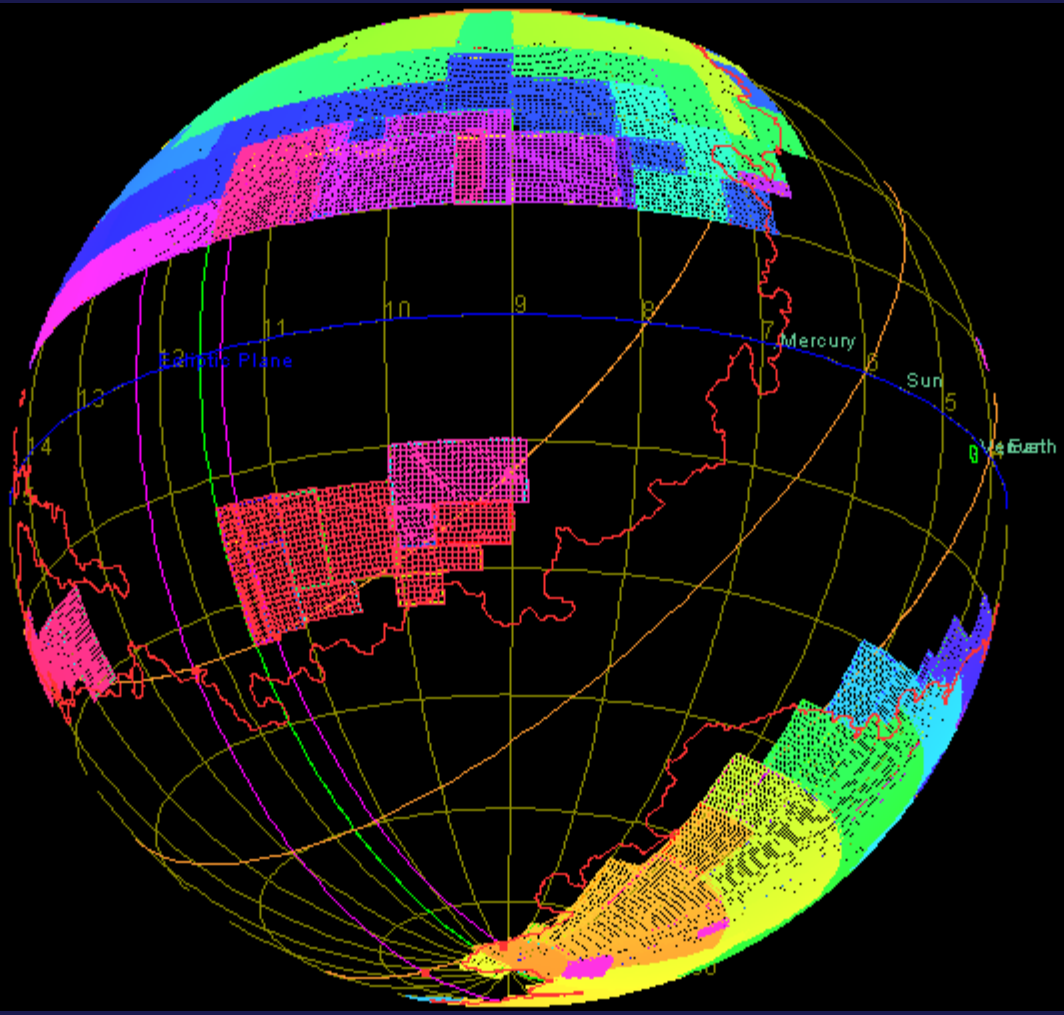
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

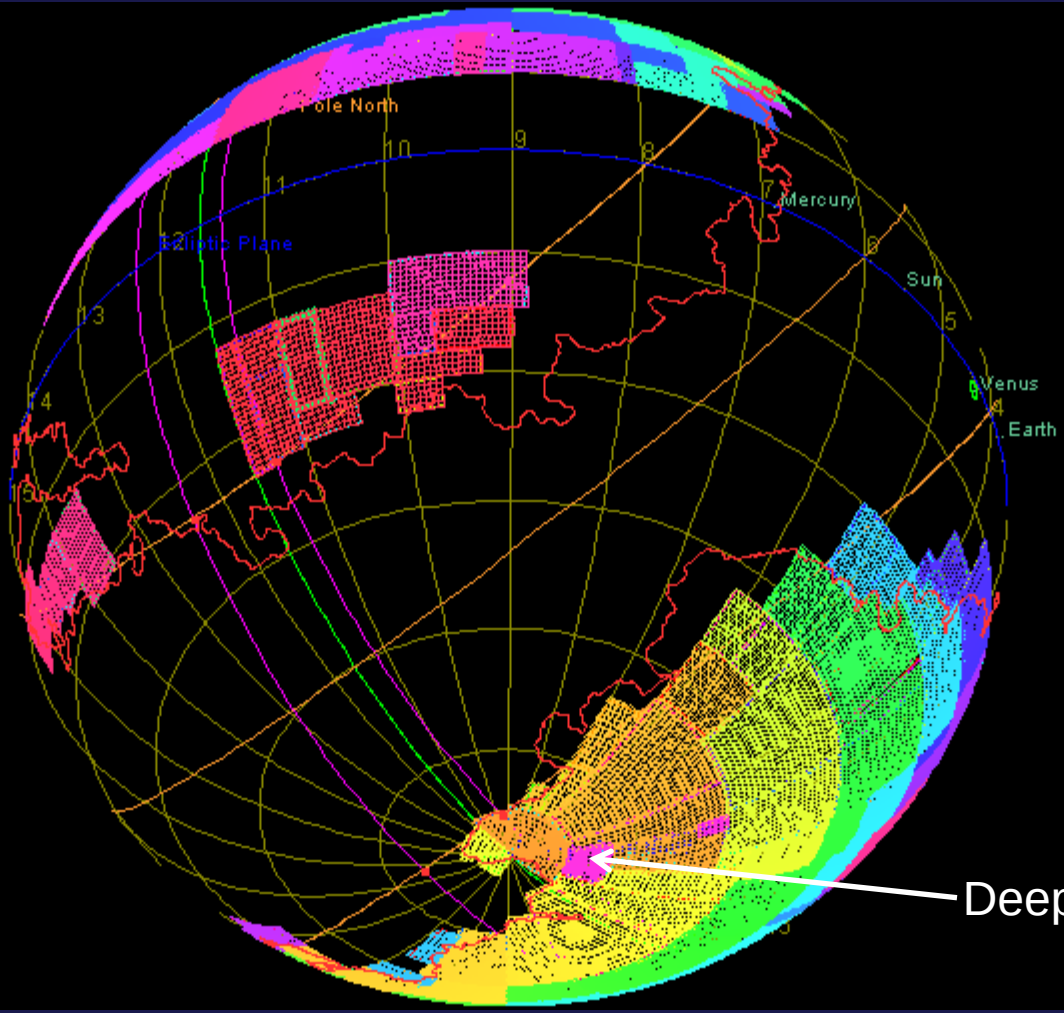
Euclid Consortium



2020	2021	2022	2023	2024	2025

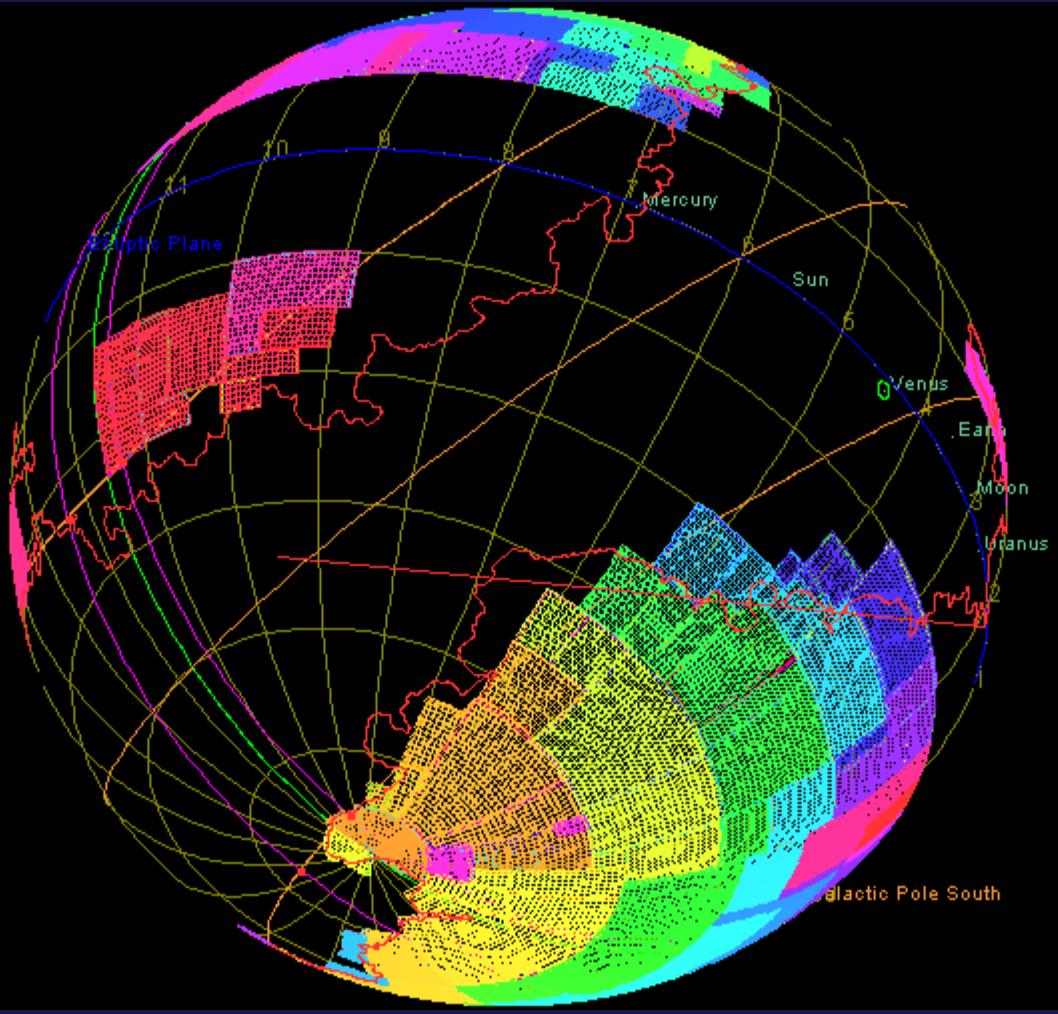
Wide Survey Implementation

Euclid Consortium



2020	2021	2022	2023	2024	2025

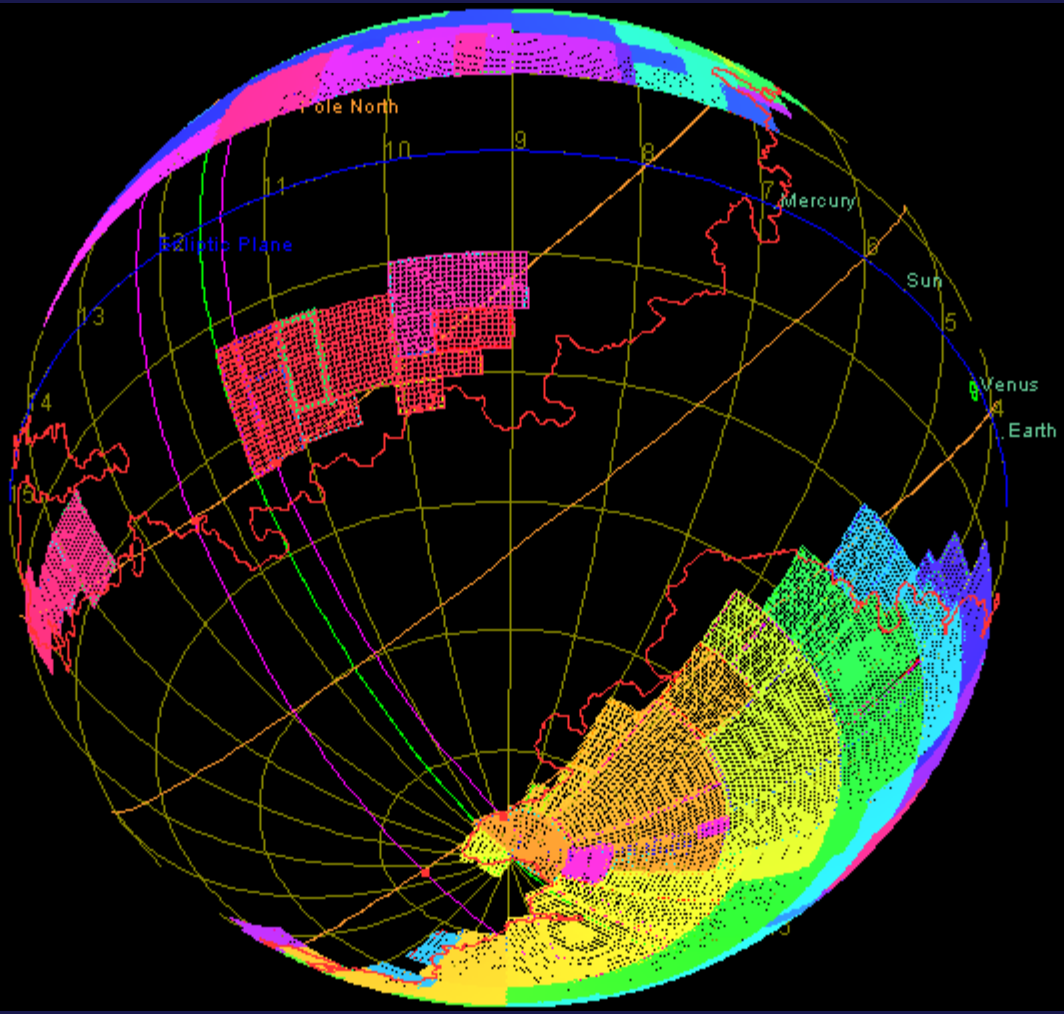
Wide Survey Implementation



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

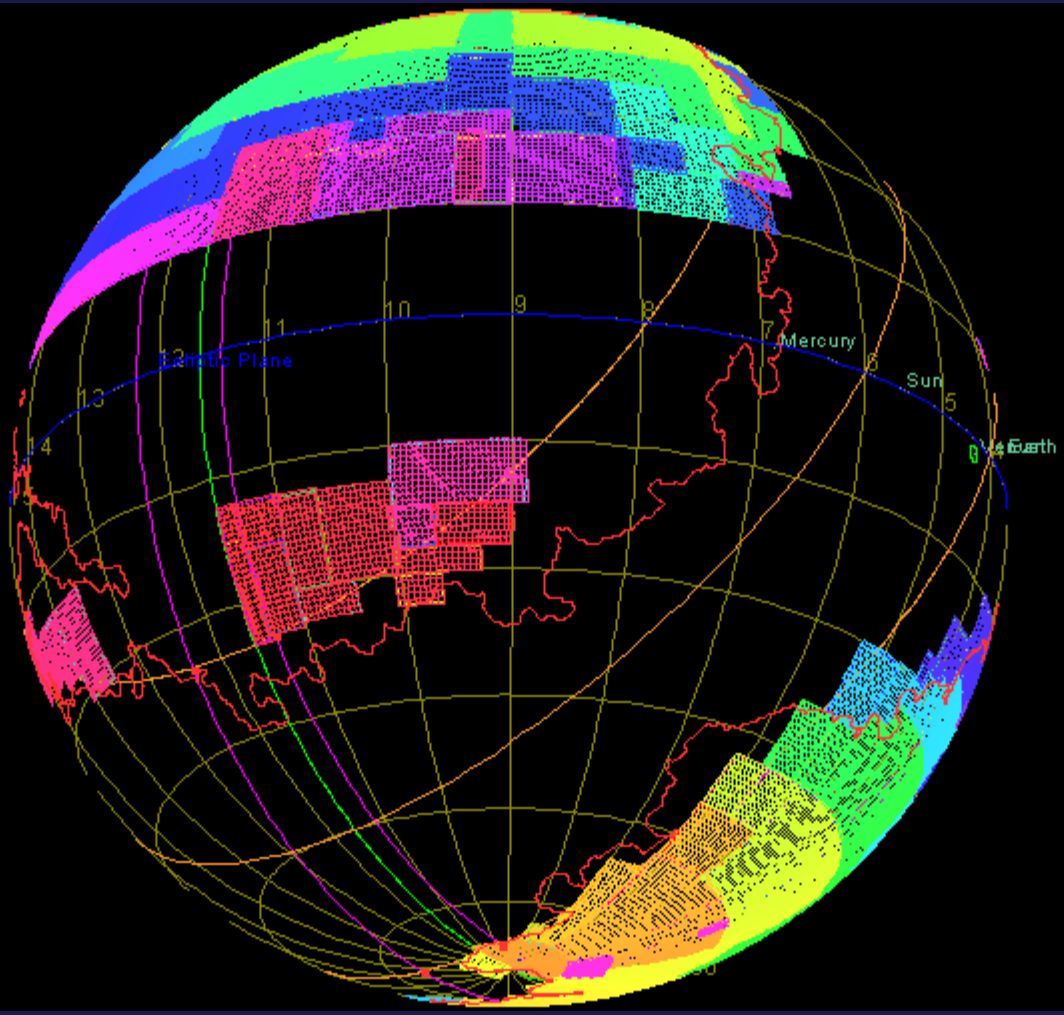
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

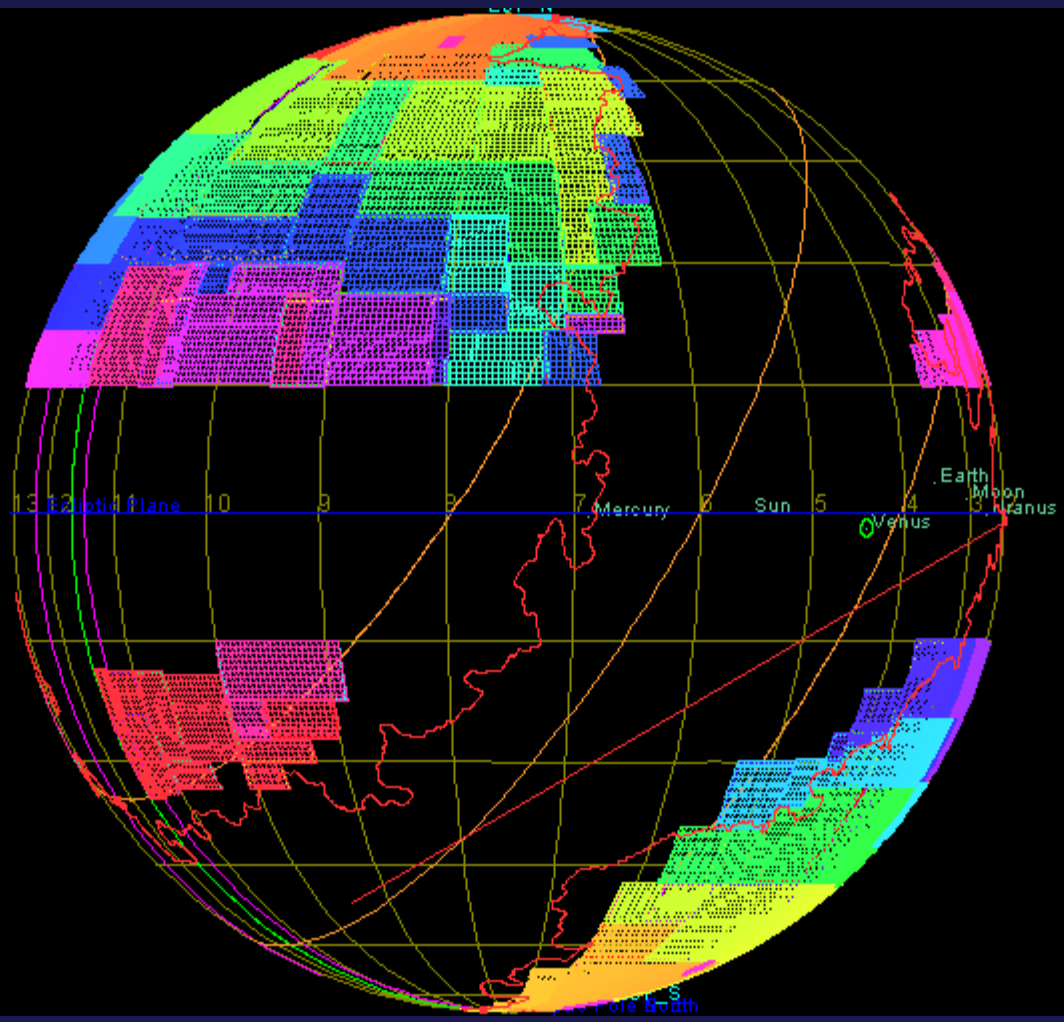
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

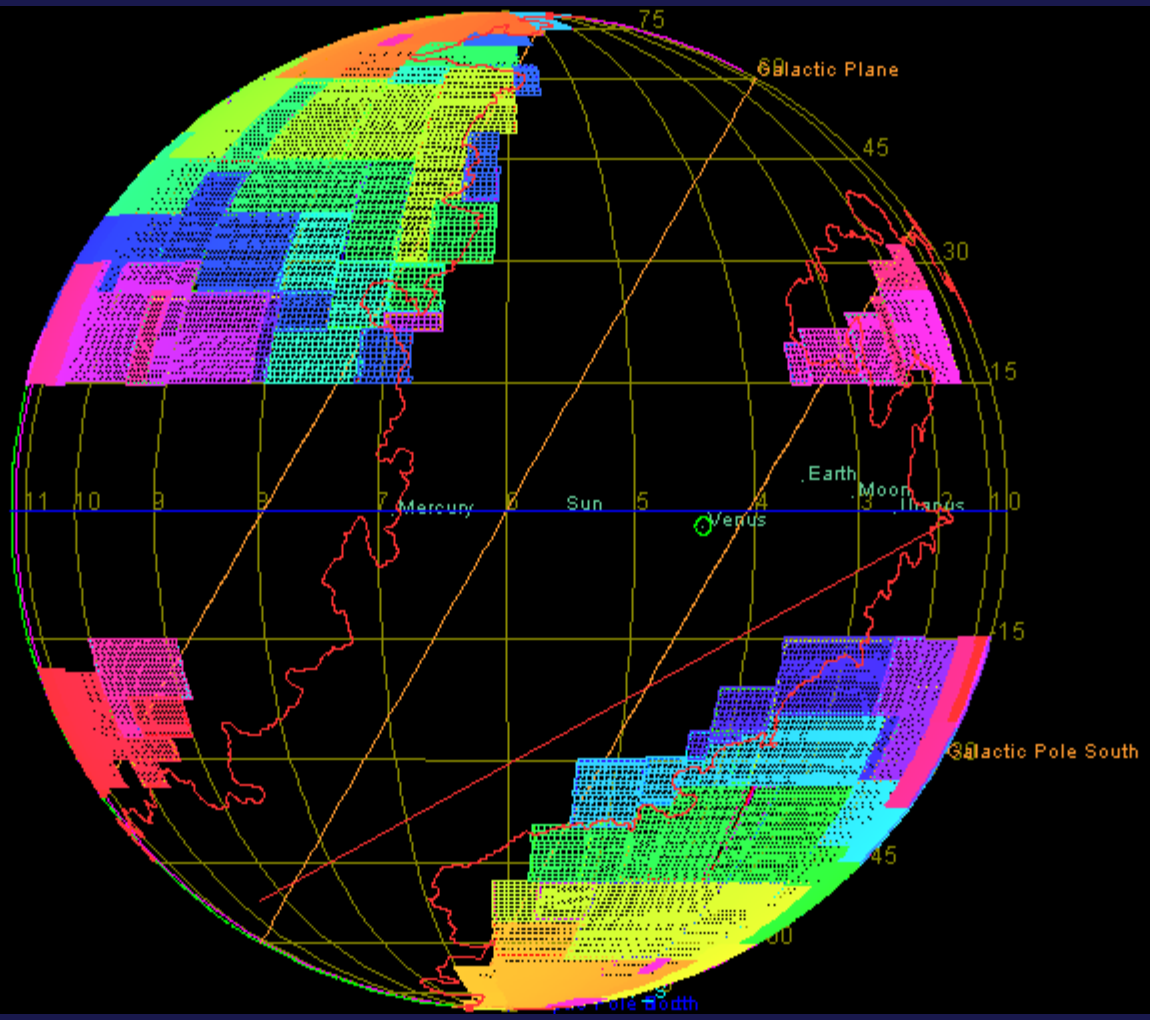
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

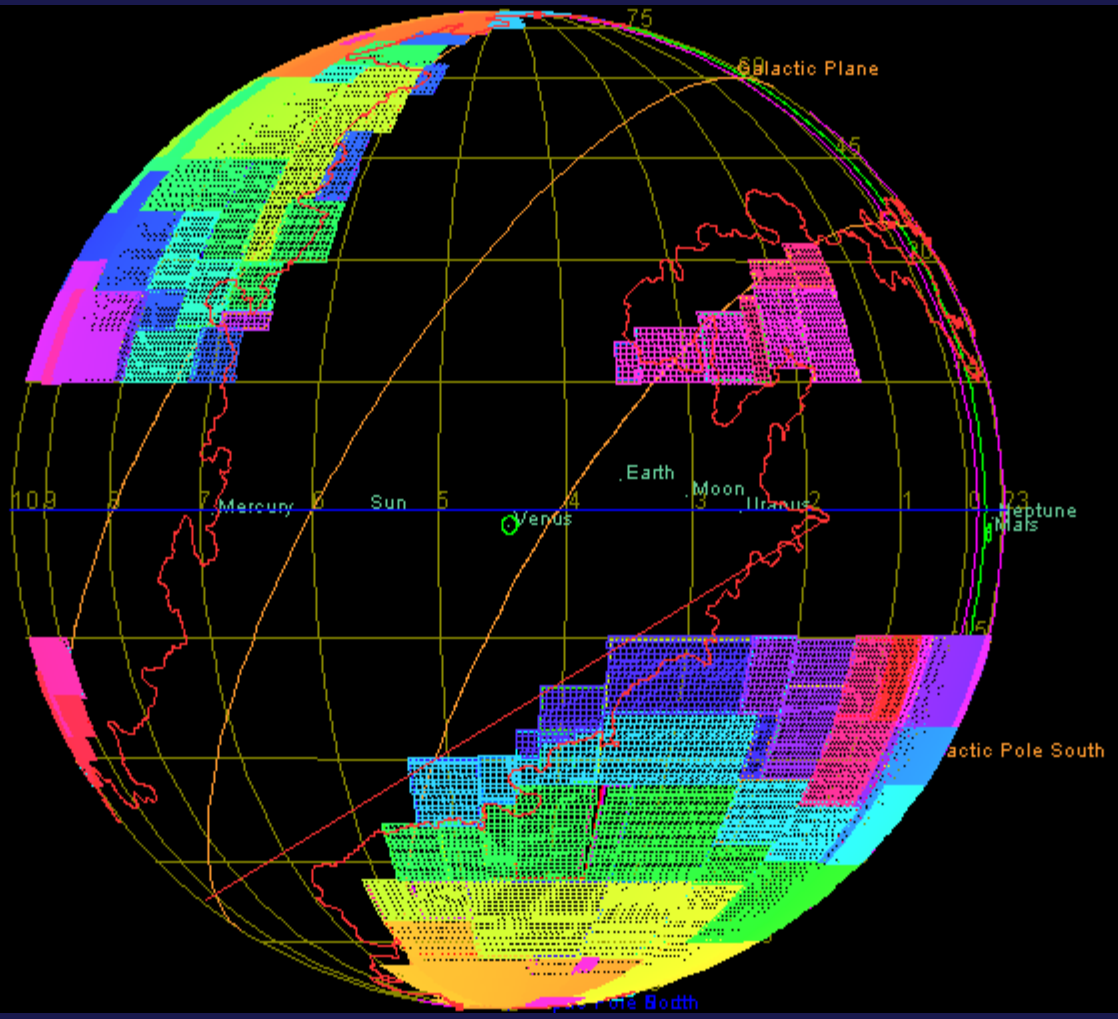
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

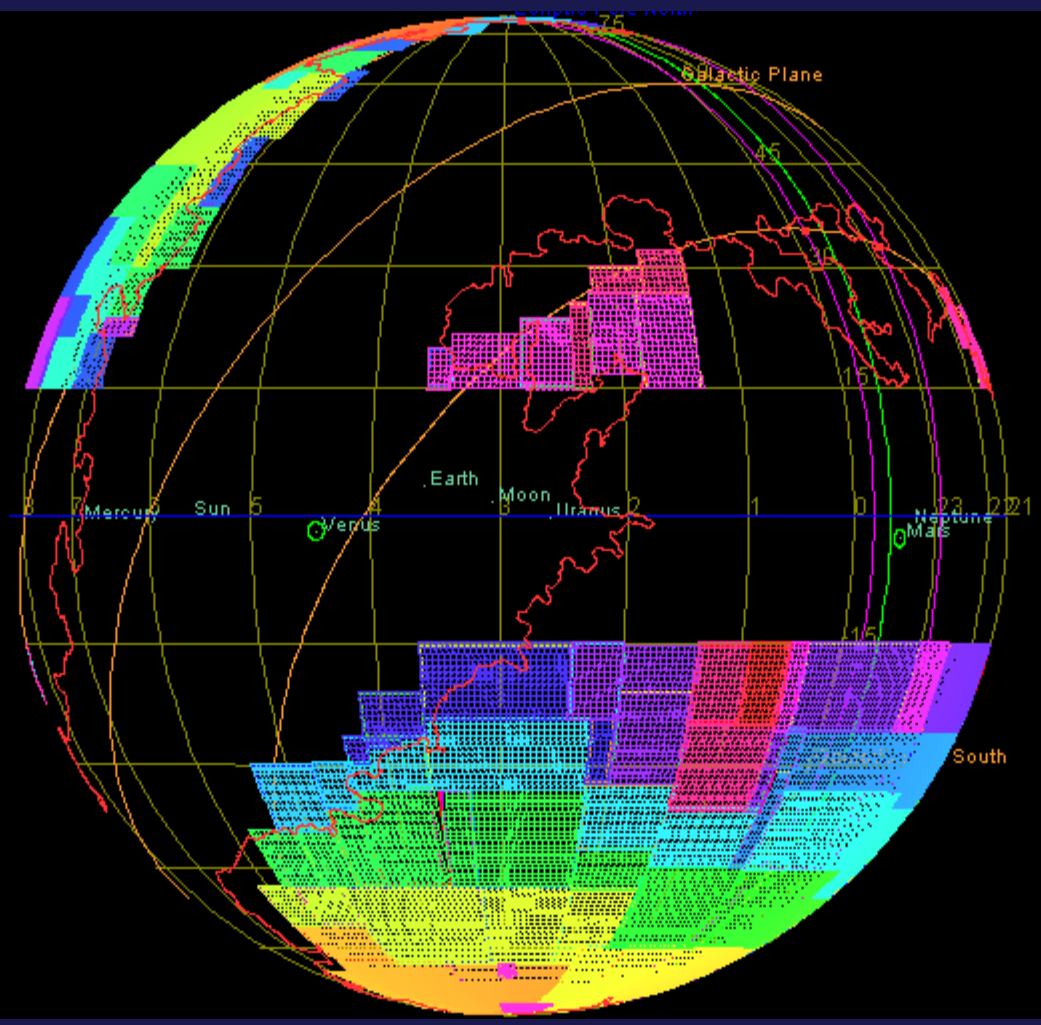
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

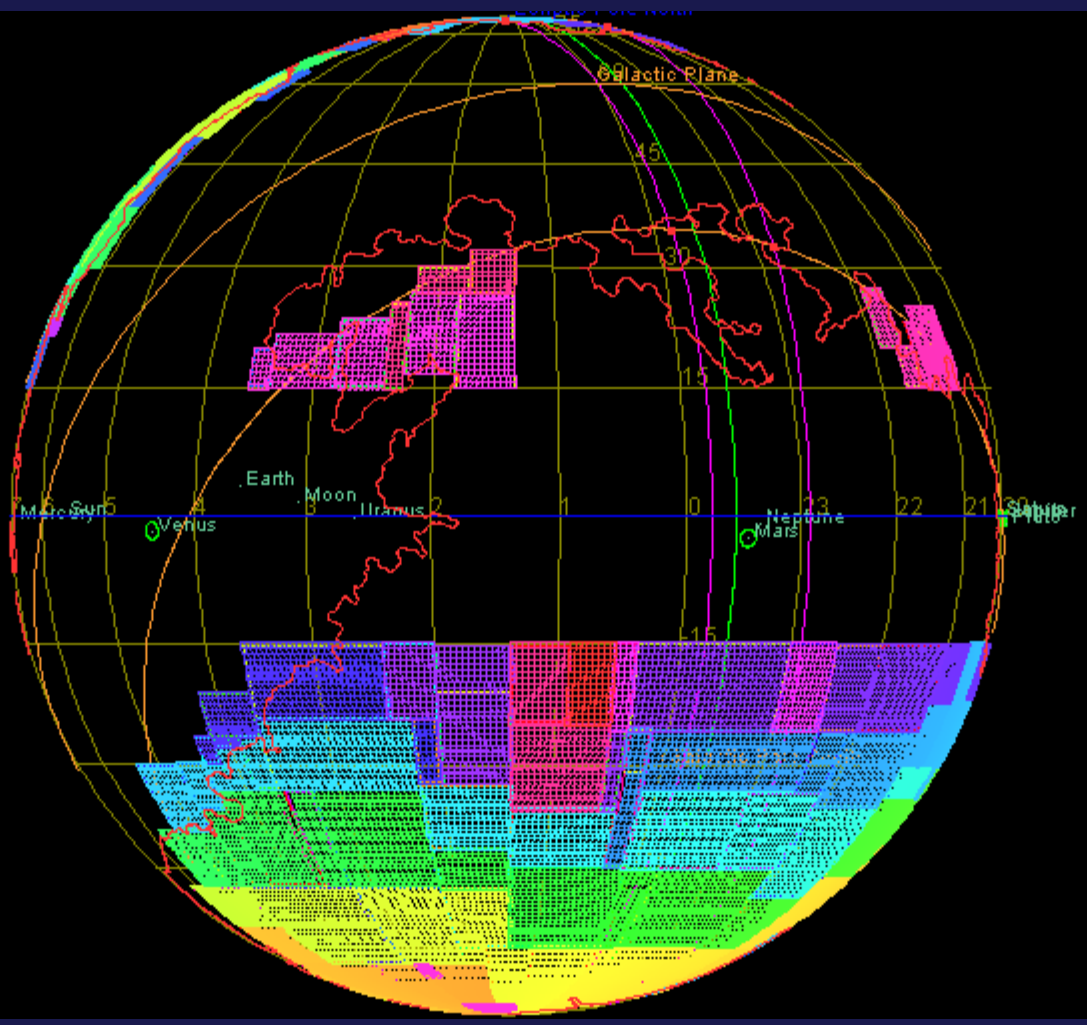
Euclid Consortium



2020	2021	2022	2023	2024	2025

Wide Survey Implementation

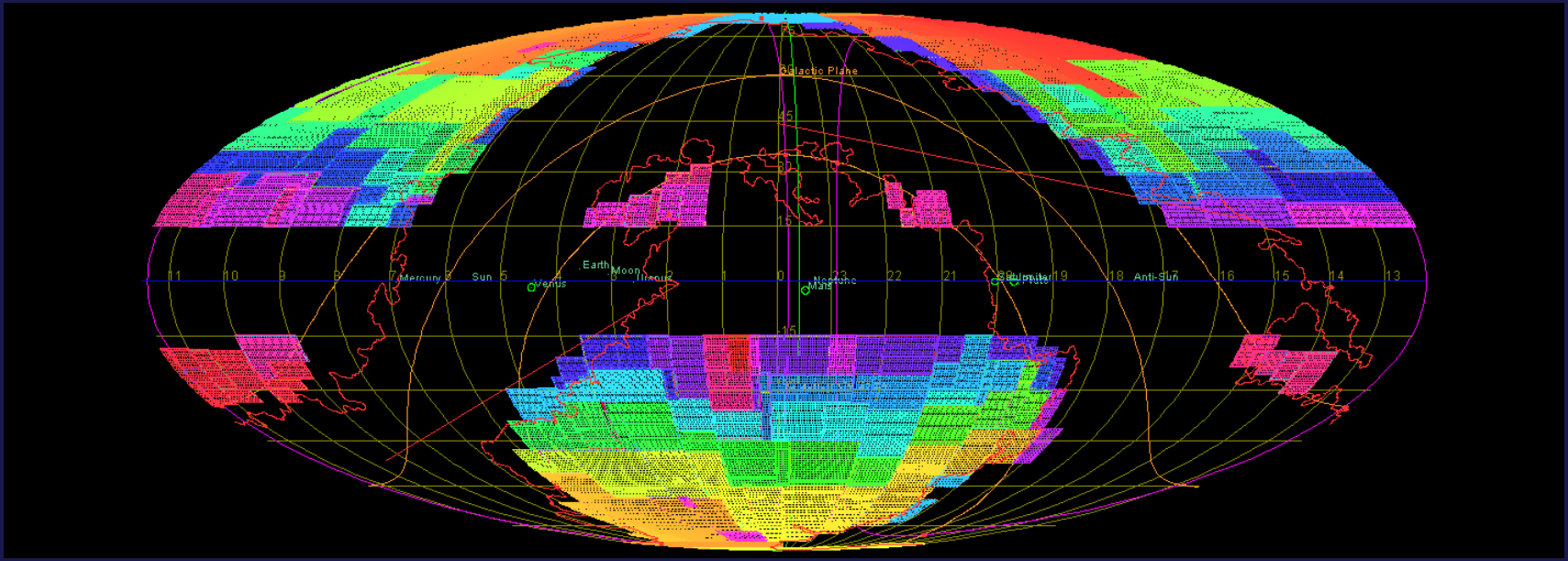
Euclid Consortium

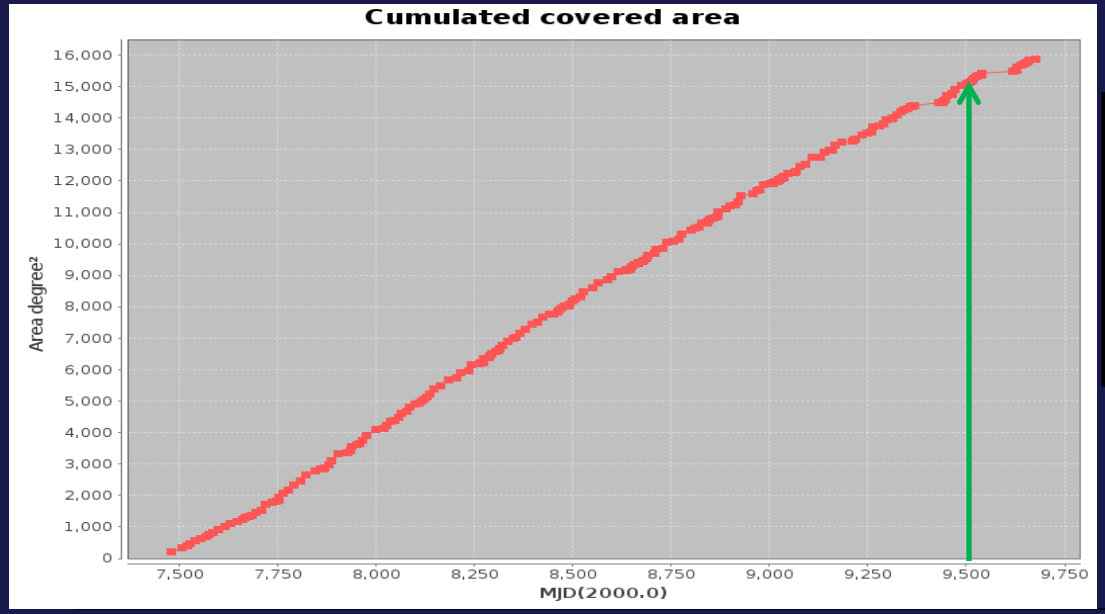


2020	2021	2022	2023	2024	2025

Wide Survey total coverage

Euclid Consortium





2020	2021	2022	2023	2024	2025

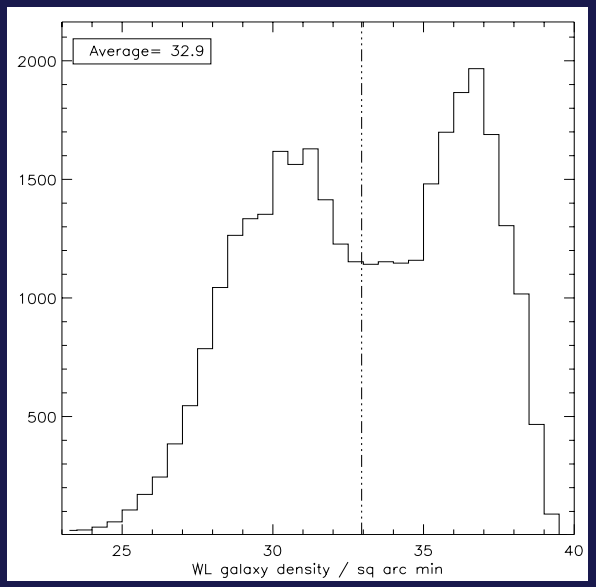
15 000 deg² covered in 5,5 years

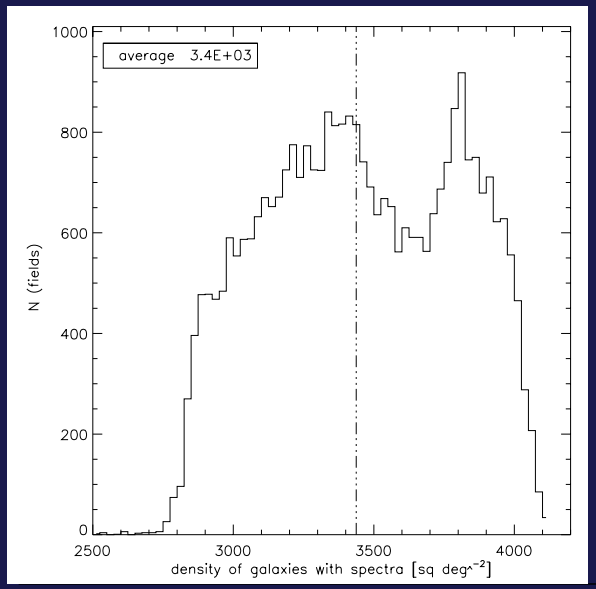
1 Deep Field 40 deg² (2 mag deeper than wide)

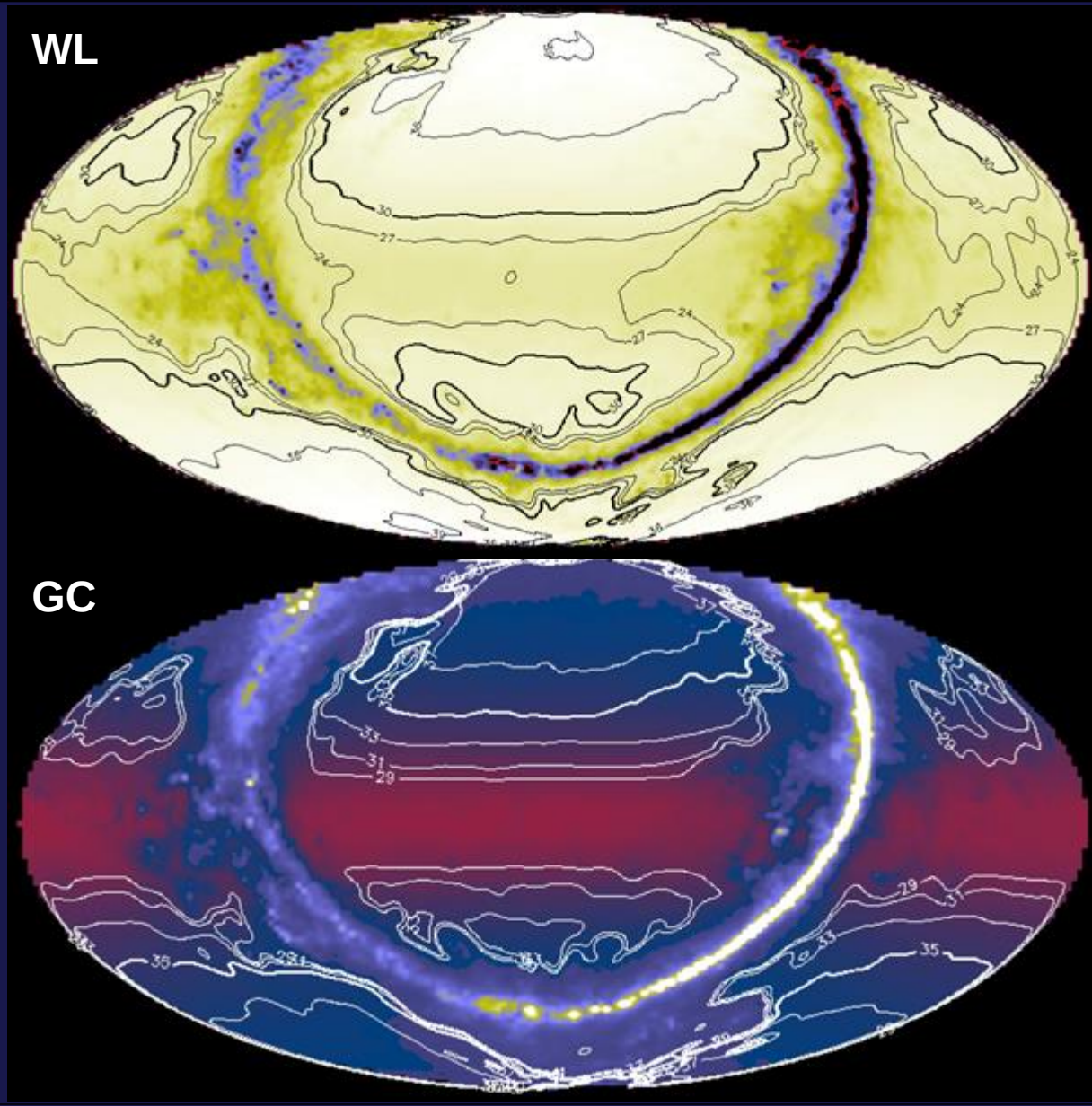
6 months margin ⇔ 1200 deg²

Associated Performance

Euclid Consortium

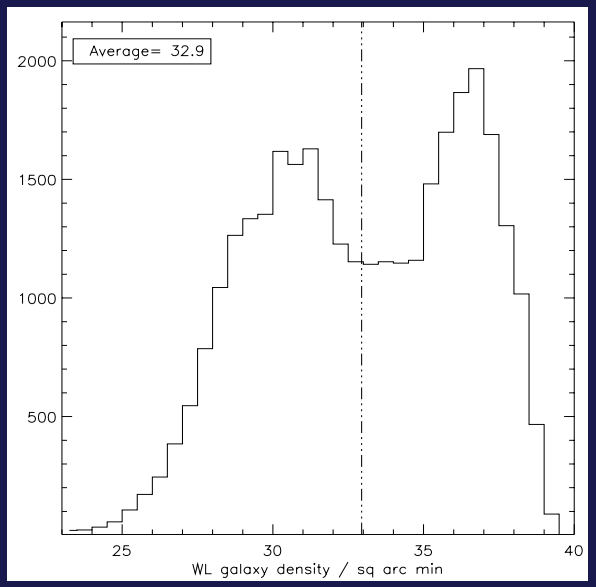


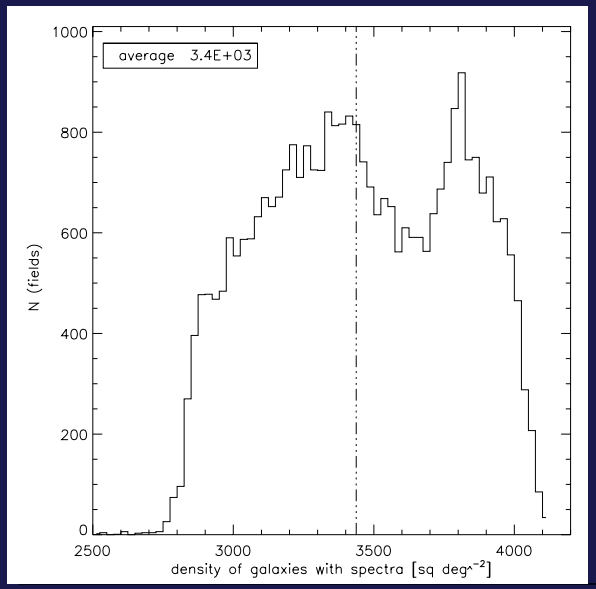


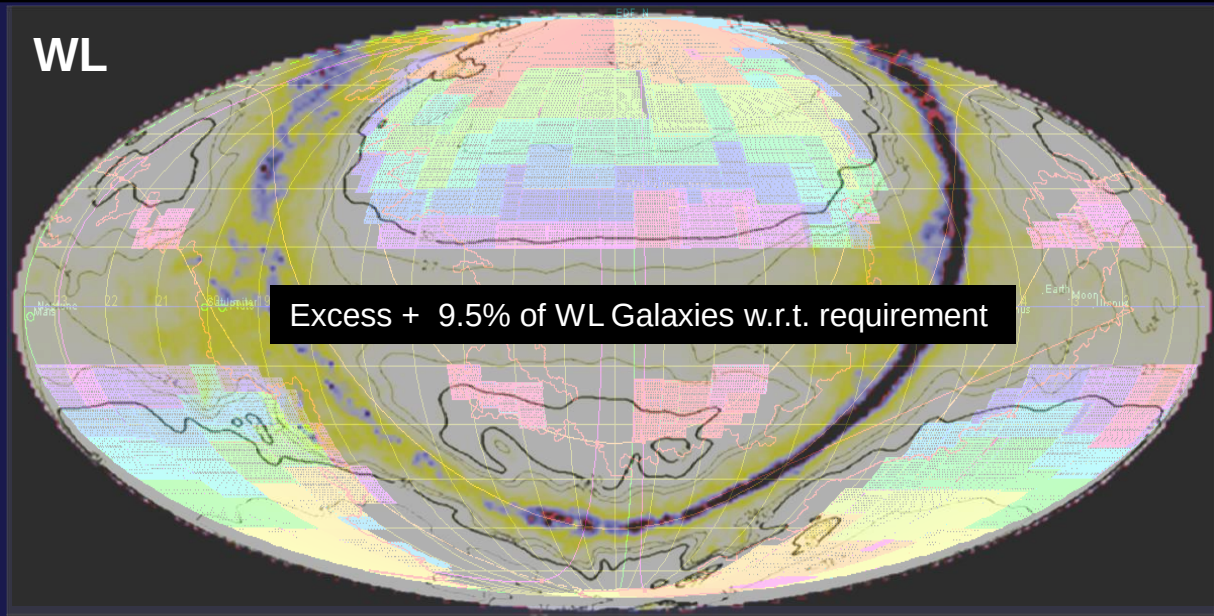


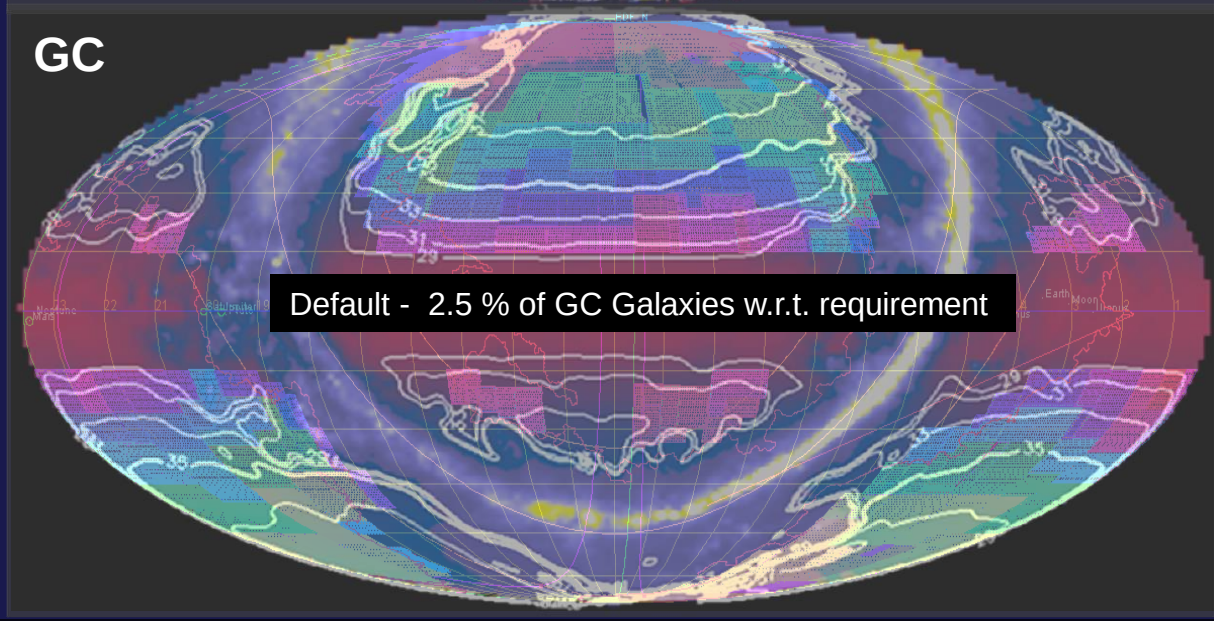
Associated Performance

Euclid Consortium









Conclusion

- Reference Survey demonstrate the capability to:

  1. Implement the survey within S/C constraints
  2. Taking into account the Required Calibrations
  3. Within 5.5 years (therefore allowing 6 months margins)
  4. Meeting upper level science Requirements for object density and coverage

- On-going work:

  1. Review Calibrations
  2. Check potential operational impacts on margins
  3. Validate the holes allocation for:

     - Ghost (VIS / NISP)
     - Straylight (VIS / NISP)
     - Star saturation (VIS / NISP)

     This work will be based on reference survey, telescope and instrument characteristics, and statistics of objects as a function of sky observed.