Key Outcomes of the 8th CGMS Risk Assessment

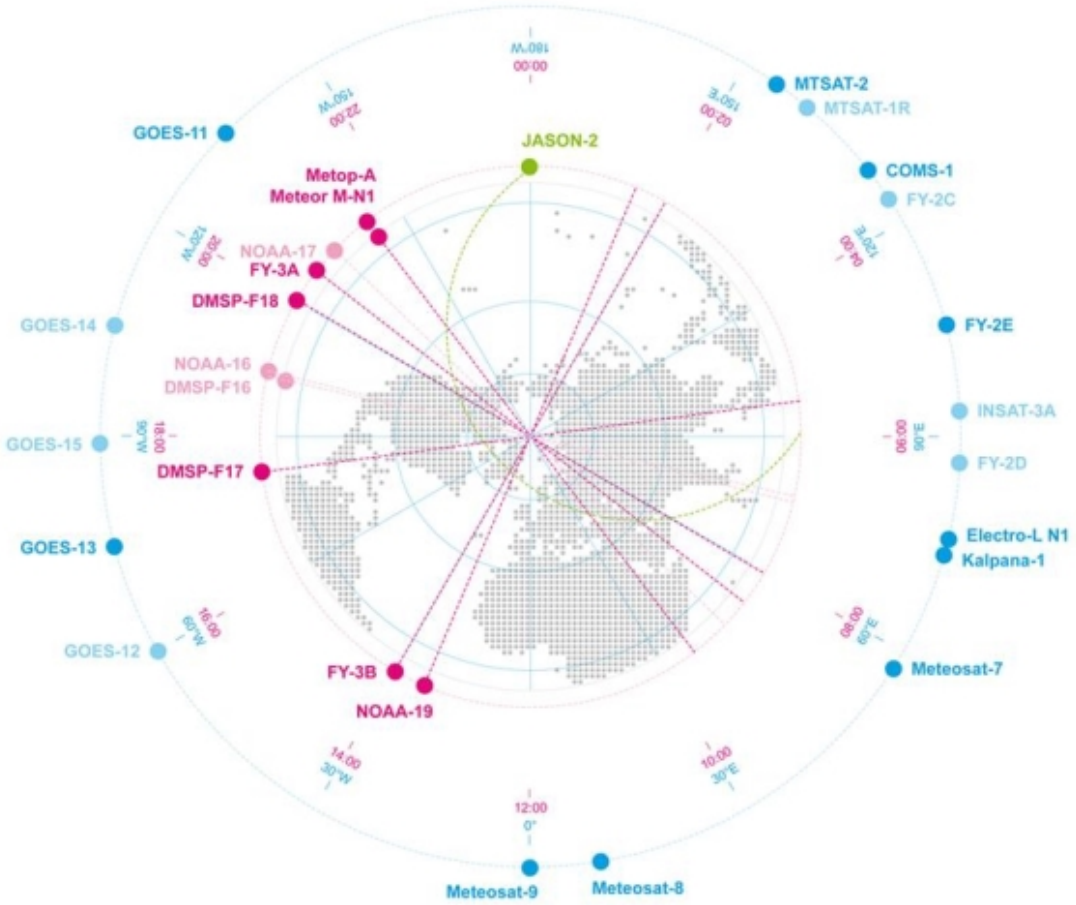
For Presentation to CGMS-54 Plenary

Executive summary

- Presentation provides the overview and outcomes of the 8th CGMS Risk Assessment, conducted annually to identify and mitigate gaps in CGMS member commitments.
- Overall risk posture remains unchanged from previous year.
- The most significant risk identified remains the potential loss of low-inclination radio occultation observations.

The CGMS Baseline:

- ***Enumerates the sustained observations, measurements, and services*** that form the CGMS contribution to observing the Earth System, Space Environment and the Sun, and responds to end-user requirements expressed in ***WMO's Rolling Review of Requirements (RRR)***.
- Constitutes the ***CGMS response to the WMO Integrated Global Observing System (WIGOS) 2040 vision*** to document what missions are currently being, or planned on being flown.



Key Principles of the CGMS Baseline:

- *Commitment*: The CGMS Members are providing, or have firm plans to provide, the observations, measurements, and services
- *Sustained*: The observations, measurements, and services are provided on a sustained basis
- *Available*: The observations, measurements, and services are available on a free and open basis
- *Operational*: The data and products can be utilized in operational applications

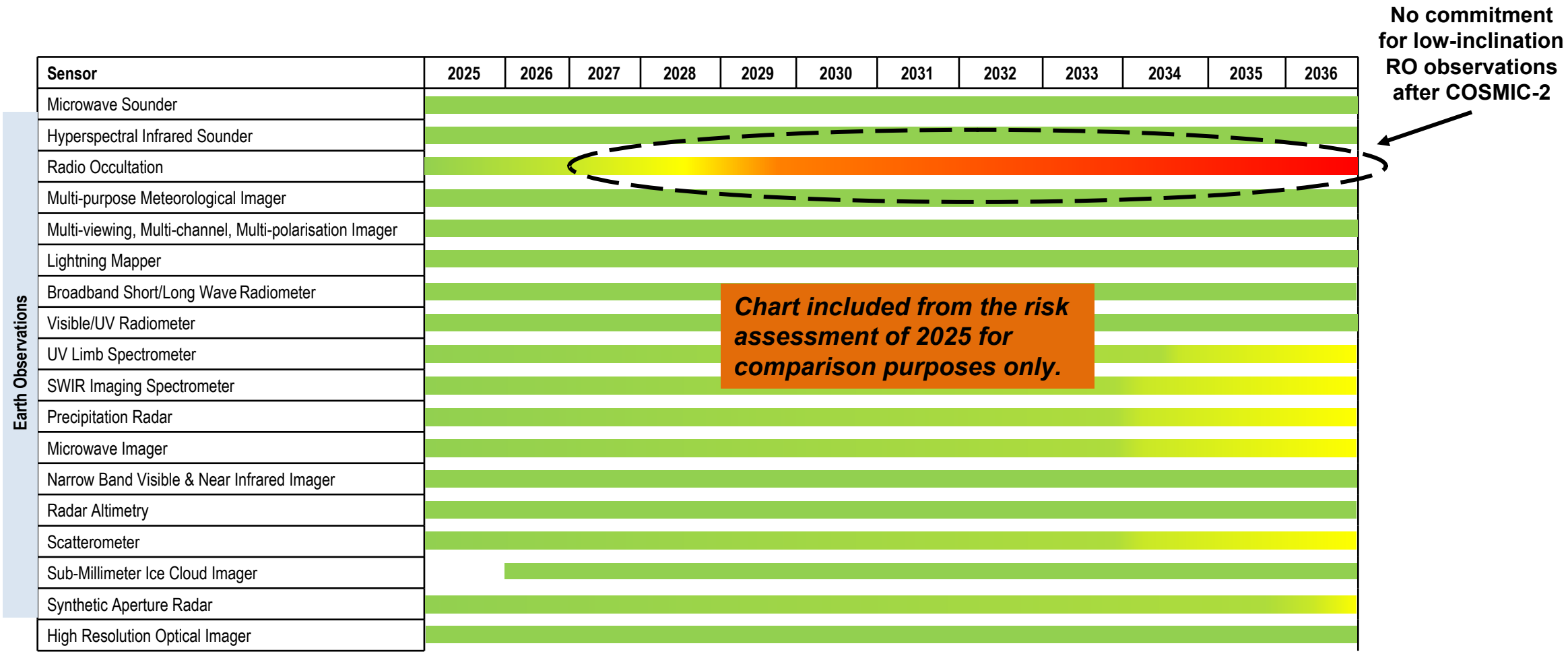
CGMS Risk Assessment

- ***CGMS conducts an annual risk assessment against the CGMS baseline*** to track how well CGMS is meeting its commitments.
- The top-level risk assessment for each sensor/observation is based on a qualitative analysis of all the orbits and satellite missions from which the observation is provided.
    - This assessment is given from a CGMS Member prospective and may not:
        - Include contributions from non-CGMS agencies
        - Include contributions from commercial providers
        - Incorporate all WMO requirements (which are covered by the gap analysis).
    - The assessment is based on planned launch dates, design life, and updated by operational experience.
    - System resiliency, nor the consequence of not meeting commitments was not specifically addressed.
    - Quality and availability were not analyzed in detail for all measurements.
    - Agency commitment to mission assumes related user readiness and ground segment operationalization.
    - Member owned and operated payloads hosted on commercial platforms are included when launch dates are determined, and members may provide commercially sourced data to meet commitments to the Baseline, with the understanding that they commit to the provision of such data consistent with the Baseline principles.

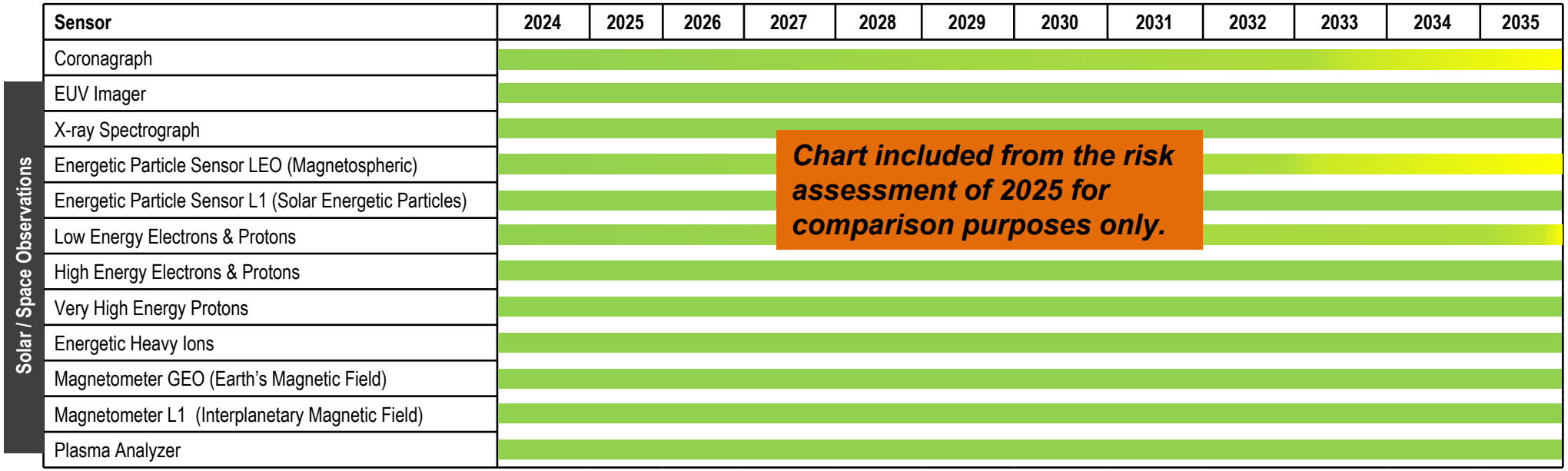
CGMS Risk Assessment Assumptions

- CGMS Risk Assessment uses **Green**, Yellow, and Red to graphically represent the overall status of that sensor/observation. The criteria for each colour is as follows:
  - **Green:** CGMS Baseline met with a low risk of a gap.
  - **Yellow:** The CGMS Baseline is at moderate risk of not being fully met. Some mitigation by CGMS Members may be required.
  - **Red:** There is a high risk of not meeting the CGMS Baseline without CGMS Member action
  - No Colour: Observation is not planned to be available until a later date

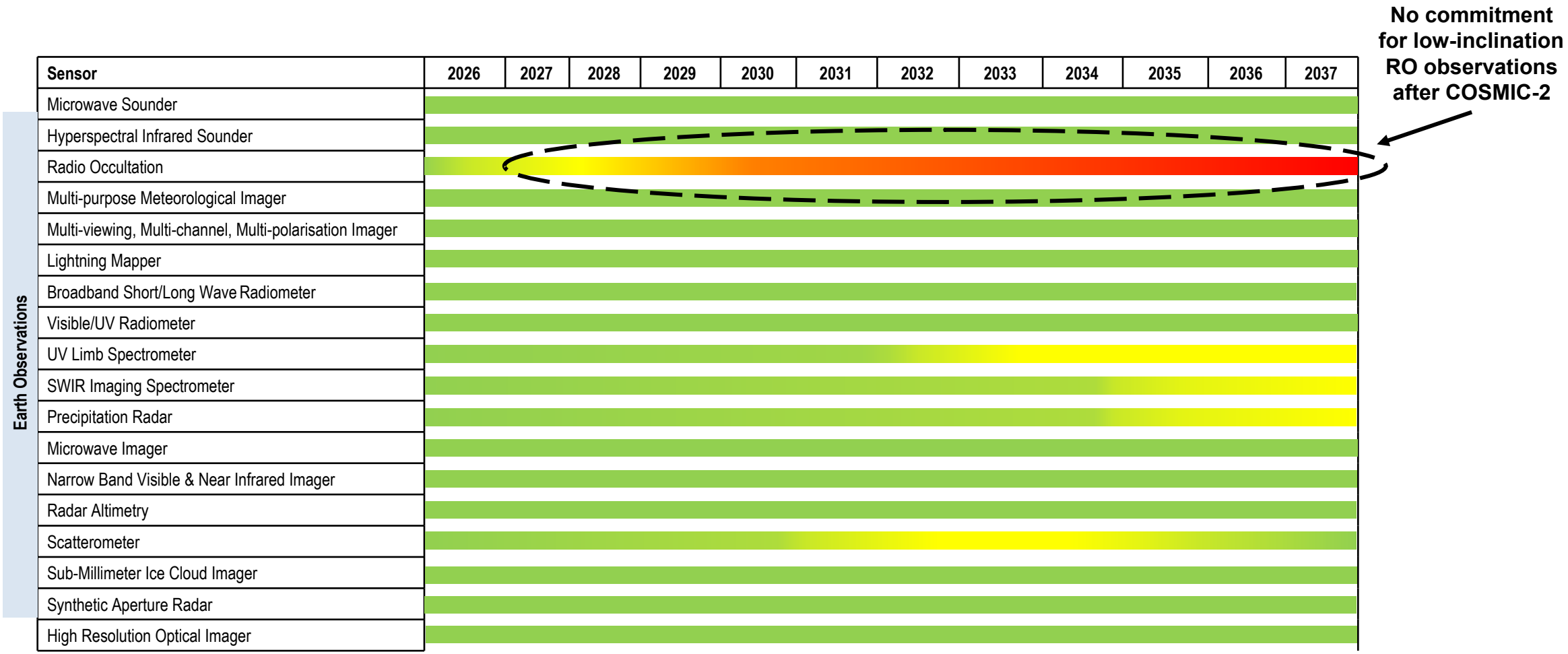
Top-Level Risk Assessment - Earth Observations (2025)



Top-Level Risk Assessment - Solar/Space Observations (2025)



Top-Level Risk Assessment - Earth Observations (2026)



Top-Level Risk Assessment - Solar/Space Observations (2026)

Solar / Space Observations

Sensor	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Coronagraph												
EUV Imager												
X-ray Spectrograph												
Low Energy Electrons & Protons												
High Energy Electrons & Protons												
Energetic Heavy Ions												
Very High Energy Protons												
Energetic Particle Sensor LEO (Magnetospheric)												
Energetic Particle Sensor L1 (Solar Energetic Particles)												
Magnetometer GEO (Earth's Magnetic Field)												
Magnetometer L1 (Interplanetary Magnetic Field)												
Plasma Analyzer												

Top-Level Risk Assessment – Focus Areas

High risk of a gap in service

- Continuity risk from RO observations in low inclination orbits in the later part of the decade as there is no commitment for a follow-on to COSMIC-2.
  - SWCG provided recommendation to WGIII on how to separate RO and Ionospheric Electron Density profiles.
  - IROWG to analyze optimal mix (number of profiles) on low, mid, high inclination orbits for RO data in short-term.

Moderate risk of gap or performance degradation

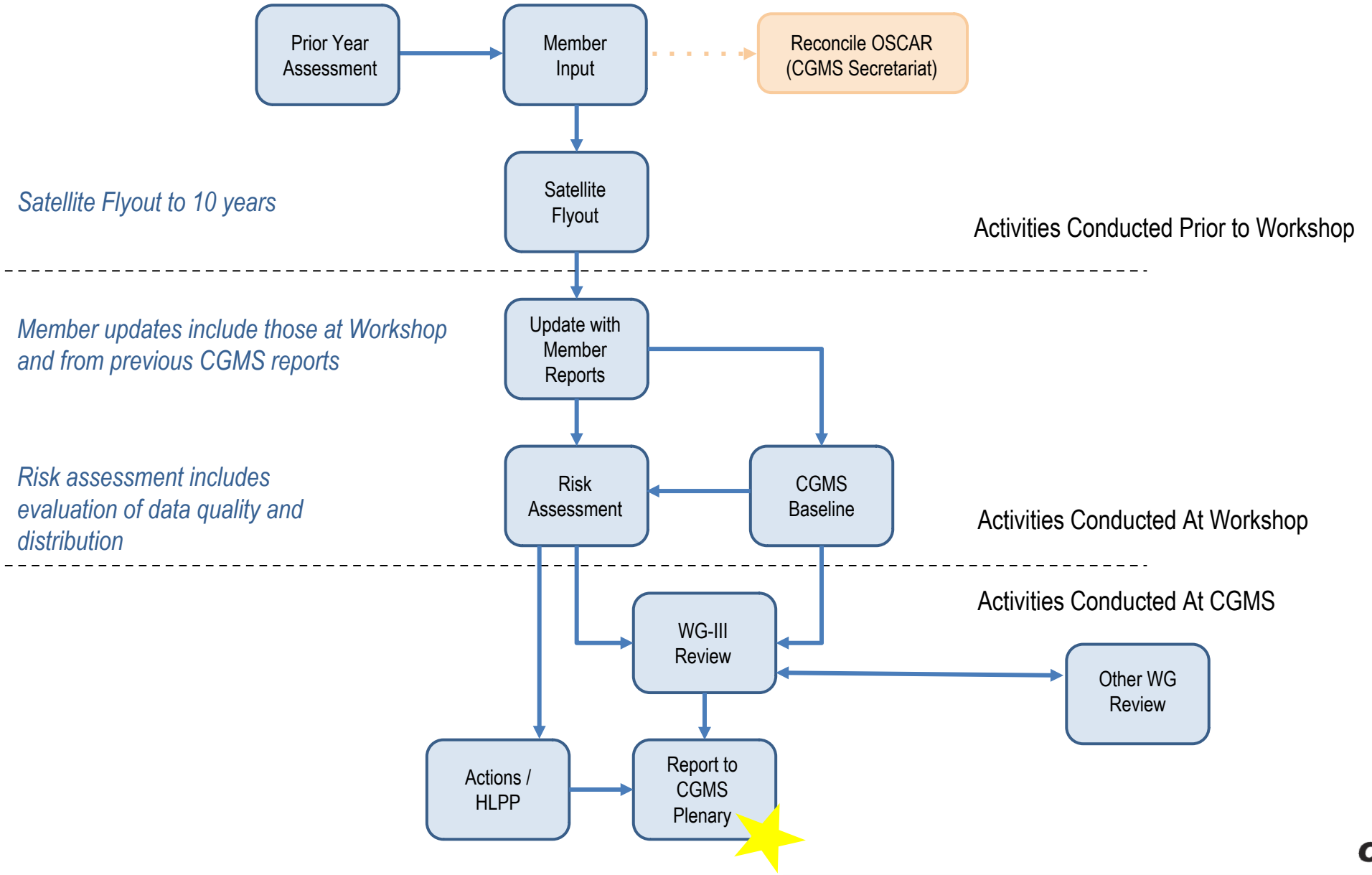
- Continuity risk for the UV Limb Spectrometer in the 2030s.
  - WGIII reviewing other capabilities for UV limb sounding to complement JPSS
- Slight long-term continuity risk for the SWIR Imaging Spectrometer in the late 2030s.
  - WGIII reviewing WGII recommendation for SWIR missions for CH4 and CO2 be added to the baseline.
- Slight long-term continuity risk for the Precipitation Radar in the late 2030s.
- Continuity risk for Scatterometry in the early to mid 2030s.
- Slight continuity risk for Magnetometer in GEO in 2030.
- Continuity risk for Energetic Particle Sensor in LEO in the early to mid 2030s.

Thank you!

BACKUP

Full Risk Assessment

CGMS Baseline Update / Risk Assessment Process



CGMS Risk Assessment Assumptions

- The top-level risk assessment for each sensor/observation is based on a qualitative analysis of all the orbits and satellite missions from which the observation is provided.
- This assessment is given from a CGMS Member prospective and may not:
  - Include contributions from non-CGMS agencies
  - Include contributions from commercial providers
  - Incorporate all WMO requirements (which are covered by the gap analysis).
- CGMS Members will develop and operate satellites in response to their national priorities.
- System resiliency, nor the consequence of not meeting commitments was not specifically addressed.
- Quality and availability were not analyzed in detail for all measurements.
- The assessment is based on planned launch dates, design life, and is updated by operational experience.
- Agency commitment to mission assumes related user readiness and ground segment operationalization.

CGMS Risk Assessment Assumptions

- The information and assessment are based on member organizations and WGIII participants, direct input from CGMS Members, and the OSCAR Database as updated by WMO.
- The assessment is a qualitative assessment done by Risk Assessment Workshop participants.
- There is uncertainty in planned launch dates, satellite lifetimes (e.g., satellites often operate beyond their design life), operational readiness, and on-orbit health – all of which impact the risk assessment and ultimately the users.
- Member owned and operated payloads hosted on commercial platforms are included when launch dates are determined

Note: The detailed charts are by calendar year. As such, if a mission launches in June, it will appear for the full calendar year, or if it's EOL is June, it will also still appear to go through the end of the calendar year.

Updates - 2026

- Updates to mission data were initially solicited in December 2025, and further obtained through feedback during the RAW and WGIII
- Each flyout chart has been updated with the new launch and EOL information:
  - ACE EOL moved to 2026
  - ALOS-2 EOL moved to 2026
  - CO2M-A launch moved to 2027 and EOL to 2034
  - CO2M-B launch moved to 2028 and EOL to 2034
  - CO2M-C launch moved to 2029 and EOL to 2035
  - CryoSat-2 EOL moved to 2028
  - DSCOVR EOL moved to 2029
  - EarthCARE EOL moved to 2028
  - Electro-L N5 launch moved to 2026
  - Electro-M N1 launch moved to 2036 and EOL to 2046
  - FY-3D EOL moved to 2026
  - FY-3E EOL moved to 2029
  - FY-3F EOL moved to 2031
  - FY-3G EOL moved to 2029
  - FY-3H EOL moved to 2033
  - FY-3I launch moved to 2027 and EOL to 2033
  - FY-3J launch moved to 2026 and EOL to 2034
  - FY-4B EOL moved to 2029
  - FY-4C EOL moved to 2033
  - GCOM-C EOL moved to 2026
  - GCOM-W EOL moved to 2026
  - GeoXO-2 launch moved to 2034 and EOL to 2043
  - GOES-18 EOL moved to 2041
  - GOES-19 EOL moved to 2043
  - GOSAT EOL moved to 2026
  - GOSAT-2 EOL moved to 2026
  - Himawari-9 EOL moved to 2034
  - Himawari-10 launch moved to 2030 and EOL to 2046
  - Jason-3 EOL moved to 2027
  - Meteor-M N2-5 launch moved to 2027 and EOL to 2032
  - Meteor-M N2-6 launch moved to 2028 and EOL to 2033
  - Meteor-MP N1 launch moved to 2036 and EOL to 2043

Updates cont.

- Launch and EOL updates continued:
  - MetOp-B EOL moved to 2030
  - MetOp-C EOL moved to 2033
  - MetOp-SG-A1 EOL moved to 2034
  - MetOp-SG-A2 launch moved to 2033 and EOL to 2042
  - MetOp-SG-B1 EOL moved to 2035
  - Meteosat-12 EOL moved to 2033
  - MTG-I2 EOL moved to 2037
  - MTG-I3 EOL moved to 2044
  - MTG-I4 EOL moved to 2047
  - MTG-S1 EOL moved to 2036
  - MTG-S2 EOL moved to 2046
  - NOAA-20 EOL moved to 2032
  - NOAA-21 EOL moved to 2033
  - OceanSat 3A launch moved to 2026
  - S-NPP EOL moved to 2029
  - Sentinel-2A EOL moved to 2026

Updates cont.

- The flyout charts also reflect the following additional updates:
  - Electro-L N6 and Electro-L N7 have been added to the flyouts for GEO Imager, Energetic Particle Sensor (Low, High and Very High), and Magnetometer in GEO
  - Electro-M N1 has been added to the flyouts for the Hyperspectral Infrared Sounder, Energetic Particle Sensor (Low, High and Very High), and Magnetometer in GEO
  - EPS-Sterna 1, 2 and 3 has been added to the flyout for Microwave Sounder
  - GEO-KOMPSAT-5 has been added to the flyout for Energetic Particle Sensor (Very High)
  - GeoXO-2 has been added to the flyout for the Hyperspectral Infrared Sounder
  - Meteor-M N2-2, Meteor-M N2-3, Meteor-M N2-4, Meteor-M N2-5, Meteor-M N2-6, and Meteor-MP N1 have been added to the flyout for Multi-purpose Meteorological Imager LEO
  - Meteor-M N2-7 and Meteor-M N2-8 have been added to the flyouts for Multi-purpose Meteorological Imager LEO, Microwave Imager, Synthetic Aperture Radar, and Energetic Particle Sensor LEO
  - SOHO has been added to the flyout for Energetic Particle Sensor at L1

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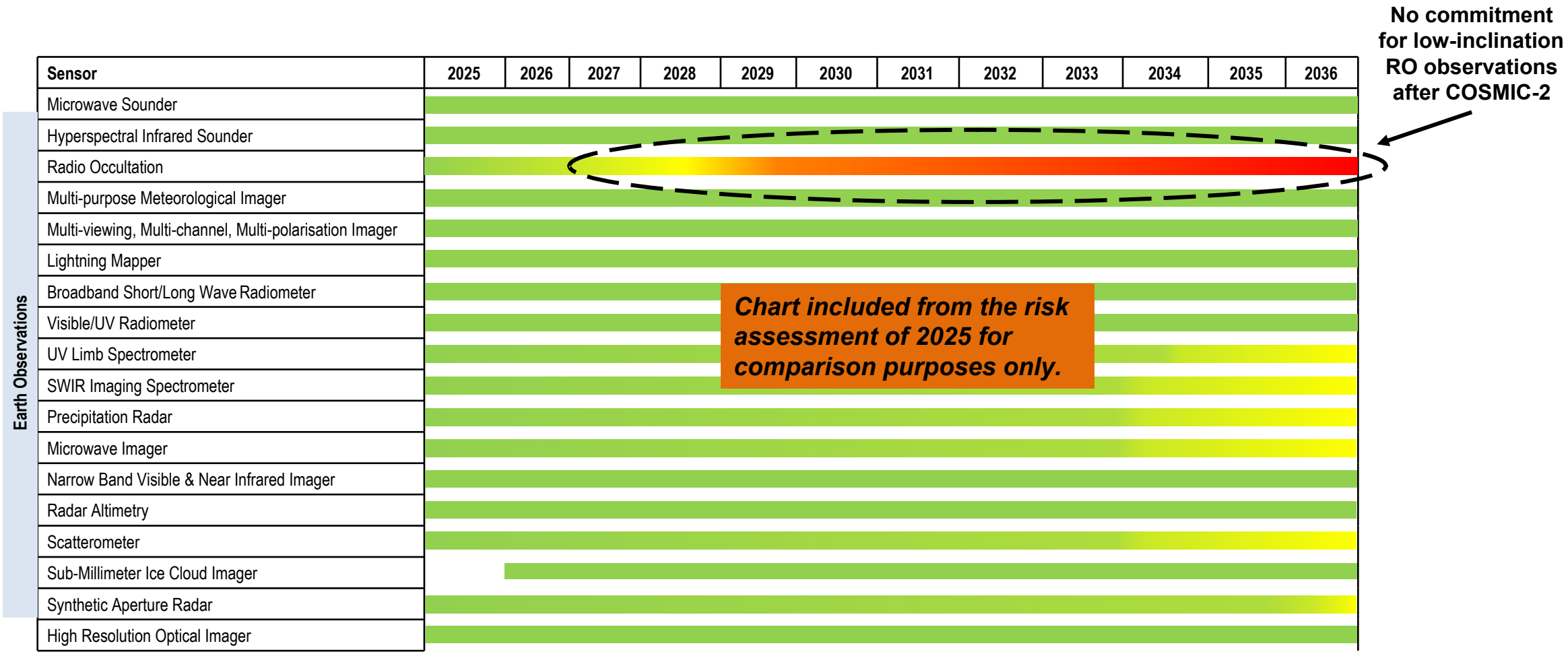

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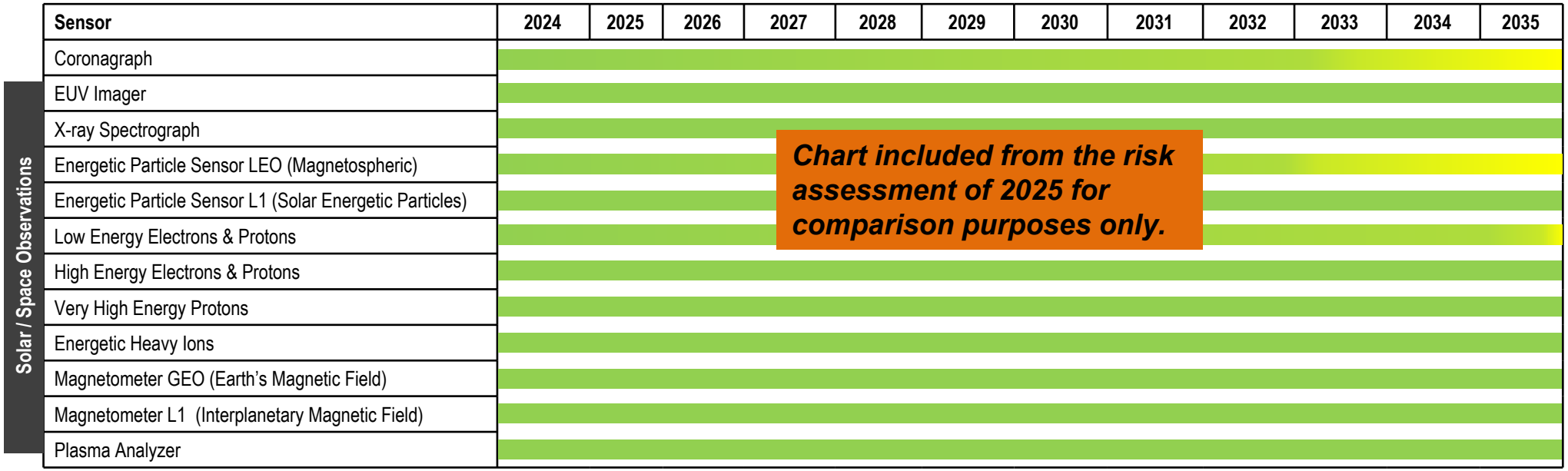

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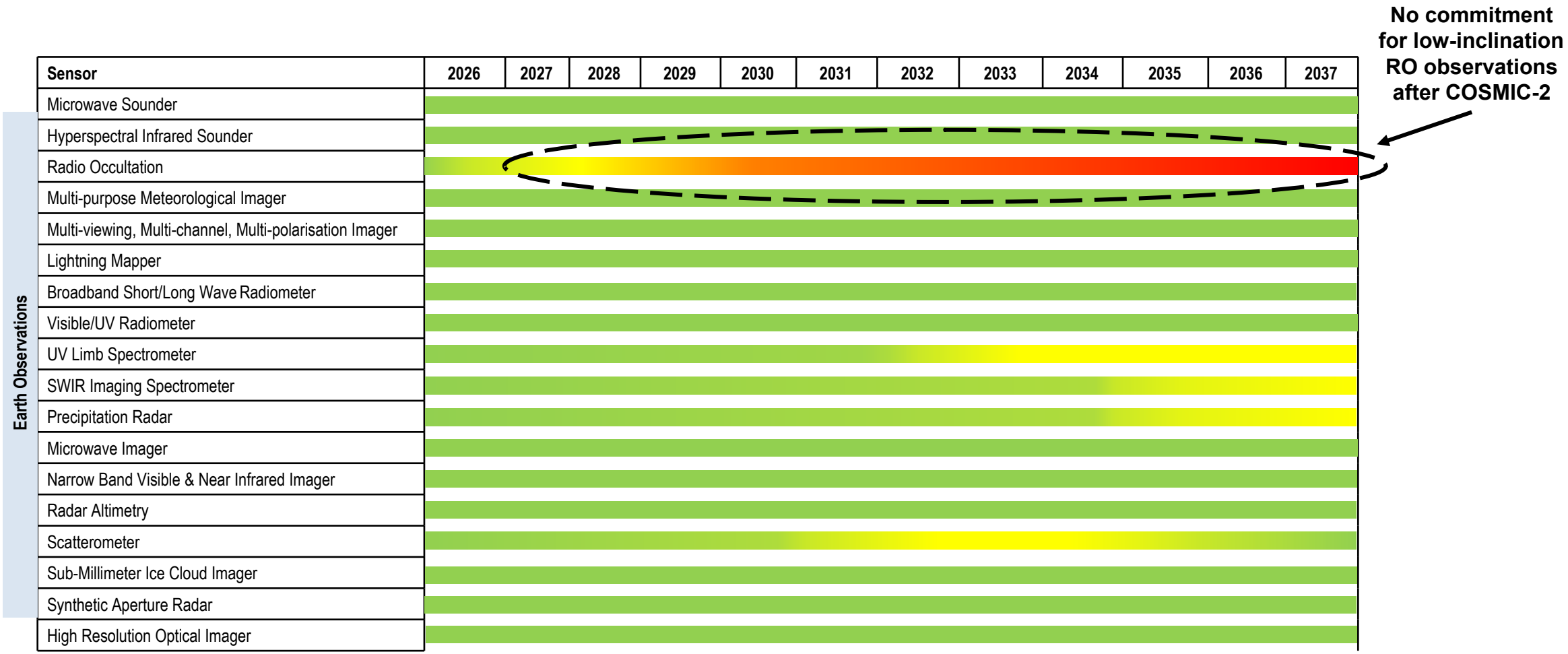

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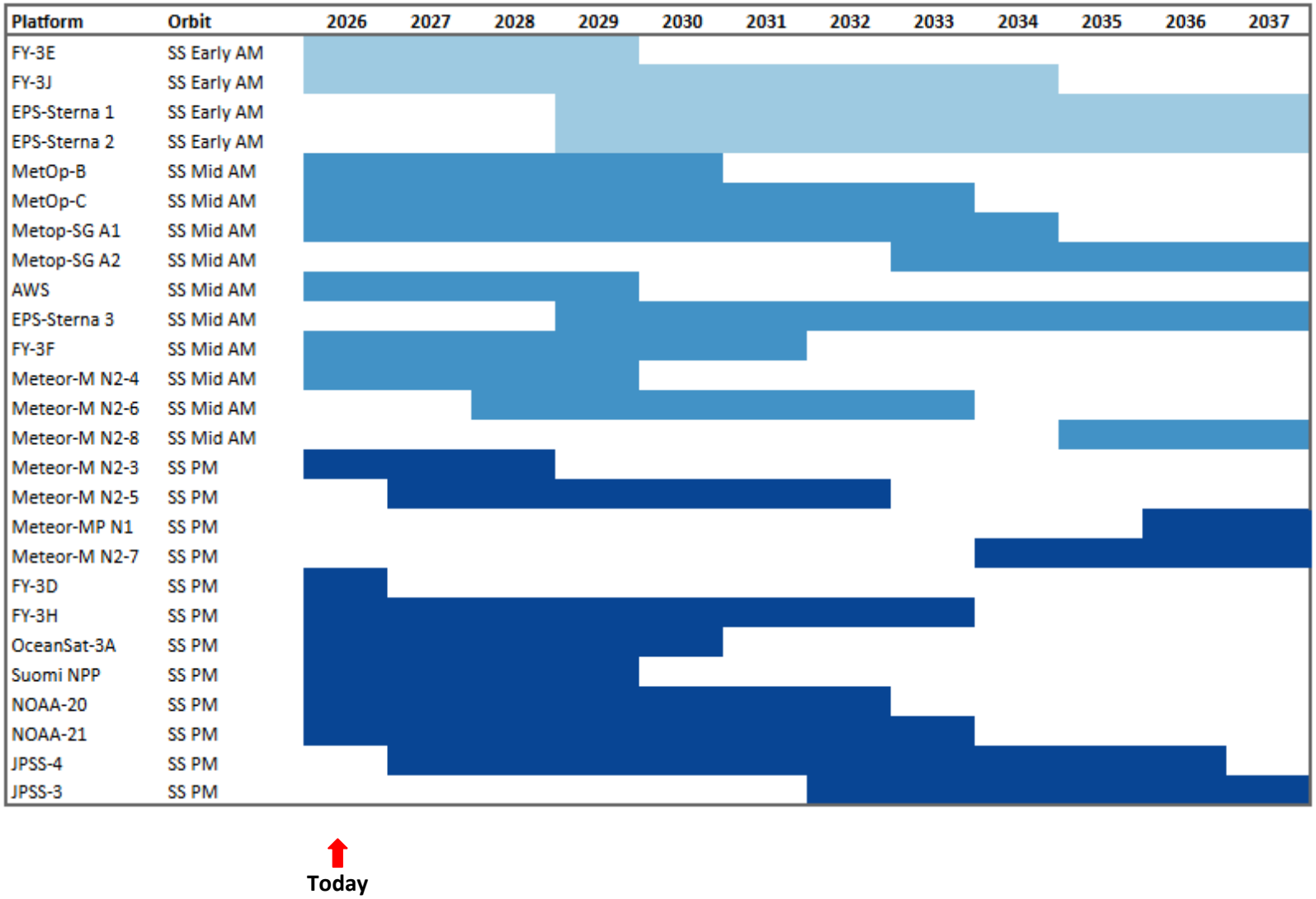
Top-Level Risk Assessment – Associated Actions

Associated Actions

- *WGIII/52.03:* WGII to articulate how MW missions with different frequencies should be addressed and visualized in the CGMS Baseline and Risk Assessment.
- *WGIII/52.04:* GHG TT (via WGII) to indicate if SWIR missions for CH4 and CO2 missions should be added to the CGMS baseline and the risk assessment.
- *WGIII/7RAWS-8*: SWCG to make a recommendation to WGIII how to separate RO and Ionospheric Electron Density profiles in the CGMS Baseline and Risk Assessment.
- *WGIII/7RAWS-12*: WGII to investigate other capabilities for UV limb sounding to complement JPSS
- *WGIII/7RAWS-13:* WGII to study and report back to WGIII the need of top of the atmosphere and spectral solar irradiance capabilities to be recorded in CGMS Risk Assessment and Baseline.
- *WGIII/7RAWS-14:* WGII to consider whether observations from geostationary orbit should be added to the CGMS baseline requirements for the broadband short/long wave radiometer.
- *WGIII/7RAWS-2:* IROWG to articulate and present the risk level and potential impacts associated with a gap of low inclination RO.
- *WGIII/7RAWS-4:* SWCG to clearly define the quantitative threshold between High and Very High (and Extremely High) Energy Electrons and Protons.

Coordination Group for Meteorological Satellites - CGMS

Microwave Sounder (Atmospheric Temperature, Humidity, and Precipitation)



LEO - 3 Orbits

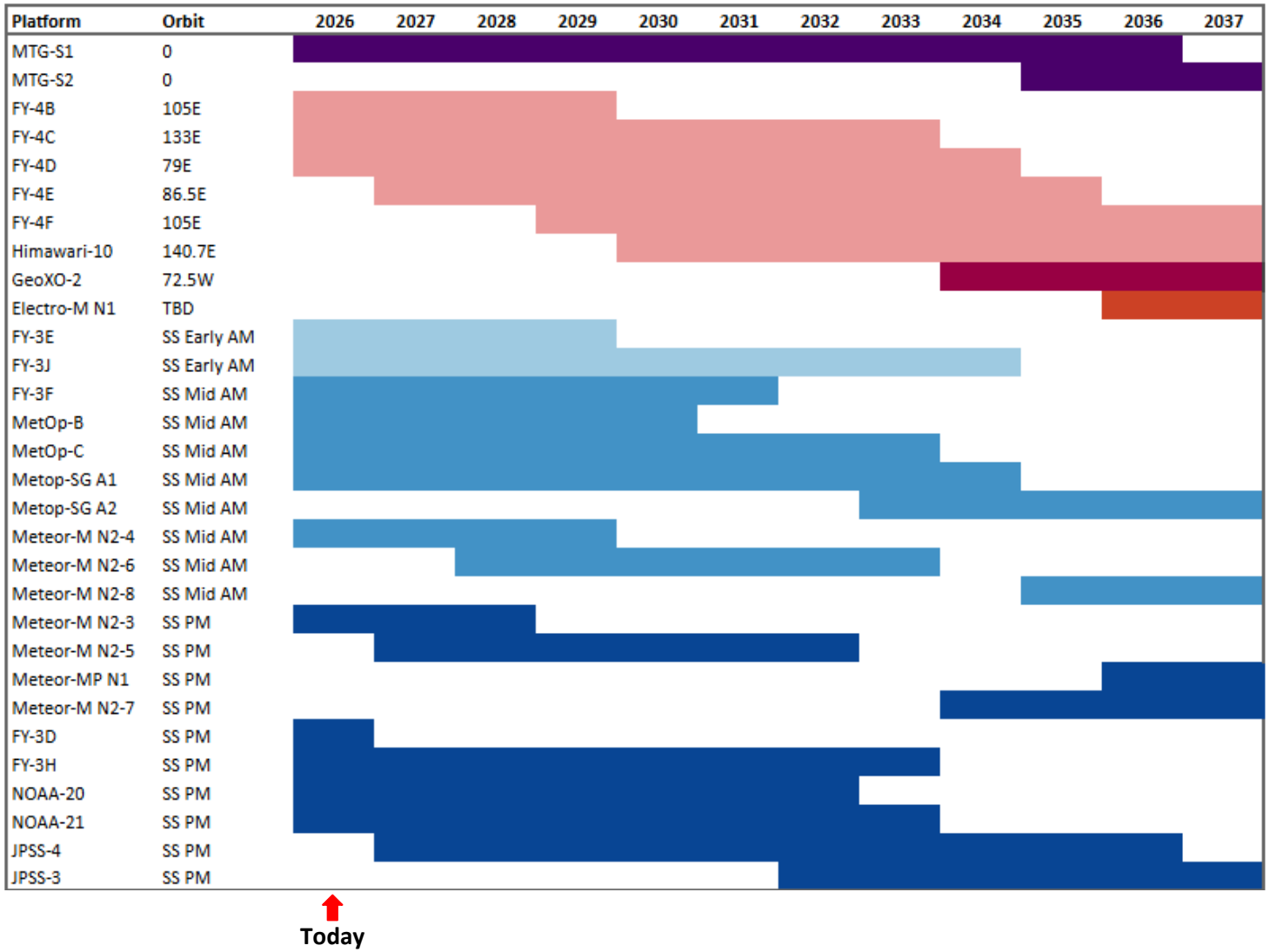
Sun-synchronous early morning

Sun-synchronous mid-morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

Hyperspectral Infrared Sounder (Atmospheric temperature, humidity, and winds Atmospheric composition: CO, CO2, SO2 , depending on spectral band also CH4 and NH3)



GEO - 2 Slots

0°

86.5°-140°E range

LEO - 3 Orbits

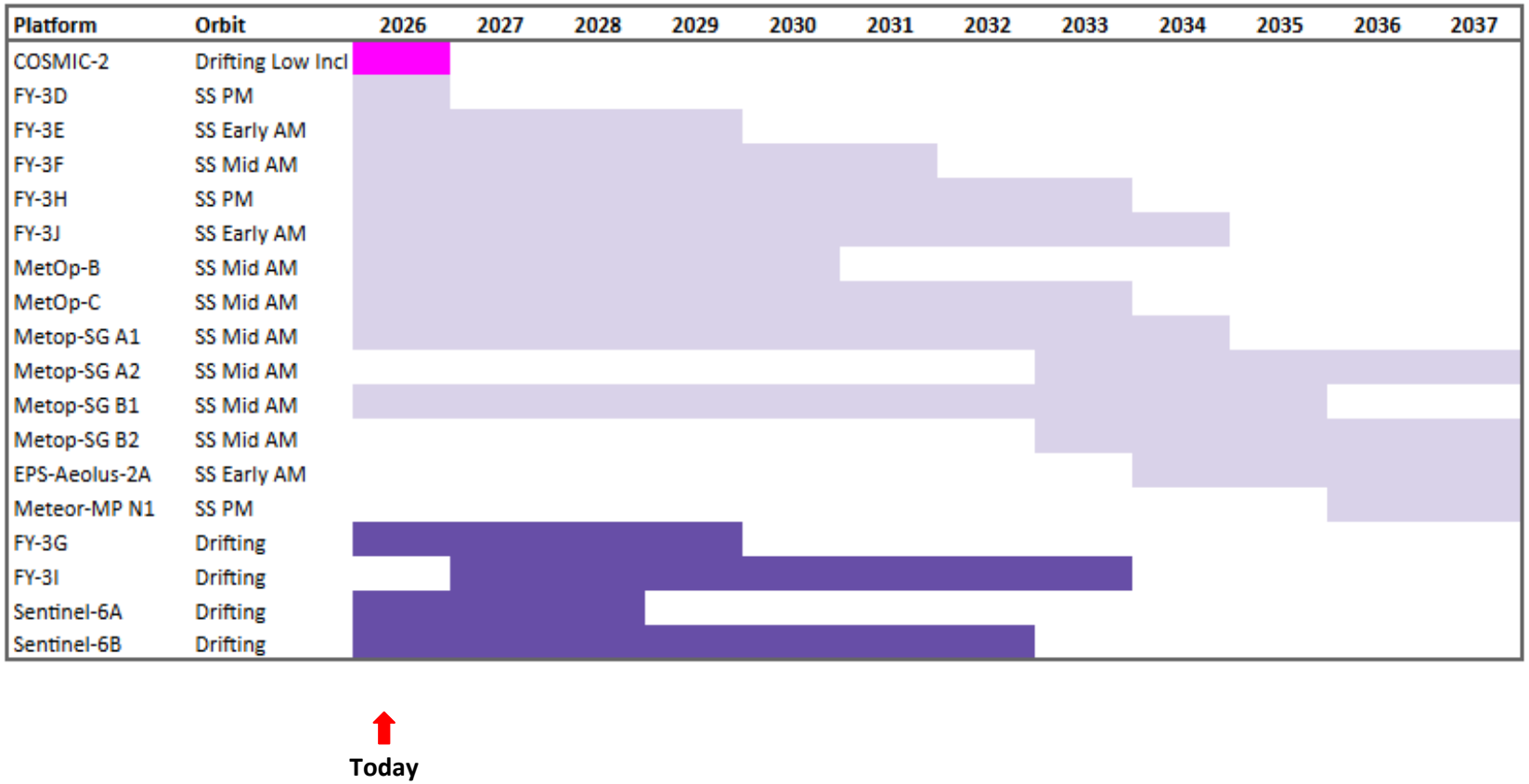
Sun-synchronous early morning

Sun-synchronous mid-morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting CGMS Baseline commitment. Note the HLPP objective (1.2) to expand hyperspectral sounding from GEO to the full geostationary ring.

Radio Occultation (Atmospheric Temperature, Humidity, and Ionospheric Electron Density)



LEO - 3 Orbits

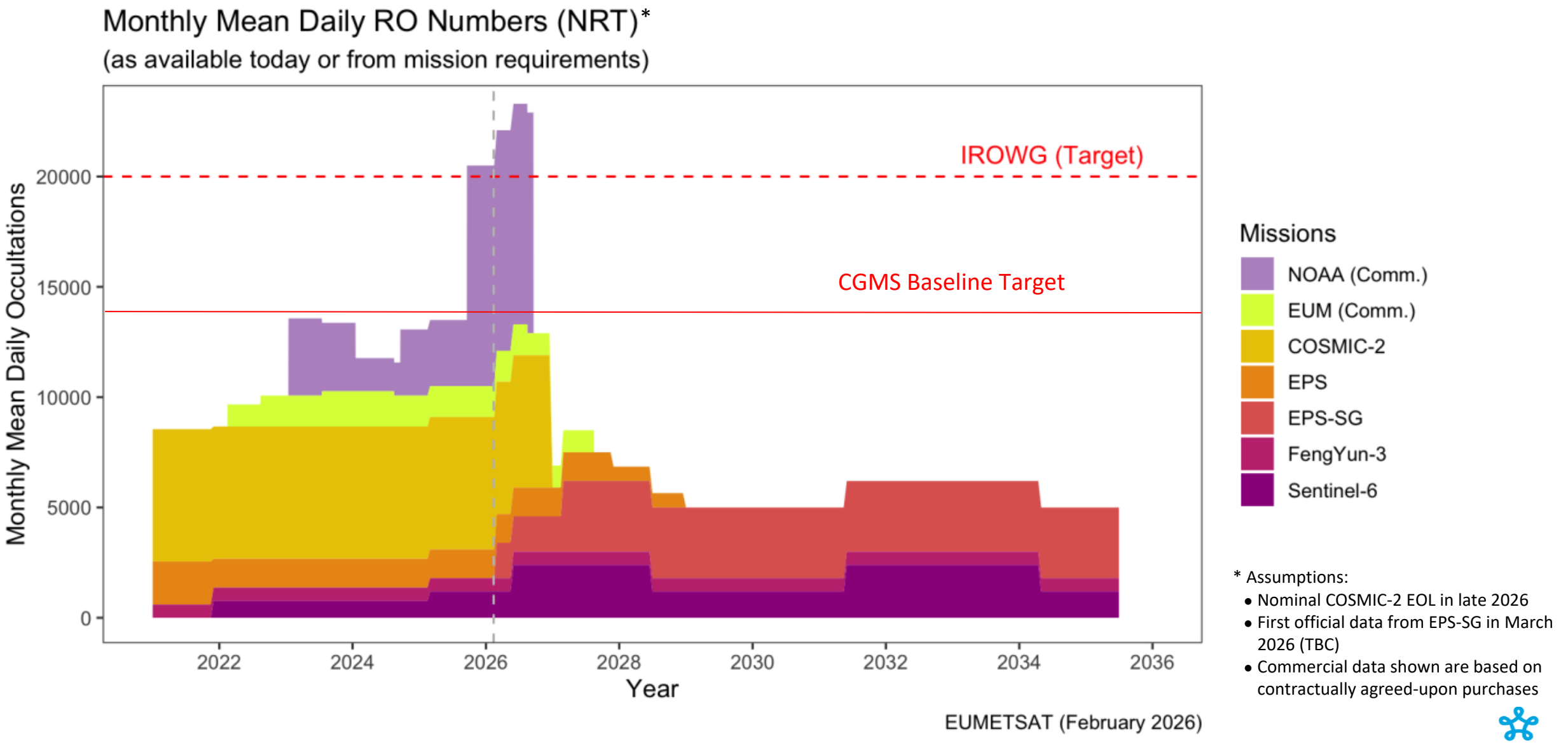
6000 occultations from **low inclination (<30°)**

7600 occultations from **sun-synchronous**

1000 occultations from **other drifting orbits**

WGIII Assessment: Risk of not meeting the CGMS Baseline commitment in low-inclination RO observations after COSMIC-2 at the end of this decade. The SWCG to make a recommendation to WGIII how to separate RO and Ionospheric Electron Density profiles in the CGMS Baseline and Risk Assessment, and the IROWG to articulate and present the risk level and potential impacts associated with a gap of low inclination RO.

Radio Occultation (Atmospheric Temperature, Humidity, and Ionospheric Electron Density)



* Assumptions:

- Nominal COSMIC-2 EOL in late 2026
- First official data from EPS-SG in March 2026 (TBC)
- Commercial data shown are based on contractually agreed-upon purchases

Coordination Group for Meteorological Satellites - CGMS

Multi-purpose Meteorological Imagers (multispectral, visible and IR) (Sea Surface Temperature, Aerosols, Land Surface Temperature, Cloud Properties, Feature Tracking Winds (AMV), Flood Mapping, Fires, Cryosphere Applications (sea ice, snow cover, etc.)

GEO - Evenly spaced satellites

137°W

75.2°W

0°-45.5°E range

14.5°W-165.8°E range

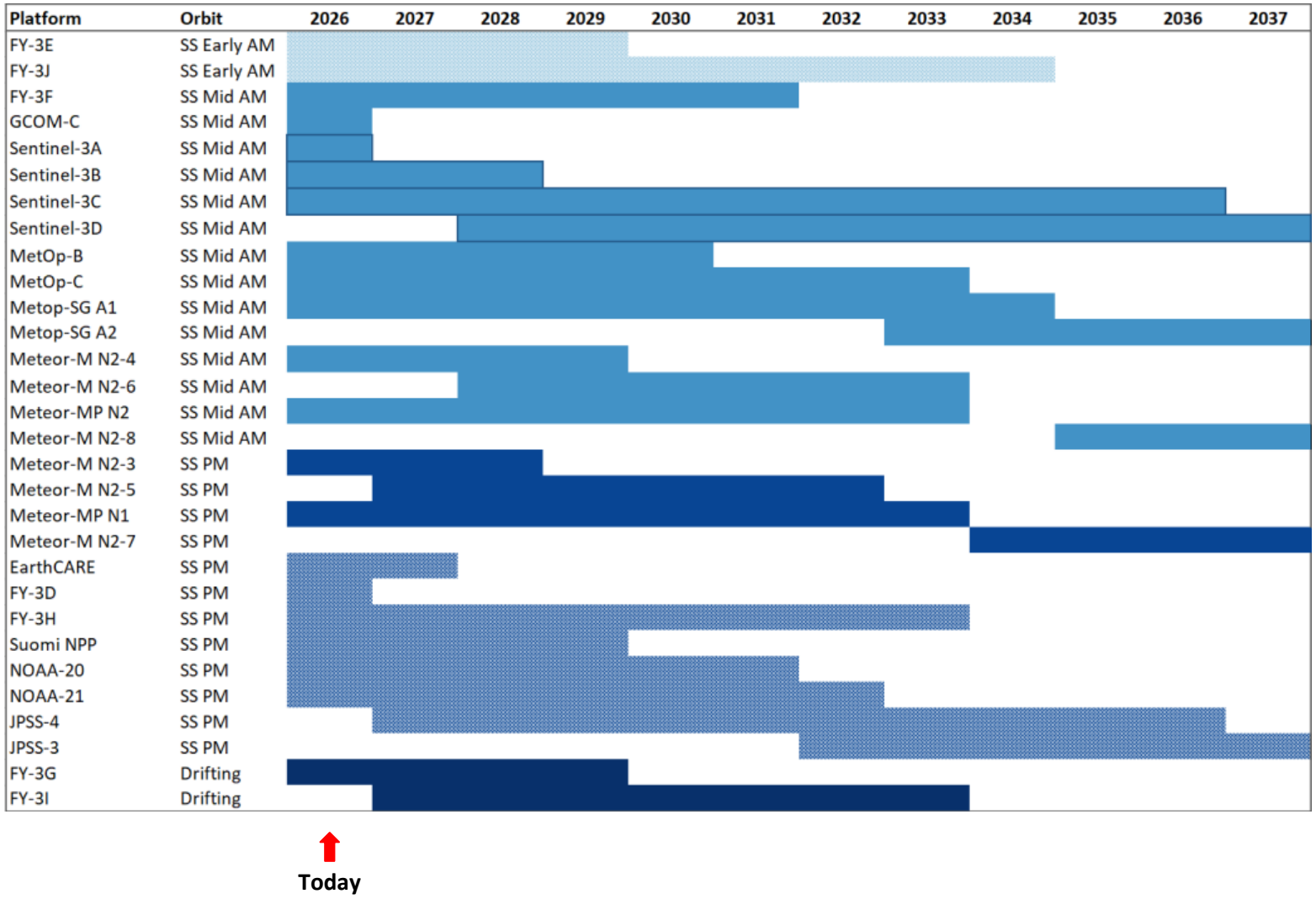
74°-82°E range

86.5°-140°E range

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

Coordination Group for Meteorological Satellites - CGMS

Multi-purpose Meteorological Imagers (multispectral, visible and IR) (Sea Surface Temperature, Aerosols, Land Surface Temperature, Cloud Properties, Feature Tracking Winds (AMV), Flood Mapping, Fires, Cryosphere Applications (sea ice, snow cover, etc.),



LEO

Sun-synchronous early morning

Sun-synchronous mid-morning

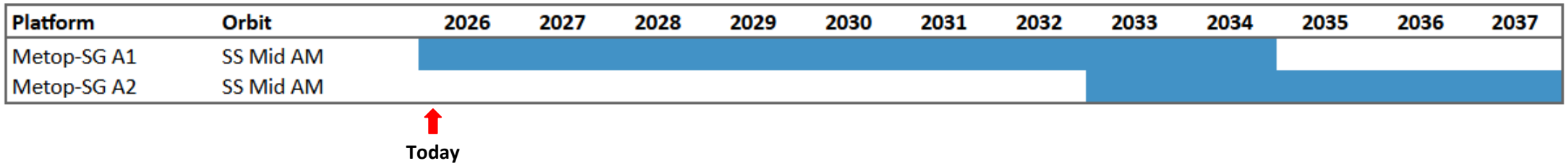
Sun-synchronous afternoon

A day-night visible channel (early morning and afternoon)

IR dual-angle view imagery for high-accuracy SST (morning)

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

Multi-viewing, Multi-channel, Multi-polarisation Imager (Aerosol)

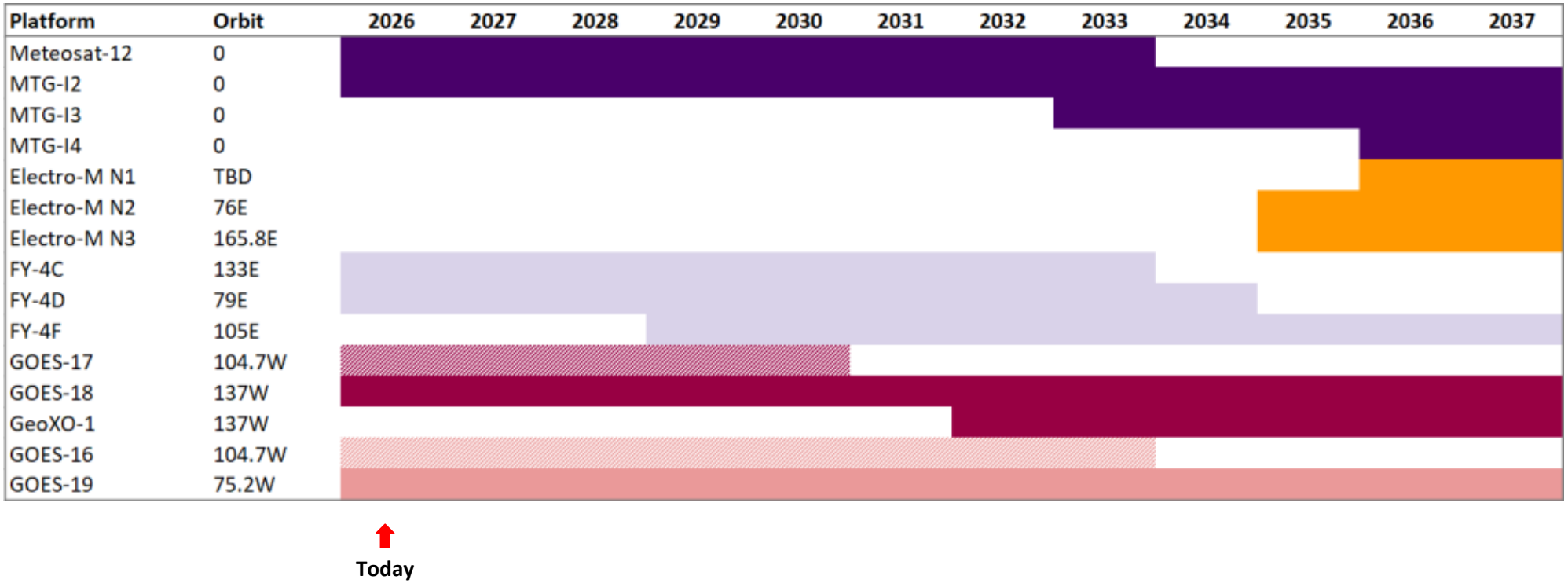


LEO - 1 orbit

Sun-synchronous

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

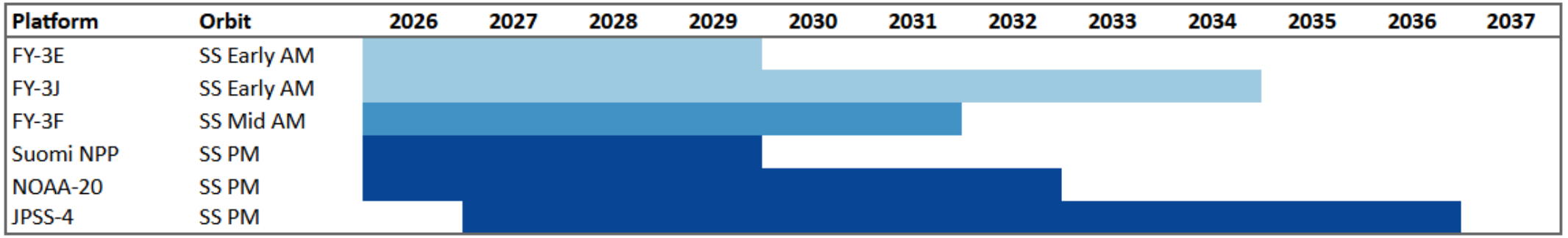
Lightning Mapper (Lightning)



GEO - 4 slots
0°
86.5°-105°E range
137°W
75.2°W

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment. An HLPP objective (1.2) exists to provide the capability for the whole geostationary ring.

Broadband Short/Long Wave Radiometer (Radiation Balance)



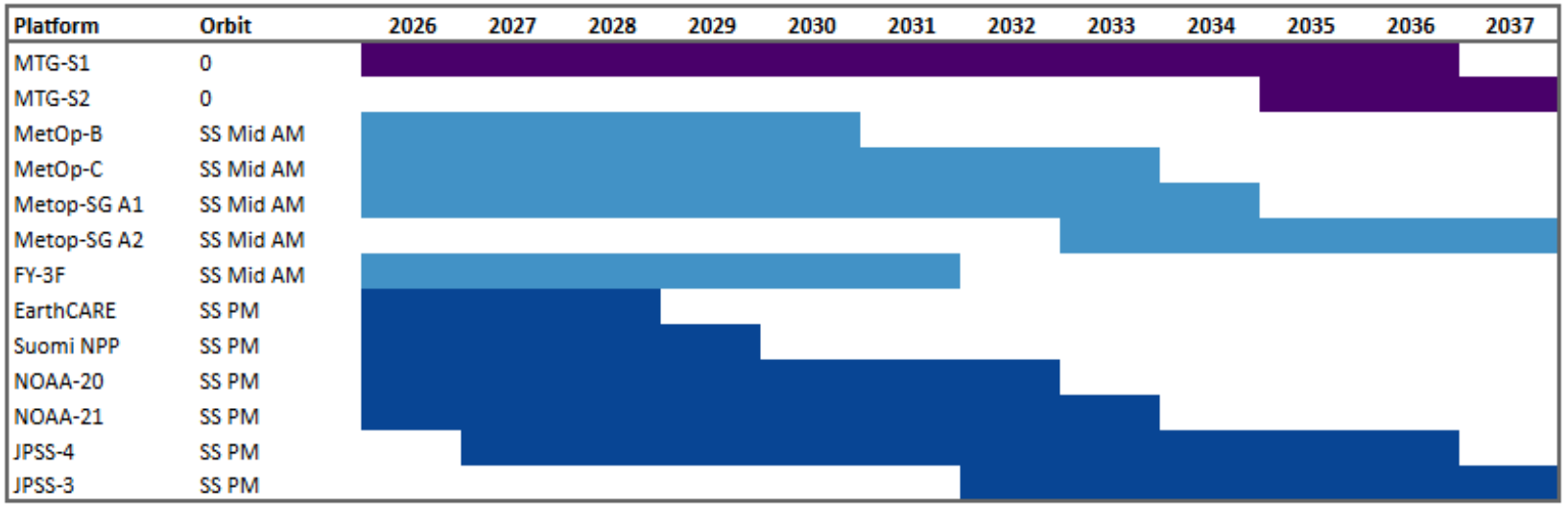
LEO - 2 Orbits

Sun-synchronous morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting the CGMS baseline commitment. Action on WGII to investigate the addition of GEO contributions to the CGMS Baseline.

Visible / UV Spectrometer (Aerosol, Atmospheric Composition: O3, CO2, NO2, SO2, BrO. C)



Today

GEO - 1 Slot

0°

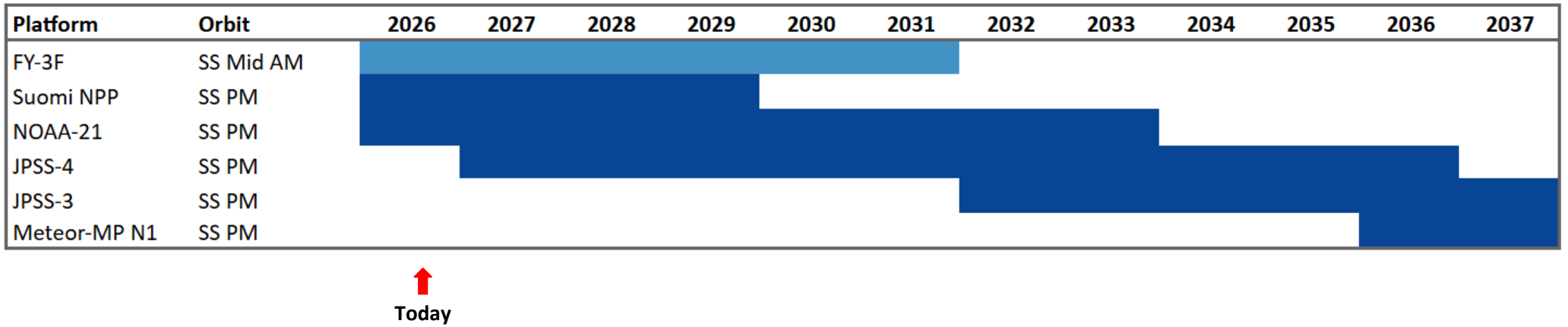
LEO - 2 Orbits

Sun-synchronous mid-morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

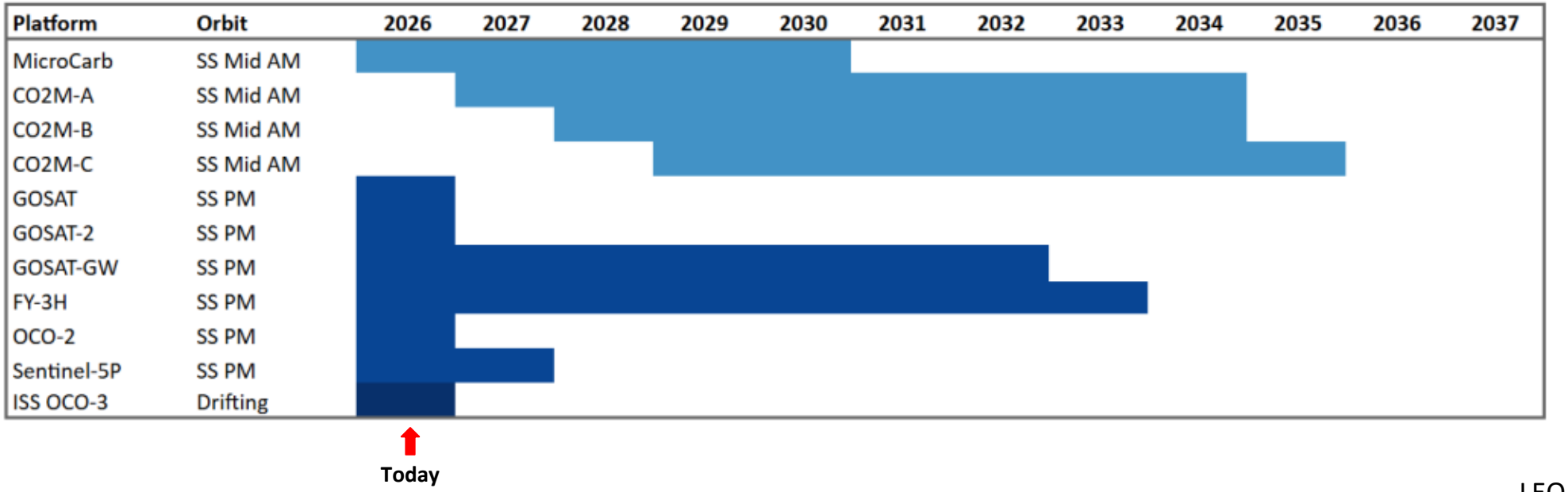
UV Limb Spectrometer (Aerosol, Atmospheric Composition: O3)



LEO - 2 Orbits
Sun-synchronous mid-morning
Sun-synchronous afternoon

WGIII Assessment: Risk of not meeting the CGMS Baseline commitment in the mid-morning orbit in the mid 2030s. WGII is investigating other capabilities for UV limb sounding to complement JPSS.

SWIR Imaging Spectrometer (Atmospheric Composition: CO2, CH4)



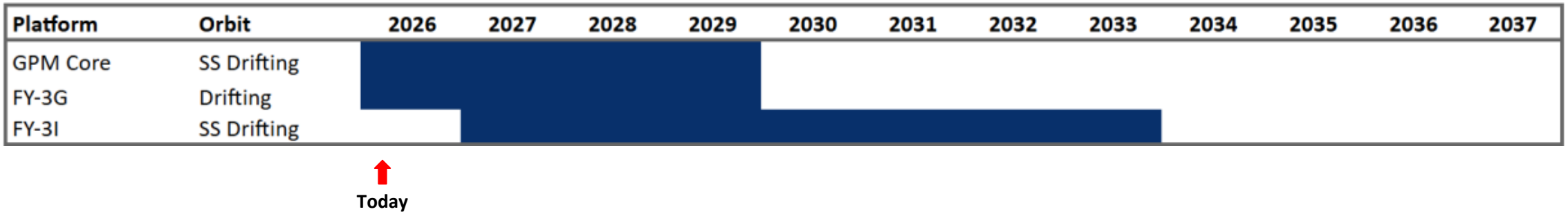
LEO - 2 Orbits

Sun-synchronous late morning

Sun-synchronous afternoon

WGIII Assessment: Slight risk of not meeting CGMS Baseline commitment in the mid 2030s in the afternoon orbit. GHG TT via WGII has action to indicate if SWIR missions for CH4 and CO2 be added to the baseline.

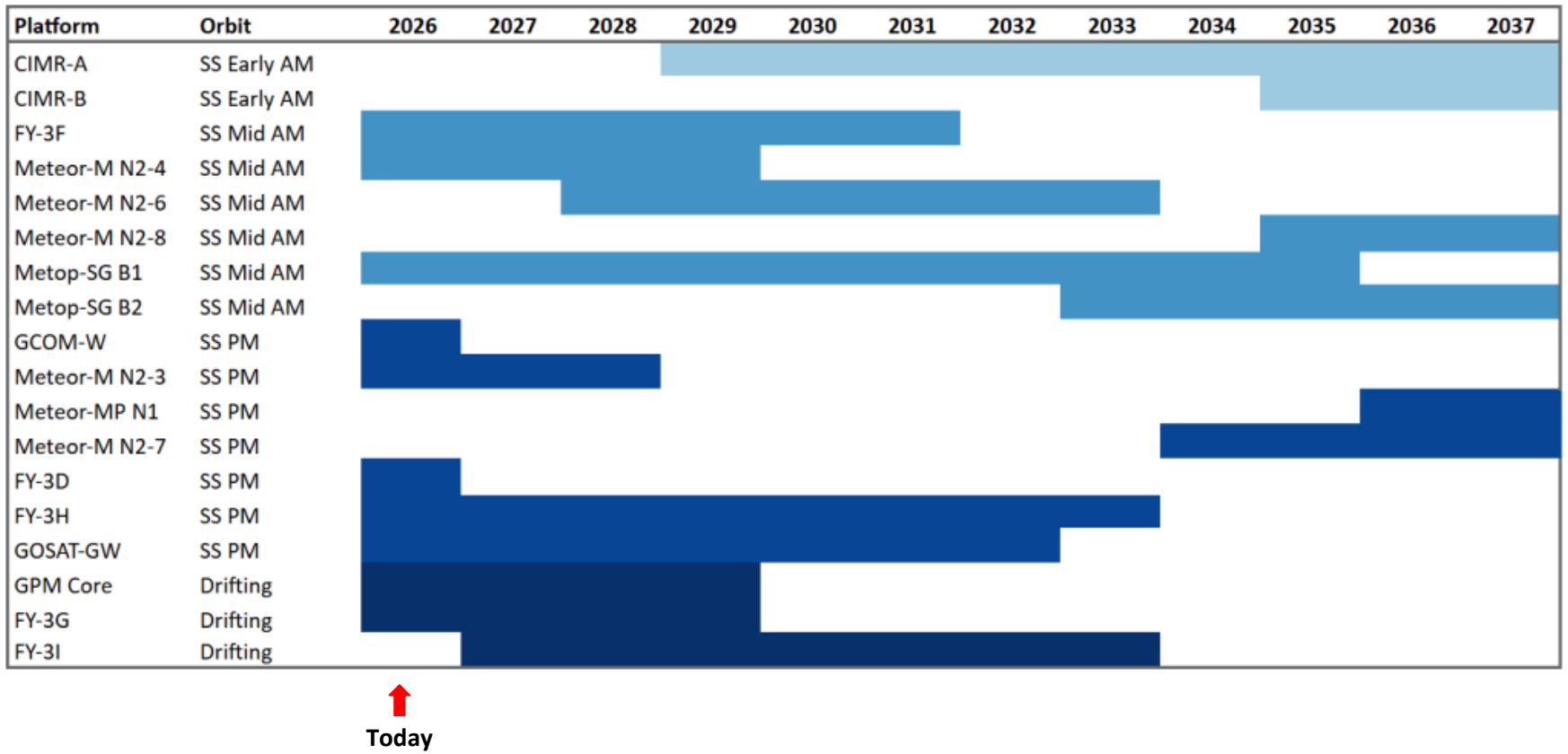
Precipitation Radar (Precipitation)



LEO - 1 orbit
Drifting

WGIII Assessment: Slight risk of not meeting the GGMS Baseline commitment in the early 2030s.

Microwave Imager (Sea Surface Temperature, Ocean Surface Winds, Precipitable Water, Soil Moisture, Snow and Ice properties, Sea Ice Properties)



LEO - 2 Orbits

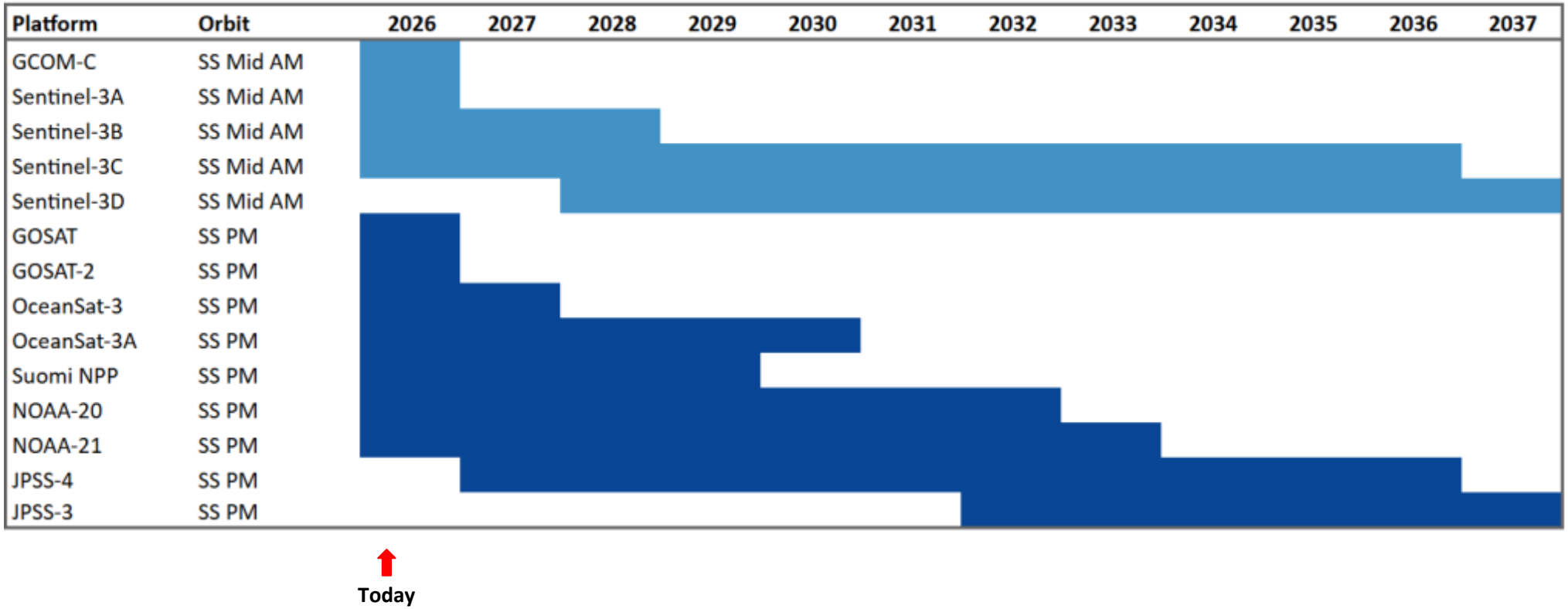
Sun-synchronous mid-morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment. WGIII reviewing WGII proposal to articulate how MW missions with different frequencies should be addressed and visualized in the CGMS Baseline and Risk Assessment.

Coordination Group for Meteorological Satellites - CGMS

Narrow Band Visible IR Imager (Ocean Colour, Aerosols)



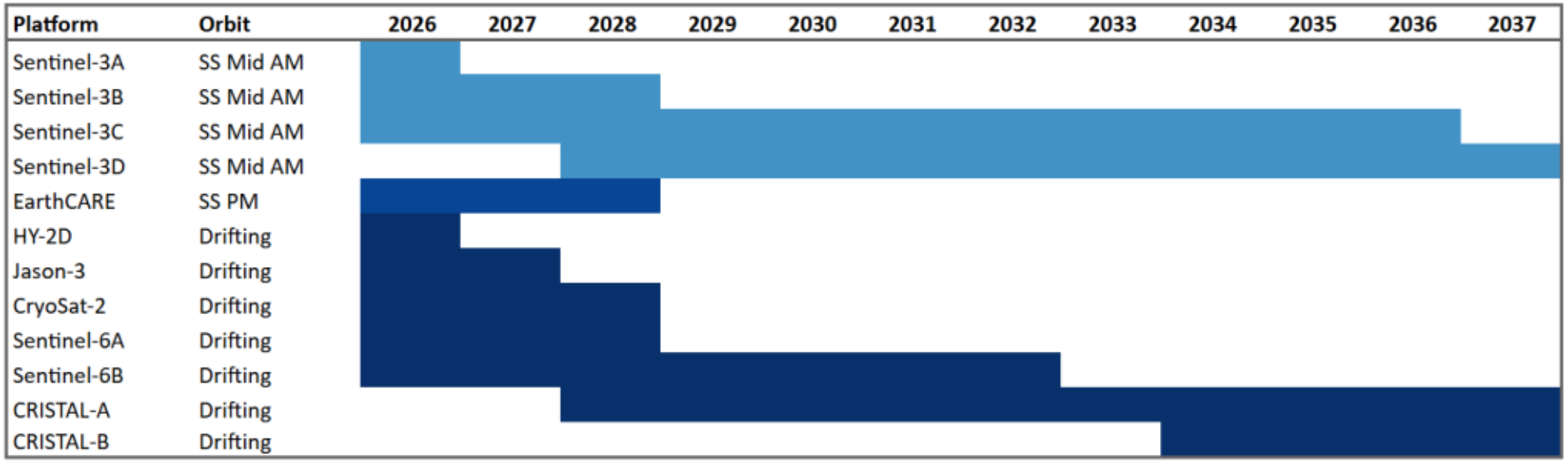
LEO - 2 Orbits

Sun-synchronous mid-morning

Sun-synchronous afternoon

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

Radar Altimetry (Ocean Surface Topography)



LEO - 1 Orbit

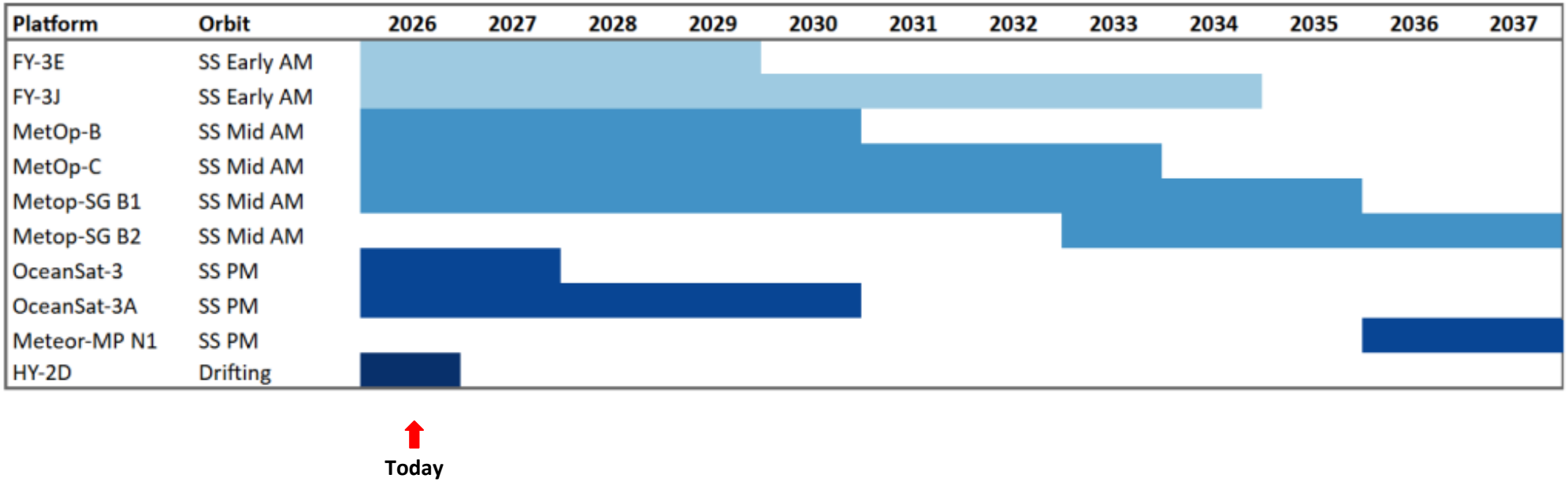
Sun-synchronous mid-morning

Reference mission on a high-precision, drifting orbit

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

Coordination Group for Meteorological Satellites - CGMS

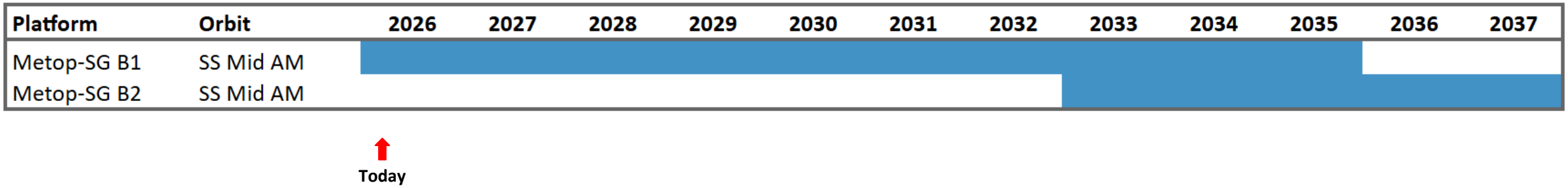
Scatterometry (Ocean Surface Winds)



LEO
Sun-synchronous early morning
Sun-synchronous mid-morning
Sun-synchronous afternoon

WGIII Assessment: Risk of not meeting the CGMS Baseline commitment in the afternoon orbit in the early 2030s.

Sub-millimetre Ice Cloud Imager (Cloud Ice)

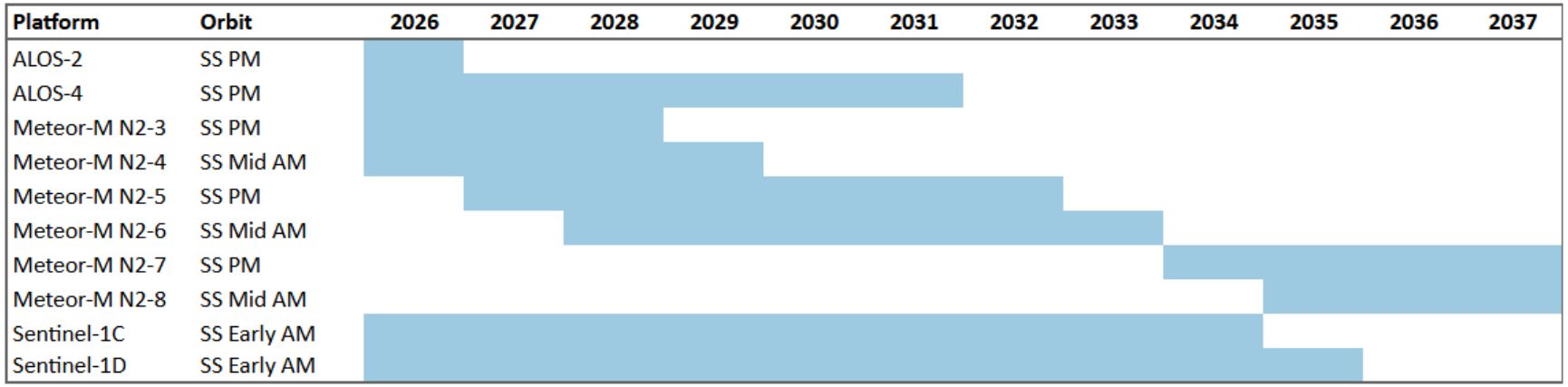


LEO - 1 Orbit

Sun-synchronous mid-morning

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Synthetic Aperture Radar (Soil Moisture, Sea Ice)

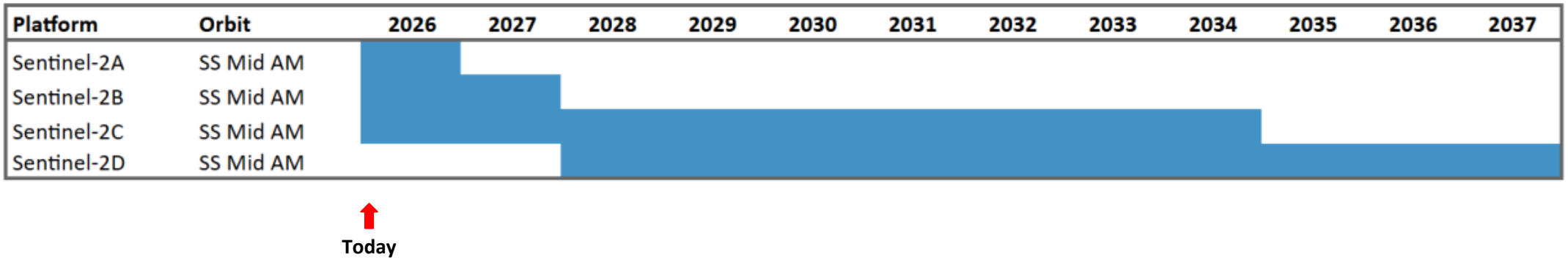


LEO - 1 Orbit

Sun-synchronous

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

High Resolution Optical Imager (Land Use, Vegetation Type and Status, Aerosols)

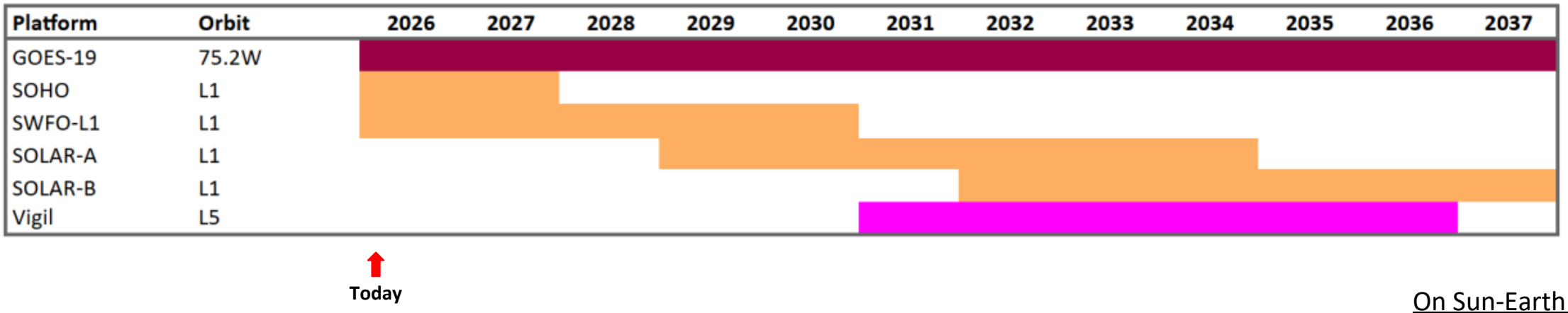


LEO - 1 Orbit

Sun-synchronous

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Coronagraph (Coronagraphy)



On Sun-Earth Line

L1

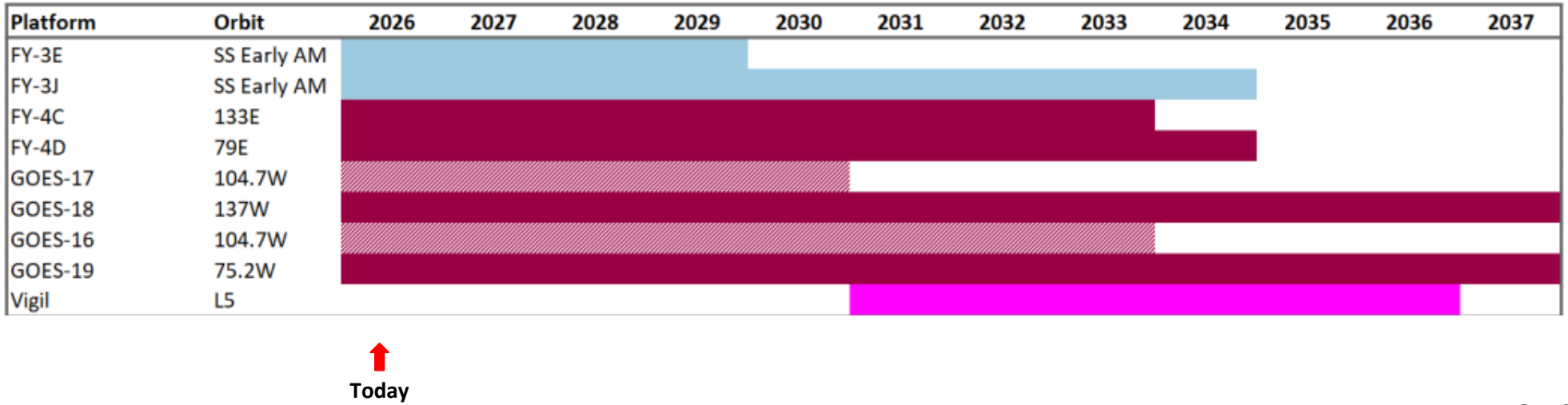
GEO - 1 slot

Off Sun-Earth Line

L5

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

EUV Imager (EUV Imagery)



On Sun-Earth Line

LEO - 1 orbit

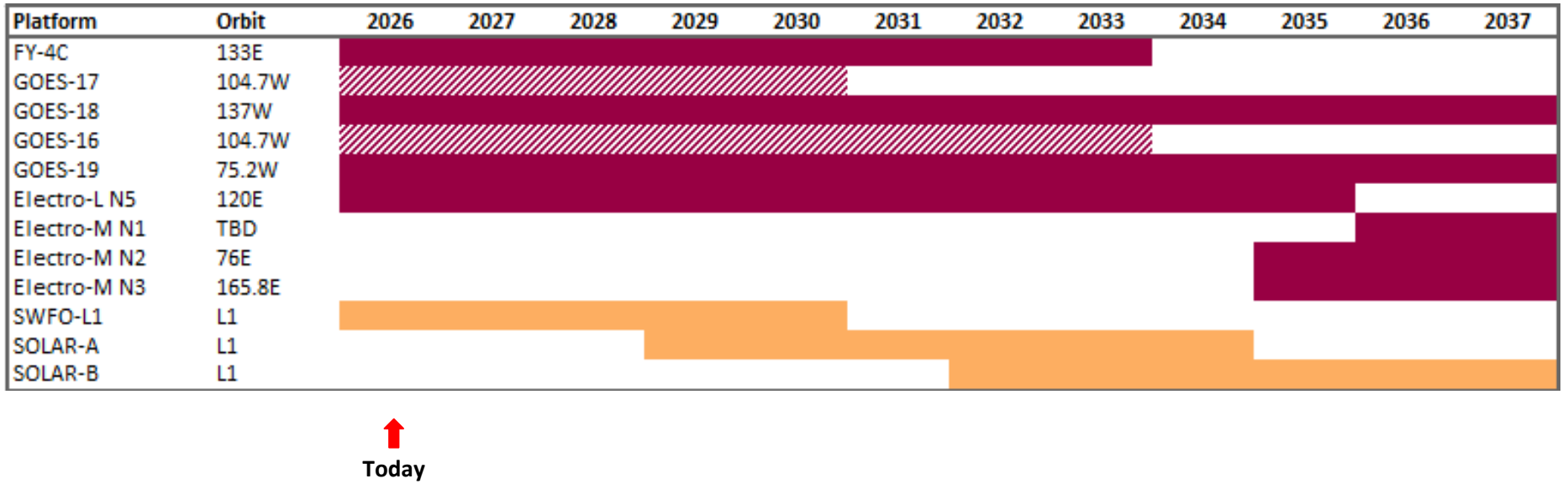
GEO - 2 slots

Off Sun-Earth Line

L5

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

X-Ray Spectrograph (X-Ray Flux)



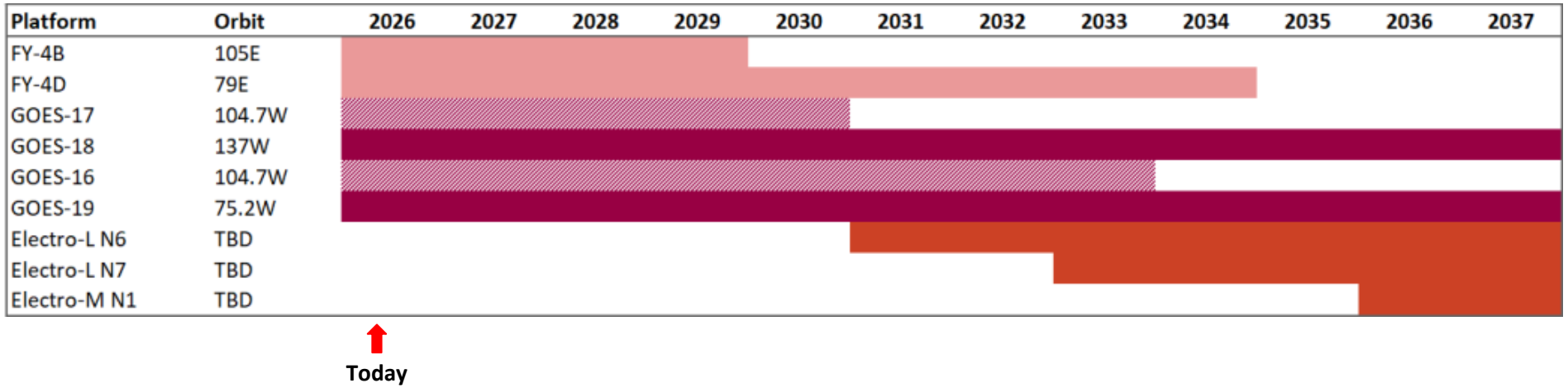
On Sun-Earth Line

GEO - 5 slots

L1

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Low Energy Electrons and Protons (Magnetospheric particles)



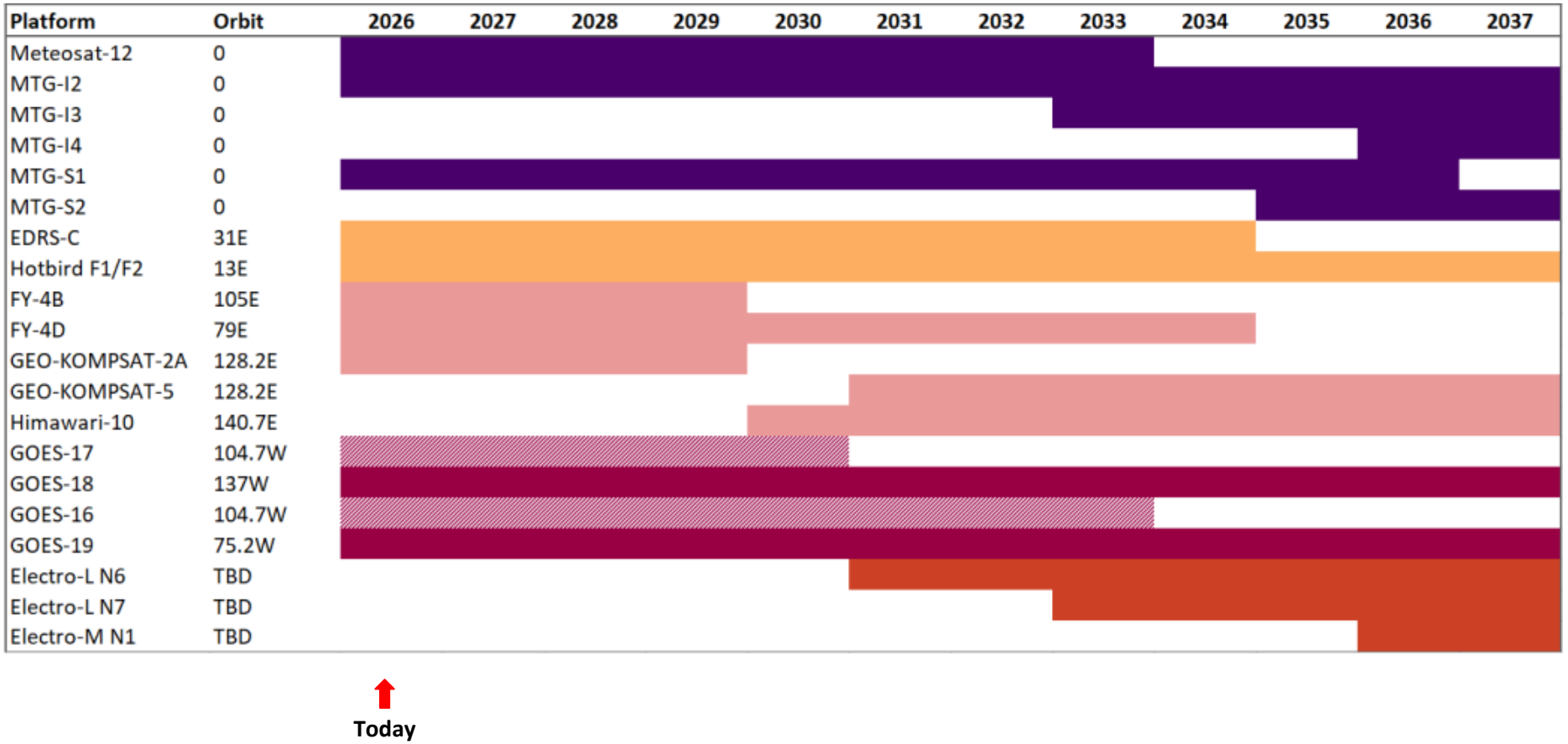
GEO, as in-situ measurements

105°E

75.2°W, 104.7°W, 137.2°W

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment.

High Energy Electrons and Protons (Magnetospheric and solar energetic particles)



GEO, as in-situ measurements

0°

13°E, 31°E

105°E, 128°E, 140.7°E

75.2°W, 104.7°W, 137.2°W

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment. SWCG to clearly define the quantitative threshold between High and Very High Energy Electrons and Protons.

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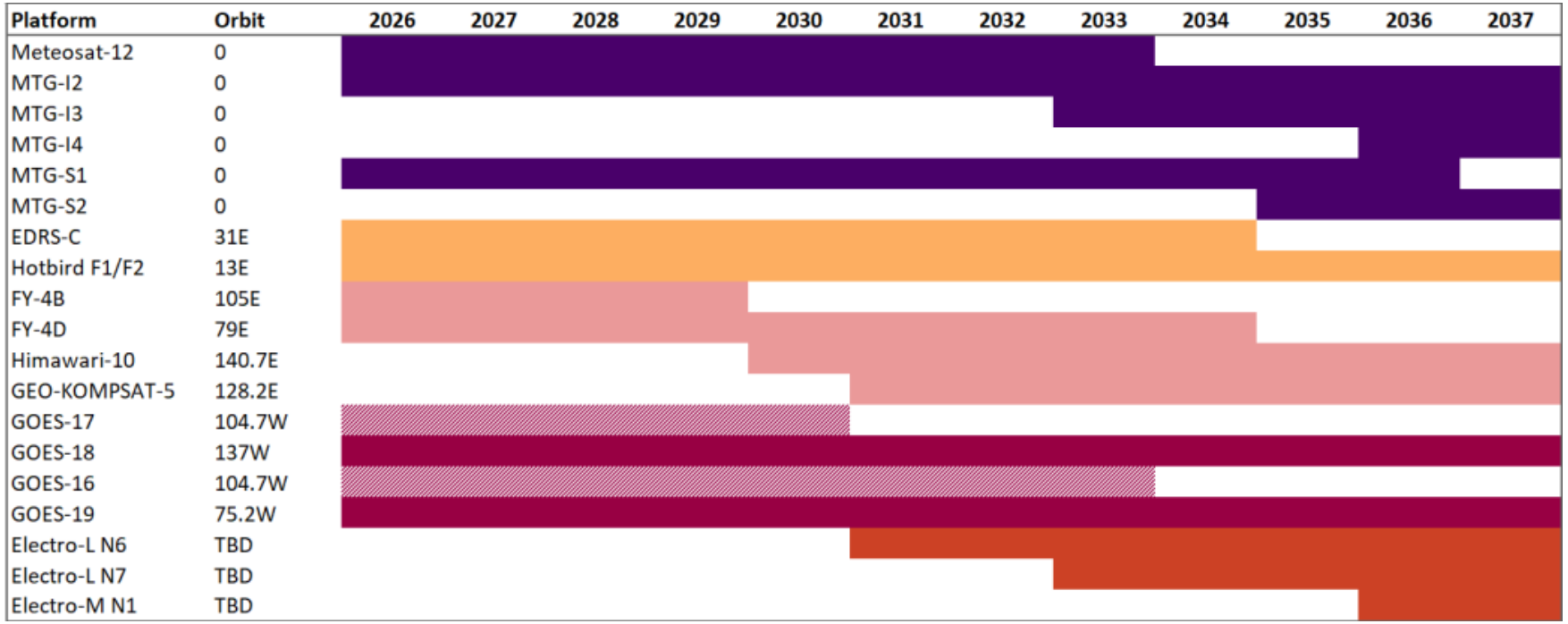
Very High Energy Protons (Magnetospheric and solar energetic particles)



GEO, as in-situ measurements

0°

13°E, 31°E

105°E, 140.7°E

75.2°W, 104.7°W, 137.2°W

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment. SWCG to clearly define the quantitative threshold between High and Very High Energy Electrons and Protons.

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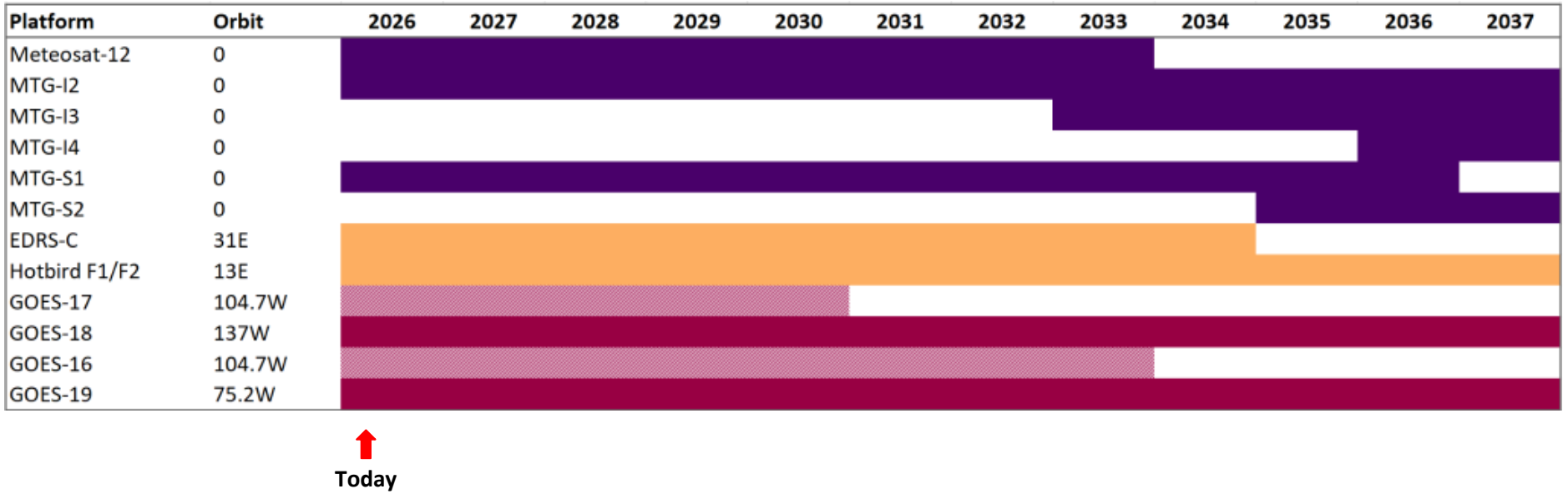
Energetic Heavy Ions (Magnetospheric and solar energetic particles)



GEO, as in-situ measurements

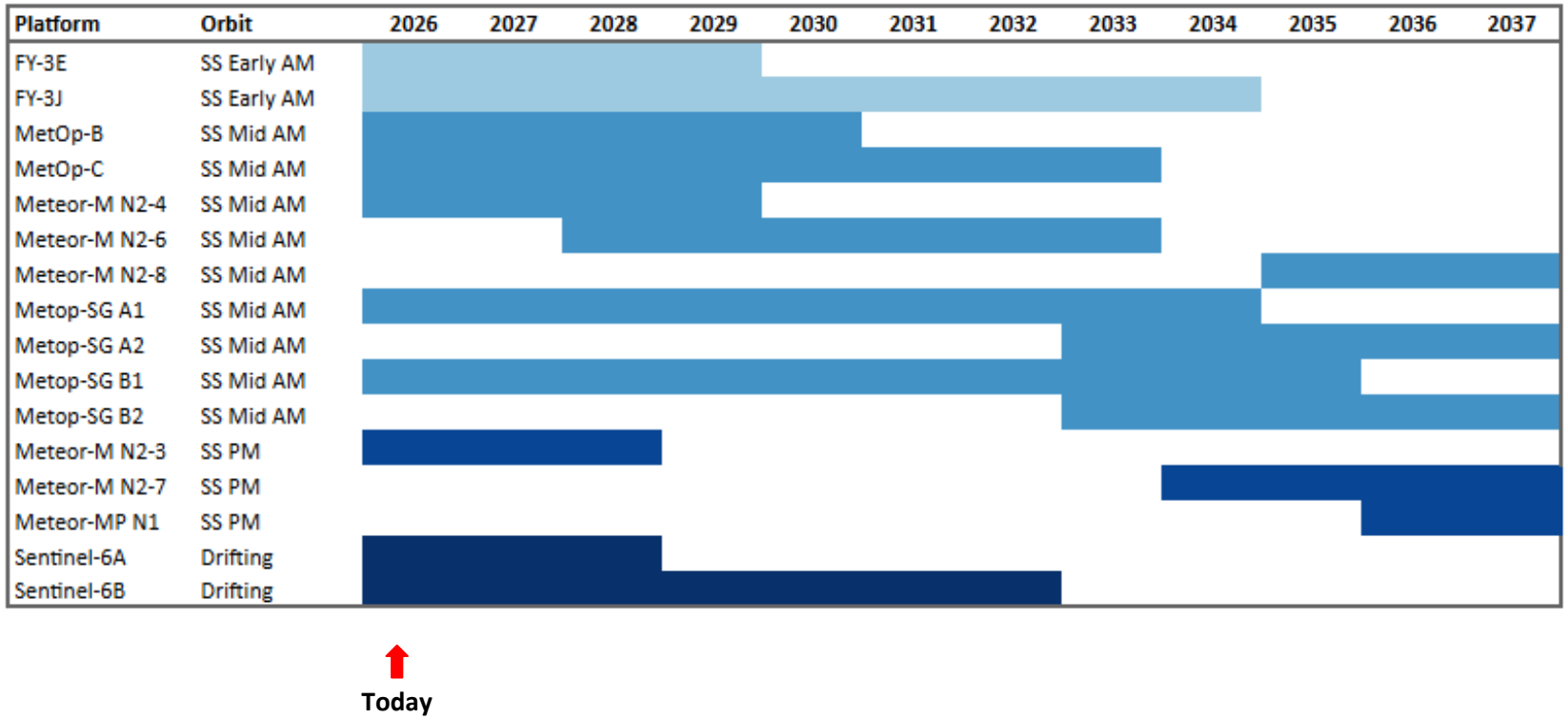
0°

13°E, 31°E

75.2°W, 104.7°W, 137.2°W

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Energetic Particle Sensor LEO (Magnetospheric)



LEO - 3 orbits as in-situ measurements

WGIII Assessment: Risk of not meeting the CGMS Baseline commitment in the afternoon orbit in the early 2030s.

Energetic Particle Sensor L1 (Solar Energetic Particles)

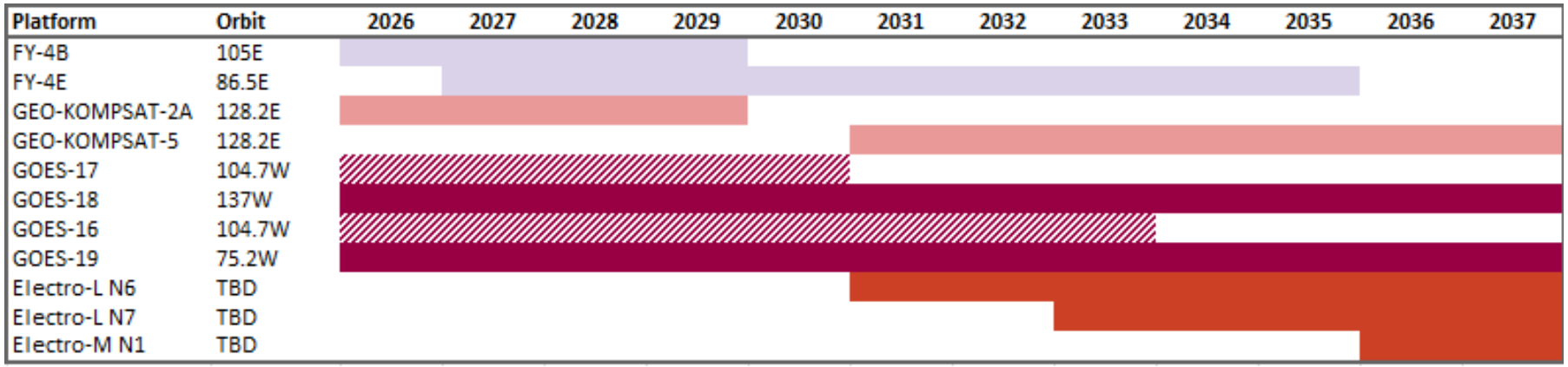
Platform	Orbit	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
ACE	L1												
SOHO	L1												
DSCOVR	L1												
SWFO-L1	L1												
SOLAR-A	L1												
SOLAR-B	L1												

Today

L1 as in-situ measurement

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Magnetometer GEO (Earth's Magnetic Field)



GEO, as in-situ measurements

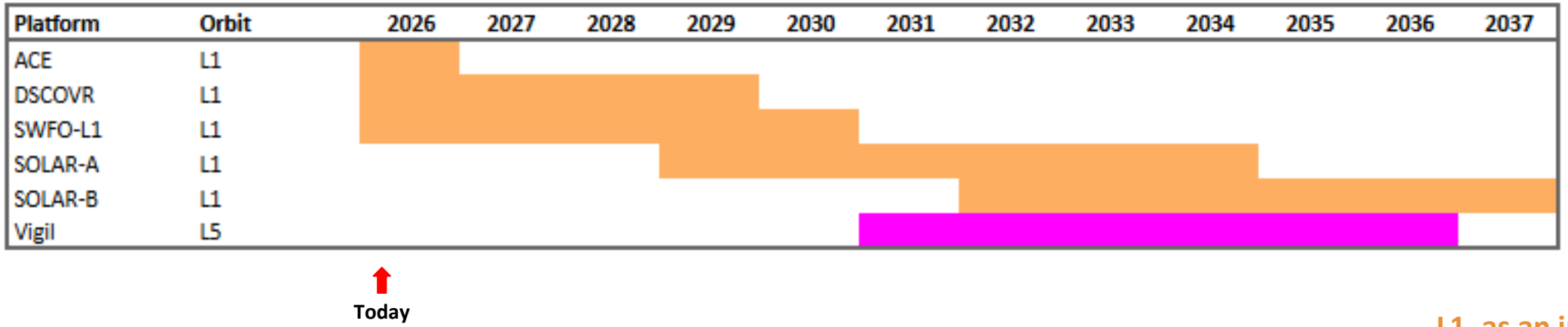
86.5°E, 105°E

128°E

137°W, 104.7°W, 75.2°W

WGIII Assessment: Slight risk of not meeting the CGMS Baseline commitment at 128°E in 2030.

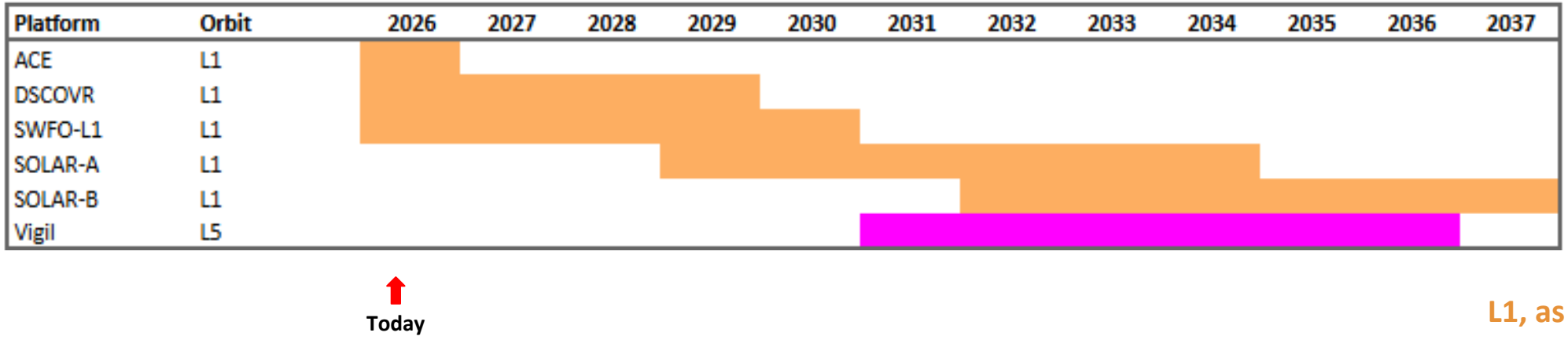
Magnetometer L1 (Interplanetary Magnetic Field)



L1, as an in-situ measurement
L5, as an in-situ measurement

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment

Plasma Analyzer (Solar Wind)



L1, as an in-situ measurement

L5, as an in-situ measurement

WGIII Assessment: Low risk of not meeting the CGMS Baseline commitment