



# **RIPE NCC**

RIPE NETWORK COORDINATION CENTRE

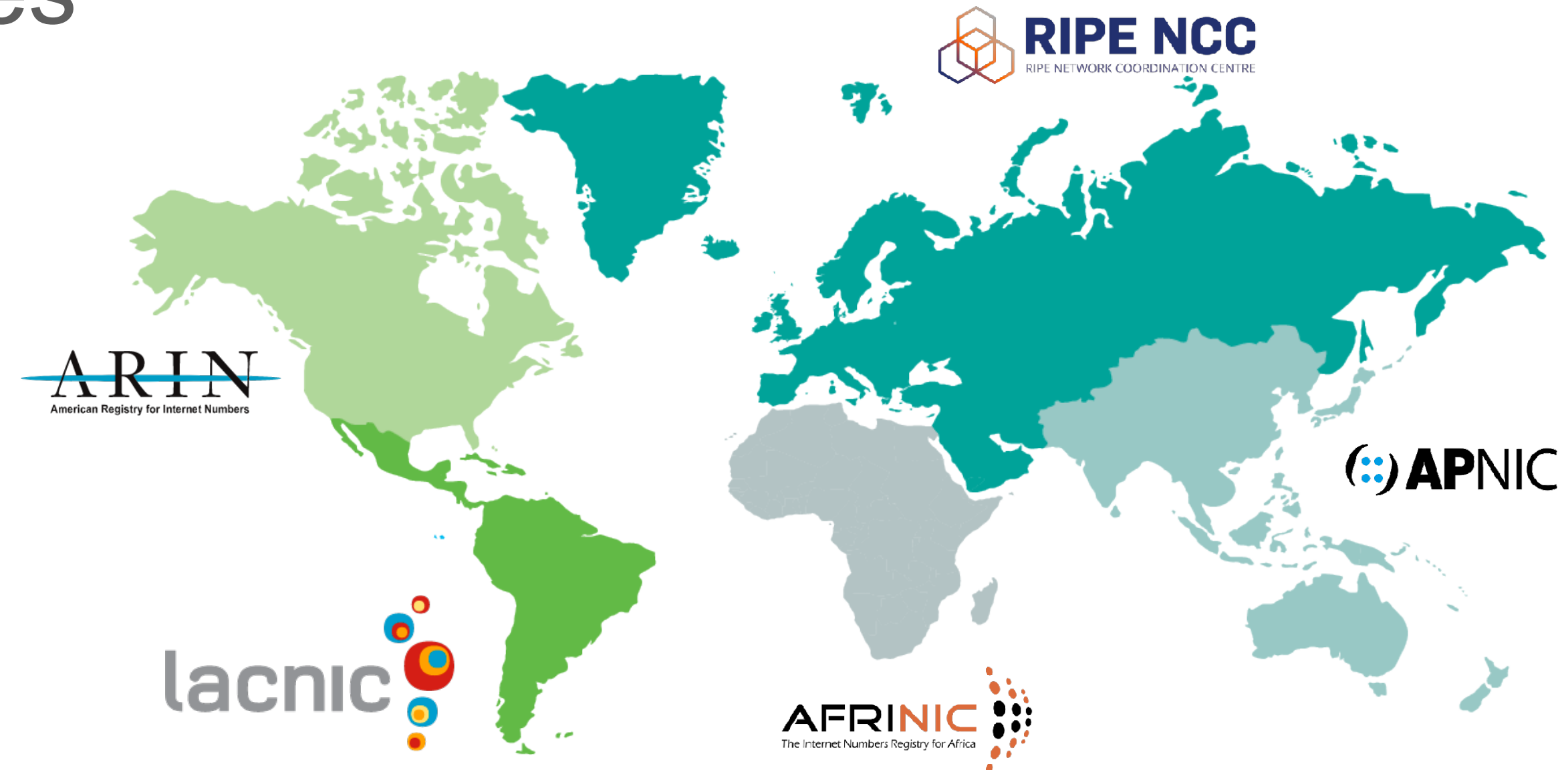
# **RIPEstat, RIPE Atlas and RIS**

## **RIPE NCC Tools**

Christian Teuschel | 15 June 2022 | M3AAWG 55th GM

# RIPE NCC

- Regional Internet Registry (RIR)
- Not-for-profit, membership-based (association)
- Funded by membership fees
- Based in Amsterdam
- Established in 1992
- ~180 employees
- <https://www.ripe.net>



# What does the RIPE NCC do?

- Distributes IPv6, IPv4 and AS Numbers to 24,000 members in 76 countries
- Operates the RIPE Database
- Provides many tools and services for members and the wider Internet community
  - RPKI
  - K-root
  - Etc.
- This presentation focuses on three tools

# RIPE NCC Tools

- Routing Information Service (RIS)
  - <https://ris.ripe.net>
- RIPE Atlas
  - <https://atlas.ripe.net>
- RIPEstat
  - <https://stat.ripe.net>





# Routing Information Service (RIS)

<https://ris.ripe.net>

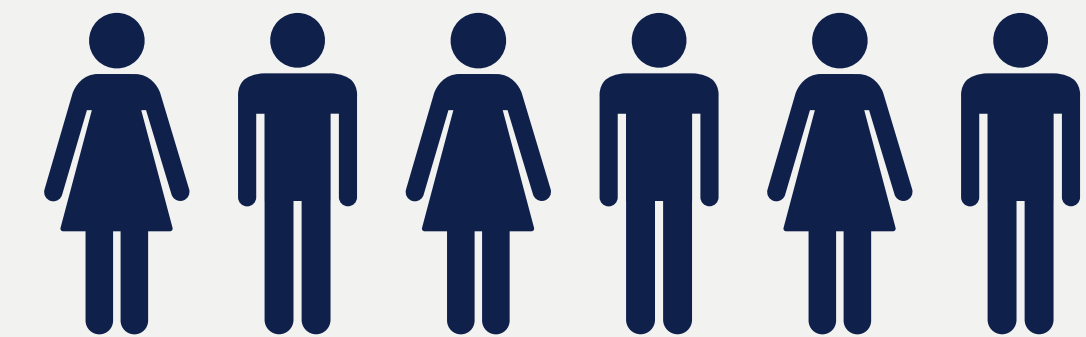
# What is RIS?

- RIS is a routing data collection platform
- Collecting BGP data since 1999
- Up-to-date routing information, as opposed to information in databases and routing registries, such as:
  - What is being announced
  - Which prefixes are seen and where
  - Which ones are not seen

THANK YOU TO OUR COMMUNITY



22 collectors



1,377 global peers

# Why collect BGP data?

- The Internet routing system doesn't have built-in security mechanisms
- Better visibility = greater security = lower risk of a BGP hijack

# Who is RIS for?

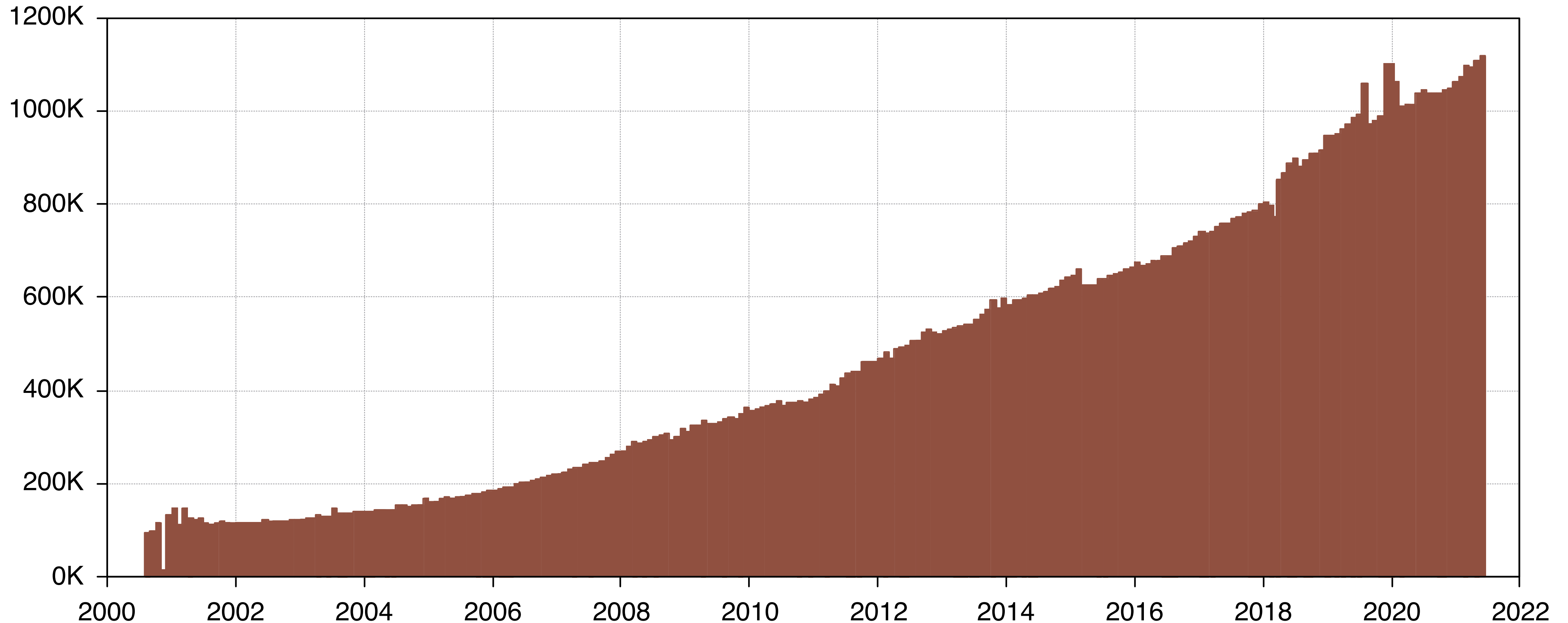
- Network operators, policy makers
  - To check specific routing incidents
  - To troubleshoot Internet routing
  - To develop future plans based on routing trends
- Researchers
  - To investigate notable events occurring on the Internet (i.e. network disruptions in specific countries, Facebook outages, etc.)

# How can you use RIS?

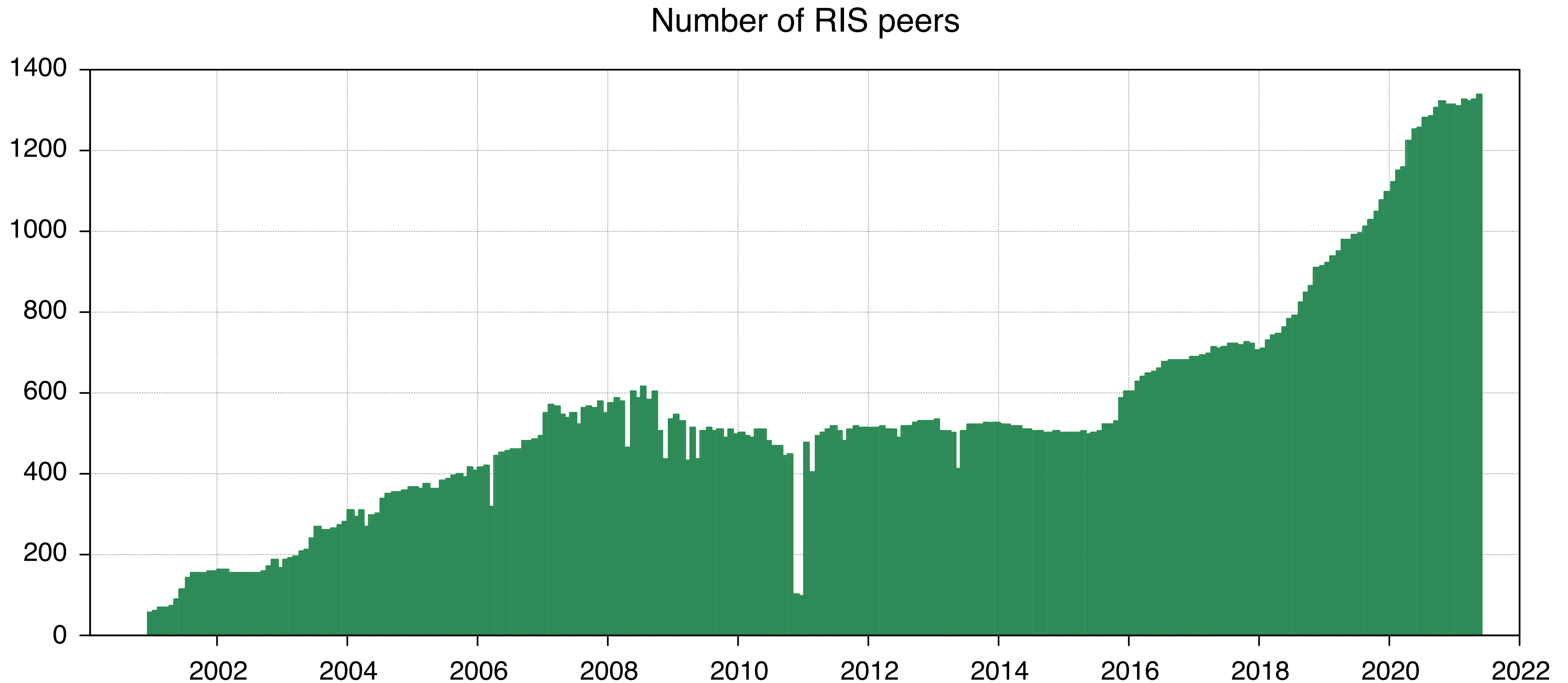
- Available as:
  - Raw data (<https://www.ripe.net/analyse/internet-measurements/routing-information-service-ris/ris-raw-data>)
  - Live stream (RIS Live, <https://ris-live.ripe.net/>)
  - Whois query interface (RISwhois, <https://www.ripe.net/analyse/archived-projects/ris-tools-web-interfaces/riswhois>)
- Data and visualisations available in RIPEstat
  - <https://stat.ripe.net>

# BGP Growth – Number of Prefixes

Number of prefixes seen in RIS



# RIS Growth – Number of Peers





# Negative Effects of Growth

- More data does not bring more diversity in routes
- More peers bring more noise into the data
- More input data causes bigger delays for output data

# Planned Improvements

- Pipeline improvements (shorter delays for output)
- Peering coordination:
  - Diversity encouraged
  - Increasing coverage in the RIPE NCC region
- Higher multi-hop capacity
- Metadata for our multi-hop collectors

# Come peer with us!

- We are inviting **representative networks** in Croatia, Czech Republic, Greece, Hungary and Slovakia to peer with RIS!
  - Send us an email: [ris-peering@ripe.net](mailto:ris-peering@ripe.net)
  - Send us a peering request: <https://www.ris.ripe.net/cgi-bin/peerreg.cgi>
  - Provide a full feed when possible
- Goals
  - Better routing visibility and more security for:
    - Your network
    - Your country
    - The Internet

# RIS Collectors

Collector	Location	IXP	Deployed	Removed	Collector	Location	IXP	Deployed	
RRC00	Amsterdam	Multi-hop	1999		RRC13	Moscow	MSK-IX	2005	
RRC01	London	LINX	2000		RRC14	Palo Alto	PAIX	2005	
RRC02	Paris	SFINX	2001	2008	RRC15	Sao Paulo	PTT-Metro SP	2006	
RRC03	Amsterdam	AMS-IX	2001		RRC16	Miami	NOTA	2008	
RRC04	Geneva	CIXP	2001		RRC18	Barcelona	CATNIX	2015	
RRC05	Vienna	VIX	2001		RRC17				
RRC06	Tokyo	DIX-IE	2001		RRC19	Johannesburg	NAPAfrica JB	2016	
RRC07	Stockholm	Netnod	2002		RRC20	Zurich	SwissIX	2015	
RRC08	San Jose	MAE-West	2002	2004	RRC21	Paris	FranceIX	2015	
RRC09	Zurich	TIX	2003	2004	RRC22	Bucharest	InterLAN	2017	
RRC10	Milan	MIX	2003		RRC23	Singapore	Equinix SG	2017	
RRC11	New York	NYIIX	2004		RRC24	Montevideo	LACNIC multi-hop	2019	
RRC12	Frankfurt	DE-CIX	2004		RRC25	Amsterdam	RIPE multi-hop	2021	

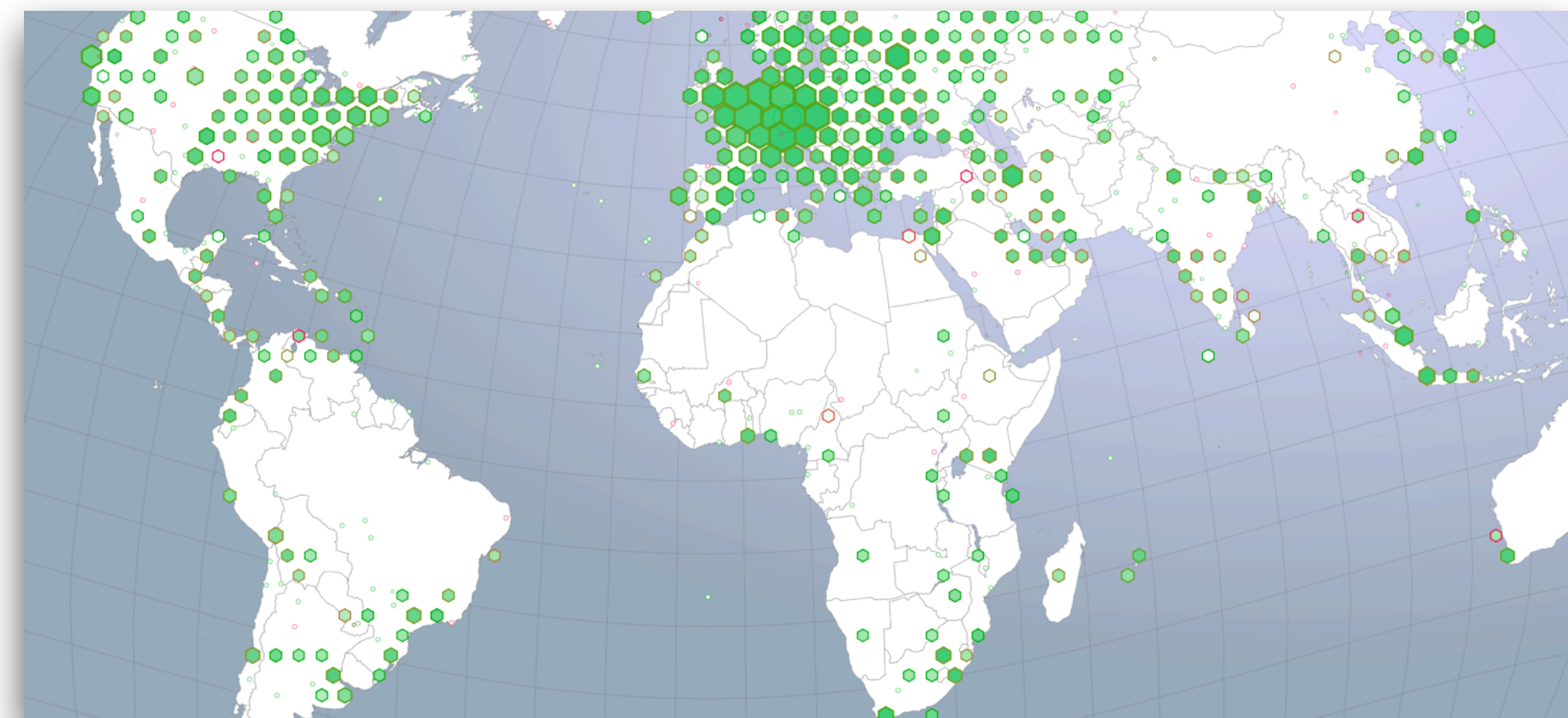


**RIPE Atlas**

<https://atlas.ripe.net>

# What is RIPE Atlas?

- A global platform for active Internet measurements
- Operated by the RIPE NCC with the support and involvement of the Internet community
- Focused on “network-level” connectivity and reachability
- Since 2010: the long term and sustainability in mind
- 11k+ measurement devices
- Hosted by volunteers





# RIPE Atlas Measurement Devices

- Hardware-based probes

- Versions 1 & 2: Lantronix XPort Pro
- Version 3: TP-Link TL-MR3020
- Version 4: NanoPi NEO Plus2
- Version 5: Turris MOX (by CZ.nic)



- Software-based probes

- Functionally similar to hardware-based probes
- Allow for easier deployment and distribution, but dependent on host resources
- Supported hosts: CentOS7/8, Debian (9 and 10), Docker, Rasbian and Turris Routers
- <https://atlas.ripe.net/docs/software-probe/>



# RIPE Atlas Measurement Devices

- RIPE Atlas Anchors
  - Probes with enhanced measurement capacity set up at special locations
  - Act as highly reliable measurement targets



# Measurements in RIPE Atlas

- Types of measurements
  - Ping, Traceroute, DNS, SSL, NTP
  - HTTP (with limitations)
- Built-in measurements
  - Created by the system
- Custom measurements
  - Created by users
  - Require RIPE Atlas credits
- Credit system to guarantee fairness and prevent abuse
  - Earned by hosting probes, spent by creating measurements

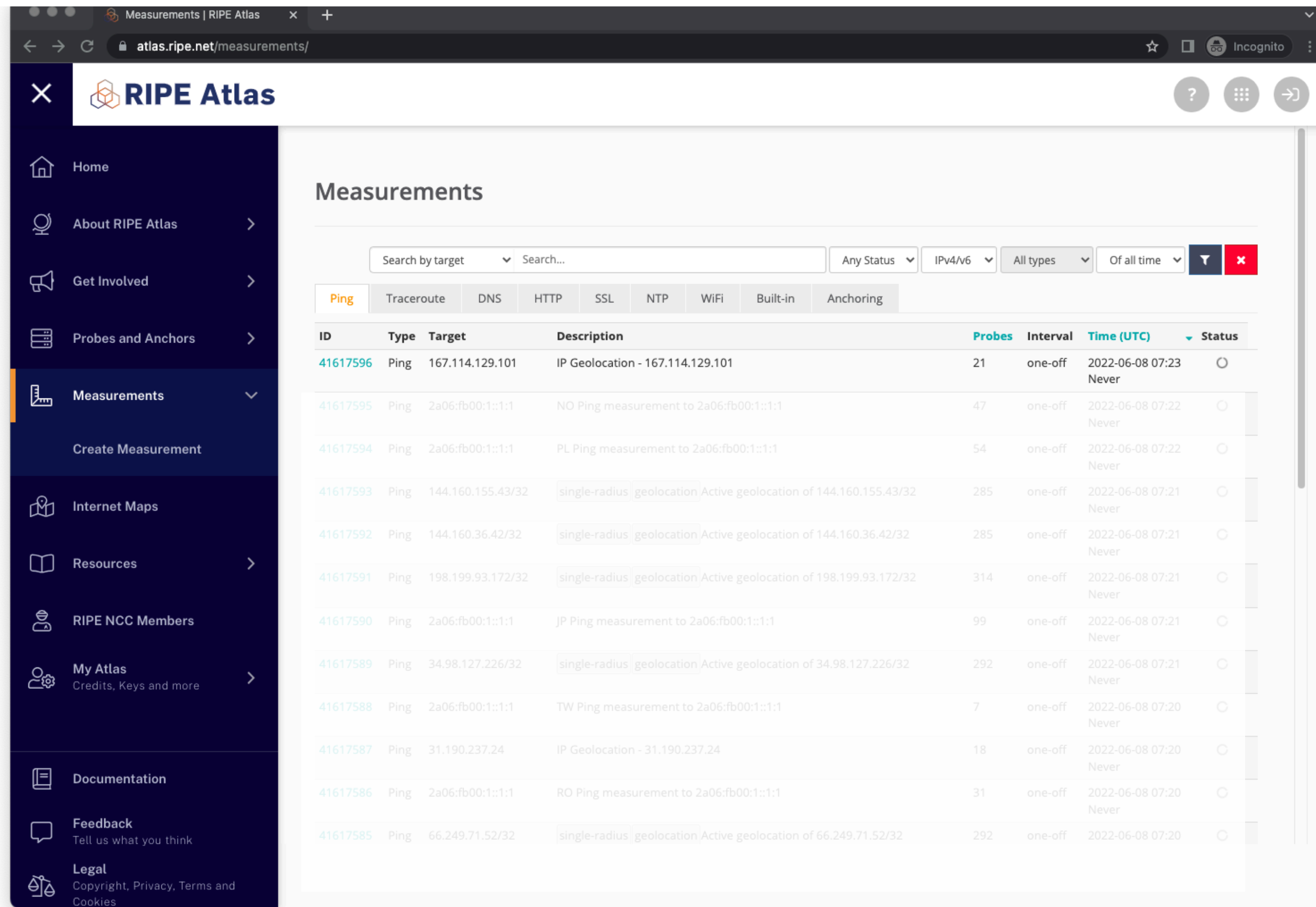
# Stakeholder Benefits of RIPE Atlas

- For probe hosts
  - Baseline results; collect credits; provide a vantage point for others; feel good
- For anchor hosts
  - All of the probe host benefits; be automatically measured
- For network operators/RIPE NCC members
  - Use external vantage points; share results and tools; get alerts\*
- For researchers
  - Access to large volumes of collected data; extract new insights

# Accessing Measurement Data

- Existing measurement data can be accessed without login or credits
- Via the user interface
  - <https://atlas.ripe.net/measurements/>
  - Various filter mechanisms
  - Select a measurement for details and download data (JSON)
- Or via REST-API
  - <https://beta-docs.atlas.ripe.net/apis/>

# Accessing Measurement Data

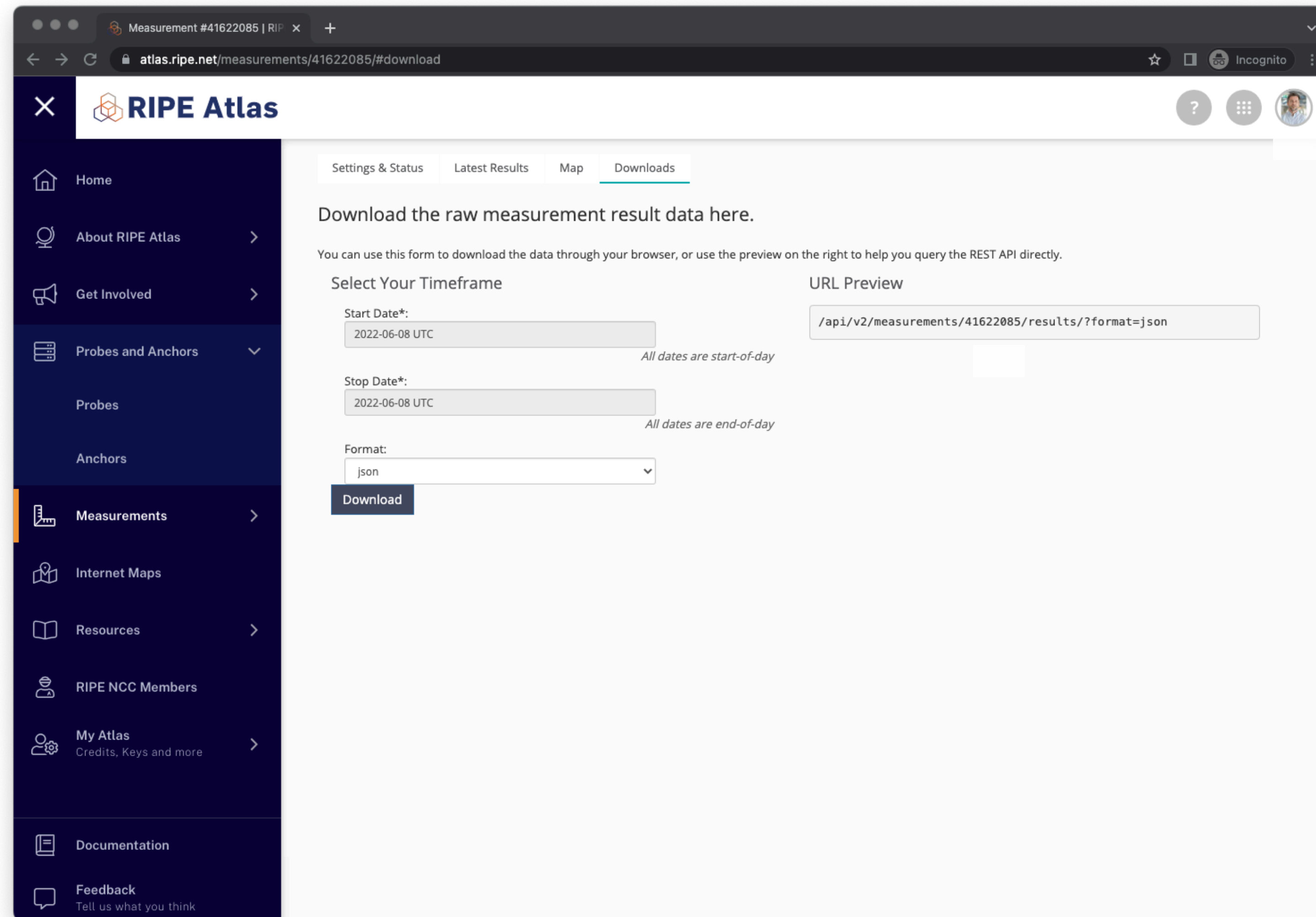


The screenshot shows the RIPE Atlas website interface. The left sidebar contains navigation links: Home, About RIPE Atlas, Get Involved, Probes and Anchors, Measurements (selected), Create Measurement, Internet Maps, Resources, RIPE NCC Members, My Atlas, Documentation, Feedback, and Legal. The main content area is titled "Measurements" and features a search bar and filters. The "Ping" filter is selected, and the table displays a list of measurements with columns for ID, Type, Target, Description, Probes, Interval, Time (UTC), and Status.

ID	Type	Target	Description	Probes	Interval	Time (UTC)	Status
41617596	Ping	167.114.129.101	IP Geolocation - 167.114.129.101	21	one-off	2022-06-08 07:23 Never	○
41617595	Ping	2a06:fb00:1::1:1	NO Ping measurement to 2a06:fb00:1::1:1	47	one-off	2022-06-08 07:22 Never	○
41617594	Ping	2a06:fb00:1::1:1	PL Ping measurement to 2a06:fb00:1::1:1	54	one-off	2022-06-08 07:22 Never	○
41617593	Ping	144.160.155.43/32	single-radius geolocation Active geolocation of 144.160.155.43/32	285	one-off	2022-06-08 07:21 Never	○
41617592	Ping	144.160.36.42/32	single-radius geolocation Active geolocation of 144.160.36.42/32	285	one-off	2022-06-08 07:21 Never	○
41617591	Ping	198.199.93.172/32	single-radius geolocation Active geolocation of 198.199.93.172/32	314	one-off	2022-06-08 07:21 Never	○
41617590	Ping	2a06:fb00:1::1:1	JP Ping measurement to 2a06:fb00:1::1:1	99	one-off	2022-06-08 07:21 Never	○
41617589	Ping	34.98.127.226/32	single-radius geolocation Active geolocation of 34.98.127.226/32	292	one-off	2022-06-08 07:21 Never	○
41617588	Ping	2a06:fb00:1::1:1	TW Ping measurement to 2a06:fb00:1::1:1	7	one-off	2022-06-08 07:20 Never	○
41617587	Ping	31.190.237.24	IP Geolocation - 31.190.237.24	18	one-off	2022-06-08 07:20 Never	○
41617586	Ping	2a06:fb00:1::1:1	RO Ping measurement to 2a06:fb00:1::1:1	31	one-off	2022-06-08 07:20 Never	○
41617585	Ping	66.249.71.52/32	single-radius geolocation Active geolocation of 66.249.71.52/32	292	one-off	2022-06-08 07:20	○



# Accessing Measurement Data



The screenshot shows the RIPE Atlas web interface in a browser window. The address bar displays `atlas.ripe.net/measurements/41622085/#download`. The page has a dark blue sidebar on the left with the following navigation items: Home, About RIPE Atlas, Get Involved, Probes and Anchors (with sub-items Probes and Anchors), Measurements (highlighted with an orange bar), Internet Maps, Resources, RIPE NCC Members, My Atlas (Credits, Keys and more), Documentation, and Feedback (Tell us what you think). The main content area has a top navigation bar with tabs: Settings & Status, Latest Results, Map, and Downloads (which is active). Below the tabs, the text reads: "Download the raw measurement result data here. You can use this form to download the data through your browser, or use the preview on the right to help you query the REST API directly." The "Select Your Timeframe" section contains two date pickers: "Start Date\*" set to "2022-06-08 UTC" and "Stop Date\*" set to "2022-06-08 UTC", both with a note "All dates are start-of-day" and "All dates are end-of-day" respectively. Below these is a "Format:" dropdown menu set to "json". A "Download" button is positioned below the format selector. To the right, the "URL Preview" section shows the API endpoint: `/api/v2/measurements/41622085/results/?format=json`.

# Creating Measurements

- Creating a measurement requires:
  - A RIPE NCC Access account
  - RIPE Atlas credits
- Via the user interface:
  - <https://atlas.ripe.net/measurements/form/>
- Or via REST-API:
  - <https://beta-docs.atlas.ripe.net/apis/>



# Creating Measurements

Measurements | RIPE Atlas

atlas.ripe.net/measurements/

Incognito

RIPE Atlas

Home

About RIPE Atlas

Get Involved

Probes and Anchors

Measurements

Internet Maps

Resources

RIPE NCC Members

My Atlas

Credits, Keys and more

Documentation

Feedback

Tell us what you think

Legal

Copyright, Privacy, Terms and Cookies

Measurements

Create a Measurement

Search by target Search...

Any Status IPv4/v6 All types Of all time

Mine Favourites Hidden Ping Traceroute DNS HTTP SSL NTP WiFi Built-in Anchoring

ID	Type	Target	Description	Probes	Interval	Time (UTC)	Status
41620174	Ping	45.83.248.1	DE Ping measurement to 45.83.248.1	99	one-off	2022-06-08 11:13 Never	🔄 ⭐
41620169	Ping	2a06:fb00:1::1:1	GB Ping measurement to 2a06:fb00:1::1:1	244	one-off	2022-06-08 11:13 Never	🔄 ⭐
41620164	Ping	45.83.248.1	NL Ping measurement to 45.83.248.1	100	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620158	Ping	2a06:fb00:1::1:1	RU Ping measurement to 2a06:fb00:1::1:1	96	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620154	Ping	185.136.96.1	NO Ping measurement to 185.136.96.1	96	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620149	Ping	45.83.248.1	IN Ping measurement to 45.83.248.1	100	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620142	Ping	2a06:fb00:1::1:1	AU Ping measurement to 2a06:fb00:1::1:1	93	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620140	Ping	185.136.96.1	PL Ping measurement to 185.136.96.1	100	one-off	2022-06-08 11:12 Never	🔄 ⭐
41620134	Ping	45.83.248.1	ZA Ping measurement to 45.83.248.1	82	one-off	2022-06-08 11:11 Never	🔄 ⭐
41620129	Ping	2a06:fb00:1::1:1	SG Ping measurement to 2a06:fb00:1::1:1	58	one-off	2022-06-08 11:11 Never	🔄 ⭐
41620125	Ping	185.136.96.1	JP Ping measurement to 185.136.96.1	99	one-off	2022-06-08 11:11 Never	🔄 ⭐
41620118	Ping	45.83.248.1	IR Ping measurement to 45.83.248.1	100	one-off	2022-06-08 11:11	🔄 ⭐

# Creating Measurements

The screenshot shows the 'Create a New Measurement' form in the RIPE Atlas web interface. The browser address bar shows 'atlas.ripe.net/measurements/form/'. The left sidebar contains navigation links: Home, About RIPE Atlas, Get Involved, Probes and Anchors, Measurements (selected), Create Measurement, Internet Maps, Resources, RIPE NCC Members, My Atlas, Documentation, Feedback, and Legal. The main content area is divided into three steps: Step 1 Definitions, Step 2 Probe Selection, and Step 3 Timing. Step 1 includes buttons for + Ping, + Traceroute, + DNS, + SSL, + HTTP, and + NTP. Step 2 shows 'Worldwide' and '10' probes, with buttons for + New Set - wizard, + New Set - manual, + IDs List, and + Reuse a set from a measurement. Step 3 includes a checkbox for 'This is a One-off', start and stop time (UTC) fields, and a 'Measurement API Compatible Specification' link. A 'Costs summary' sidebar on the right shows a dropdown for 'Users who will supply credits for this measurement' with 'christian.teuschel@ripe.net' selected. A 'Create My Measurement(s)' button is at the bottom.

Create Measurement | RIPE Atl x +

atlas.ripe.net/measurements/form/

RIPE Atlas

Home

About RIPE Atlas >

Get Involved >

Probes and Anchors >

Measurements >

Create Measurement

Internet Maps

Resources >

RIPE NCC Members

My Atlas >  
Credits, Keys and more

Documentation

Feedback  
Tell us what you think

Legal  
Copyright, Privacy, Terms and Cookies

### Create a New Measurement

**Step 1 Definitions**

Please select the type of measurement you want to create

+ Ping + Traceroute + DNS + SSL + HTTP + NTP

**Step 2 Probe Selection**

Worldwide 10 x

+ New Set - wizard + New Set - manual + IDs List + Reuse a set from a measurement

**Step 3 Timing**

This is a One-off: ☐

Start time (UTC):  
As soon as possible

Stop time (UTC):  
Never

> Measurement API Compatible Specification

Create My Measurement(s)

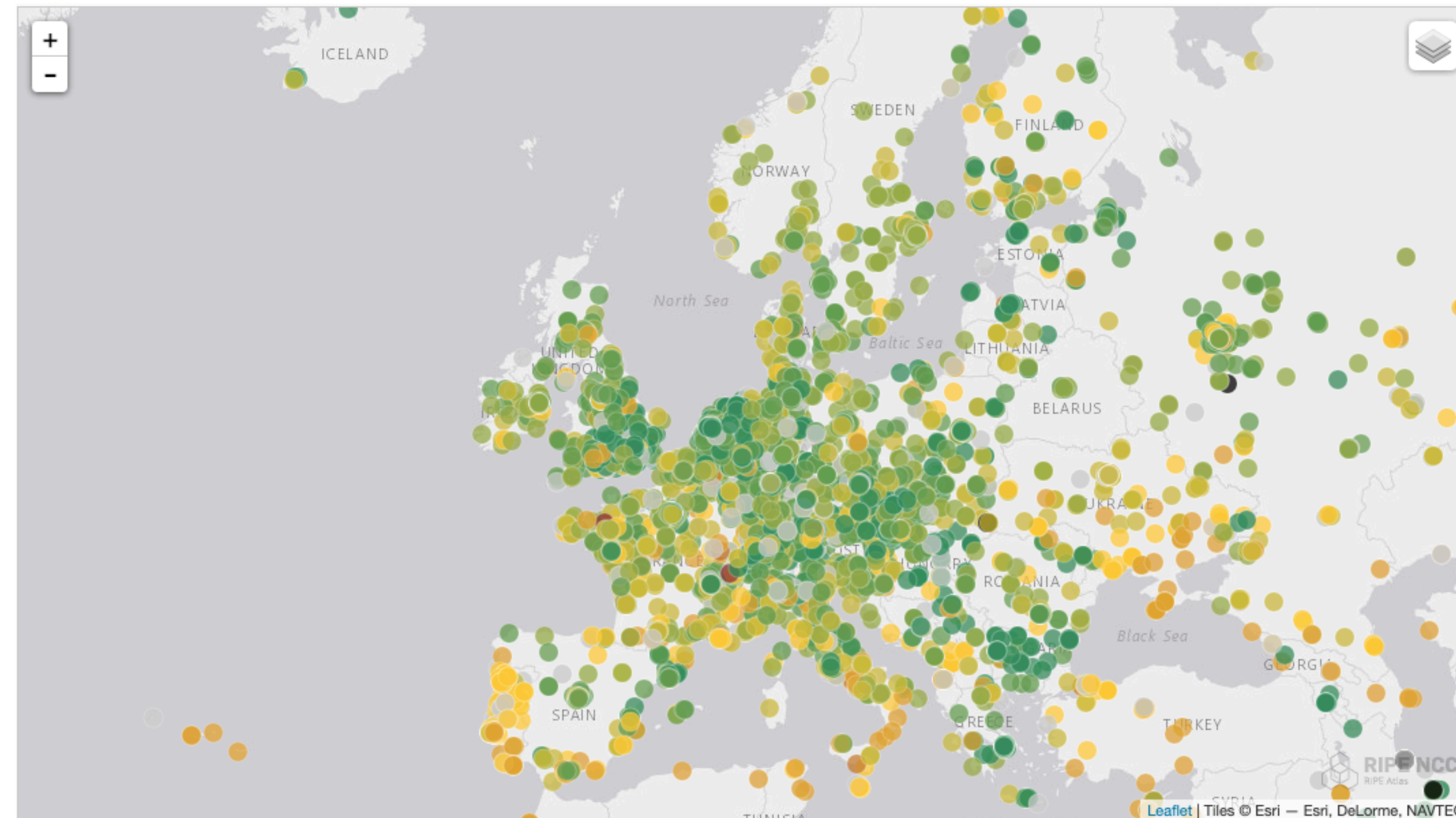
#### Costs summary

Please define a measurement

Users who will supply credits for this measurement:  
christian.teuschel@ripe.net

# Internet Maps

- Measurement data provides insights on a global level
- <https://atlas.ripe.net/results/maps/>
  - E.g. RTT to K-root





# Security Aspect

- Probes connect to the infrastructure using SSH
- The very reason to run a probe is to measure, so outgoing ping, traceroute, DNS, TLS, etc. to all over is the expected behaviour!
- The probes don't have any publicly open ports
  - They only initiate connections
  - This works fine with NATs too
- Probes don't listen to local traffic; no passive measurements are running
  - There's no snooping around

# Apply for a RIPE Atlas Probe

- Hardware probe
  - Standard probe:  
<https://atlas.ripe.net/get-involved/become-a-host/>
  - Anchor:  
<https://atlas.ripe.net/anchors/apply/>
- Software probe
  - Build a software probe from source:  
<https://github.com/RIPE-NCC/ripe-atlas-software-probe>
  - Register your probe:  
<https://atlas.ripe.net/apply/swprobe/>



**RIPEstat**

<https://stat.ripe.net>

# What is RIPEstat?

- Open data platform for RIPE NCC data
  - RIPE Database, RIS and RIPE Atlas
- Large-scale information service for Internet-related data
- Data insights for Internet number resources, hostnames (FQDN) and countries



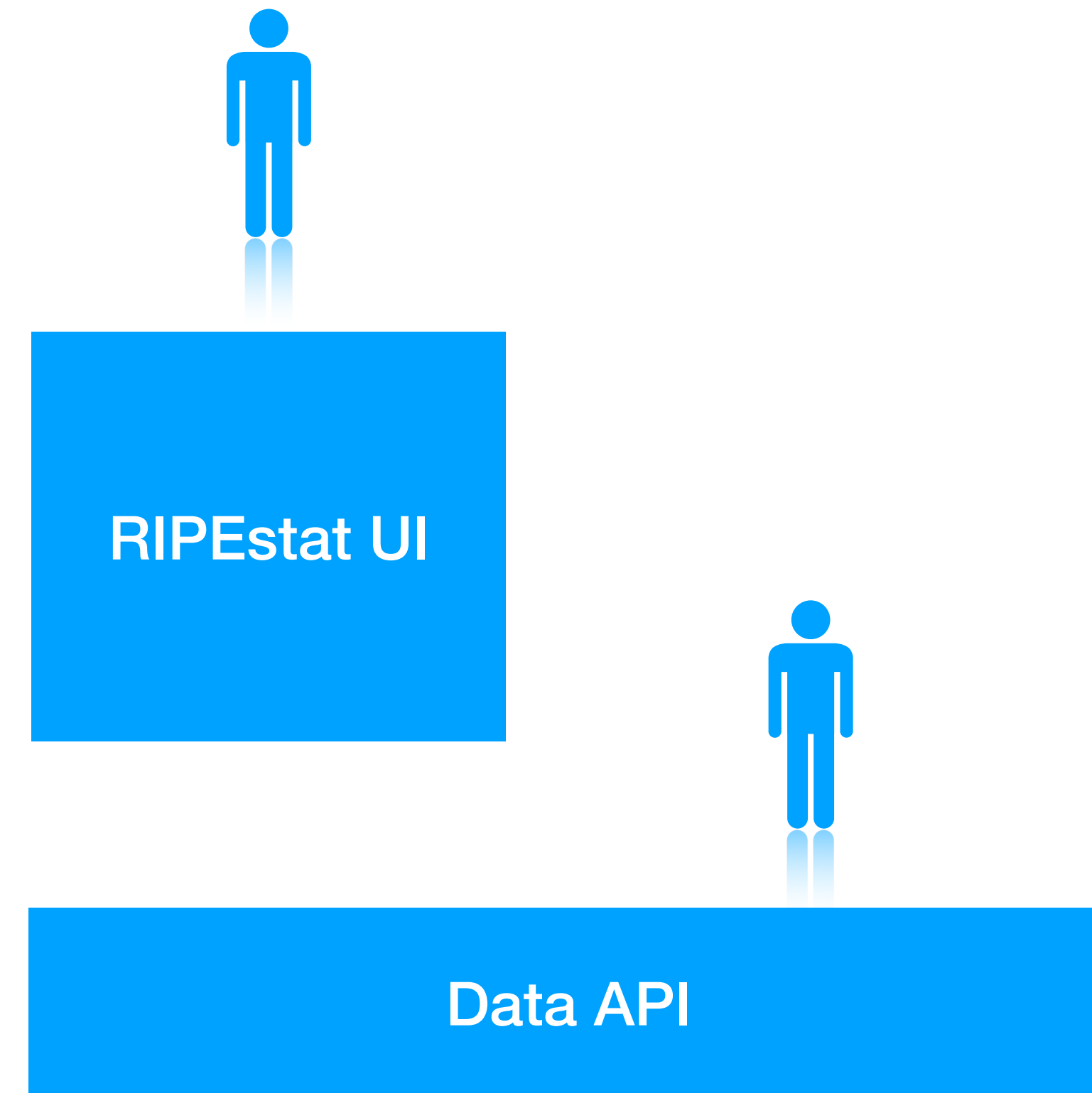


# Data Sets on RIPEstat

- More than 35 different data sets
  - RIPE Database (INR, IRR) and other RIRs'
  - BGP routing data (RIS)
  - RIPE Atlas, M-Lab, Speedchecker, Meter.net, etc.
  - Geolocation
  - Blocklists
  - More details at <https://stat.ripe.net/data-sources>
- New data sets are constantly added!
  - E.g. new feature for RDNSBL

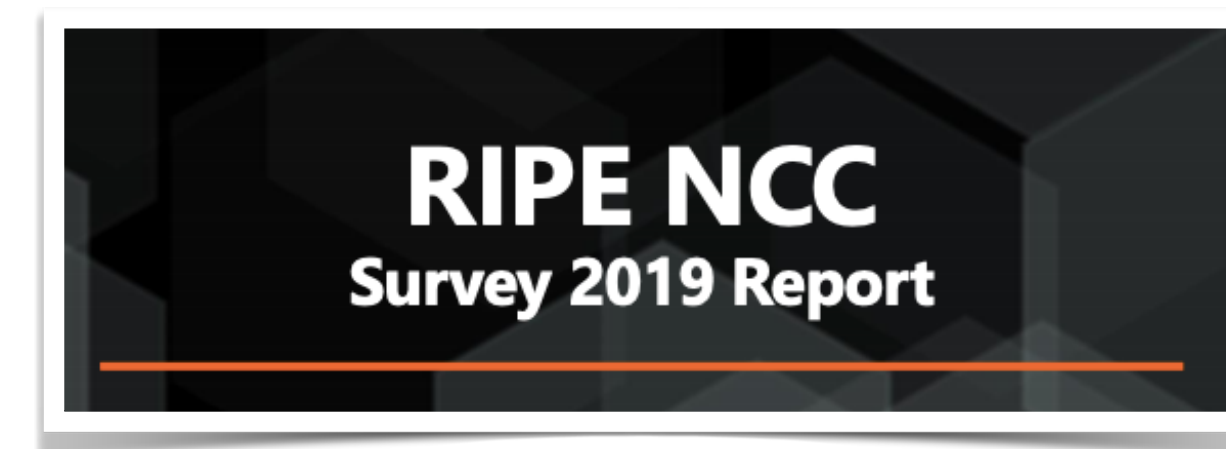
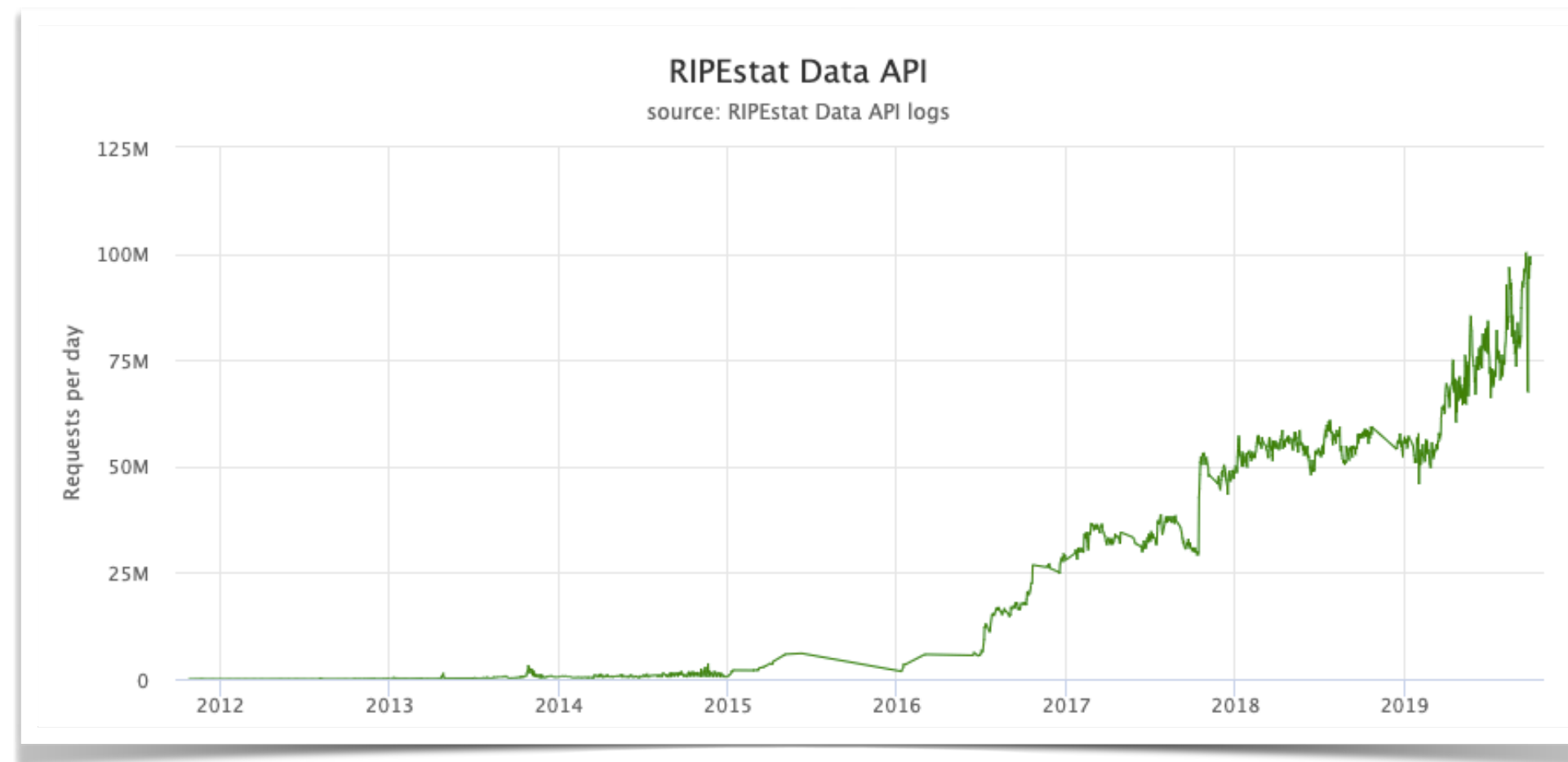
# RIPEstat Interfaces

- RIPEstat UI
  - UI2020 (latest user interface)
    - <https://stat.ripe.net/app/launchpad>
  - UI2013 (previous user interface)
    - <https://stat.ripe.net/ui2013/>
- RIPEstat Data API
  - Raw, uninterpreted data



# RIPEstat Data API

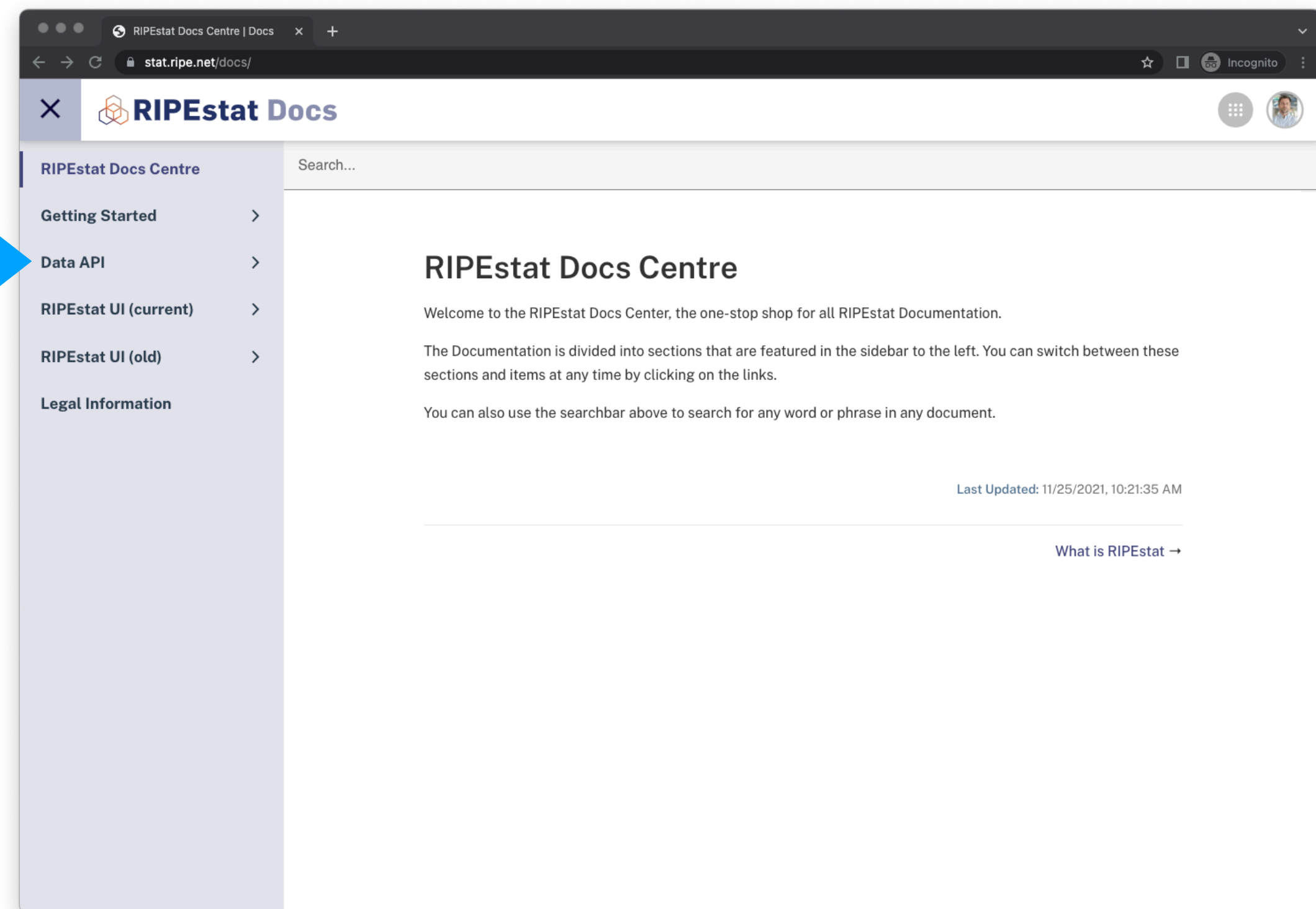
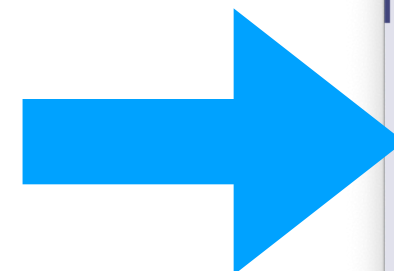
- Core of RIPEstat
- Powering RIPEstat UIs and many other use cases



*“RIPEstat is the most-used tool of RIPE NCC tools and services...”*

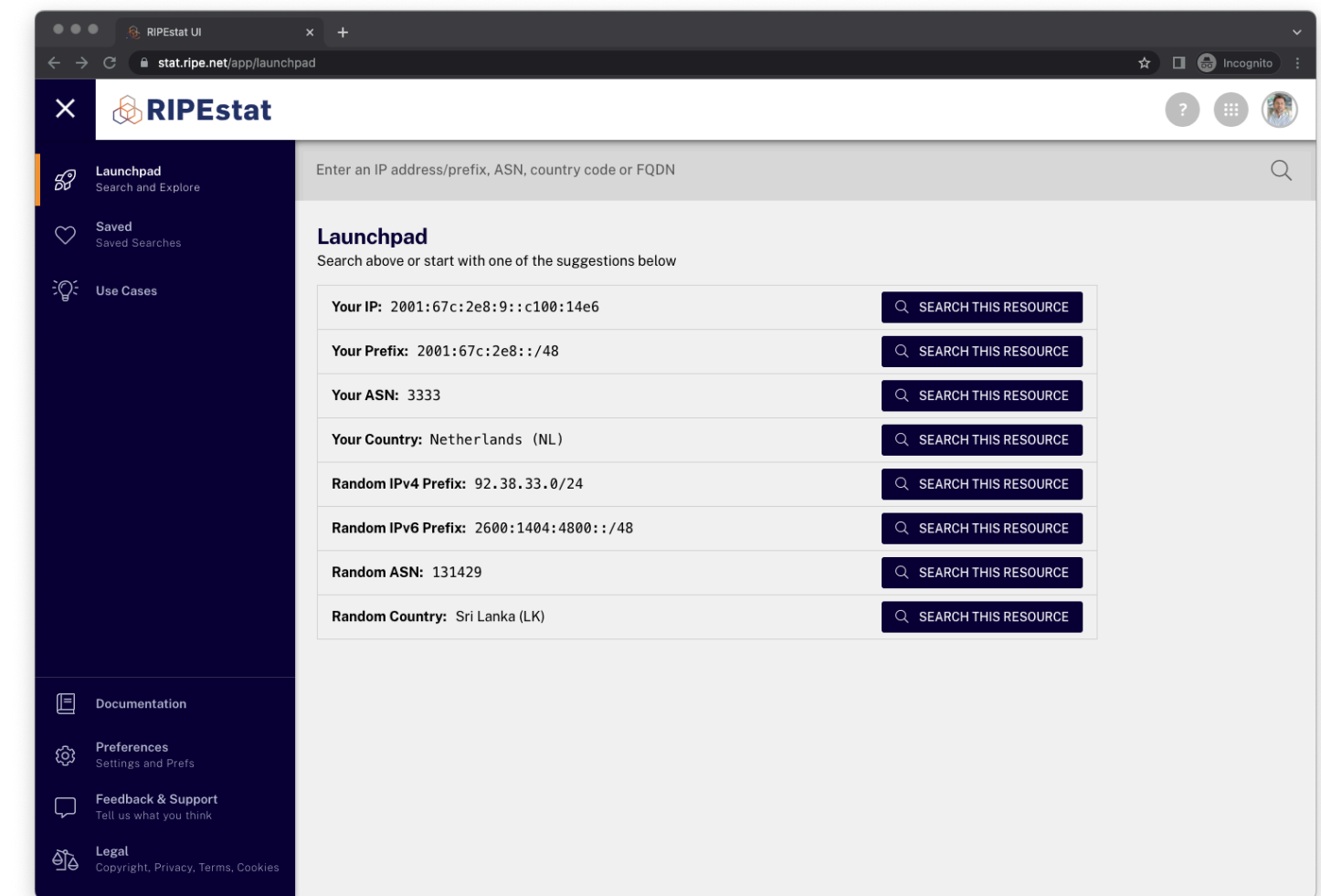
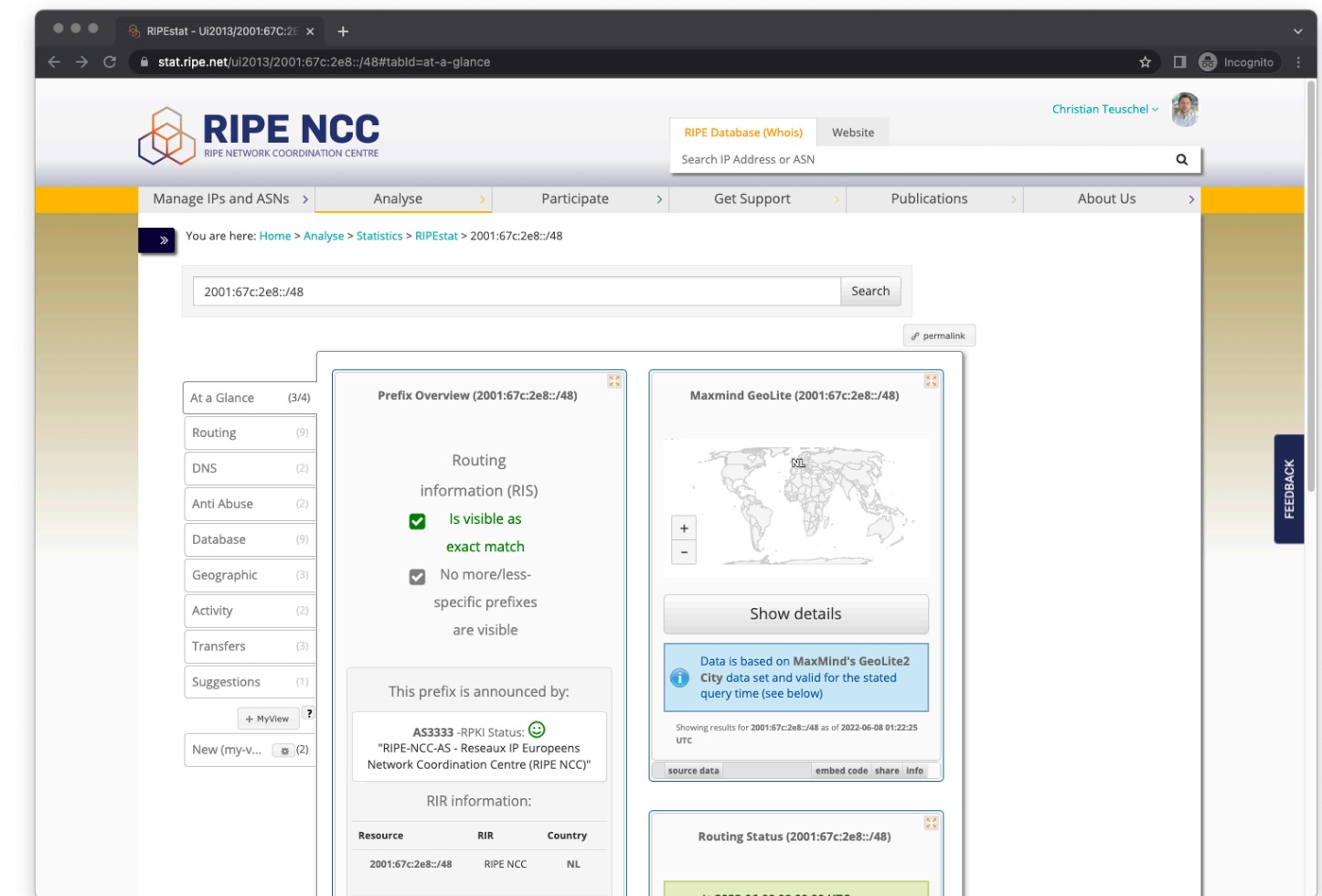
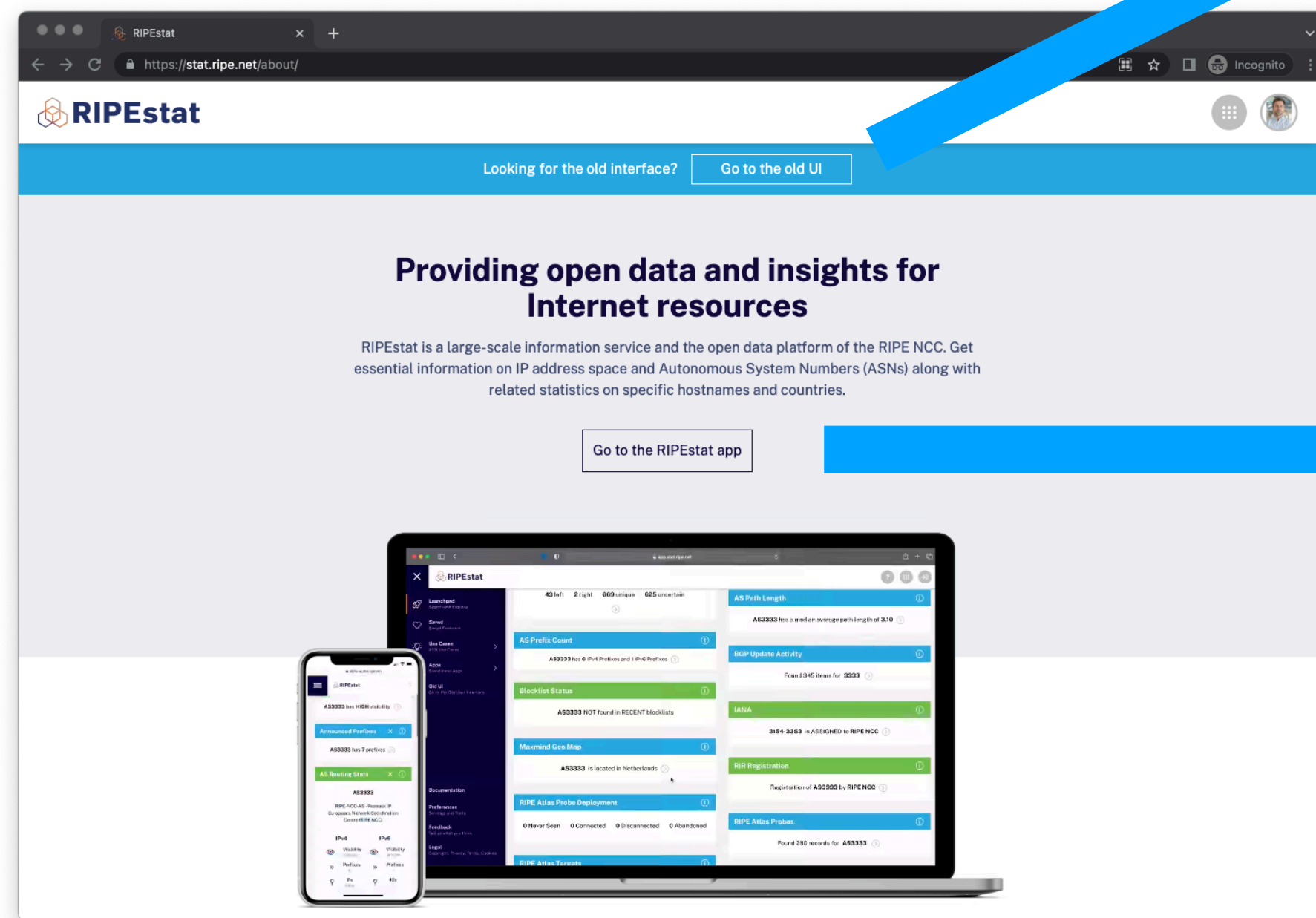
# RIPEstat Data API

- JSON-RPC API
  - E.g. [https://stat.ripe.net/data/prefix-overview/data.json?max\\_related=50&resource=193.0.20.0%2F23](https://stat.ripe.net/data/prefix-overview/data.json?max_related=50&resource=193.0.20.0%2F23)
- More than 50 data calls
- Documentation
  - <https://stat.ripe.net/docs/>



# RIPEstat UIs

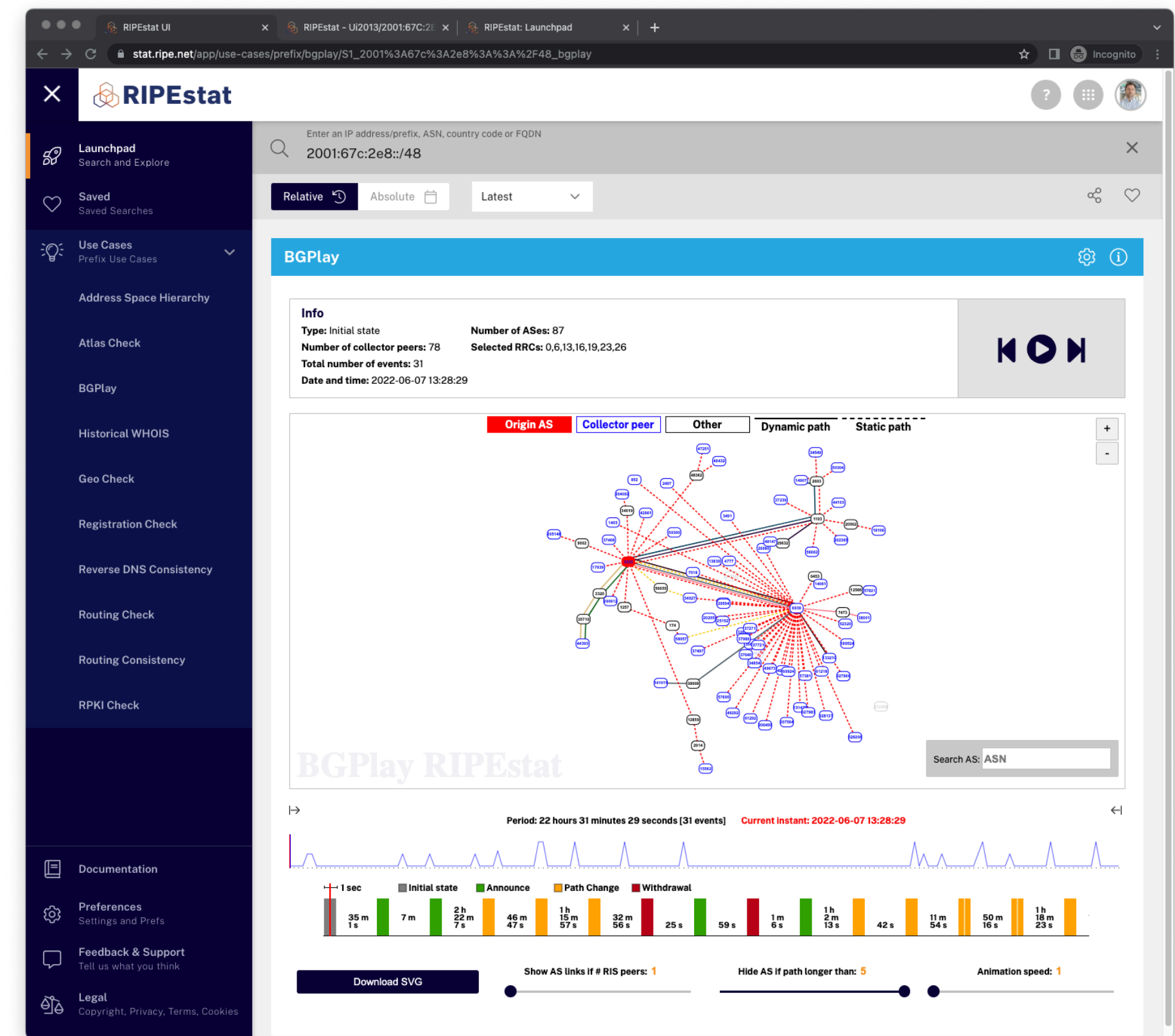
- UI2020 / UI2013
  - UI2013 will be open-sourced and discontinued by the RIPE NCC
  - <https://stat.ripe.net>





# UI Example: BGPlay

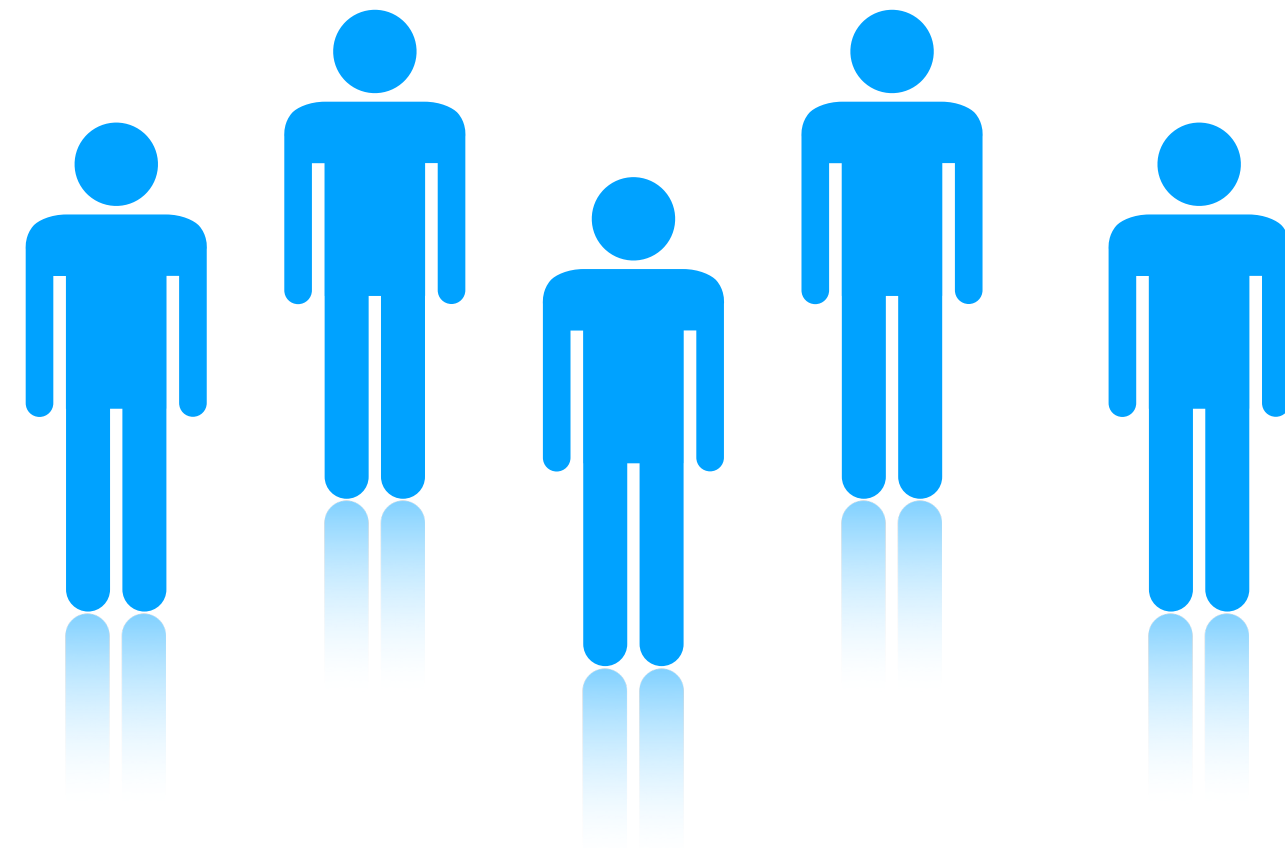
- Tool to visualise/animate the state of BGP routing (“control plane”)
- Use cases:
  - Visibility analysis (IPv4/IPv6), route flapping
  - Multi-homed prefixes, prefix hijacks, etc.



# Use Case Example: Anti-Abuse

- Provide an abuse contact for Internet resources
  - Full coverage for the RIPE NCC region
  - Best effort for other RIRs
- Blocklist feature
  - New interface for RDNSBL: <https://stat.ripe.net/widget/dns-blocklists>
- Are there other interesting data sets/features?
  - Must be linked to Internet number resources

# RIPEstat Feedback



<https://ripestat.featureupvote.com/>



[stat@ripe.net](mailto:stat@ripe.net)





# Questions



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[@christian\\_toysh](#)