

# Antelope in Antarctica

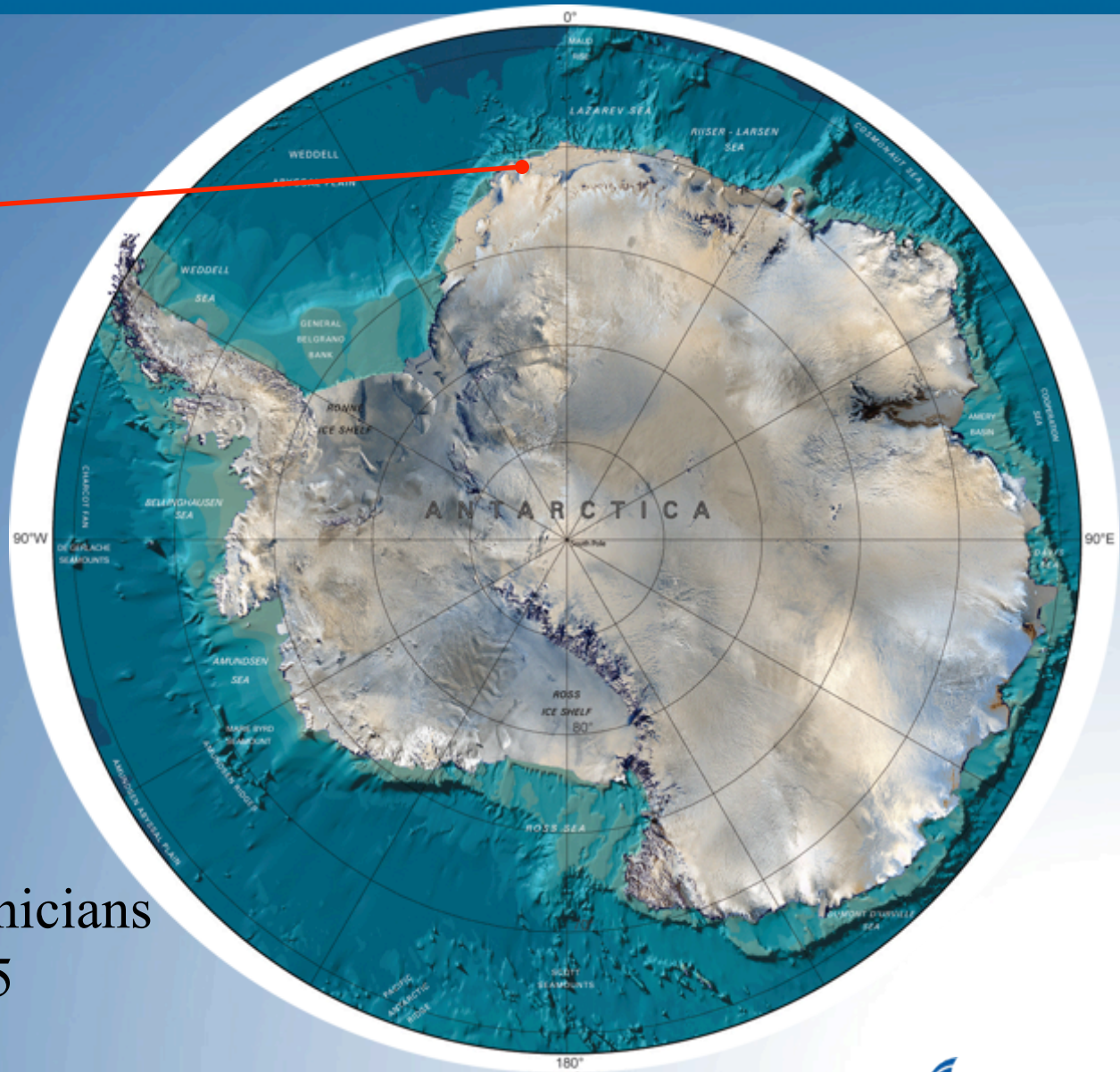
AUG 2012  
Trieste, Italy

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Alfred-Wegener-Institute for Polar and Marine Research

- Network
- Hardware: How does a station look like
- Hardware Problems: Batterys, Energy, Station Availabilty
- Main interests: Regional, local earthquakes -> array processing
  - Including offline data
- `rtexec` tasks

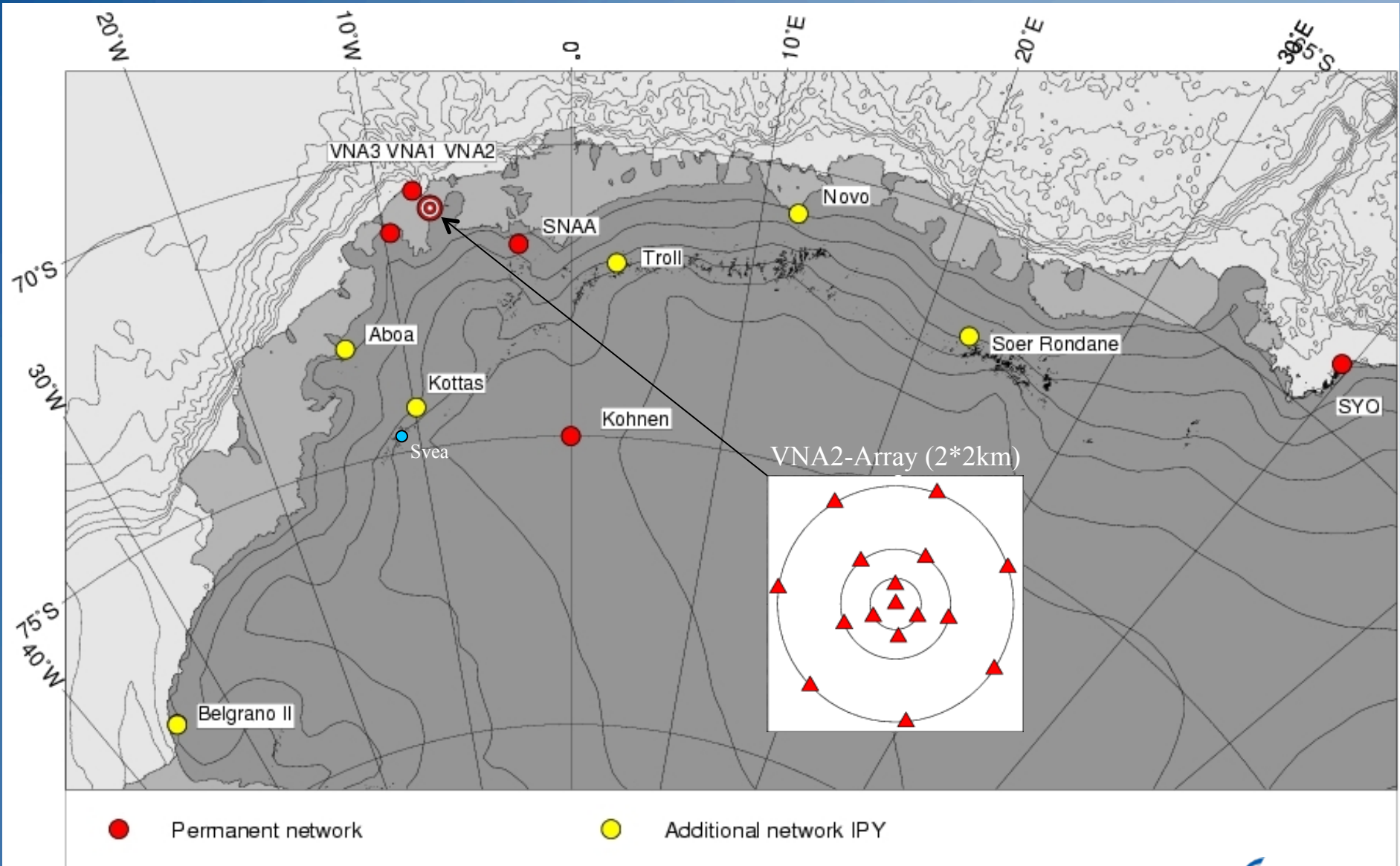


# Neumayer Station - Antarctica



- Accessible only 4 month in summer
- Winter personnel: 9, 2 Geophysicists, 1 Meteorologist, 1 Airchemist, Cook, Doctor, Technicians
- Crew change after 15 months

- Detection of local and regional events  
→ array processing
- First analysis of events during winter with real-time accessible stations
- Most data stored on disks and need to be merged with existing datasets



Station	Coms	Power	Rec	Seismometer
VNA1	LAN	Generator	Q330	Lennartz LE-3D/20s
VNA2	VHF	Solar, Wind	Q330	Guralp CMG3ESP/120s, Mark L4C
VNA3	VHF	Solar, Wind	Q330	Guralp CMG3ESP/120s
SNAA	Internet	Generator	Q330	Streckeisen STS-2
Svea	none	Solar, Wind	Reftek	
Kohnen	none	Solar, Wind	Reftek	
Kottas	none	Solar	Reftek	
Troll	none	Generator	Reftek	
Novo	none	Generator	Reftek	

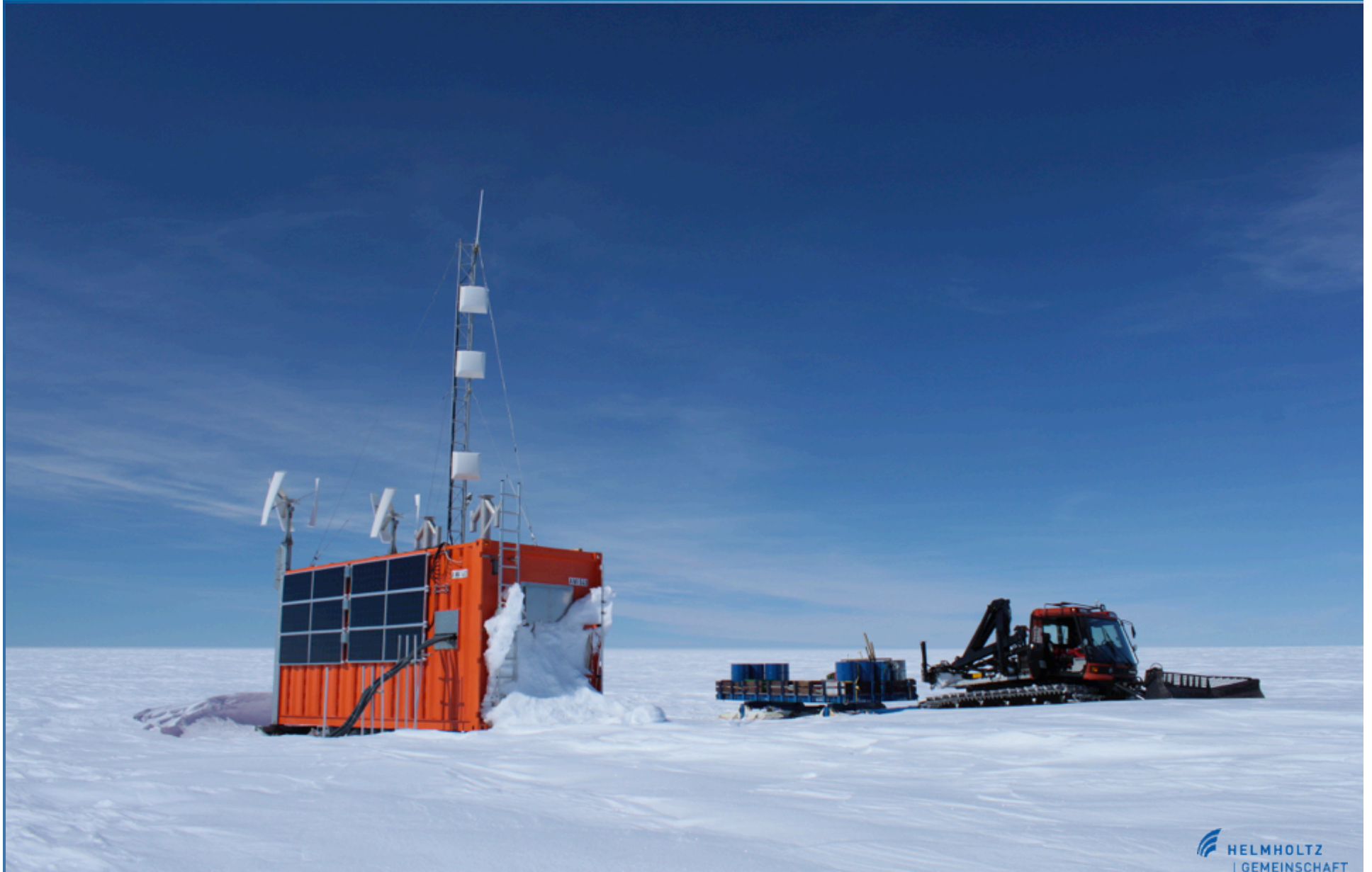
- SunFire V245: Data Acquisition
- MacPro 2,93 GHz Intel 12core Xeon: Array Processing



How does a station look like?

- VNA2
- VNA3

# Station VNA2





# Station VNA2

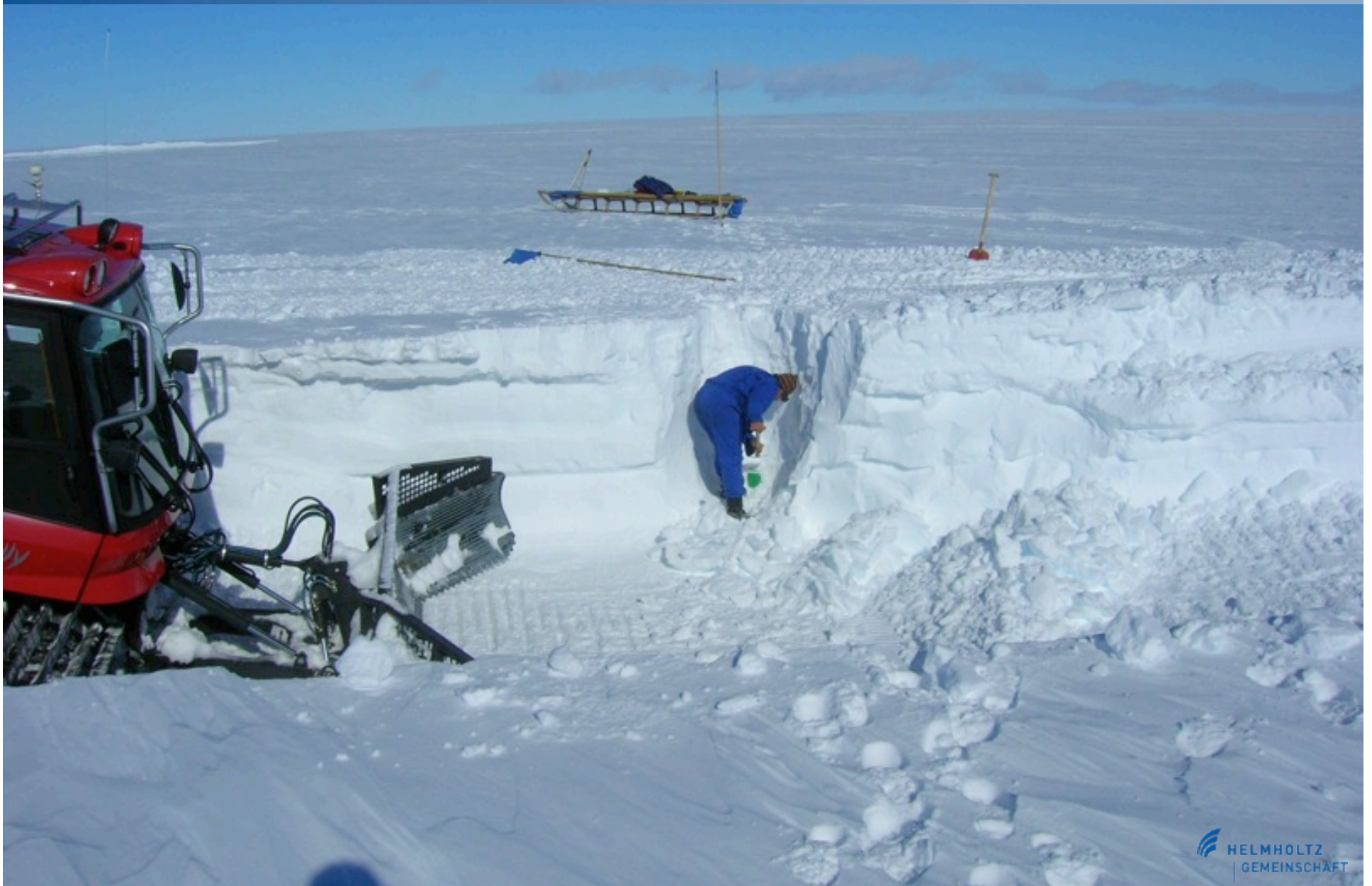


# Station VNA2 - Maintenance



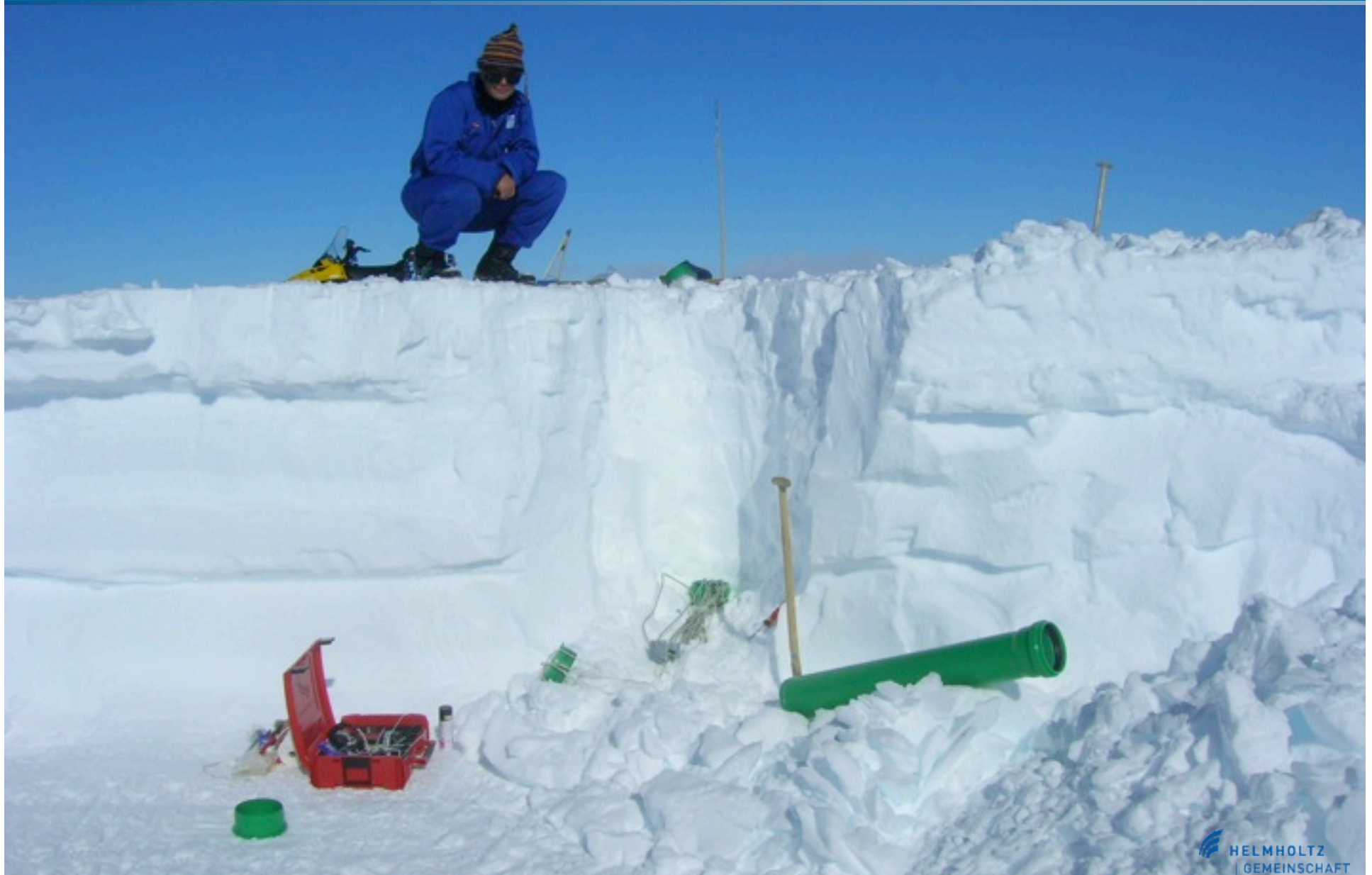


# Station VNA2 - Maintenance

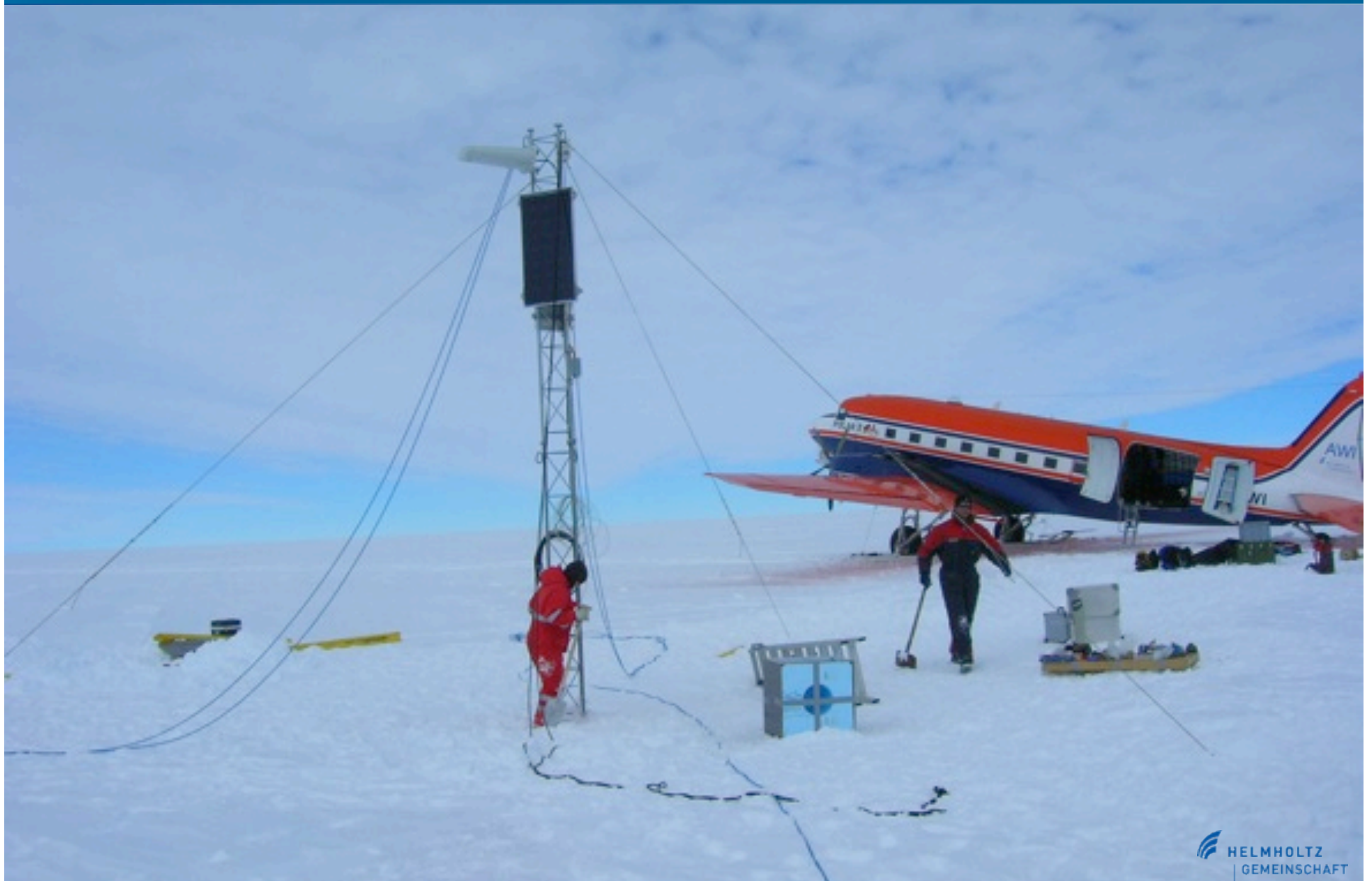




# Station VNA2 - Maintenance



# Station VNA3 - Maintenance





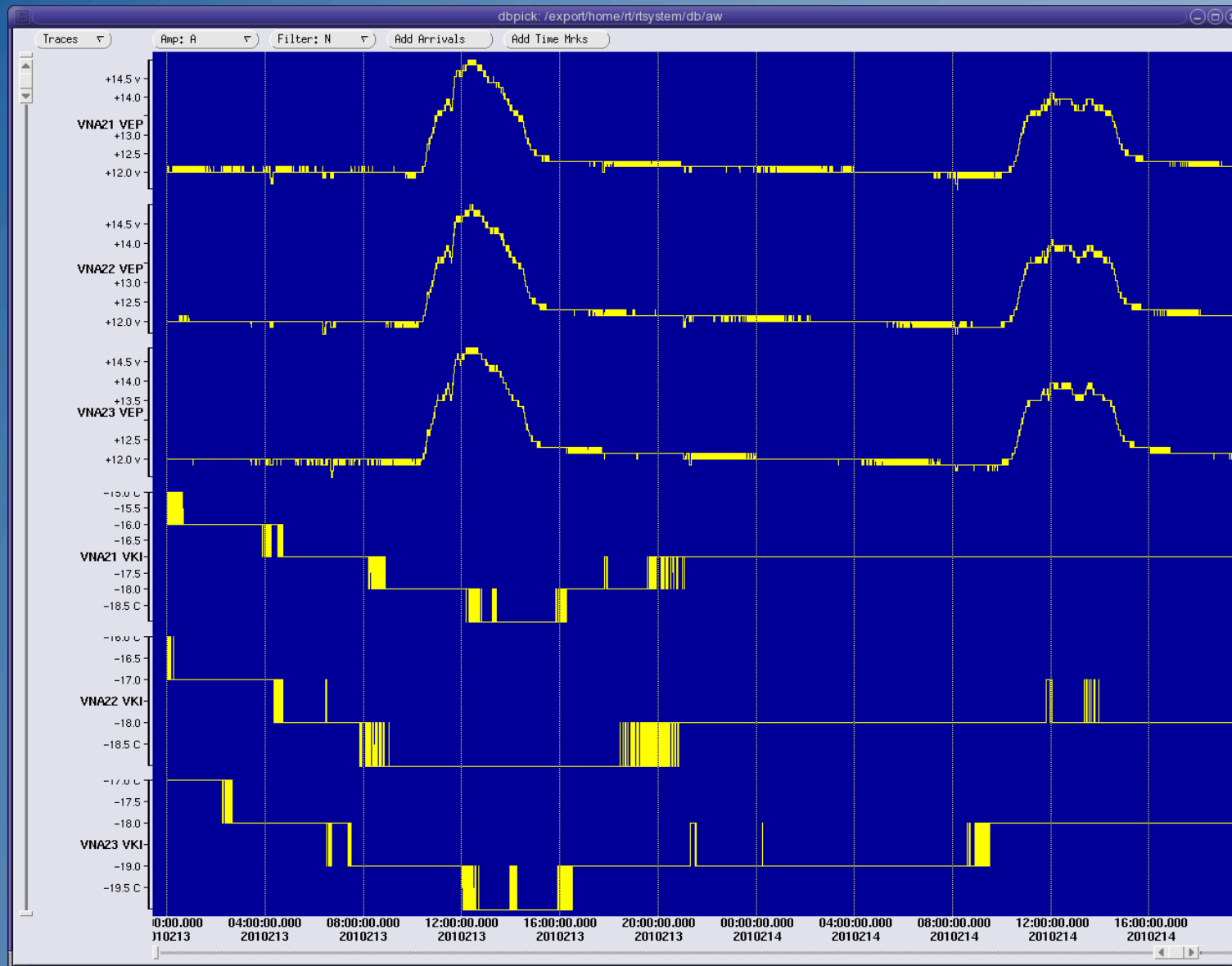
# Station VNA3 - Maintenance



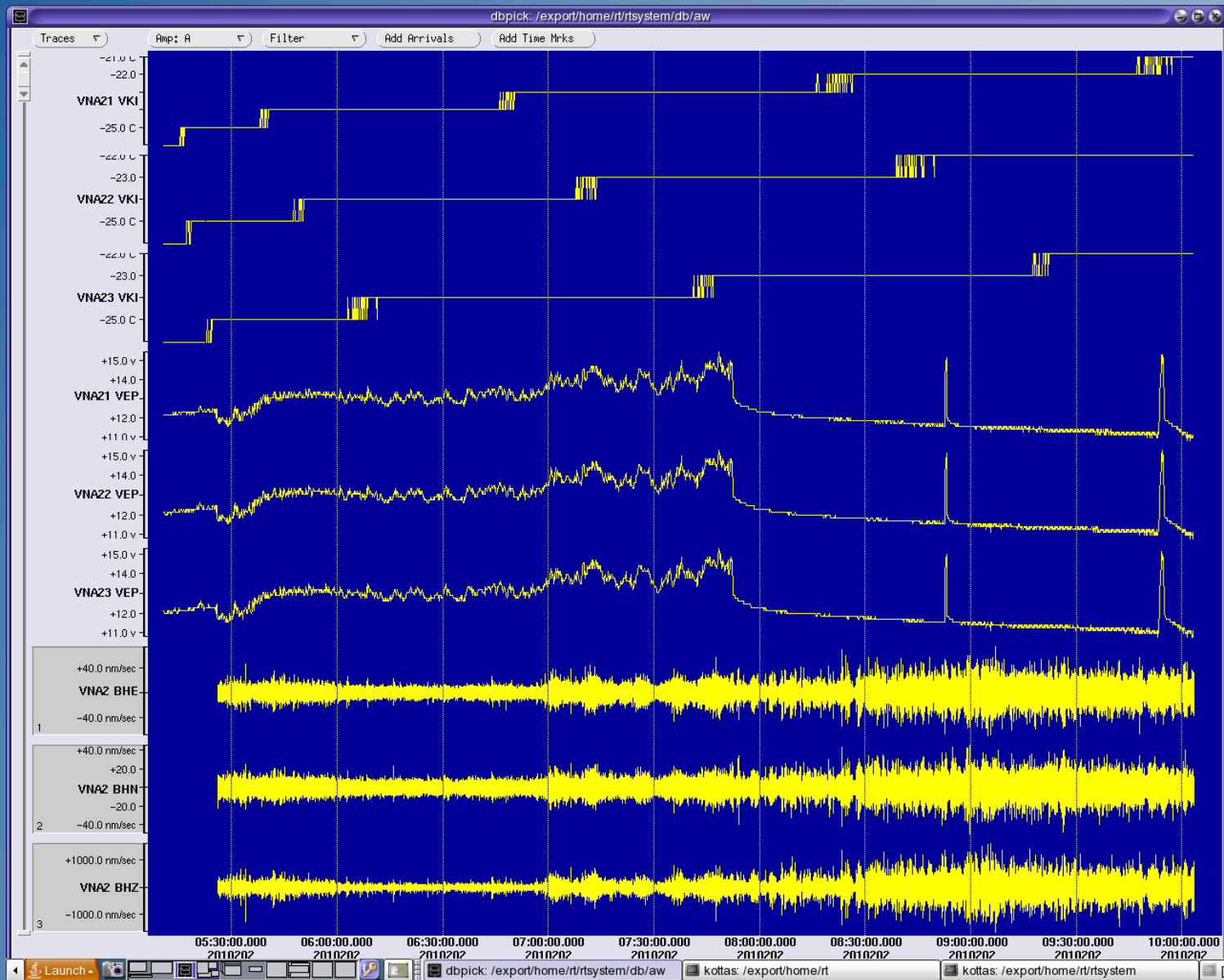


- Energy supply
  - No sunlight during winter time
  - Wind power is not reliable, too much wind
  - Batteries too cold for charging
- Short periods for maintenance
- Logistics
- Weather conditions
- changing personnel

# Charging Batteries in winter



# Battery voltage during storm





# RT - Processes

Neumayer Antarctic Seismographic Network 2012-050 12:16

File Edit View Refresh

**Start**

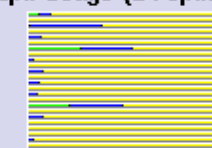
System is up

**Stop**

Load Average

1min	1.08
5min	1.02
15min	1.00

Cpu Usage (24 cpus)



109 processes

Memory Usage

ram	16384 Mb
swap	16384 Mb

Disk Usage

root

Orb Ring Buffer Status :awi

pkts/s	16	connections	
In	4.090		12.00
Out	10.504		12.00

Processing Tasks								
Task	Pid	cpu	cpu	rss	rss	To Orb	From Orb	Latency
rtexec	201	0.00	200.0	8.4	1200			
orbserver	245	0.00	200.0	524.6	1200			
orbarray	248	0.00	200.0	1034.3	1200			
nm2awi	249	0.00	200.0	1.8	1200	2.000	10.00	100.0
awi2array	292	0.00	200.0	1.7	1200	2.000	10.00	100.0
orb2db	351	0.00	200.0	57.7	1200	2.000	10.00	100.0
orbwfproc	565	0.00	200.0	14.2	1200			
orbarray2db	637	0.00	200.0	51.5	1200	2.000	10.00	100.0
orb2dbt	680	0.00	200.0	3.3	1200	2.000	10.00	100.0
orb2logs	726	0.00	200.0	1.9	1200			
slink2orb	779	0.00	200.0	1.7	1200			
gsn2orb	824	0.00	200.0	1.7	1200	2.000	10.00	100.0
orbdetect	885	0.00	200.0	3.7	1200	2.000	10.00	100.0
orbassoc	962	0.00	200.0	85.6	1200	2.000	10.00	100.0
NEIC2orb	1033	0.00	200.0	2.2	1200			
getNEIC	1109	0.00	200.0	18.5	1200			

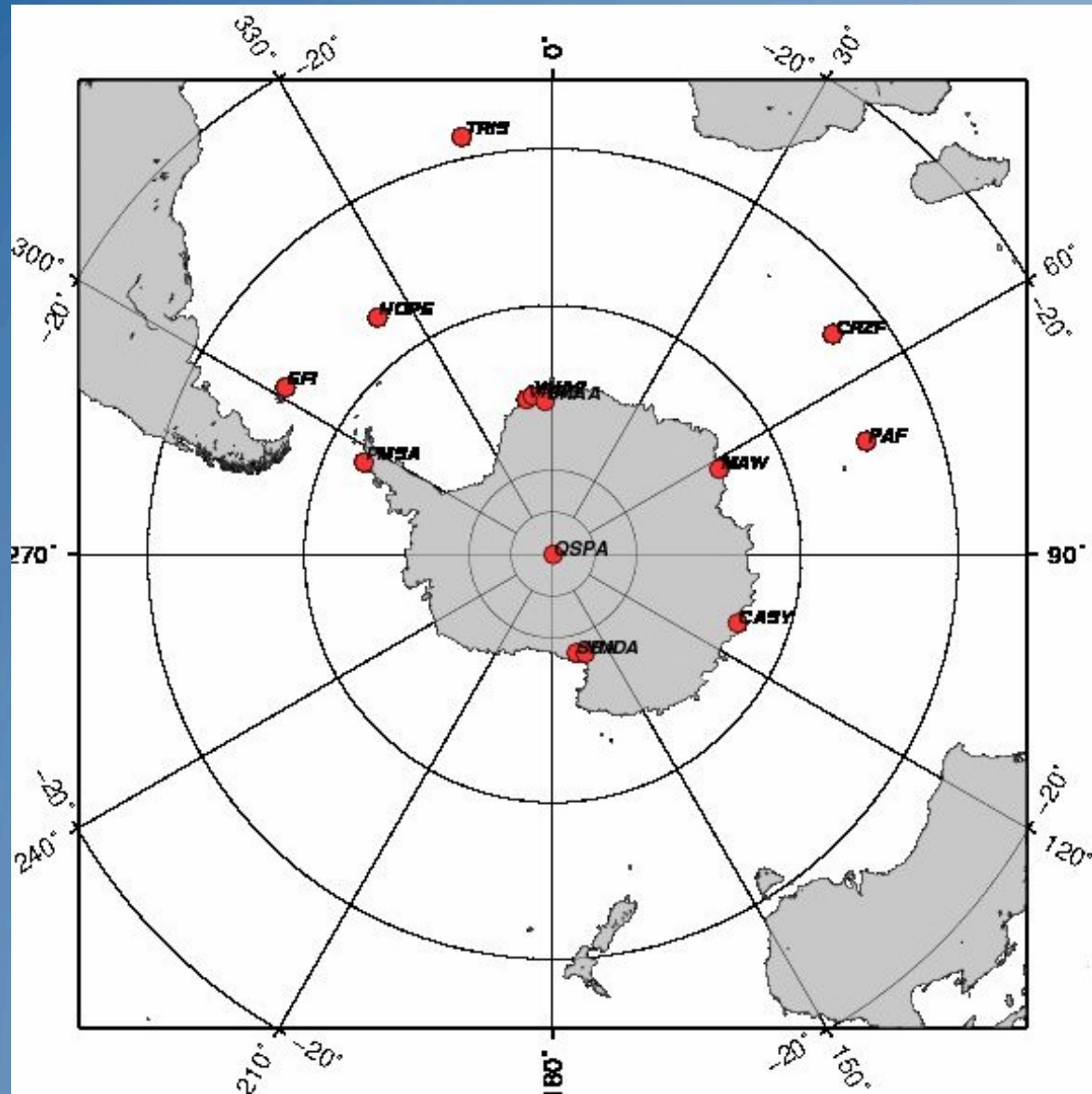
Cron Job Status	patches	cleanlogs	datareport	sysreport	rtdbclean
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Network Operation

Quanterra	processes	ORB_Clients	ORB_Sources	ORBARRAY	ORB_Data	Array_Data	dbpick	DB_loc2
Event_Map	showgrid							

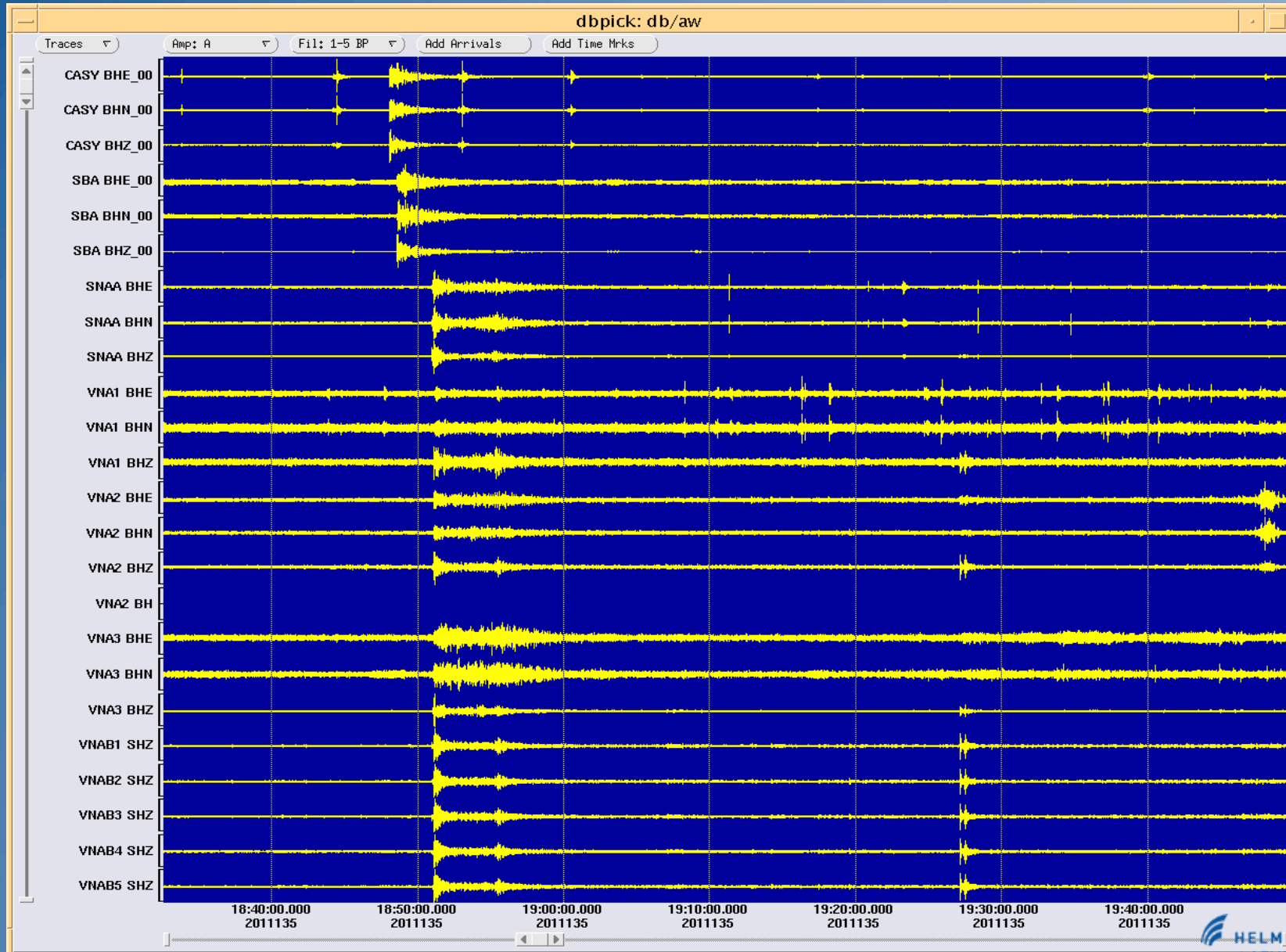
- Automated processing is difficult due to the small amount of stations available
- Event detection with `orbdetect`, `orbassoc`
- Using NEIC list to locate global earthquakes
- Picking local events manually for later relocating with additional offline stations
- Using `array2db` to get values for slowness and azimuth for corresponding picks
- Trigger on semblance not reliable due to high levels of background noise from sea swell
- Daily bulletin for NEIC

# Stations for initial earthquake location

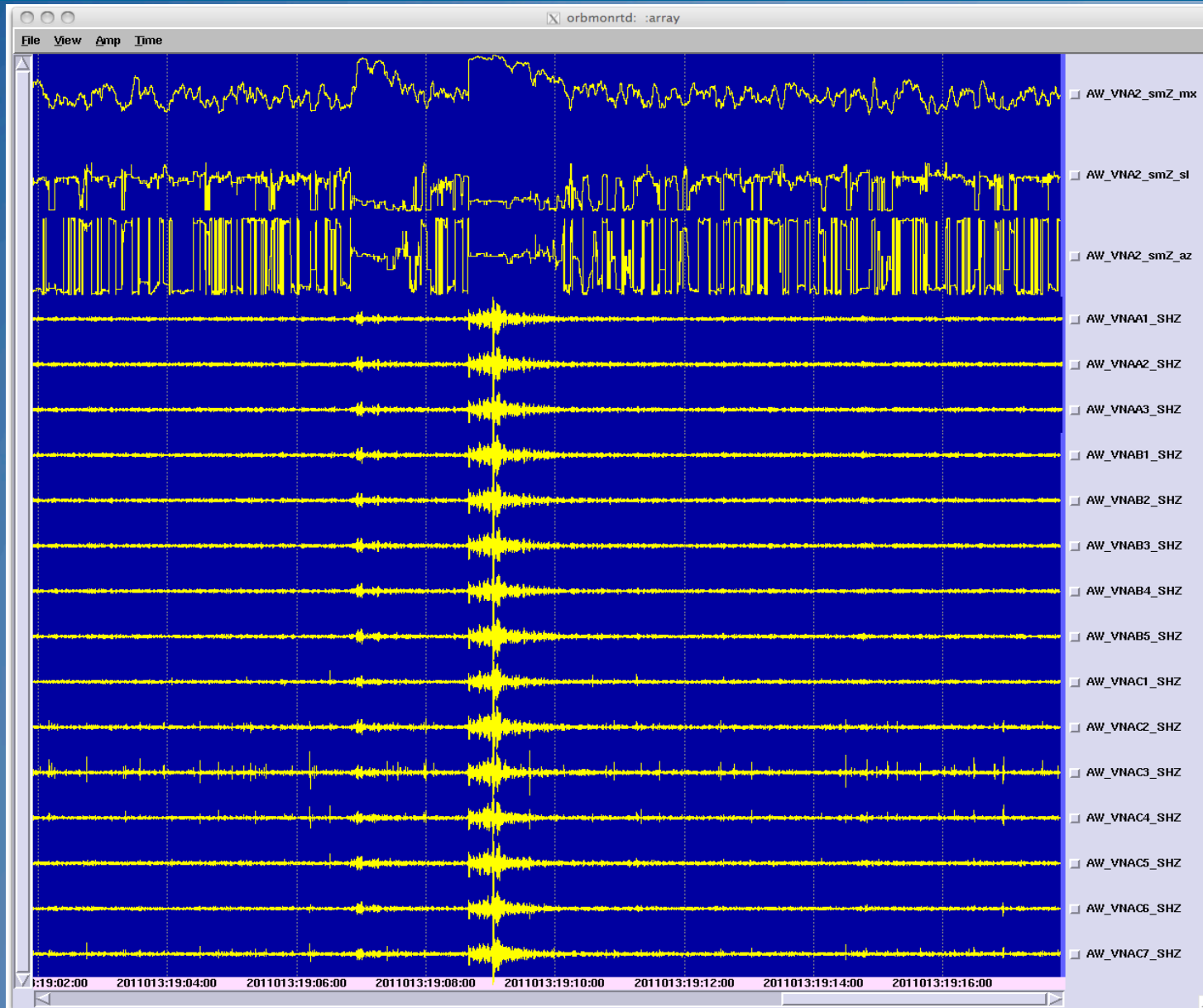




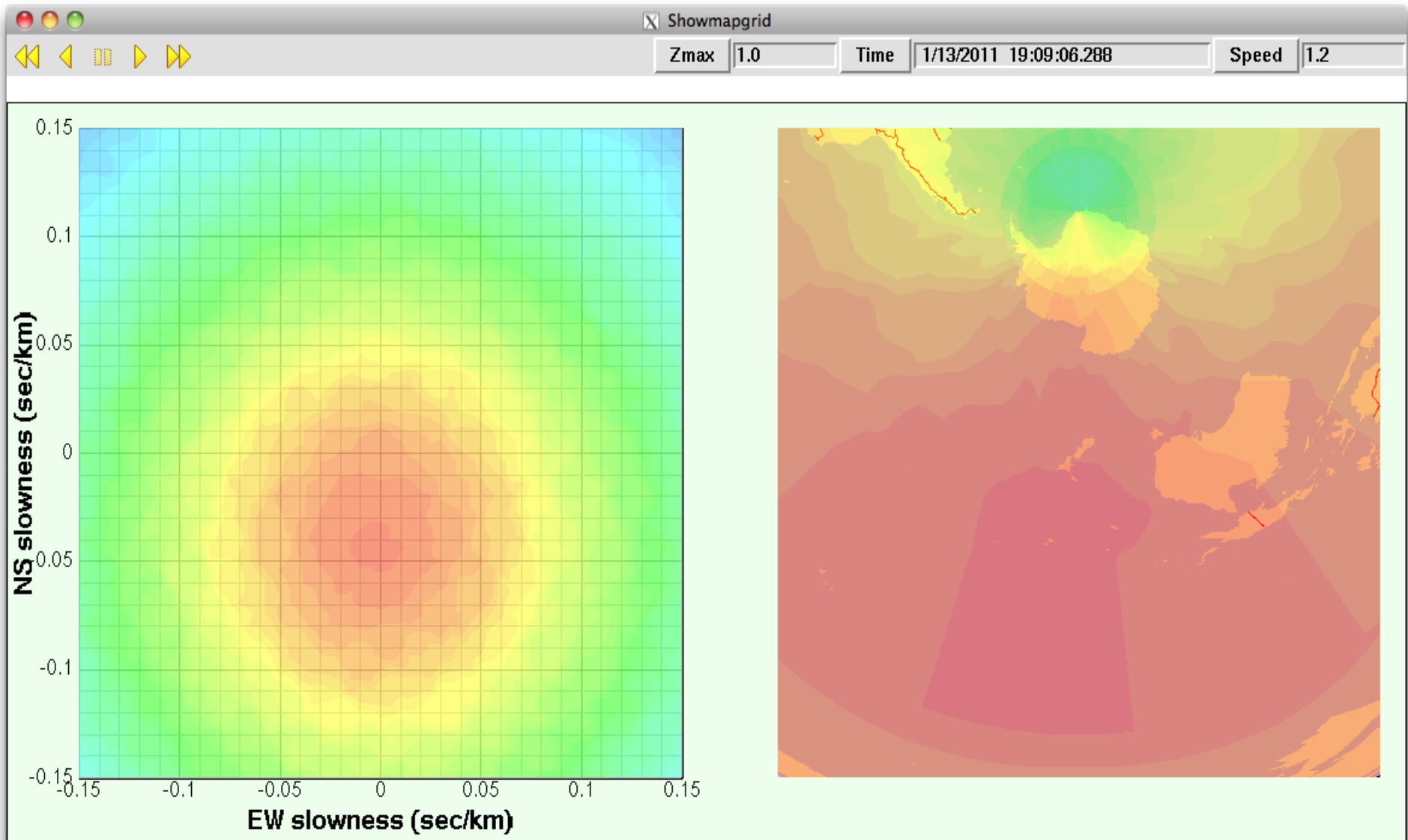
# Example Event



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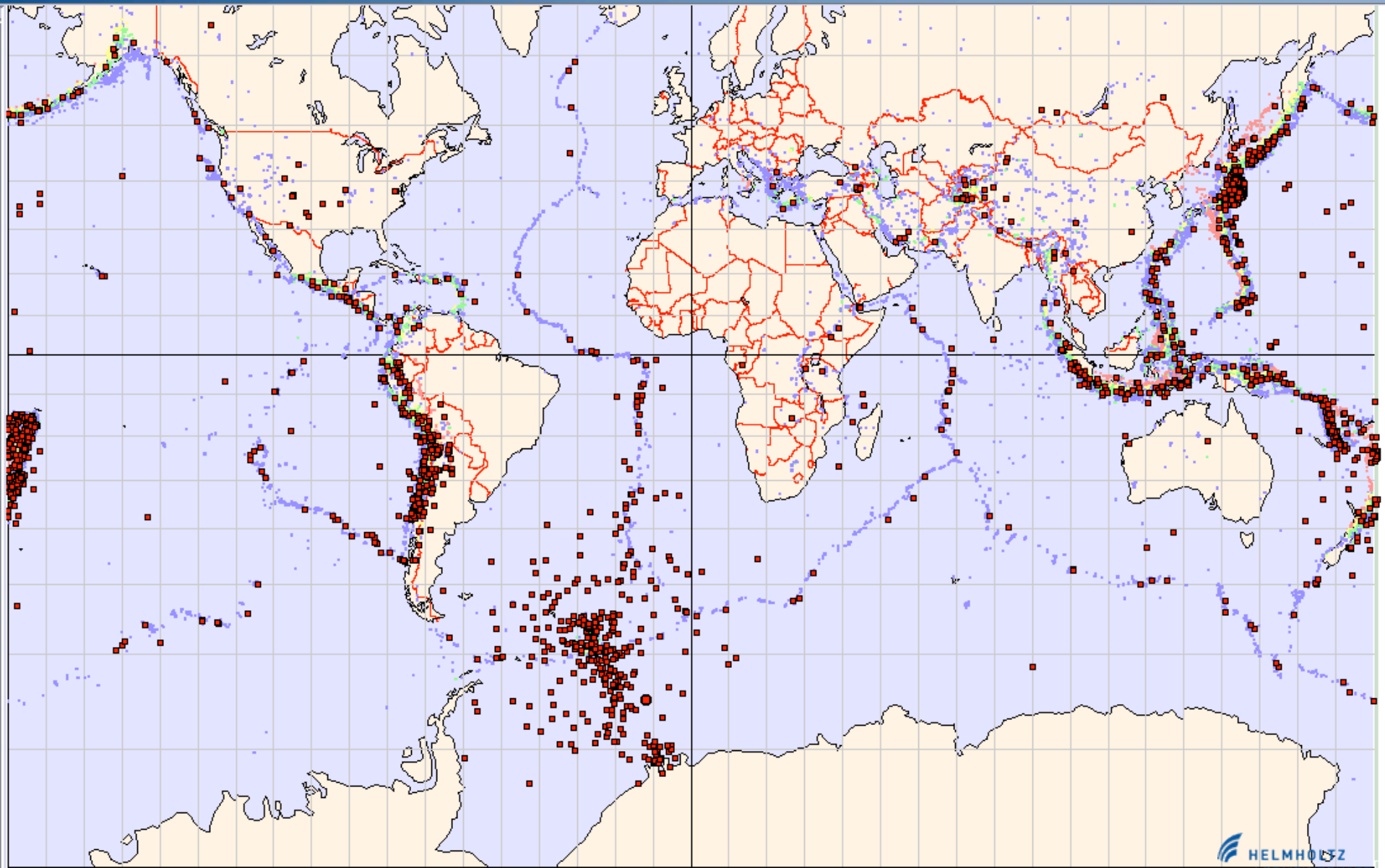


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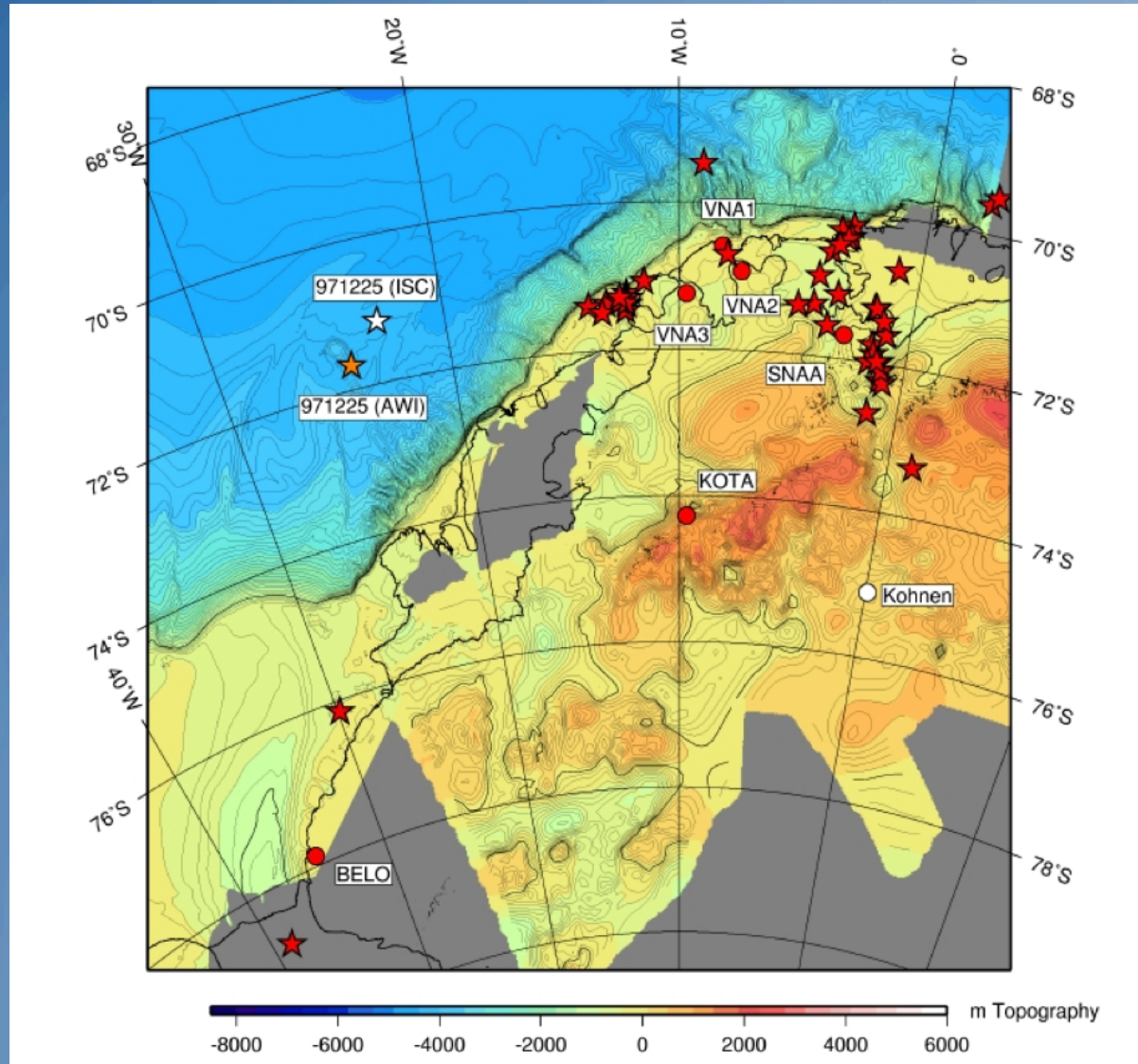




# Located Events in 2011



# Local Events



- Importing offline station data into existing Antelope database
- Batch-Processing offline stations with automated event detection
- Include old datasets from pre-Antelope times
- Run array-processing with offline data
- Synchronizing databases in Bremerhaven with Neumayer



Questions, suggestions, remarks, ..?

Thanks for your attention