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EDITORIAL ANALYSIS

Methane Super-Emitters Exposed — Satellite Monitoring Must Drive Climate Accountability

 **DOWN TO EARTH**

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SUBJECTS COVERED**ENVIRONMENT****SCIENCE & TECH****GS PAPERS****GS3****CURATED & WRITTEN BY****Bharat Choudhary**

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Down to Earth 22 March 2026 **GS3**

DTE Down to Earth | MAINS RELEVANCE: **GS Paper 3**



INTERVIEW ANGLE

"Satellites can now pinpoint individual methane leaks from oil and gas facilities — how should this data reshape global climate negotiations?"

WHY IN NEWS

New satellite-based monitoring by MethaneSAT and other instruments has identified over 1,000 methane super-emitting events at oil and gas facilities worldwide, with Turkmenistan leading with 184 events — raising questions about accountability in the Global Methane Pledge.

The Methane Emergency

Methane (CH₄) is the **second most important greenhouse gas** after CO₂, but its near-term climate impact is far greater:

PROPERTY	CO ₂	METHANE
Atmospheric lifetime	~300-1,000 years	~12 years
Global Warming Potential (20-year)	1x	80x
Global Warming Potential (100-year)	1x	28x
Contribution to warming since 1750	~66%	~25%

Because methane is short-lived but potent, **cutting methane emissions is the single fastest way to slow near-term warming**. The Global Methane Pledge (COP26, Glasgow, 2021) committed 150+ countries to reducing methane emissions by **30% from 2020 levels by 2030**.

Satellite Detection: A Game Changer

Until recently, methane emissions were estimated using bottom-up inventories — essentially self-reported data from countries and companies. Satellites have changed this fundamentally:

SATELLITE/INSTRUMENT	OPERATOR	CAPABILITY
MethaneSAT	EDF (Environmental Defense Fund)	Maps methane across oil/gas basins at 100m resolution
GHGSat	Private (Canada)	Point-source detection at 25m resolution
EMIT	NASA	Identifies super-emitters globally
Tanager-1	Carbon Mapper	Quantifies individual point sources
Tango-Carbon	ESA (planned 2026 launch)	Area flux mapping at 300m

The key finding: **Turkmenistan dominates the global “Top 25” methane super-emitters**, with emissions from aging Soviet-era oil and gas infrastructure. The country had **184 out of 1,005 detected super-emitting events** — releasing methane at rates of 3.7 to 10.5 tonnes per hour.

Why This Matters for India

India is the **5th largest methane emitter** globally, though India’s sources are primarily:

- **Agriculture:** Rice paddies (anaerobic decomposition) and livestock (enteric fermentation) — ~50% of India’s methane
- **Waste:** Landfills and open dumping — ~20%
- **Energy:** Coal mines and natural gas systems — ~30%

India did **not sign the Global Methane Pledge** at COP26, arguing that its per capita emissions are low and that methane from agriculture is fundamentally different from industrial methane leaks.

The editorial argues this distinction is **scientifically valid but strategically risky** — as satellite monitoring makes all emissions transparent, India’s agricultural methane will face increasing scrutiny regardless of its source.

Policy Recommendations

- 1 **Support satellite transparency:** India should endorse open satellite methane data rather than opposing it — transparency helps identify fixable leaks
- 2 **Target low-hanging fruit:** Coal mine methane capture and landfill methane recovery are technically feasible and economically viable
- 3 **Rice cultivation reform:** Alternate Wetting and Drying (AWD) reduces rice paddy methane by 30-50% without yield loss — needs wider adoption

- ④ **Livestock management:** Feed additives (e.g., Asparagopsis seaweed) can reduce enteric methane by up to 80%
- ⑤ **National Methane Action Plan:** India needs a specific methane mitigation strategy beyond the general NDC commitments

UPSC RELEVANCE

Methane GWP, Global Methane Pledge, MethaneSAT, EMIT, methane sources.

MAINS GS-3:

Climate change mitigation, satellite monitoring technology, methane and agriculture, India's climate commitments vs. agricultural realities.

ESSAY:

“When satellites reveal what nations hide, transparency becomes the most powerful climate tool.”

★ FACTS CORNER — KNOWLEDGEPEDIA

METHANE FACTS:

- 2nd most important GHG after CO₂
- GWP (20-year): 80x CO₂
- Atmospheric lifetime: ~12 years
- Contribution to warming: ~25% since 1750
- India: 5th largest methane emitter globally

GLOBAL METHANE PLEDGE:

- Launched: COP26, Glasgow (November 2021)
- Target: 30% reduction from 2020 levels by 2030
- Signatories: 150+ countries
- India: Did NOT sign (argued per capita emissions are low)
- Top 3 emitters: China, Russia, USA

SATELLITE MONITORING:

- MethaneSAT: EDF; maps oil/gas basins globally
- GHGSat: Private (Canada); 25m resolution point sources
- EMIT: NASA; super-emitter identification
- Turkmenistan: 184/1,005 detected super-emitting events

INDIA'S METHANE SOURCES:

- Agriculture (rice + livestock): ~50%
- Waste (landfills + open dumps): ~20%
- Energy (coal mines + gas): ~30%

OTHER RELEVANT FACTS:

- Alternate Wetting and Drying (AWD): Reduces rice paddy methane by 30-50%
- India's NDC: Net-zero by 2070; 50% non-fossil power by 2030
- Harit Dhara (anti-methanogenic feed supplement): ICAR innovation to cut livestock methane
- Coal Mine Methane: India has ~1,200 coal mines; methane capture technology available but underdeployed

Paris Agreement Article 4: All countries must submit progressively ambitious NDCs

Sources: [Down to Earth](#) , [Copernicus ACP](#) , [Space.com](#)

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