

TOW2023 - Lecture

IVS Seamless Auxiliary Data Archive (SADA) and EVN Monitor

Alexander Neidhardt (TUM Wetzell)

Experience level: Beginners; new material.

Description: This lecture explains the IVS Seamless Auxiliary Data Archive. It shows how to participate and how to extract useful information.

Thanks for input from Aard Keimpema (JIVE)

Code: Sad

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IVS SADA & EVN Monitor

What is the IVS SADA / EVN Monitor

How to send in data?

How to get out data?

Why?

What is the IVS SADA / EVN Monitor

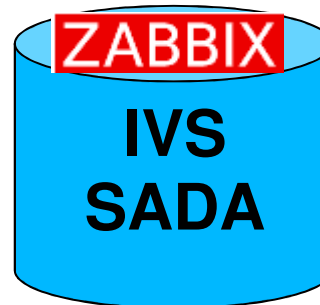
Why and
what?

- Continuous, auxiliary data are of high interest
- Additional data might be interesting for research
- Centralized data repository
- Real-time overview of the observation network
- Preparations for dynamic observations

What is the IVS SADA / EVN Monitor

Why and what?

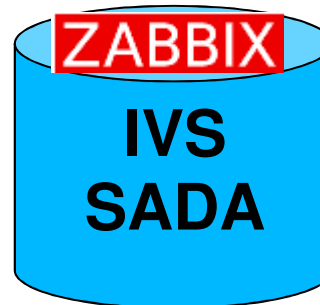
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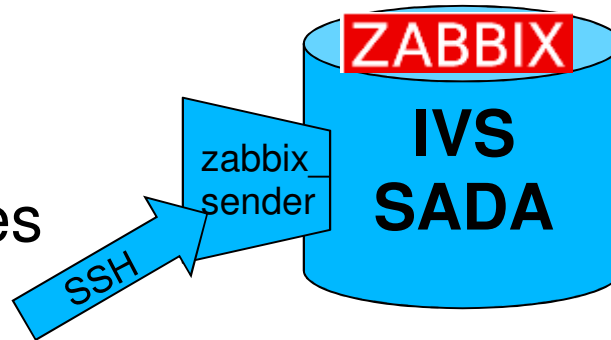
<https://vlbisyson.evlbi.wettzell.de/zabbix/>

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Data Injenction by Sites



ERC.TEMPERATURE => Temperature => unit deg C
 ERC.HUMIDITY => Humidity => unit %
 ERC.PRESSURE => Pressure => unit hPa
 ERC.WINDSPEED => Windspeed => unit km/h
 ERC.WINDDIRECTION => Winddirection => unit degree
 ERC.DOTMON => Dotmon Clock Offsets (GPSminusFMOUT) => unit usec

<https://vlbisyson.evlbi.wettzell.de/zabbix/>

(without additional installation of software)

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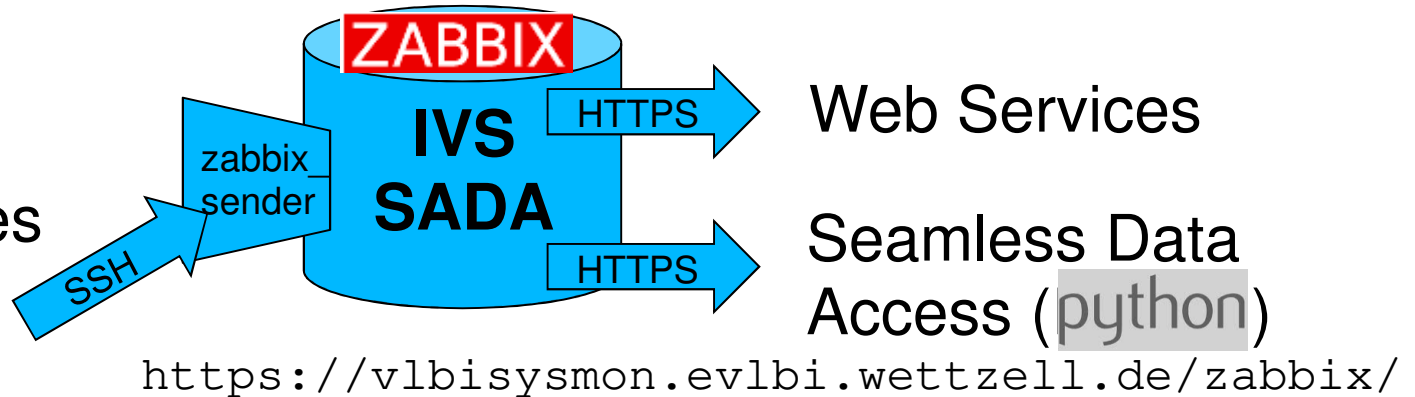
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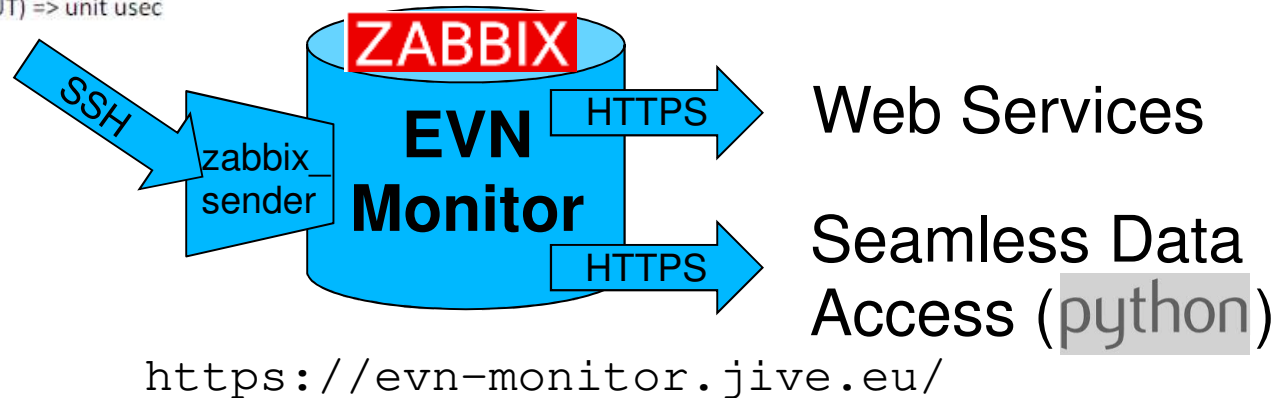
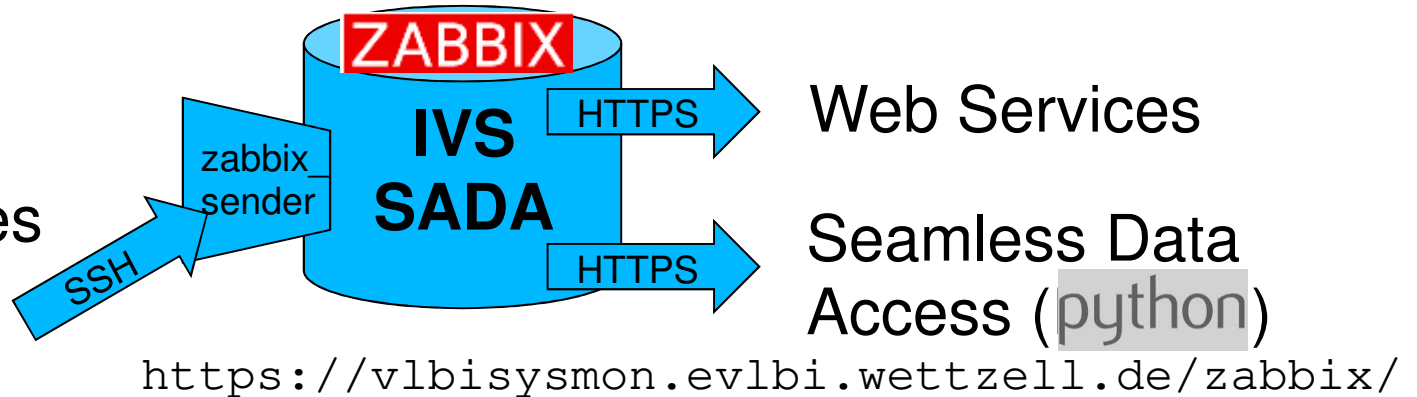
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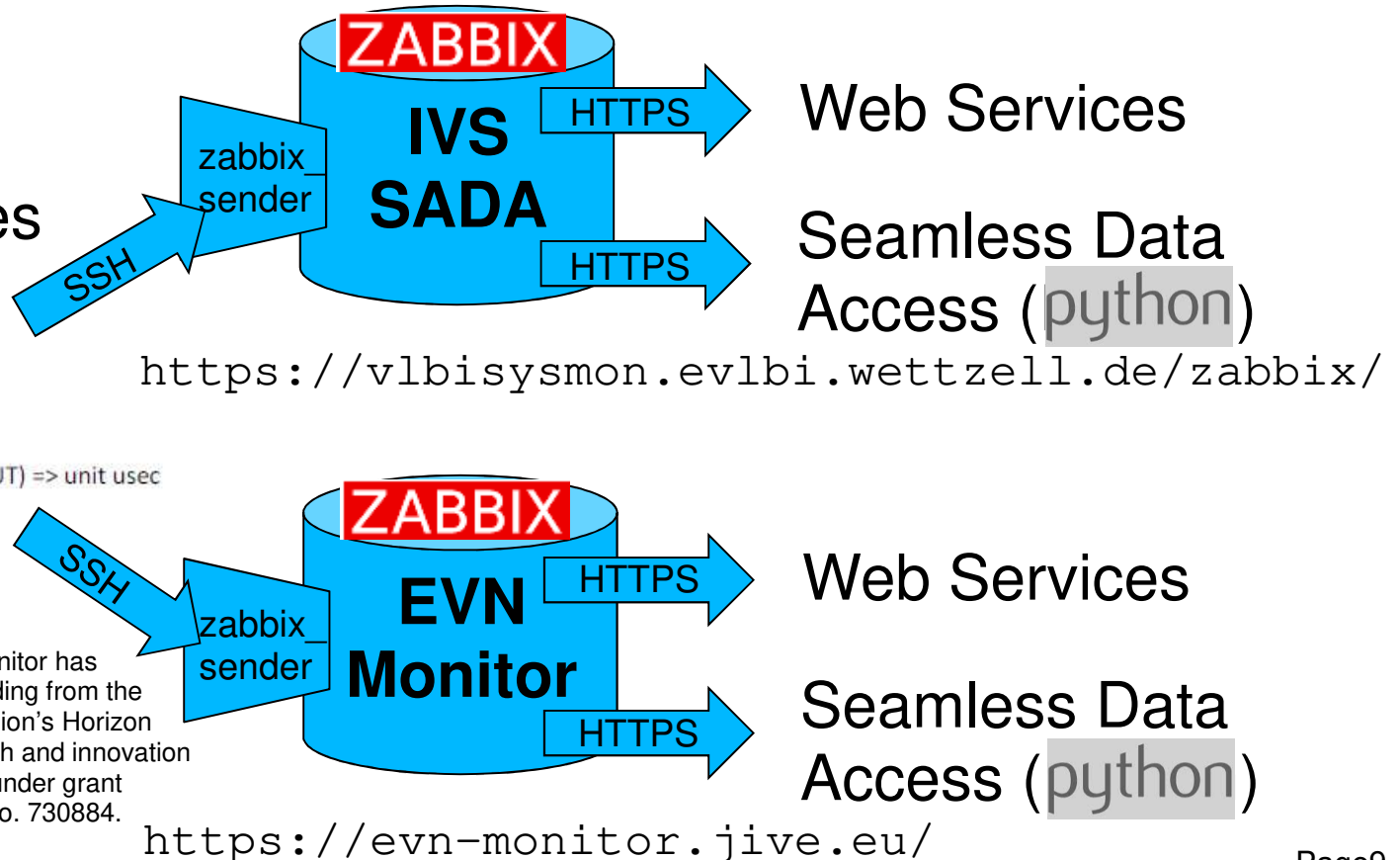
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(without additional installation of software)

The EVN Monitor has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 730884.



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IVS SADA & EVN Monitor

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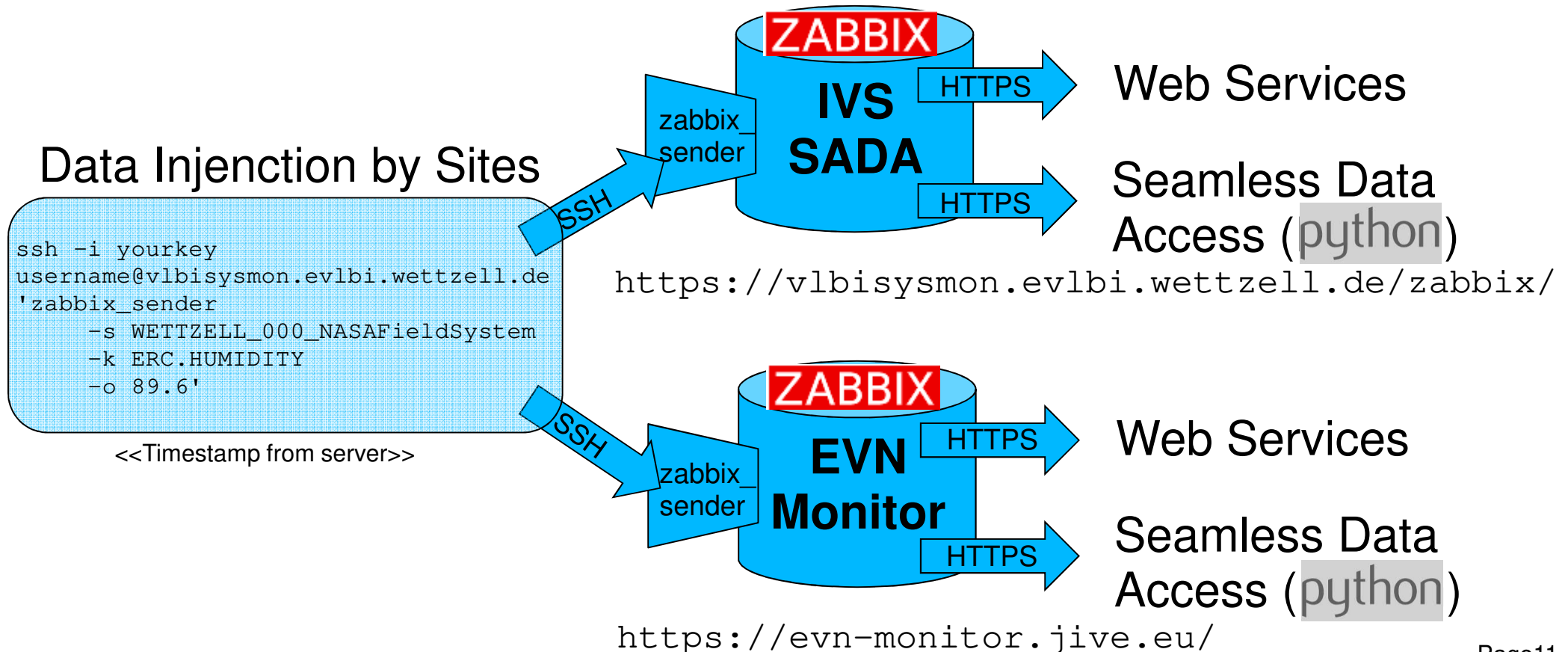
How to get out data?

Why?

How to send in data?

Why and what?

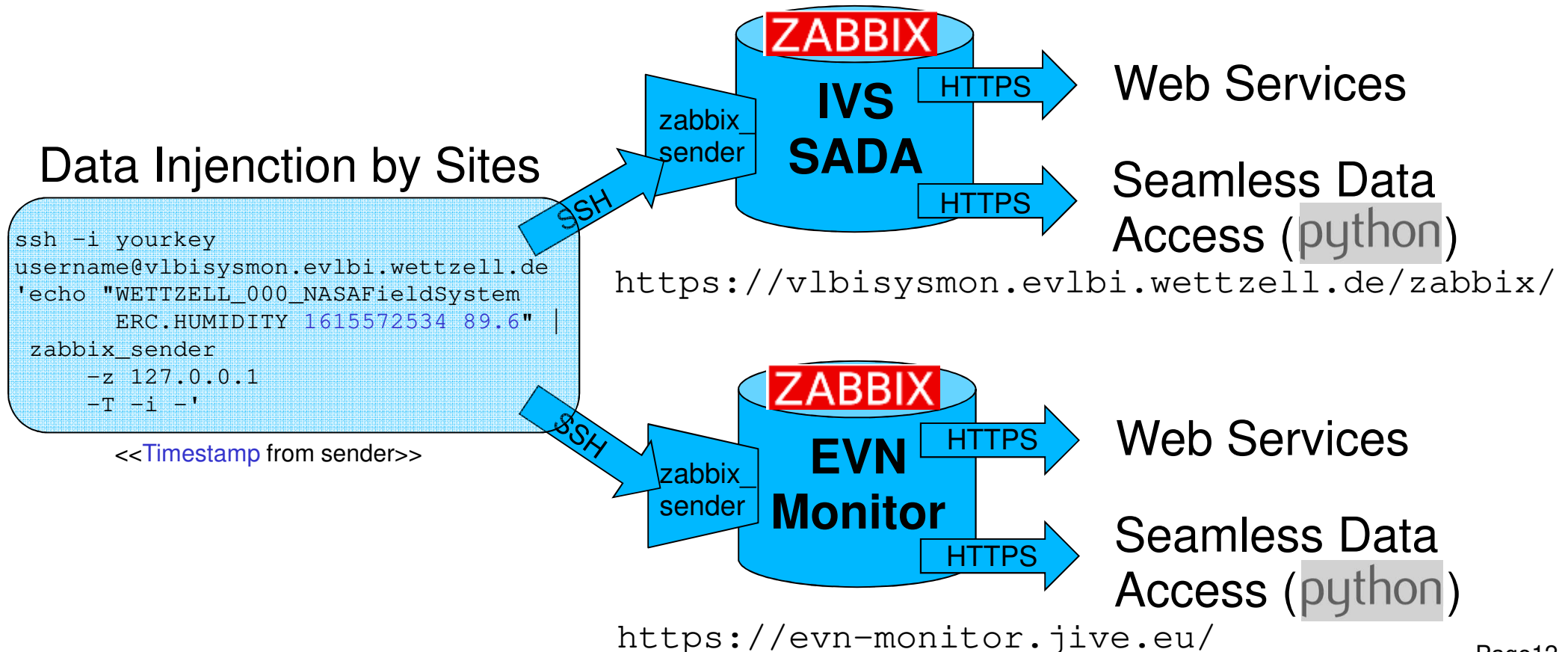
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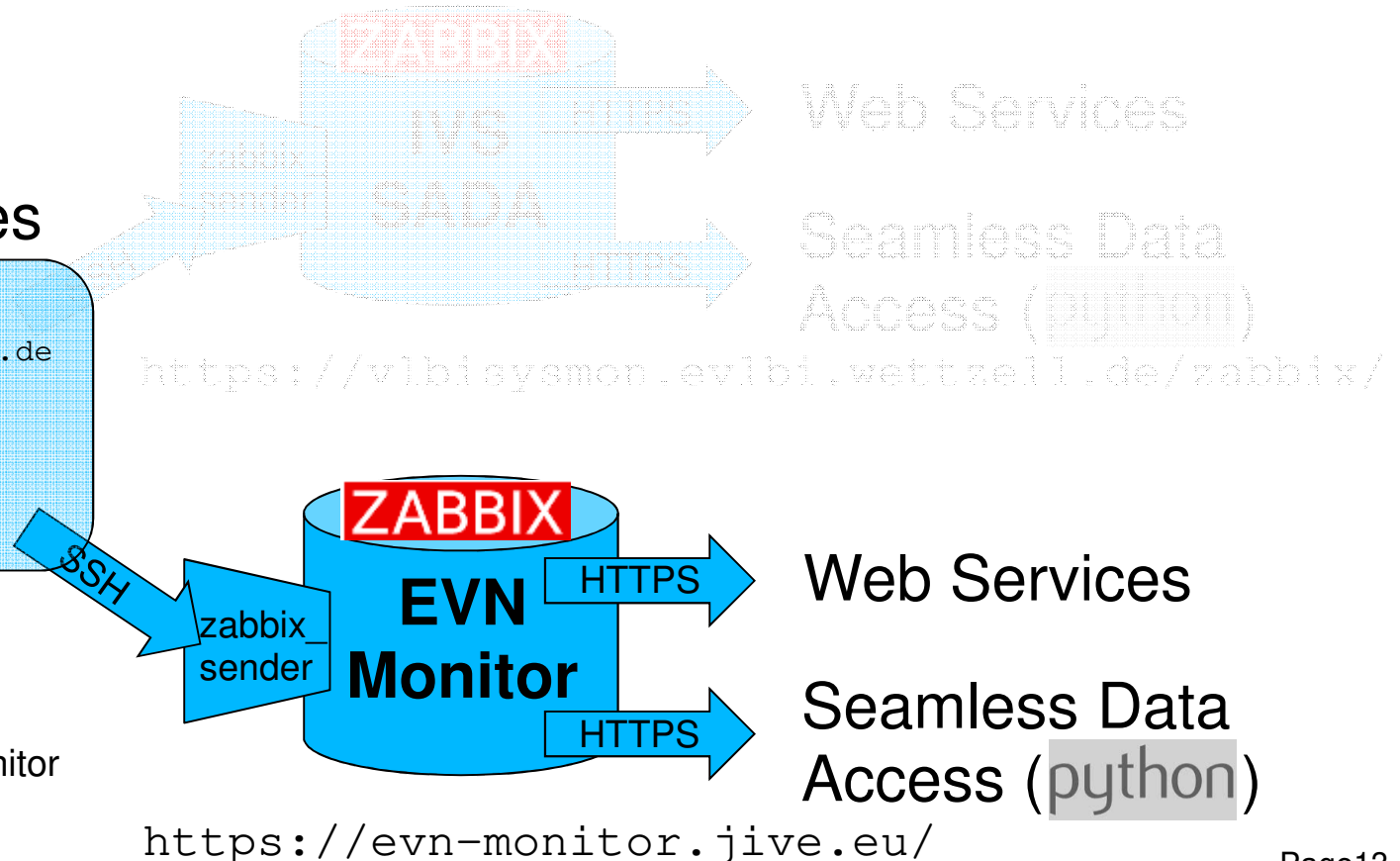
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Data Injenction by Sites

```
ssh -i yourkey
username@vlbisyson.evlbi.wettzell.de
datasender -t 1615572534
ERC.HUMIDITY 89.6
```

<<Timestamp from sender>>

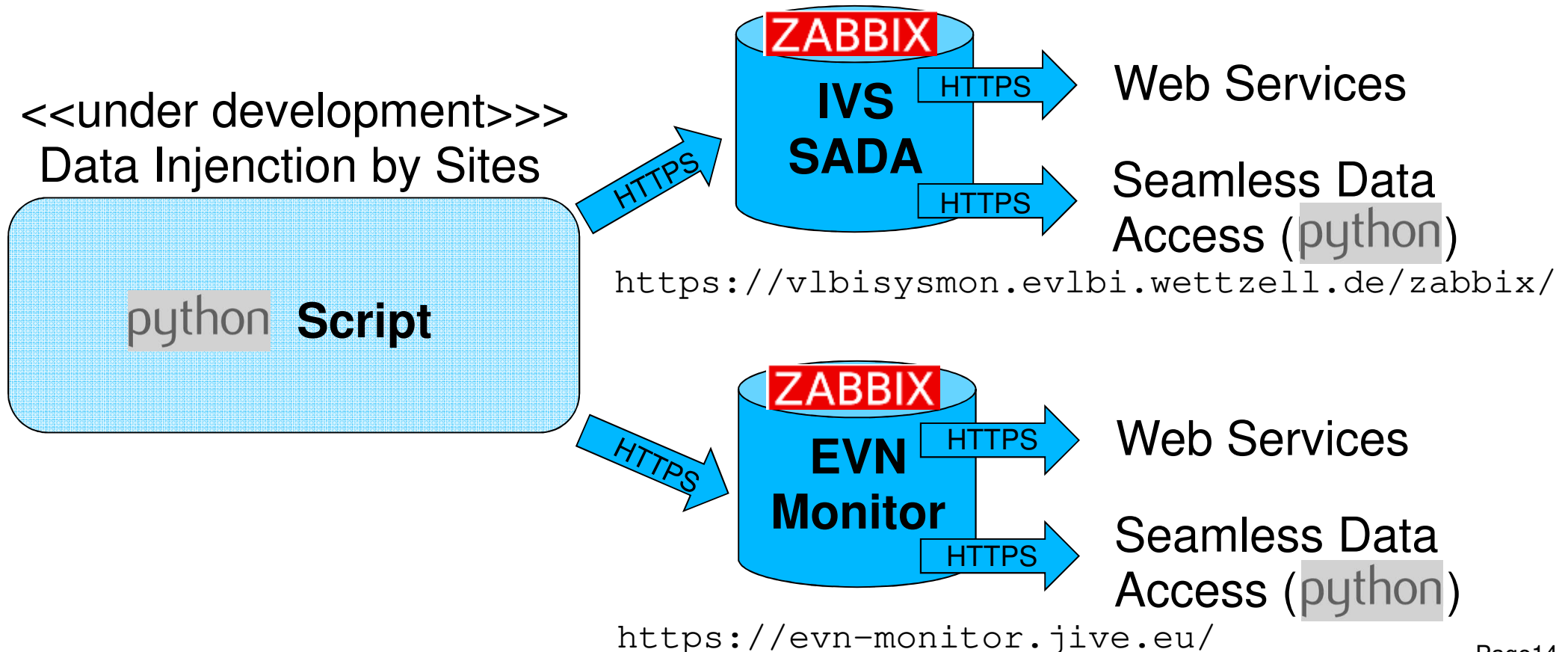
See Aard Keimpema (JIVE):
https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/EVN_Monitor



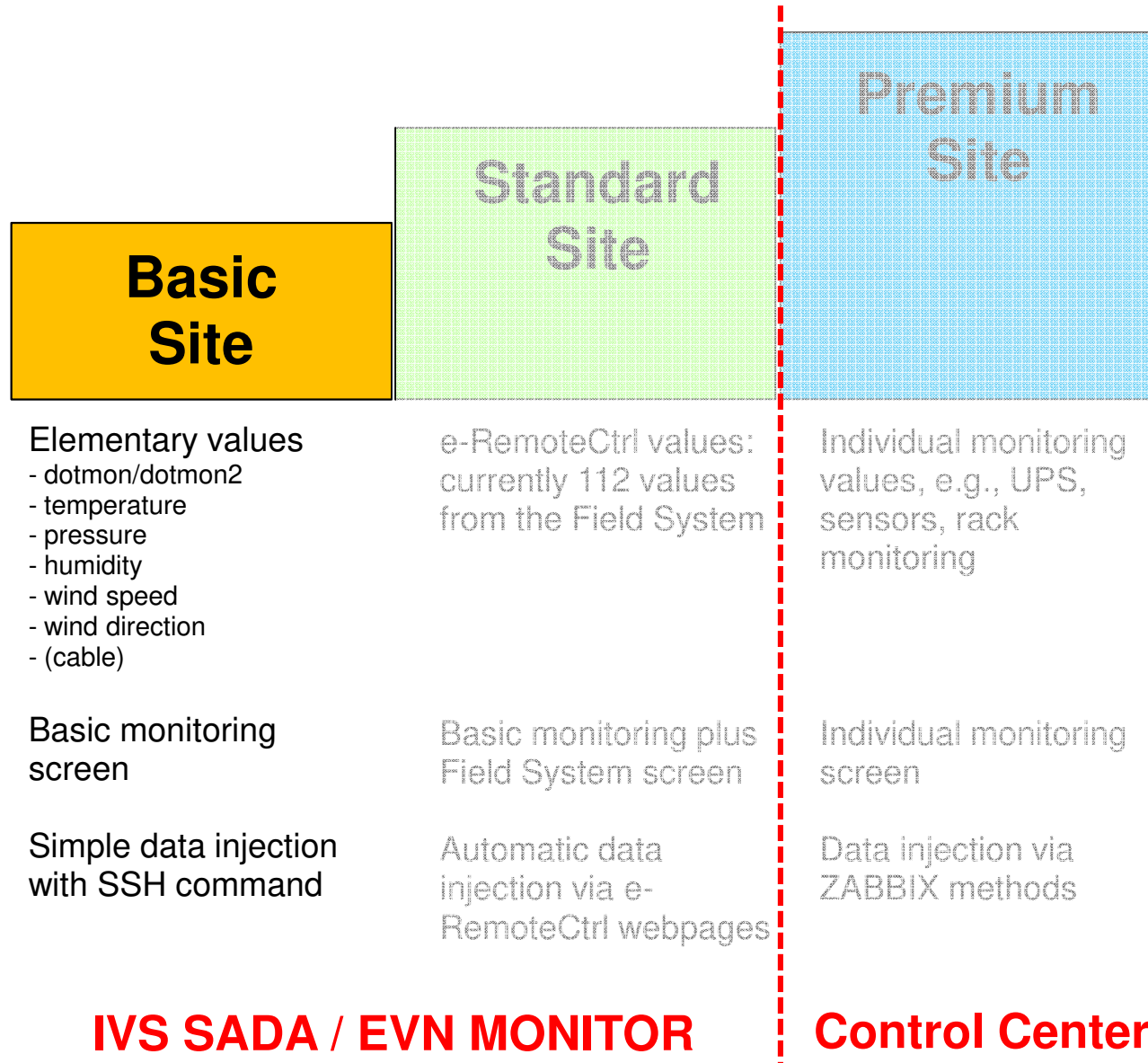
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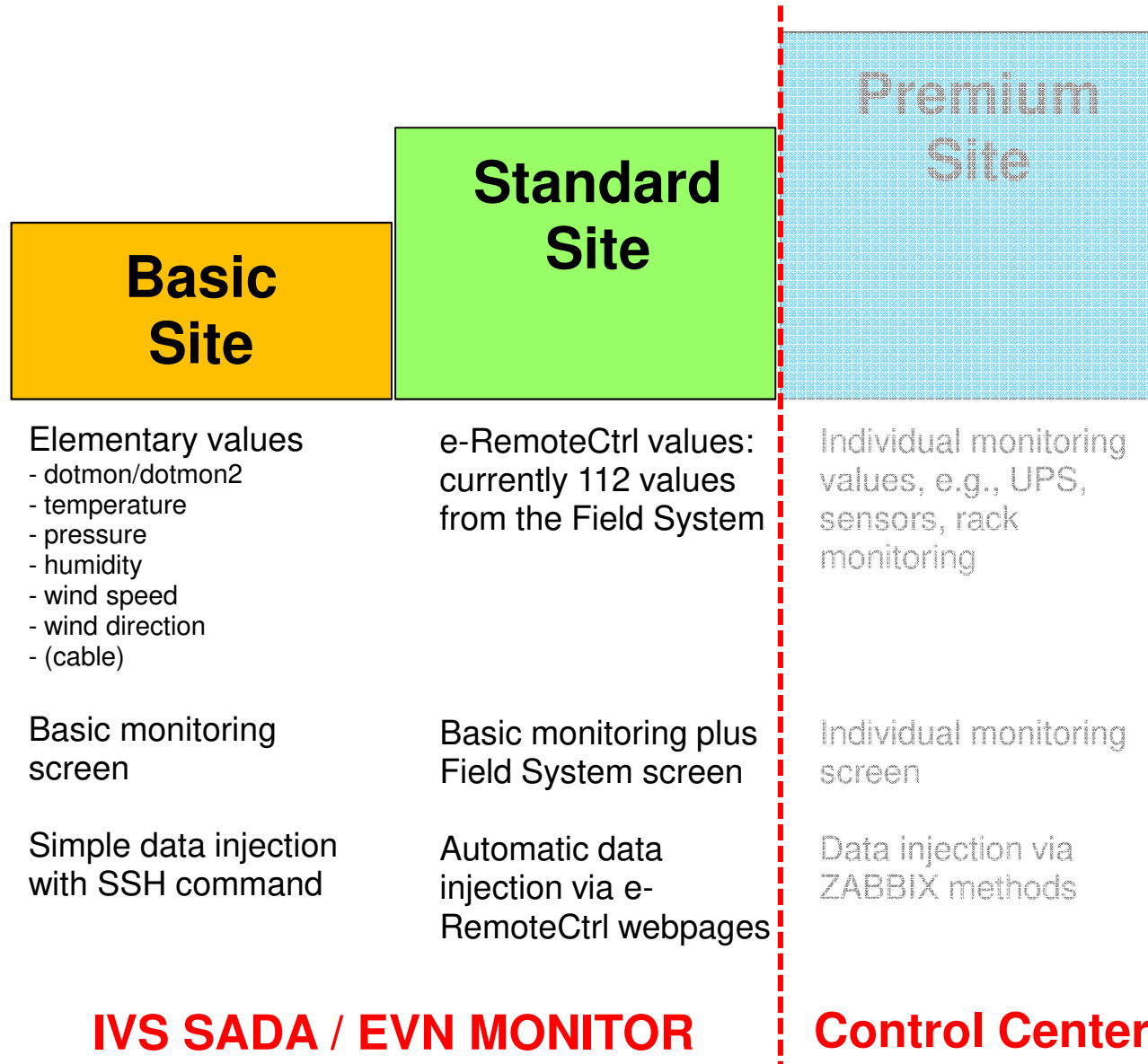
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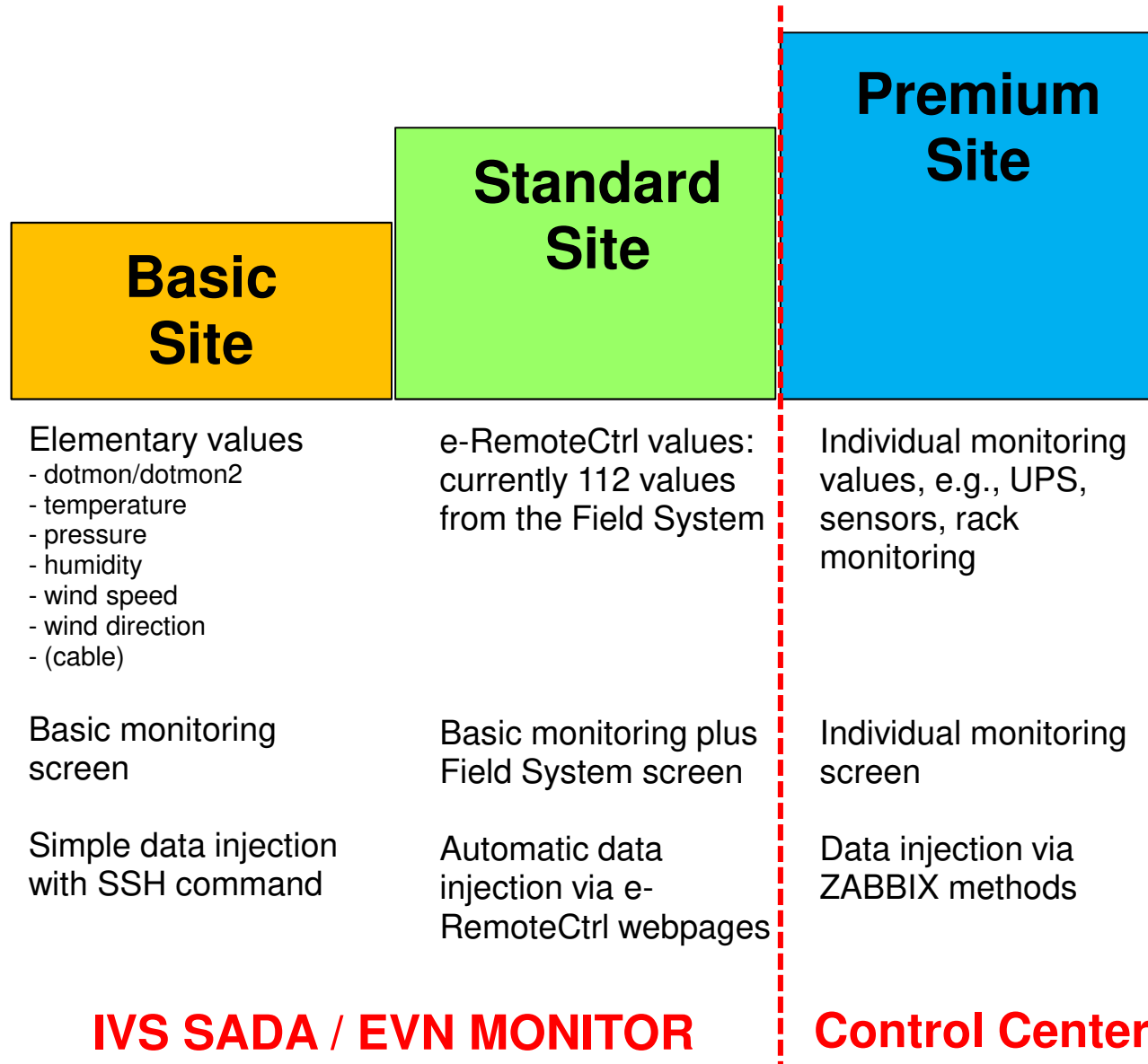
How to send in data?



How to send in data?



How to send in data?



How to send in data?



Predefined templates

Name ▲	Applications	Items	Triggers	Graphs	Screens	Discovery	Web
MyTemplate NASA Field System Data - Antenna Control Unit Vertex Type	Applications 1	Items 19	Triggers 65	Graphs 6	Screens 1	Discovery	Web
MyTemplate NASA Field System Data - Cryogenic Dewar	Applications 1	Items 6	Triggers 3	Graphs 5	Screens 1	Discovery	Web
MyTemplate NASA Field System Data - Log	Applications 1	Items 3	Triggers 3977	Graphs	Screens	Discovery	Web
MyTemplate NASA Field System Data - Mark5 Remaining Capacity	Applications 1	Items 16	Triggers	Graphs 2	Screens	Discovery	Web
MyTemplate NASA Field System Data - Phase Cal Monitoring Legacy	Applications 1	Items 48	Triggers	Graphs	Screens	Discovery	Web
MyTemplate NASA Field System Data - System Status Monitor	Applications 2	Items 33	Triggers 8	Graphs 8	Screens 1	Discovery	Web
MyTemplate NASA Field System Data - System Temperatures Legacy	Applications 1	Items 58	Triggers 1	Graphs 4	Screens	Discovery	Web

IVS SADA / EVN MONITOR

Control Center

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IVS SADA & EVN Monitor

What is the IVS SADA / EVN Monitor

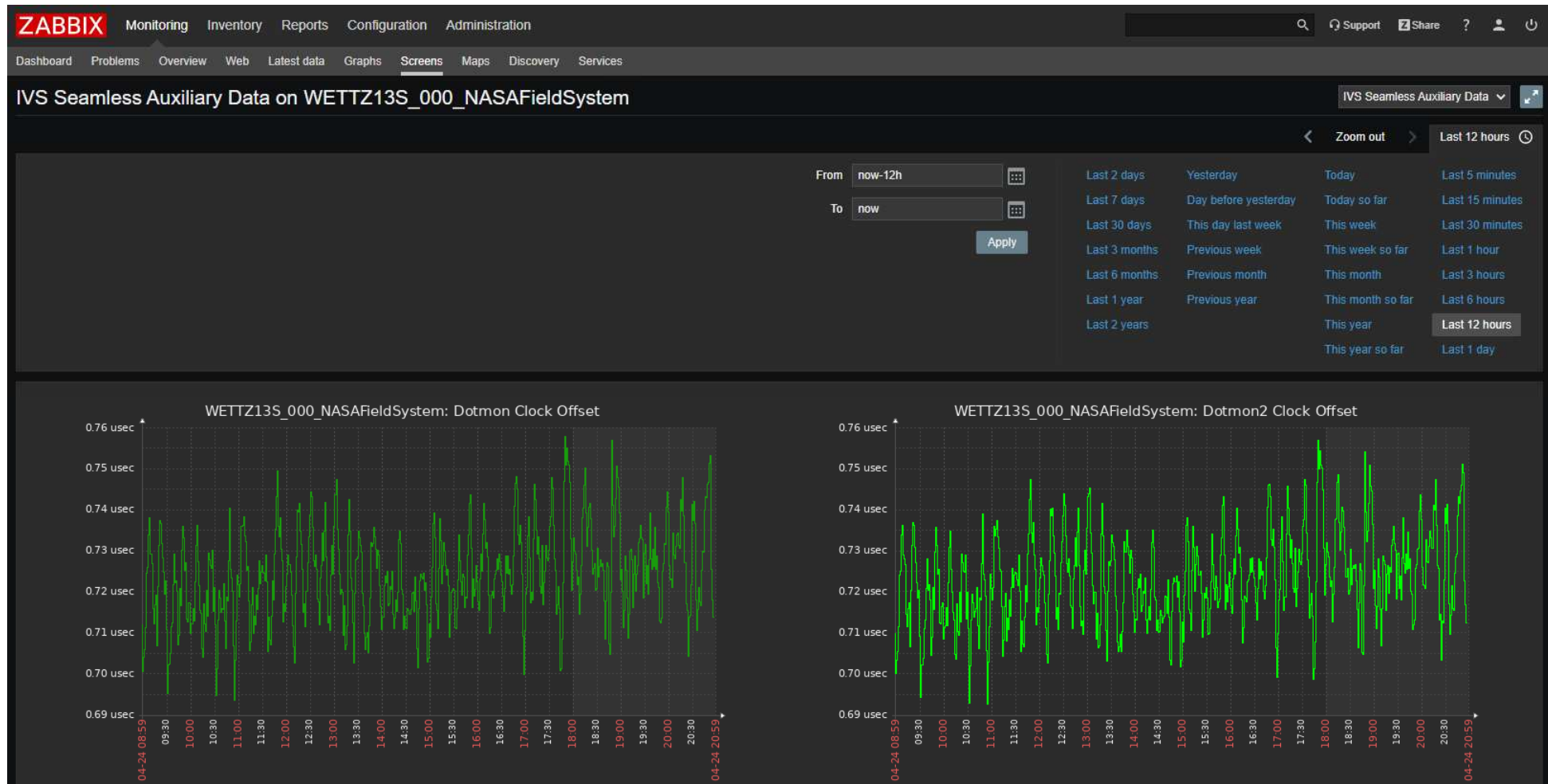
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Why?

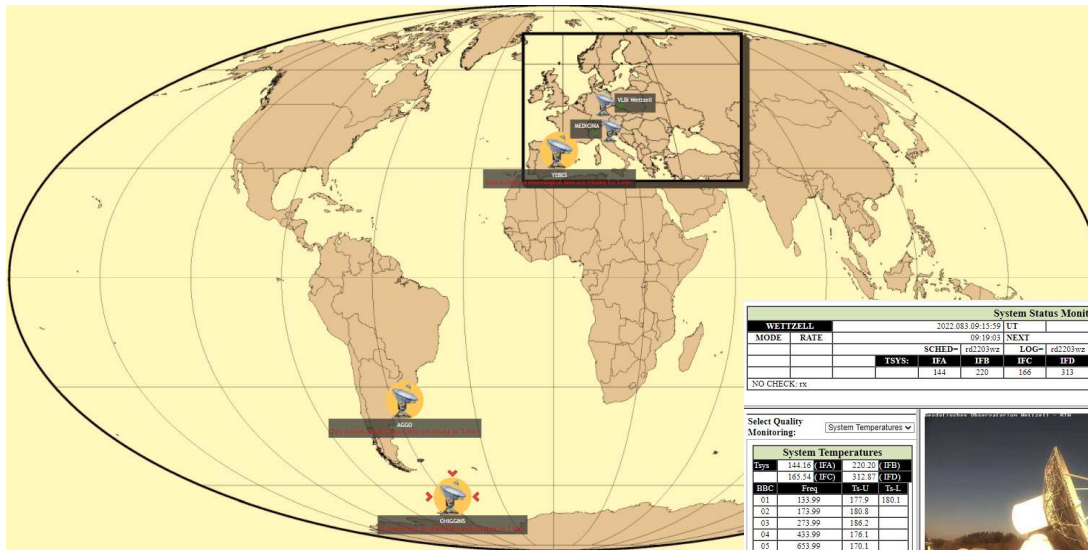
How to get out data?

Web server screens



How to get out data?

Web server overview

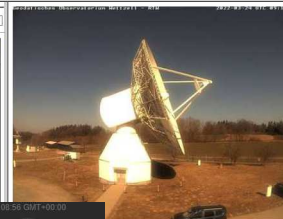


System Status Monitor												
WETZELL	2022-08-09 15:59	UT	TEMP	13.4	0426-273	TRACKING						
MODE	RATE	SCHED	NEXT	RUMID	31.3	RA	04h 29m 52.96s					
		LOG	r02203wz	PREN	956.1	DEC	5° 6' 24m	(2000)				
		TSYS:	IFA	IFB	IFC	IFD	CABLE	0.006366	AZ	68.4418	EL	17.8915
			144	220	166	313	WINDI	10.08	DIR	294		
NO CHECK: rx												

Mark 5 Remaining Capacity					
A	VSN	Time	GB	%	Check-UT
0%					100% (Volume)
B					100% (Volume)
0%					

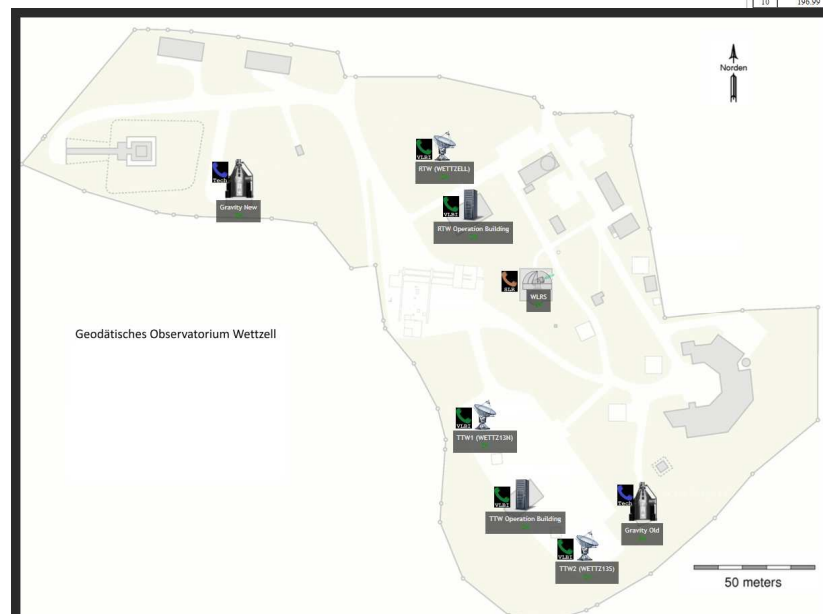
Select Quality Monitoring:

System Temperatures				
Temp	144.12	155.51	220.20	312.07
	(EA)	(FC)	(ED)	(FD)
BBC	Freq	Ts-U	Ts-L	
01	133.99	177.9	180.1	
02	173.99	180.8		
03	273.99	186.2		
04	433.99	176.1		
05	653.99	170.1		
06	773.99	168.5		
07	793.99	166.5		
08	853.99	164.7	162.5	
09	180.99	159.8		
10	190.99	114.0		



Antenna Monitoring		
RTW ([2022] 083 09 15 59 [Offset: 0 msec])		
Actual Pos.	17.8966	Elevation
Commanded Pos.	17.8966	
NASA'S Pos.	17.8915	
Com. Pos. Offset	0.0000	
STARTTRACK	Status	STARTTRACK
Star track	Star track	Star track
Star pos. retraced	Star pos. retraced	Star pos. retraced

Station Monitoring	
Dsnwr	
Time:	2022-08-09 14:58
FOK:	281.28%
COK:	281.00%
Pressure:	802000.00 [0 -6 mbar]
Amb. Temp:	13.18°C
Master Clock Offset	
Time:	2022-08-08 04:00
Time:	(2022-Mrz-24)
EPOS39:	7.441
Time:	2022-08-09 15:59
Time:	(Session: r02203wz)
dotmon:	6.9573 [msec]
Painting (Gnss)	
Time:	2022-05-10 04:19
Source:	cygnus
Position:	249 deg 72 deg
Az. Offset:	0.0505 [deg]
Az. Offset:	0.0212 [deg]
Status:	NOK



Log

0403a.1169.16
021b.1248.17
39.50

034a.1155.07
015b.1249.13
06.28

WETZL_SLR_WLRS: Error Message

Timestamp: 2022-01-27 23:08:03

Value: OK

How to get out data?

python Script

Sample call: available hosts

```
python.exe ZabbixAPI.py -C config_evn.ini -L
```

```
#HostID Hostname  
#-----  
10289 MEDICINA_000_NASAFIELDSystem  
10272 WETTZELL_000_NASAFIELDSystem  
10271 YEBES_000_NASAFIELDSystem
```

How to get out data?

python Script

Sample call: seamless request for specific time interval

```
python.exe ZabbixAPI.py -C config_evn.ini -L
-H YEBES_000_NASAFIELDSystem -K ERC.PRESSURE
-TS "2022-03-15 18:15:00" -TE "2022-03-15 18:30:00"
```

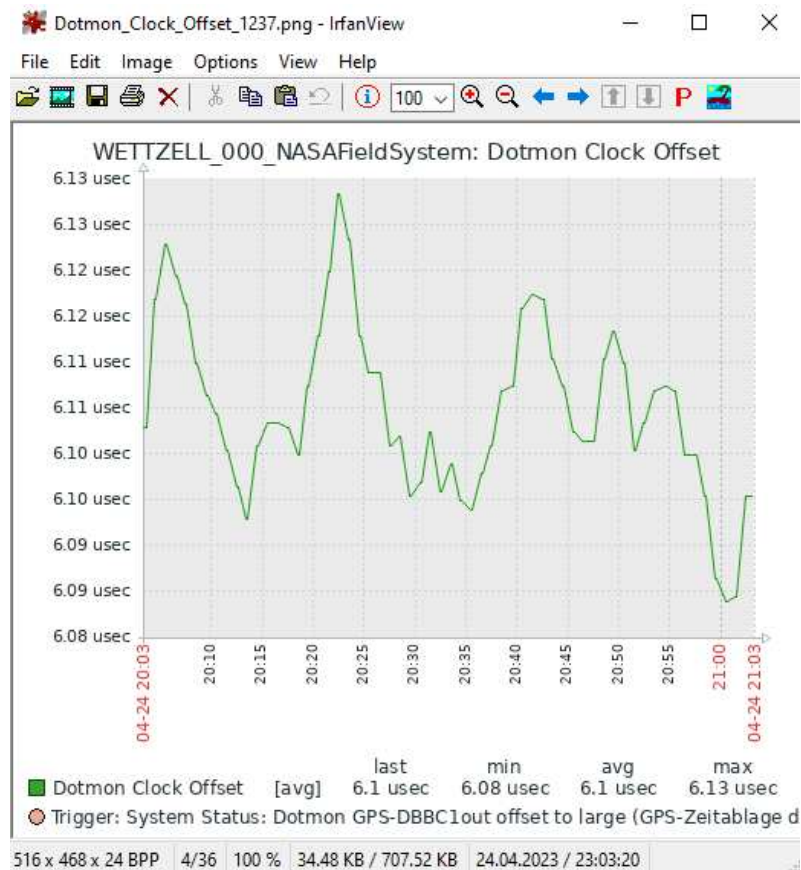
#Date	Unixtime	Value
2022-03-15 18:29:01	1647368941	911.0114
2022-03-15 18:28:01	1647368881	911.0114
2022-03-15 18:27:01	1647368821	911.0114
2022-03-15 18:26:01	1647368761	911.0114
2022-03-15 18:25:02	1647368702	911.0114
2022-03-15 18:24:02	1647368642	910.9211
2022-03-15 18:23:01	1647368581	910.9211
2022-03-15 18:22:01	1647368521	910.9211
2022-03-15 18:21:01	1647368461	910.9211
2022-03-15 18:20:02	1647368402	910.9211
2022-03-15 18:19:01	1647368341	910.8493
2022-03-15 18:18:02	1647368282	910.8493
2022-03-15 18:17:02	1647368222	910.8493
2022-03-15 18:16:01	1647368161	910.8493
2022-03-15 18:15:02	1647368102	910.8493

How to get out data?

python Script

Sample call: seamless request for graph image

```
python.exe ZabbixAPI.py -C config_evn.ini -GID 1237
```



How to get out data?

Monitoring archive files

https://vlbisysmon.evlbi.wettzell.de/monitoring_archive/ivs_archive/

Index of /monitoring_archive/ivs_archive

Name	Last modified	Size	Description		
Parent Directory		-			
HOBART/	2023-01-02 00:05	-			
MEDICINA/	2023-01-02 00:05	-			
OHIGGINS/	2023-01-02 00:05	-			
WARKWORTH/	2023-01-02 00:05	-			
WETTZ13N/	2023-01-02 00:05	-			
WETTZ13S/	2023-01-02 00:05	-			
WETTZELL/	2023-01-02 00:05	-			
<ul style="list-style-type: none"> 2021/ 2022/ 2023/ <ul style="list-style-type: none"> 01/ 02/ 03/ 04/ 	<ul style="list-style-type: none"> 2021-12-02 00:05 2022-12-02 00:05 2023-04-02 00:05 2023-01-02 00:05 2023-02-02 00:05 2023-03-02 00:05 2023-04-02 00:05 	<ul style="list-style-type: none"> - - - - - - - 	<ul style="list-style-type: none"> 20230401_WETTZELL_DOTMON.txt 20230402_WETTZELL_DOTMON.txt 20230403_WETTZELL_DOTMON.txt 20230404_WETTZELL_DOTMON.txt 20230405_WETTZELL_DOTMON.txt 	<ul style="list-style-type: none"> 2023-04-02 00:05 2023-04-03 00:05 2023-04-04 00:05 2023-04-05 00:05 2023-04-06 00:05 	<ul style="list-style-type: none"> 59K 59K 59K 59K 59K
<ul style="list-style-type: none"> DOTMON/ HUMIDITY/ PRESSURE/ TEMPERATURE/ 	<ul style="list-style-type: none"> 2023-04-24 00:05 2023-04-24 00:05 2023-04-24 00:05 2023-04-24 00:05 	<ul style="list-style-type: none"> - - - - 			

#Date	Unixtime	Value
2023-04-01 23:59:51	1680393591	6.2093
2023-04-01 23:58:51	1680393531	6.2113
2023-04-01 23:57:51	1680393471	6.2113
2023-04-01 23:56:51	1680393411	6.2103
2023-04-01 23:55:51	1680393351	6.2008
2023-04-01 23:54:51	1680393291	6.1973
2023-04-01 23:53:51	1680393231	6.2023
2023-04-01 23:52:50	1680393170	6.2023
2023-04-01 23:51:50	1680393110	6.2078
2023-04-01 23:50:50	1680393050	6.2198
2023-04-01 23:49:51	1680392991	6.2253
2023-04-01 23:48:51	1680392931	6.2203
2023-04-01 23:47:51	1680392871	6.2143
2023-04-01 23:46:51	1680392811	6.2098
2023-04-01 23:45:51	1680392751	6.2098
2023-04-01 23:44:51	1680392691	6.2108
2023-04-01 23:43:51	1680392631	6.2153
2023-04-01 23:42:51	1680392571	6.2073
2023-04-01 23:41:51	1680392511	6.2048
2023-04-01 23:40:51	1680392451	6.2083
2023-04-01 23:39:51	1680392391	6.2053

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Why?

Live status of the network

The screenshot shows the ZABBIX monitoring interface. The top navigation bar includes 'Monitoring', 'Inventory', 'Reports', 'Configuration', and 'Administration'. Below this is a secondary navigation bar with 'Dashboard', 'Problems', 'Overview', 'Web', 'Latest data', 'Graphs', 'Screens', 'Maps', 'Discovery', and 'Services'. The main content area is titled 'Dashboard' and contains several panels:

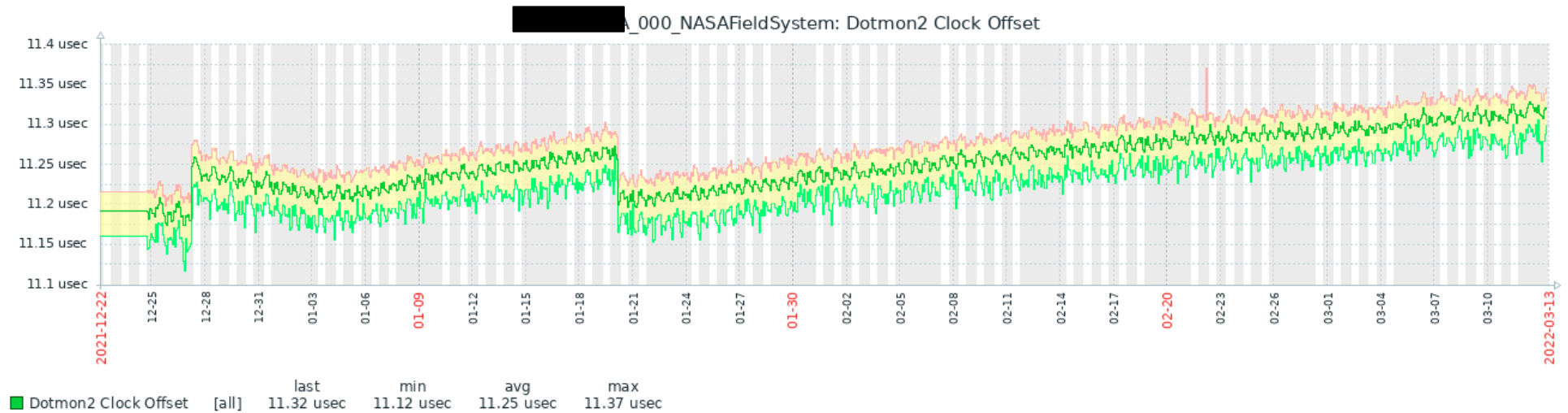
- Problems:** A table listing network issues.

Time	Recovery time	Status	Info	Host	Problem • Severity	Duration
2023-04-21 11:49:19		PROBLEM	SPACEWEATHER_WSV17		MAG_DATA_AVAILABLE	3d 9h 2
2023-04-21 11:44:47		PROBLEM	SPACEWEATHER_WSV17		G_INDEX_STATUS_Check	3d 9h 3
2023-04-13 00:11:50		PROBLEM	OHIGGINS_000_NASAFeldSystem		No elementary set of seamless auxiliary data for 20 min.	11d 21h
2023						
2021-08-17 13:14:10		PROBLEM	WETTZELL_000_NASAFeldSystem_PREMIUM		Data Archive: wind data are missing for 3 min.	1y 8m 1
2021-08-17 13:13:05		PROBLEM	WETTZELL_000_NASAFeldSystem_PREMIUM		Data Archive: meteorological data are missing for 3 min.	1y 8m 1
August						
2021-06-03 14:39:45		PROBLEM	WETTZELL_000_NASAFeldSystem_PREMIUM		Data Archive: dolmon2 data are missing for 3 min.	1y 10m
2021-06-03 14:36:00		PROBLEM	WETTZELL_000_NASAFeldSystem_PREMIUM		Data Archive: dolmon data are missing for 3 min.	1y 10m
- Observatory:** A map of the Geodätisches Observatorium Wettzell showing various equipment locations like 'Gravity point', 'VLBI point', and 'GNSS point'. It includes contact information for the observatory.
- Favourite screens:** A list of saved dashboard views such as 'vlibisysmon.evlibi.wetzell.de' and 'Wetzell Observatory (VLBI Operator)'.
- Favourite maps:** A list of saved maps, including 'Worldmap'.
- Problems by severity:** A filter section for problems categorized by severity: Disaster, High, Average, Warning, Information, and Not classified.

Just makes sense if there are possibilities to interact.
 → See VCC for information exchange or the tests at AuScope for re-scheduling

Why?

Detection of system changes



Why?

Detection of causes for failures

Email from Haystack: No fringes for about 15 min. in vt2049ws

....
 There was a roughly 15 minute period of no fringes at Ws in the middle of the vt2049 test. In the log it looks like the antenna was not pointing (greeting out 'onsource' from log):

```
<< all before = TRACKING >>
2022.049.20:26:15.08/onsource/TRACKING
2022.049.20:26:57.02/onsource/SLEWING
<< SLEWING from 20:26:57 to 20:42:04 >>
2022.049.20:42:04.02/onsource/SLEWING
2022.049.20:42:06.06/onsource/TRACKING
<< all after = TRACKING >>
```

...

ACU error messages in the system monitoring here:

Timestamp	Value
2022-02-18 20:40:42	[General] Wind stow alert (remaining tim e: 9.95 min)
2022-02-18 20:39:42	[General] Wind stow alert (remaining tim e: 10.95 min)
2022-02-18 20:38:43	[General] Wind stow alert (remaining tim e: 11.95 min)

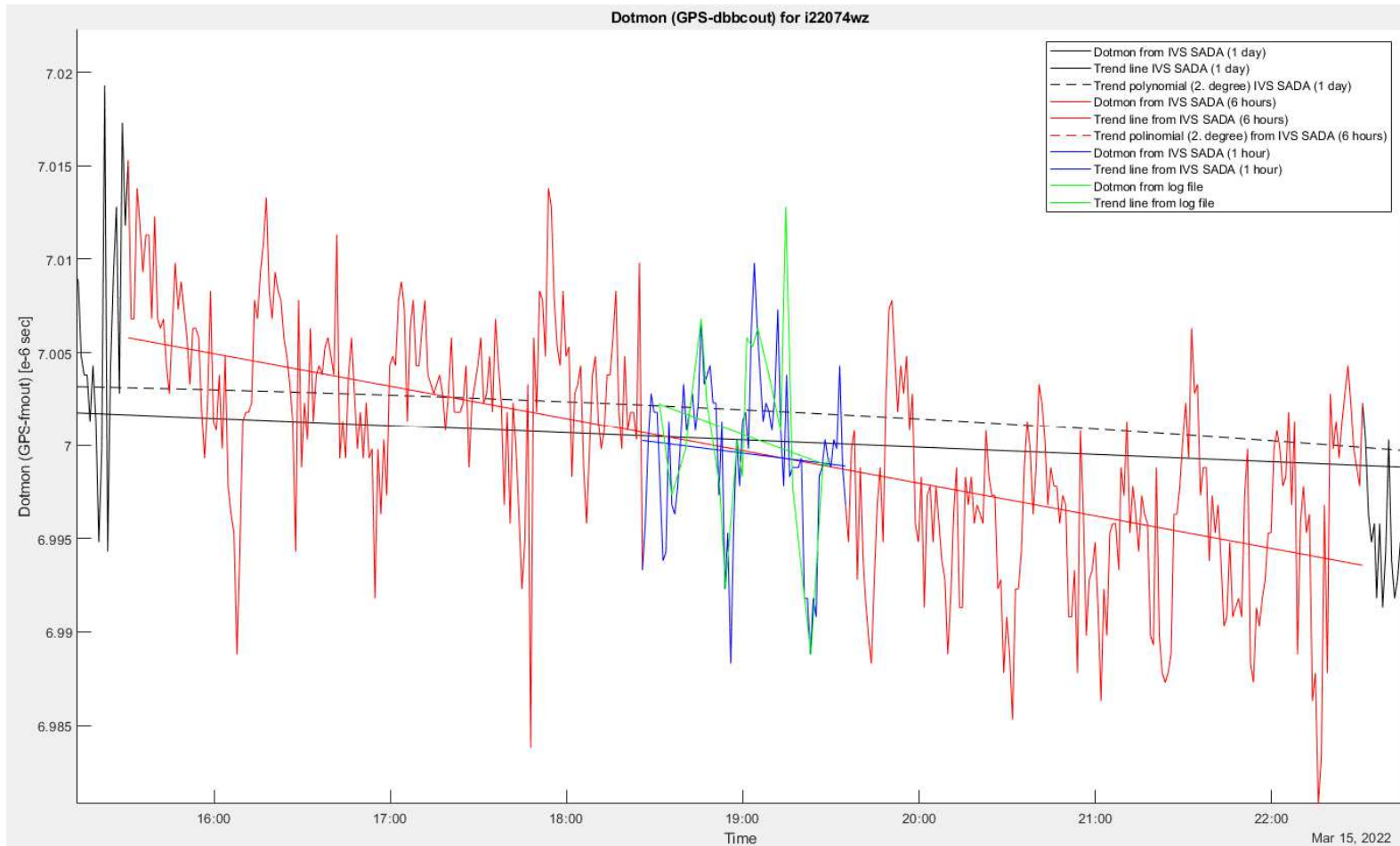
...

2022-02-18 20:27:43	[General] Wind stow alert (remaining tim e: 20.00 min)
2022-02-18 20:26:45	[Elevation] Survival stow
2022-02-18 20:26:44	[Azimuth] Survival stow
2022-02-18 20:26:42	[General] Wind stow alert (remaining tim e: 20.00 min)



Why?

Additional data for correlation and analysis

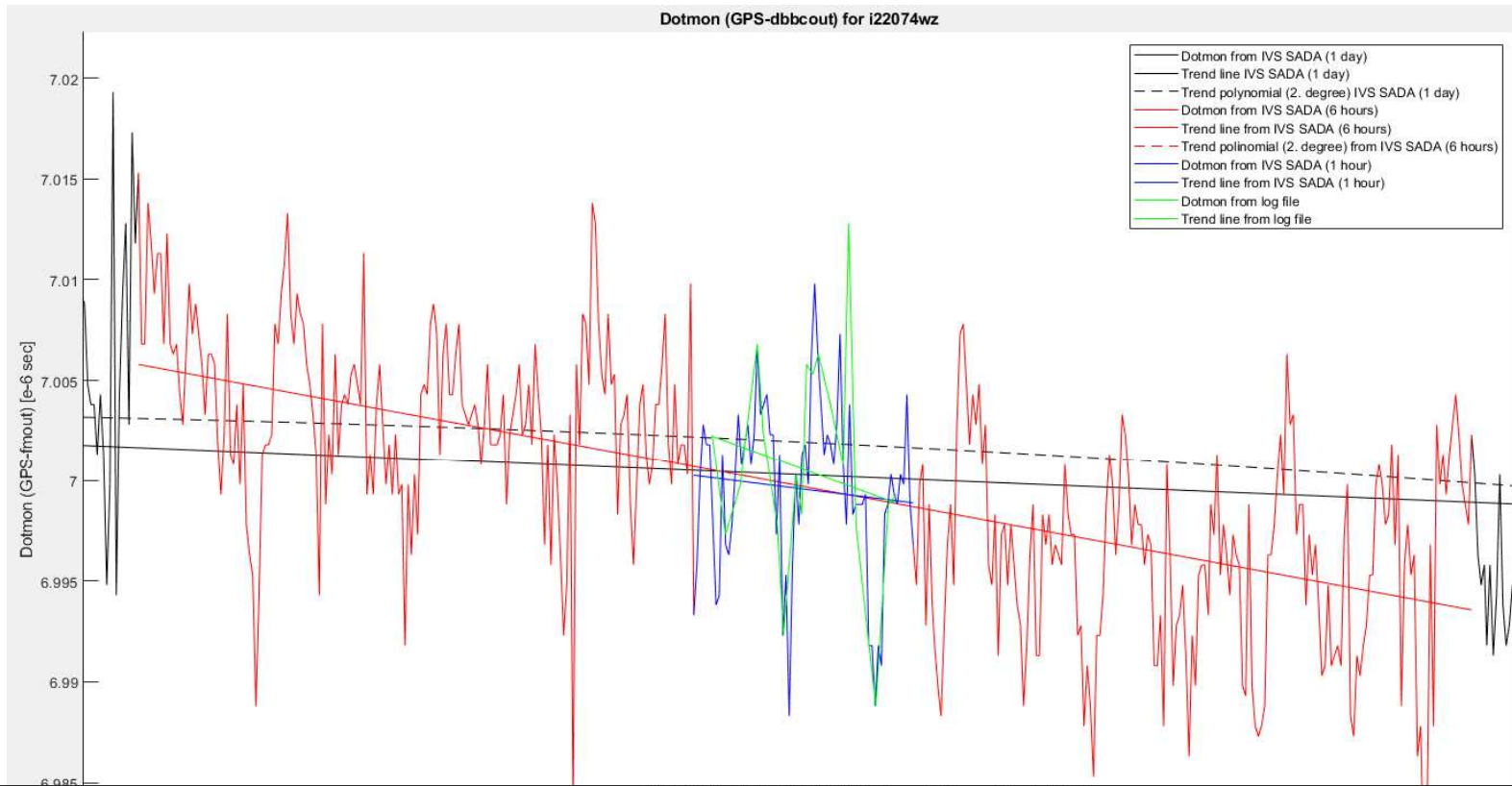


Short-term

TRENDS

Why?

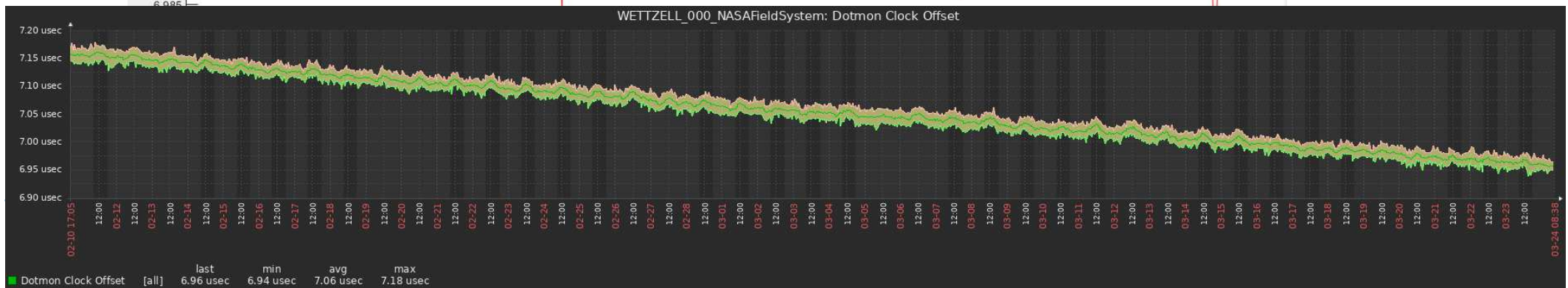
Additional data for correlation and analysis



Short-term

TRENDS

Long-term



Summary

- Completely functional systems at Wettzell, Germany and JIVE ERIC Dwingeloo, The Netherlands
- Easy to handling when importing data
- Already 9 antennas send data
- Nice browser-based web interfaces independent from OS
- Convenient data export with Python script independent OS
- Some first use of data for special projects (auxiliary data for surveying, photogrammetry, and quality checks
- Permanent use for station monitoring at Wettzell observatory

Wish list for the future:

- More participating antennas
- Use of data for correlation and analysis / science
- Extended data sets according to requirements

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IVS SADA & EVN Monitor

Thank you ...

Acknowledgements: Giuseppe Maccaferri, Hayo Hase, Javi Gonzalez,
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Michael Lösler, and all supporters