

# RadLab Platform: Investigating Space Radiation

National Aeronautics and  
Space Administration



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### The RadLab portal and the RadLab data API

RadLab is a portal that aims to provide a single point of access to radiation telemetry data from multiple databases maintained by multiple space agencies.

The Web interface provides the ability to query, visualize, inspect, and download data; for example, [time series plots](#) of readings from multiple radiation detectors, [pairwise comparisons](#) of detector readings, and [geospatial visualizations](#) of radiation dose and flux registered by the detectors.

[The underlying API](#) enables data selection and retrieval at a programmatic level.

The demo version of RadLab contains the data obtained from four detectors included in the DORELI project (DOSTEL1, DOSTEL2, Lidal, REM; [Italian Space Agency](#)) and the data from three Liulin-5 detectors ([Bulgarian Academy of Sciences](#)). All seven detectors are/were located on the International Space Station (ISS).

## RadLab Platform Capabilities

### ► Data overview

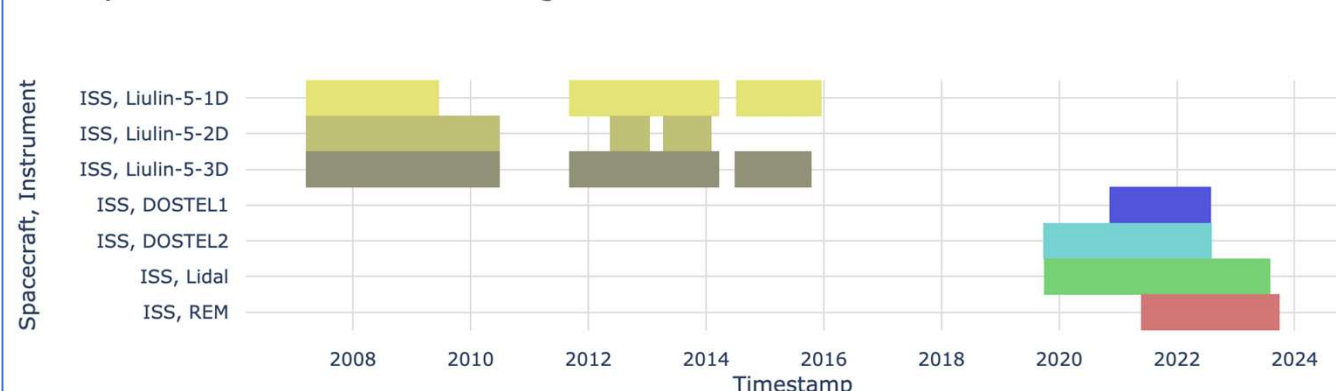
Time series plots

Data comparison

Geographical plots

Data access / API

### Time span of available detector readings





- Data overview
- Time series plots
- Data comparison
- Geographical plots
- Data access / API

**Spacecraft, Instrument**

- ISS, DOSTEL1
- ISS, DOSTEL2
- ISS, Lidal
- ISS, REM
- ISS, Liulin-5-1D
- ISS, Liulin-5-2D
- ISS, Liulin-5-3D

**Measurement**

- Total dose rate
- Total flux

**Time period**

Start: 04 / 01 / 2022, 12 : 00 AM

End: 04 / 02 / 2022, 12 : 00 AM

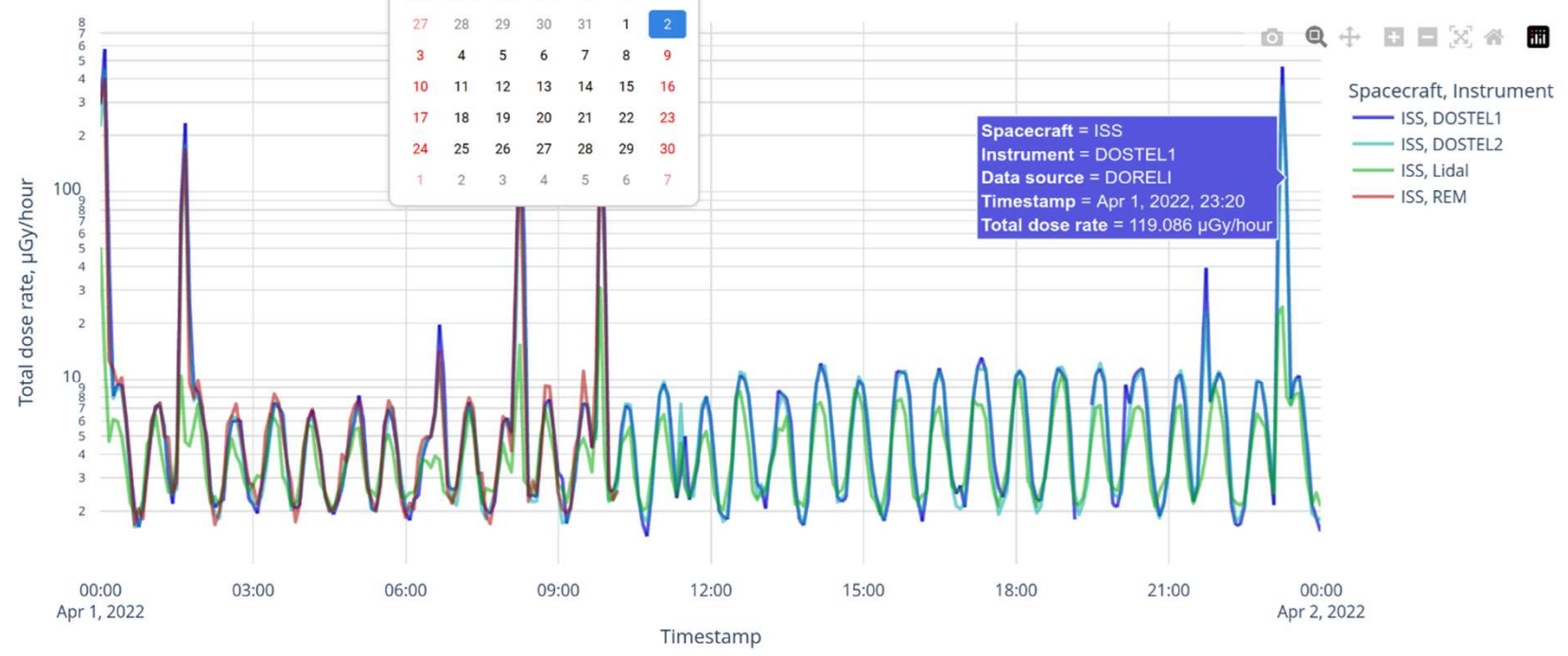
**Scale**

- Linear
- Log

Update

**Retrieved data**

Formats:  
[CSV](#), [TSV](#), [JSON](#), [HTML](#)



# Multi-format raw data download capabilities

## HTML

spacecraft	instrument	source	timestamp	dose_rate_total
ISS	DOSTEL1	DORELI	2022-04-01T00:00:00	290.826900363636
ISS	DOSTEL2	DORELI	2022-04-01T00:00:00	225.322131
ISS	Lida1	DORELI	2022-04-01T00:00:00	49.921313777676
ISS	REM	DORELI	2022-04-01T00:00:00	304.45104
ISS	DOSTEL1	DORELI	2022-04-01T00:05:00	576.20498774359
ISS	DOSTEL2	DORELI	2022-04-01T00:05:00	441.191662057508
ISS	Lida1	DORELI	2022-04-01T00:05:00	12.4811198675547
ISS	REM	DORELI	2022-04-01T00:05:00	394.68912
ISS	DOSTEL1	DORELI	2022-04-01T00:10:00	42.0836981052632
ISS	DOSTEL2	DORELI	2022-04-01T00:10:00	17.2710316875
ISS	Lida1	DORELI	2022-04-01T00:10:00	4.666333096772
ISS	REM	DORELI	2022-04-01T00:10:00	12.599346
ISS	DOSTEL1	DORELI	2022-04-01T00:15:00	8.081070962264
ISS	DOSTEL2	DORELI	2022-04-01T00:15:00	7.874416256410
ISS	Lida1	DORELI	2022-04-01T00:15:00	6.100163333799
ISS	REM	DORELI	2022-04-01T00:15:00	11.334756
ISS	DOSTEL1	DORELI	2022-04-01T00:20:00	9.307428

## CSV

#instrument	spacecraft	source	timestamp	flux_total
DOSTEL2	ISS	DORELI	2021-01-01T	0.25882892
DOSTEL2	ISS	DORELI	2021-01-01T	0.39735477
DOSTEL2	ISS	DORELI	2021-01-01T	0.43372988
DOSTEL2	ISS	DORELI	2021-01-01T	0.29760066
DOSTEL2	ISS	DORELI	2021-01-01T	0.16540546
DOSTEL2	ISS	DORELI	2021-01-01T	0.1251464
DOSTEL2	ISS	DORELI	2021-01-01T	0.11808112

## Multiple JSON formats

JSON Raw Data Headers

Save Copy Collapse All Expand All (slow) Filter JSON

columns:

- 0: "spacecraft"
- 1: "instrument"
- 2: "source"
- 3: "timestamp"
- 4: "dose\_rate\_total"
- 5: "latitude"
- 6: "longitude"
- 7: "altitude"
- 8: "b"
- 9: "l"

index: [...]

data:

- 0:
  - 0: "ISS"
  - 1: "DOSTEL1"
  - 2: "DORELI"
  - 3: "2022-04-01T00:00:00"

JSON Raw Data Headers

Save Copy Collapse All Expand All (slow) Filter JSON

```

0:
  spacecraft: "ISS"
  instrument: "DOSTEL1"
  source: "DORELI"
  timestamp: [...]
  dose_rate_total: [...]
  latitude: [...]
  longitude: [...]
  altitude: [...]
  b: [...]
  l: [...]
1:
  spacecraft: "ISS"
  instrument: "DOSTEL2"
  source: "DORELI"
  timestamp: [...]
  dose_rate_total: [...]
    0: 225.322131
            
```



- Data overview
- Time series plots
- Data comparison
- Geographical plots
- Data access / API

**Spacecraft, Instrument (X axis)**

- ISS, DOSTEL1
- ISS, DOSTEL2
- ISS, Lidal
- ISS, REM
- ISS, Liulin-5-1D
- ISS, Liulin-5-2D
- ISS, Liulin-5-3D

**Spacecraft, Instrument (Y axis)**

- ISS, DOSTEL1
- ISS, DOSTEL2
- ISS, Lidal
- ISS, REM
- ISS, Liulin-5-1D
- ISS, Liulin-5-2D
- ISS, Liulin-5-3D

**Measurement**

- Total dose rate
- Total flux

**Time period**

Start:

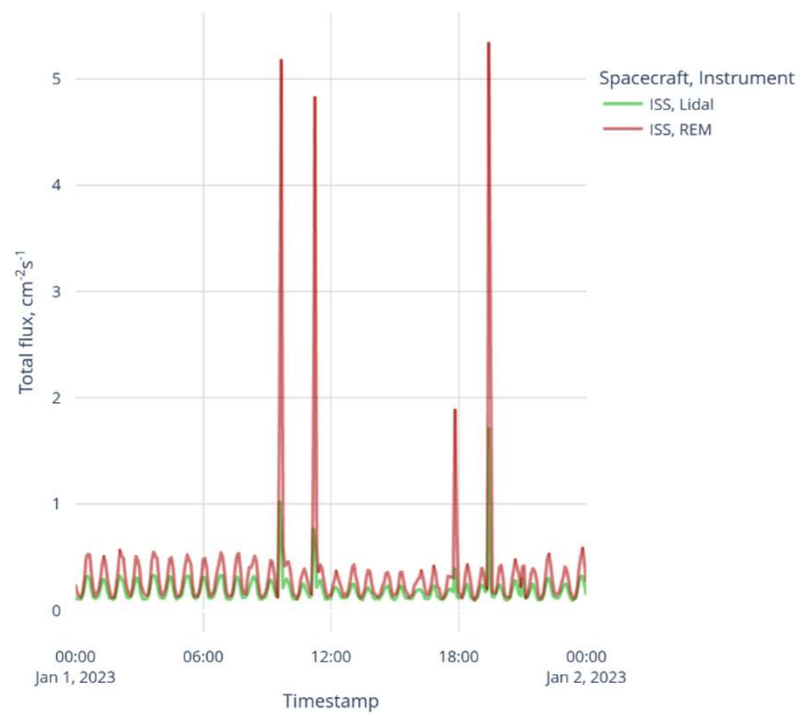
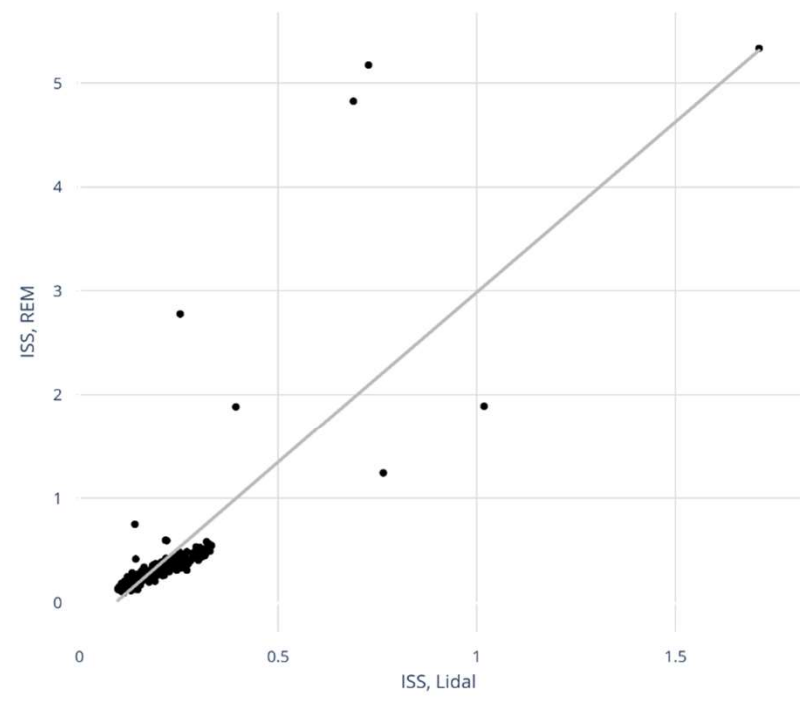
End:

**Scale**

- Linear
- Log

**Retrieved data**

Formats:  
[CSV](#), [TSV](#), [JSON](#), [HTML](#)



- Data overview
- Time series plots
- Data comparison
- ▶ Geospatial plots
- Data access / API

**Spacecraft, Instrument**

- ISS, DOSTEL1
- ISS, DOSTEL2
- ISS, Lidal
- ISS, REM
- ISS, Liulin-5-1D
- ISS, Liulin-5-2D
- ISS, Liulin-5-3D

**Measurement**

- Total dose rate
- Total flux

---

**Time period**

Start:

End:

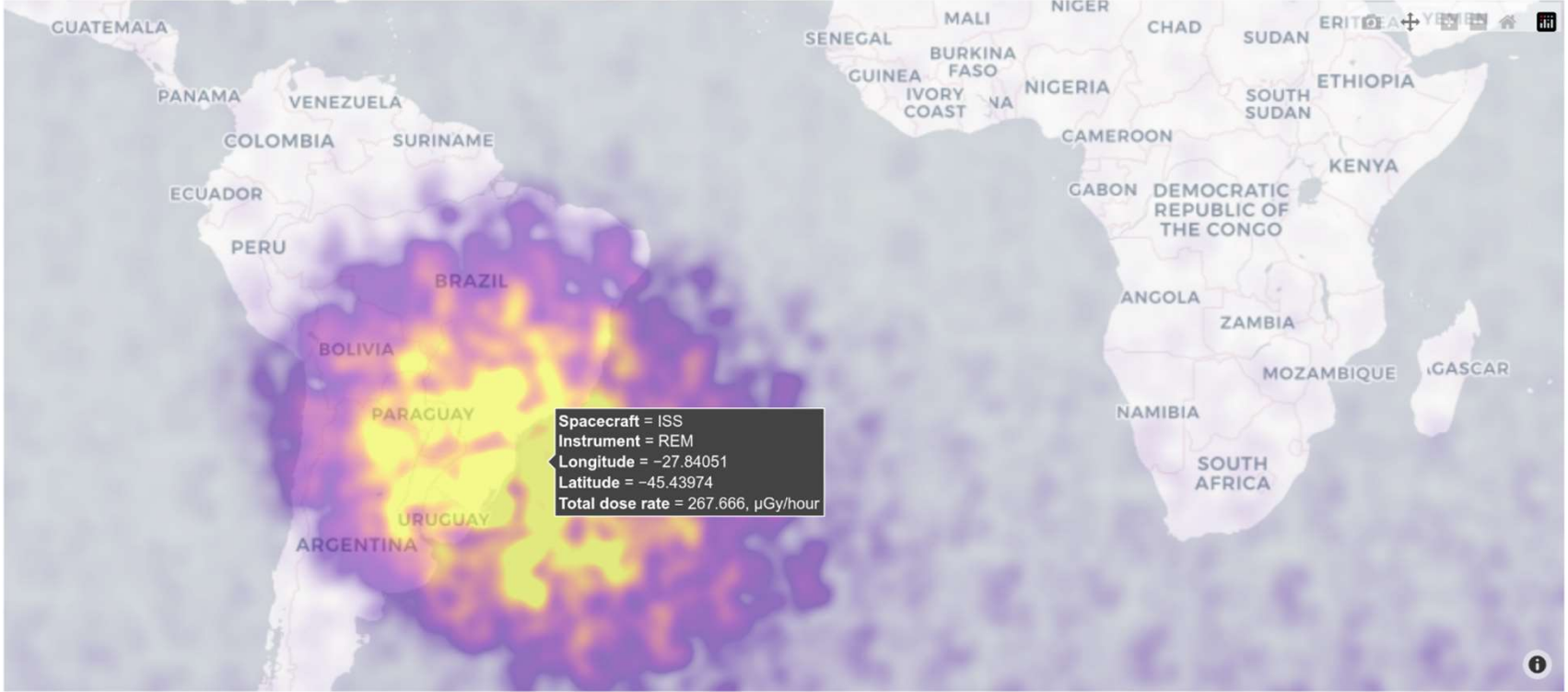
**Scale**

- Linear
- Log

---

**Retrieved data**

Formats:  
[CSV](#), [TSV](#), [JSON](#), [HTML](#)





- Data overview
- Time series plots
- Data comparison
- Geographical plots**
- Data access / API

## Geospatial plots

The interactive plot overlays the data from a single detector over the world map. In the demo example (a full year of radiation dose rate data from the REM detector, from 2022/01/01 to 2023/01/01), the contribution of the South Atlantic Anomaly can be clearly seen.

Note: the zoom level of the plot can be adjusted with the mouse wheel.

### Spacecraft, Instrument

- ISS, DOSTEL1
- ISS, DOSTEL2
- ISS, Lidal
- ISS, REM
- ISS, Liulin-5-1D
- ISS, Liulin-5-2D
- ISS, Liulin-5-3D

### Measurement

- Total dose rate
- Total flux

### Time period

Start: 01/01/2022 12:00 AM

End: 01/01/2023 12:00 AM

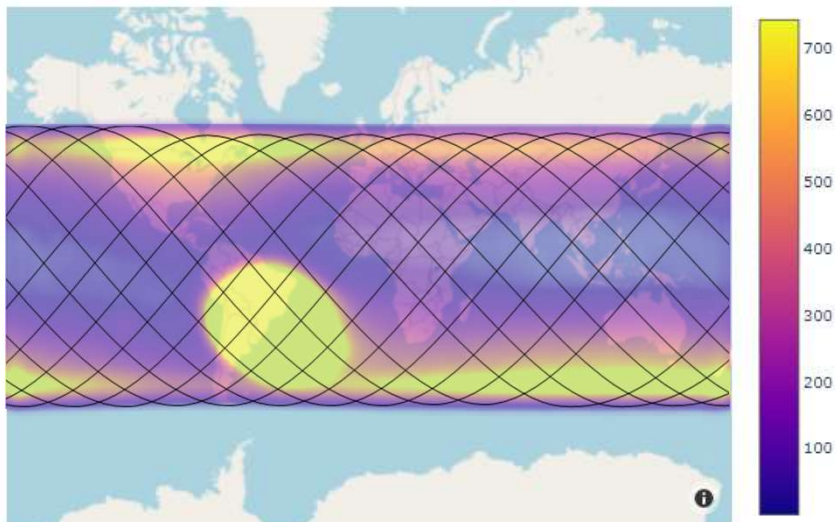
### Scale

- Linear
- Log

Update

### Retrieved data

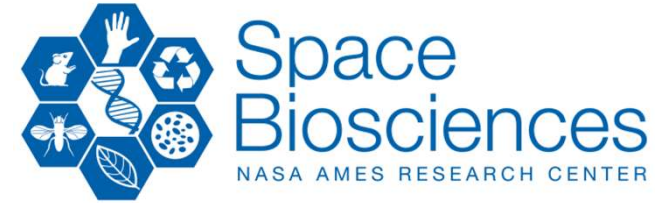
Formats:  
[CSV](#), [TSV](#), [JSON](#), [HTML](#)



# Acknowledgments

## RadLab Team:

Kirill Grigorev, Jack Miller, Livio Narici, Lauren Sanders, Ana Uriarte Acuna



NASA FUNDING: HRP



OSDR: Open Science Data Repository  
FUNDING: Biological and Physical Sciences

