

GEONAS

**The GEOdynamic Network of the Academy
of Sciences of the Czech Republic:**

**Permanent GNSS observations and routine data
processing in the IRS operational centre.**

**František Mantlík, Vladimír Schenk, Zdeňka Schenková,
Pavel Kottbauer, Milada Grácová and Zdeněk Fučík**



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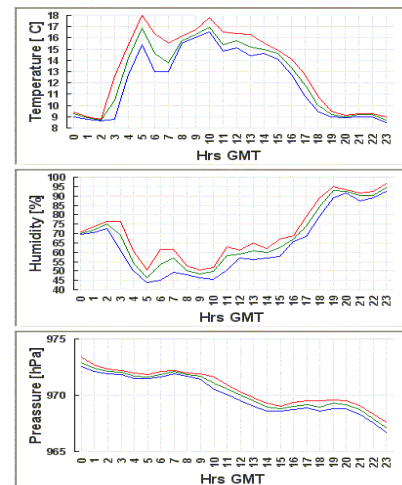


Outlines

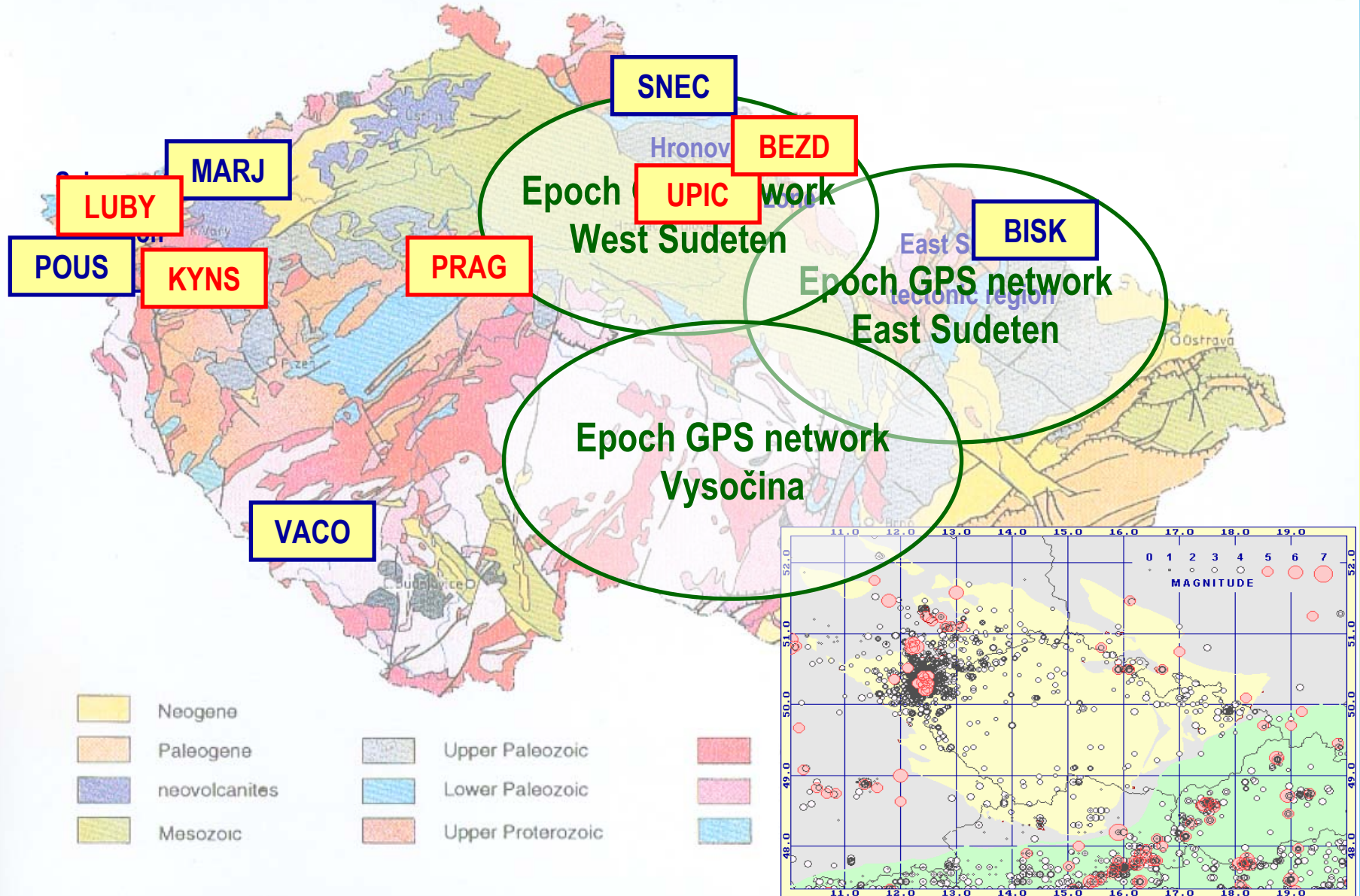
1. **Strategy of observatory siting**
2. Location, monumentation and observation time spans
3. Observatory equipment and capabilities
4. Operational centre IRS data flow and delivery
5. Routine data processing
6. Outlook



Meteorological data 09.06.2006
observatory BISK



Strategy of observatory siting

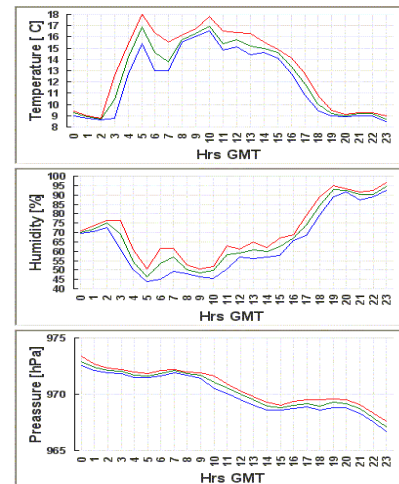


Outlines

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GNSS Measurements at the top of Snezka Mt. (alt. 1602 m)



Polish point

SNIE

SNE2



geodetic pylon

SNEC



**GPS observatory
operates from
August 23-rd 2001**



Permanent
observatory

GEONAS observatories – first stage up to end 2004



GERMANY



oper. since
Oct. 20-th, 2003

POUS



MARJ



operating since
May 15-th, 2003

VACO

GERMANY

operating since
Oct. 20-th 2004



oper. since
Sep. 6-th, 2001

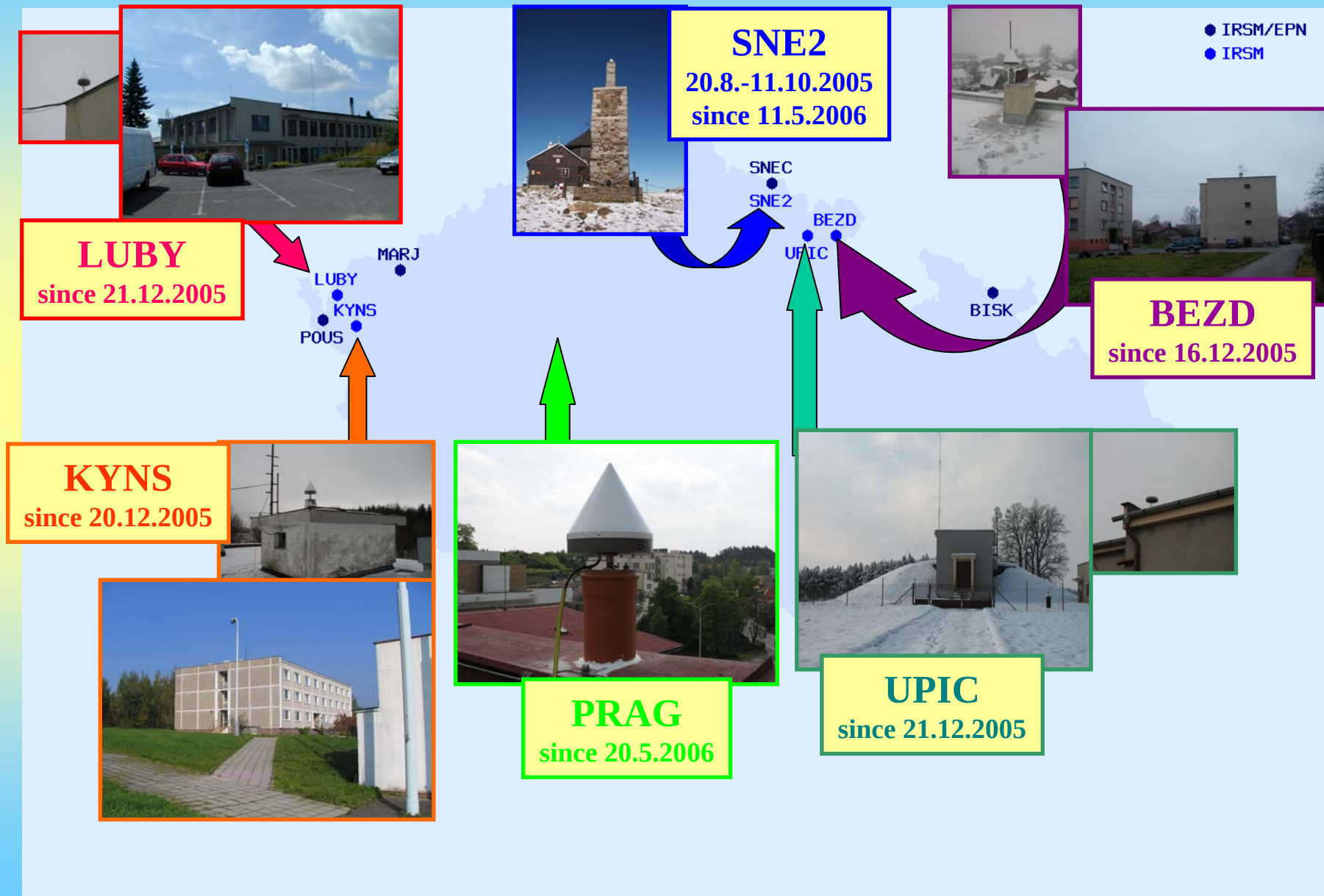
BISK



SLOVAKIA



GEONAS observatories – second stage 2005-2006:

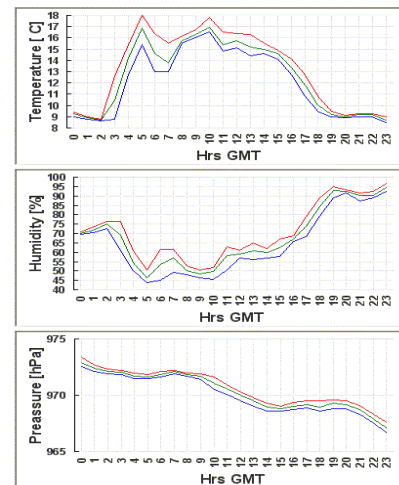


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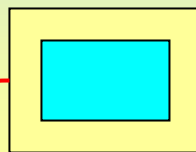
Configuration and equipment first stage:



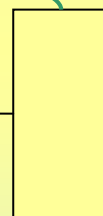
GPS antenna
choke-ring



monitor

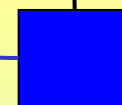


PC+GPRS



COM1

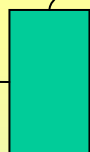
RS232



GPS receiver
Ashtech Z18

ethernet

WiFi



230 V



inverter
12 / 230 V



charger
230 / 12 V



AKUMA

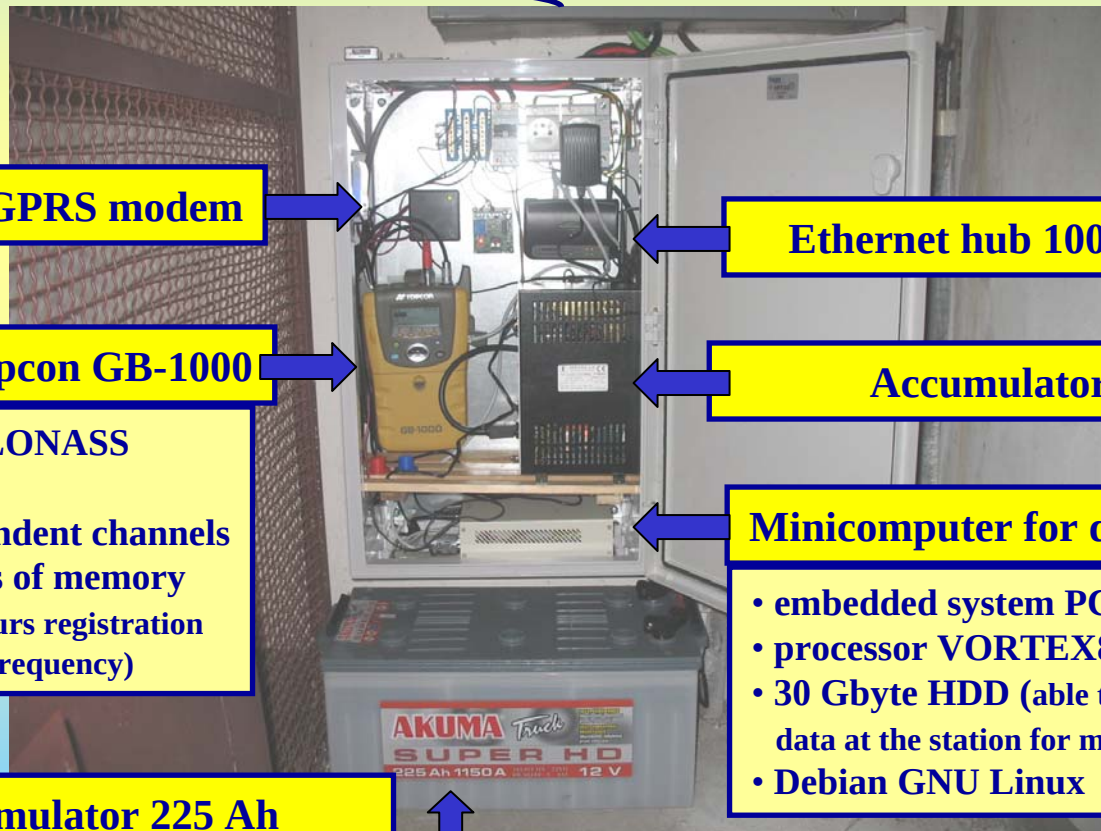
battery
12 V / 220 Ah



Configuration and equipment of the GEONAS observatories – 2-nd stage:



GNSS antenna Topcon CR3 GGD



GPRS modem

Ethernet hub 100 Mbit/s

GNSS receiver Topcon GB-1000

Accumulator charger

- GPS + GLONASS
- L1 + L2
- 40 independent channels
- 96 Mbytes of memory
(cca 30 hours registration
at 1 Hz frequency)

Minicomputer for data processing

- embedded system PC
- processor VORTEX86 / 166 MHz
- 30 Gbyte HDD (able to store
data at the station for min. 8 months)
- Debian GNU Linux

Accumulator 225 Ah
(25-30 hrs of operation in case of public
electrical supply failure)

Supplementary instrumentation – meteorological etc.

METEO sensors ANEMO:

Temperature and relative humidity sensor

TH99 (-40°C/+85 °C, 0/100 % rel. humidity)

Pressure sensor type R (800/1200 hPa)

Sampling rate 30 sec

Installed at the BISK, MARJ

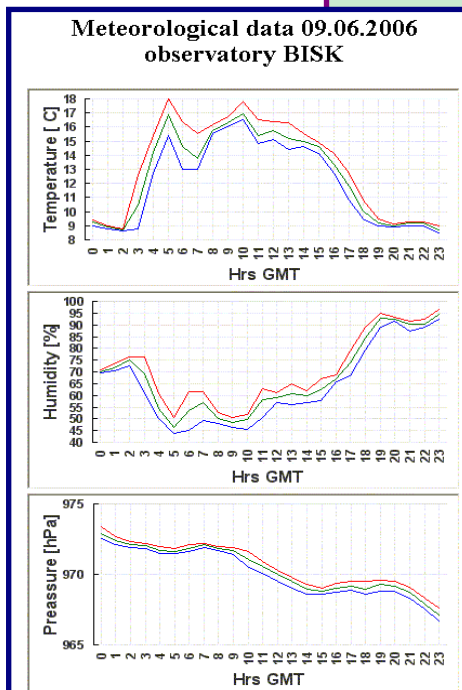
and SNEC observatories.

Web camera

Monitoring of local weather conditions
and snow coverage of the antenna radome.

One still image every 5 minutes.

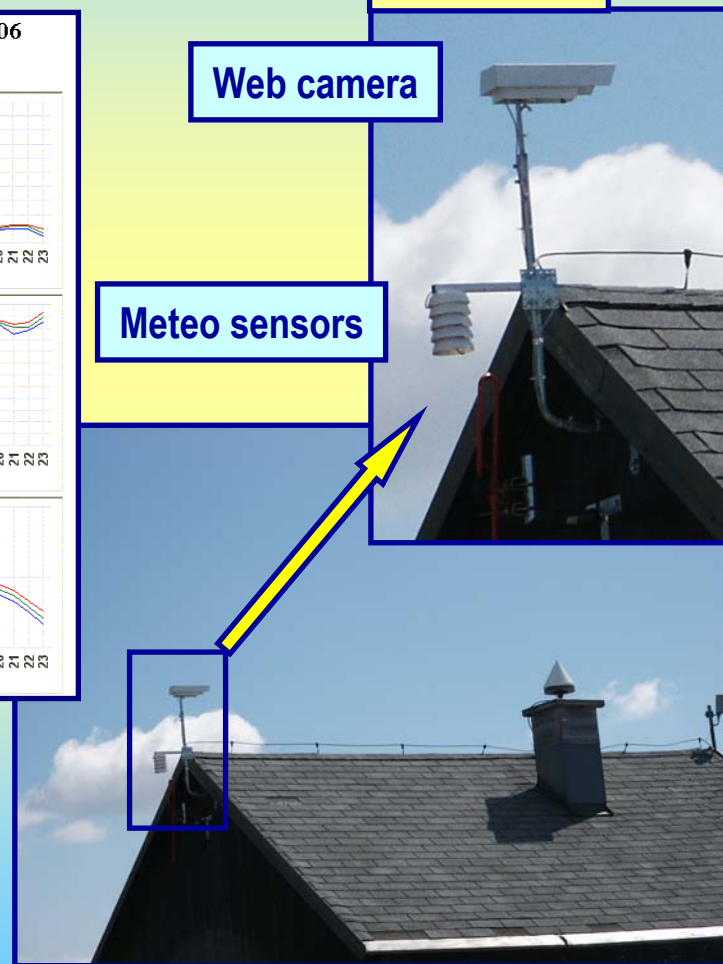
Installed at the SNEC observatory.



SNEC

Web camera

Meteo sensors

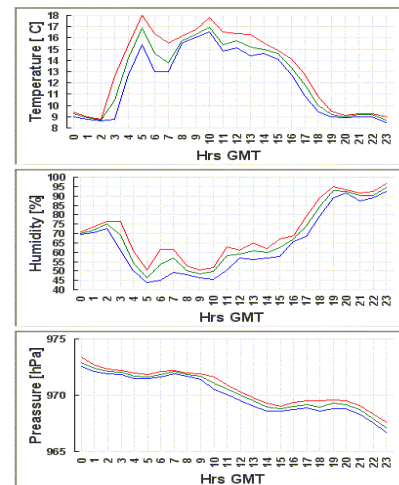


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Data processing flowchart - OC IRS:

- 1. **Checking data completeness:**
 - RSYNC
 - check of connection availability

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3. **Creating/updating database entry:**

- on-line overview and check are easy
- on/line quality check of the registration
- quick detection of problems with connection or processing

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 - on/line quality check of the registration
 - quick detection of problems with connection or processing

4. Data transfer to the international data centers:

- re-sampling of records (30 sec registration interval)
- data transfer (FTP, HTTP)
- check whether new data present in DC
- transfer repeated automatically in case of any problems

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2. Data quality testing – TEQC

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[illegible]

On-line data quality maps:

# of epochs / METEO epochs	
BEZD	
BISK...	
KYNS	
LUBY	
MARJ...	
POUS...	
SNEC...	
UPIC	
VACO...	
# of obs.	
BEZD	
BISK	
KYNS	
LUBY	
MARJ	
POUS	
SNEC	
UPIC	
VACO	

% of obs.	
BEZD	
BISK	
KYNS	
LUBY	
MARJ	
POUS	
SNEC	
UPIC	
VACO	
No. of binary files	
BEZD	
BISK	
KYNS	
LUBY	
MARJ	
POUS	
SNEC	
UPIC	
VACO	

EPN delay primary DC [min]	
BISK	
MARJ	
POUS	
SNEC	
VACO	
EPN delay secondary DC [min]	
BISK	
MARJ	
POUS	
SNEC	
VACO	

# of sats NAVSTAR	
BEZD	
BISK	
KYNS	
LUBY	
MARJ	
POUS	
SNEC	
UPIC	
VACO	
# of sats GLONASS	
BEZD	
BISK	
KYNS	
LUBY	
MARJ	
POUS	
SNEC	
UPIC	
VACO	

[\[View upload log\]](#) [\[View test transfer log\]](#) [\[View daily merge log\]](#)

Legend:							
# of epochs	120	110+	90+	70+	40+	Any	No
% of obs.	100	95+	85+	70+	50+	Any	No
# of obs.	1000+	900+	800+	700+	600+	Any	No
# of sats NAVSTAR	>10	9-10	8-9	6-7	4-5	1-3	No
# of sats GLONASS	8	6-7	4-5	3	2	1	No
EPN delay pri/sec [min]	0-2	-6	-10	-2h	-1d	-3d	N/A

[\[Previous day\]](#) [\[Next day\]](#)

[TEQC tutorial](#)

2006-01-26 17:47:16 GMT

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Public www interface of the OC IRS:

GPS station BISK - available data for year 2005

Month\Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Jan 05	100	100	100	100	100	100	100	100	100	100	100	99	28	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Feb 05	100	100		100	100	100	99	99	41	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98	100				
Mar 05	100	100	100	100	100	100	37	99	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100	100	100	99	100	100	100	99
Apr 05	100	100	100	99	34					100	100	100	100	100	100	99	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100
May 05	100	100	99	100	96	100	100	100	100	100	100	100	99	100	100	99	100	100	52	100	100	100	100	100	100	97	100	99	100	100	98
Jun 05	100	100	100	100	99	100	100	100	99	100	100	100	100	100	100	94	100	99	99	100	100	100	99	100	100	99	100	100	100	99	
Jul 05	100	100	100	99	100	100	100	99	100	100	100	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99
Aug 05	100	100	100	100	100	100	100	100	100	99	99	100	100	100	100	100	100	100	100	100	100	100	99	99	100	100	100	100	100	100	100
Sep 05	100	100	100	100	100	100	99	100	100	100	100	100	73	19	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Oct 05	99	99	99	100	100	99	100	100	100	100	100	100	100	99	100	100	100	100	100	100	100	99	100	100	100	99	100	100	100	100	100
Nov 05	100	31	99	100	99	100	100	100	100	100	100	100	100	39	100	100	100	100	37	99	99	99	100	100	100	100	100	100	100	100	100
Dec 05	100	100	99	100	100	100	99	100	100	99	99	100	100	100	100	100	100	100	100	100	100	100	100	99	100	100	100	100	100	90	15

Table shows number of registered epochs in % of all possible epochs.

Legend: > 95 % > 75 % > 50 % > 25 % > 0 % No data Data not registered

Station: BISK Year: 2005 Parameter: % of registered epochs

Optional actions: [View RINEX creation overview](#) [View BISK creation log](#)

Registration interval
Registration interval
% of registered epochs
% of registered observations
Missing data

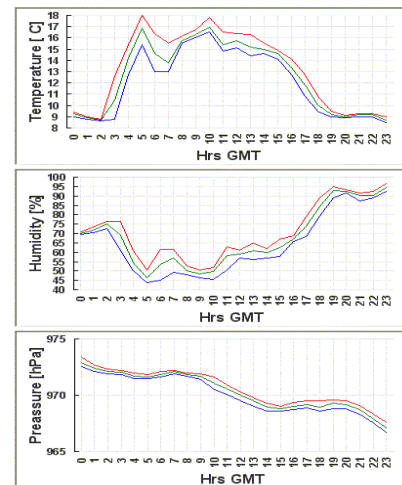
<http://www.geonas.irmsm.cas.cz>

Outlines

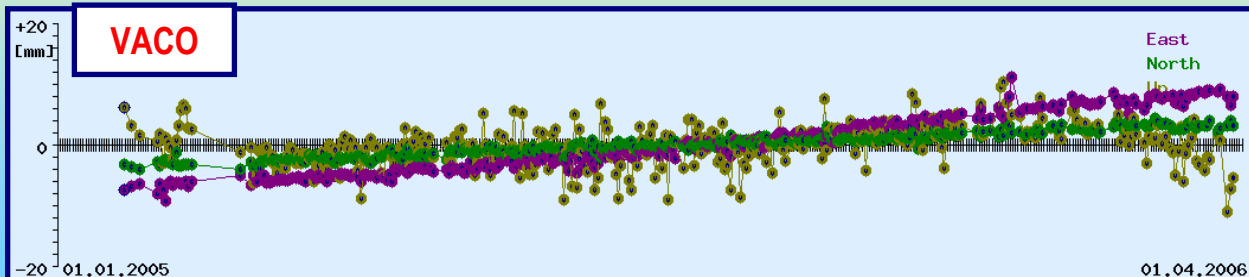
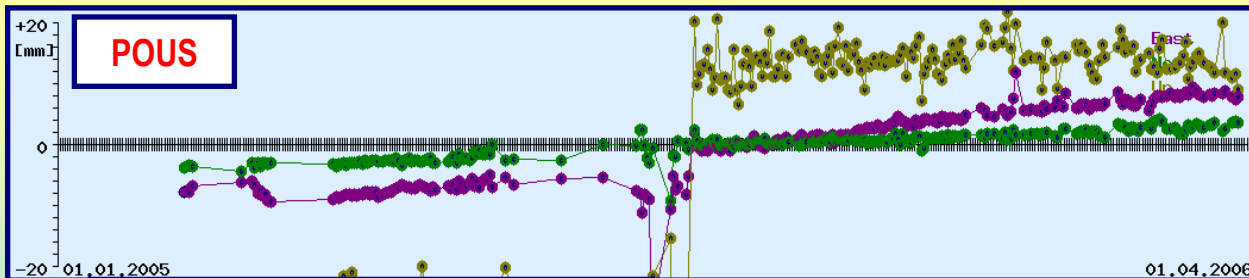
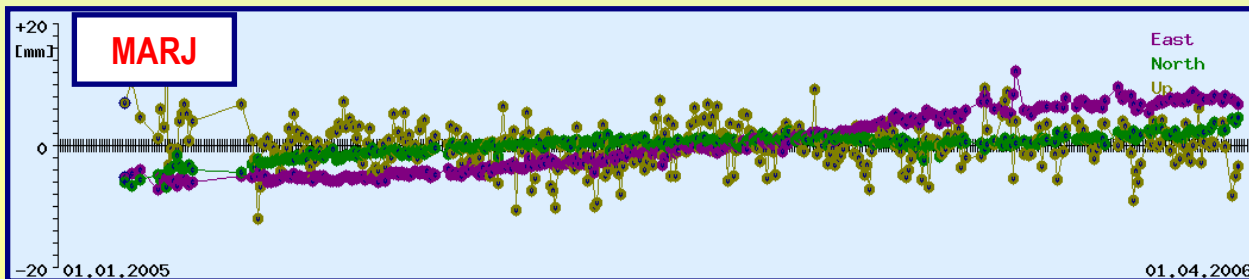
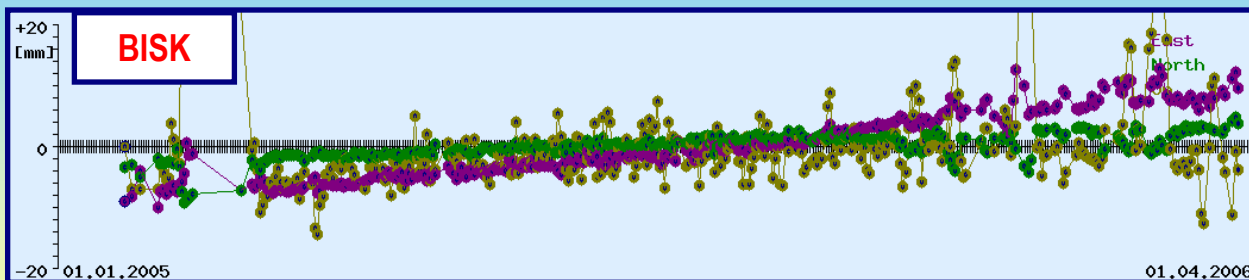
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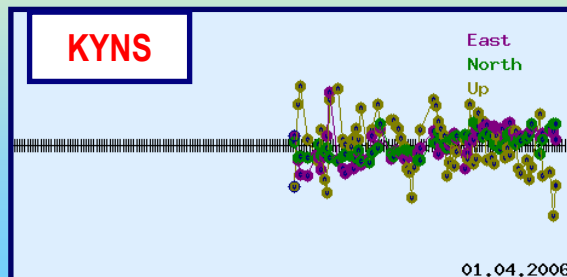


GEONAS Examples of time series plots

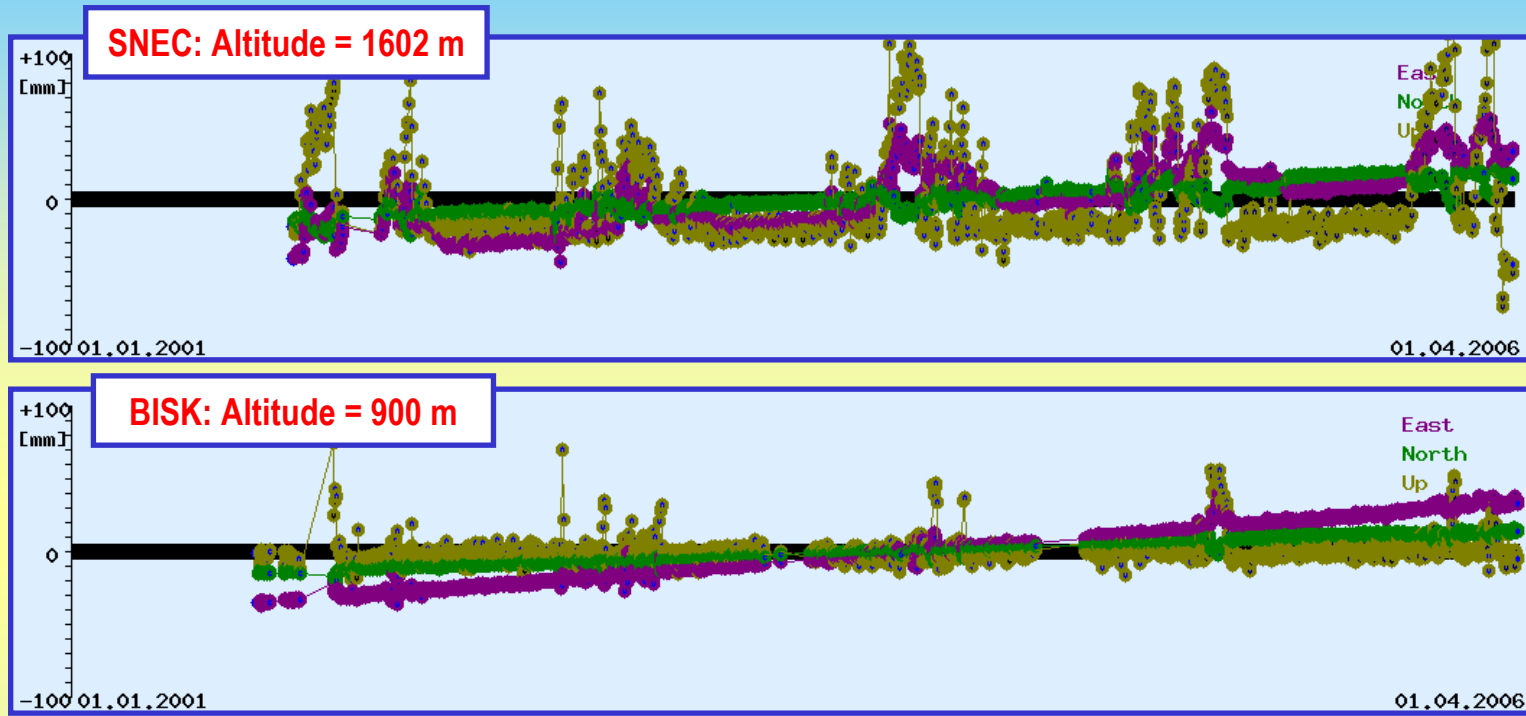


Properties of time series plots presented:

- computed using BERNESE GPS software version 5.0
- 30 second reg. intervals
- CODE orbits and Earth rotation parameters
- NAVSTAR and GLONASS GNSS signals
- constrained network solutions with 4 IGS fiducial stations: POTS, PENC, WTZR and BOR1
- daily processing coordinates results plotted without smoothing

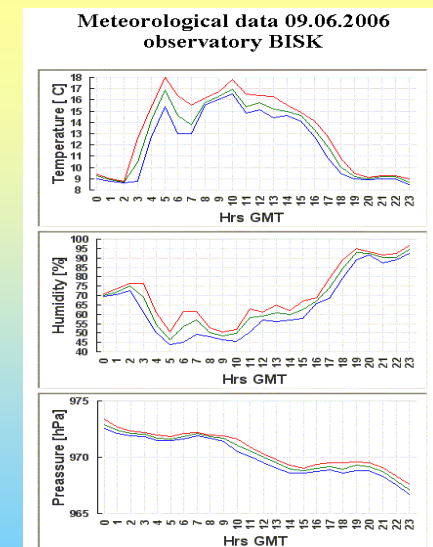


Snow cover influence at the mountain stations

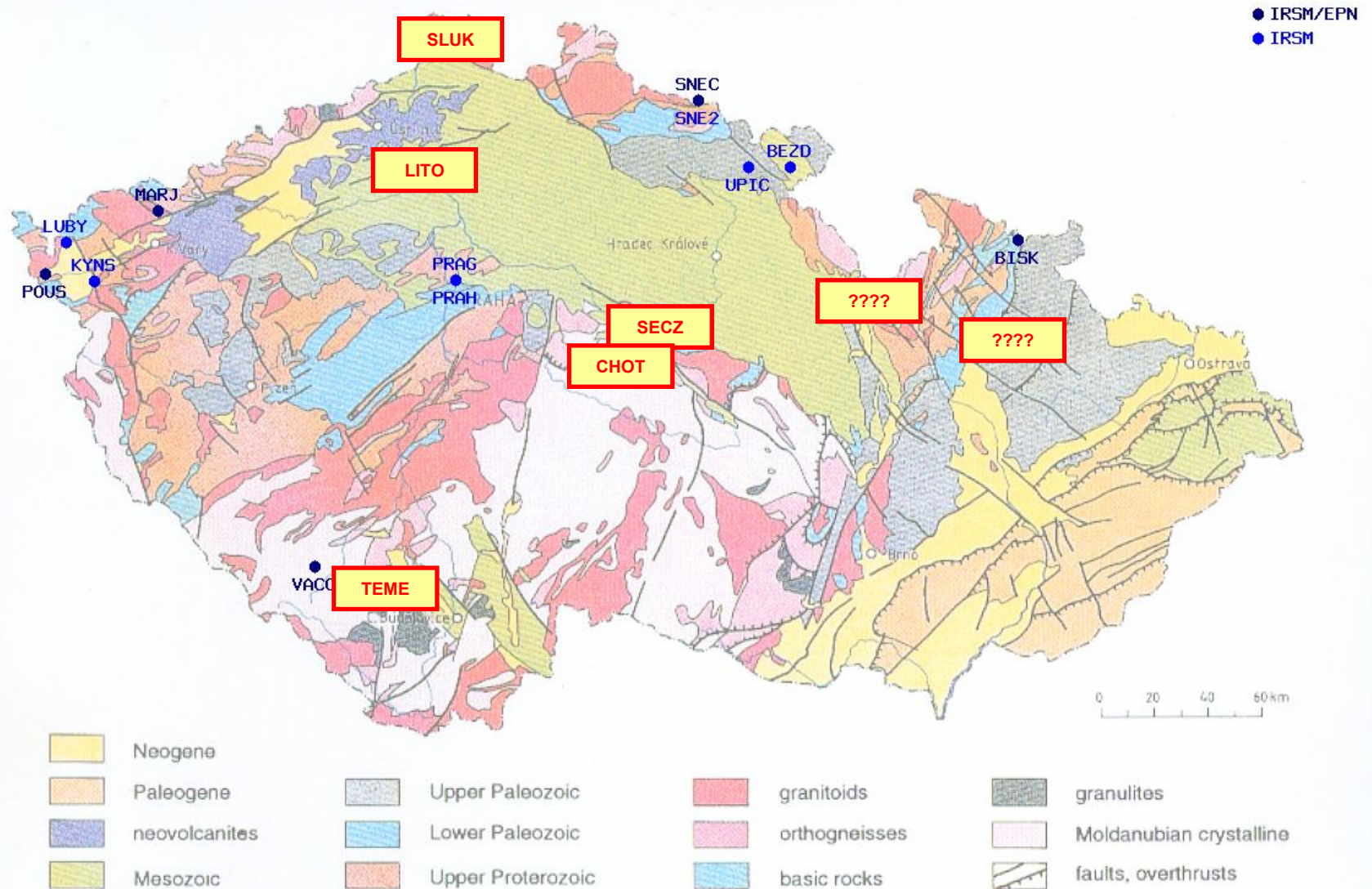


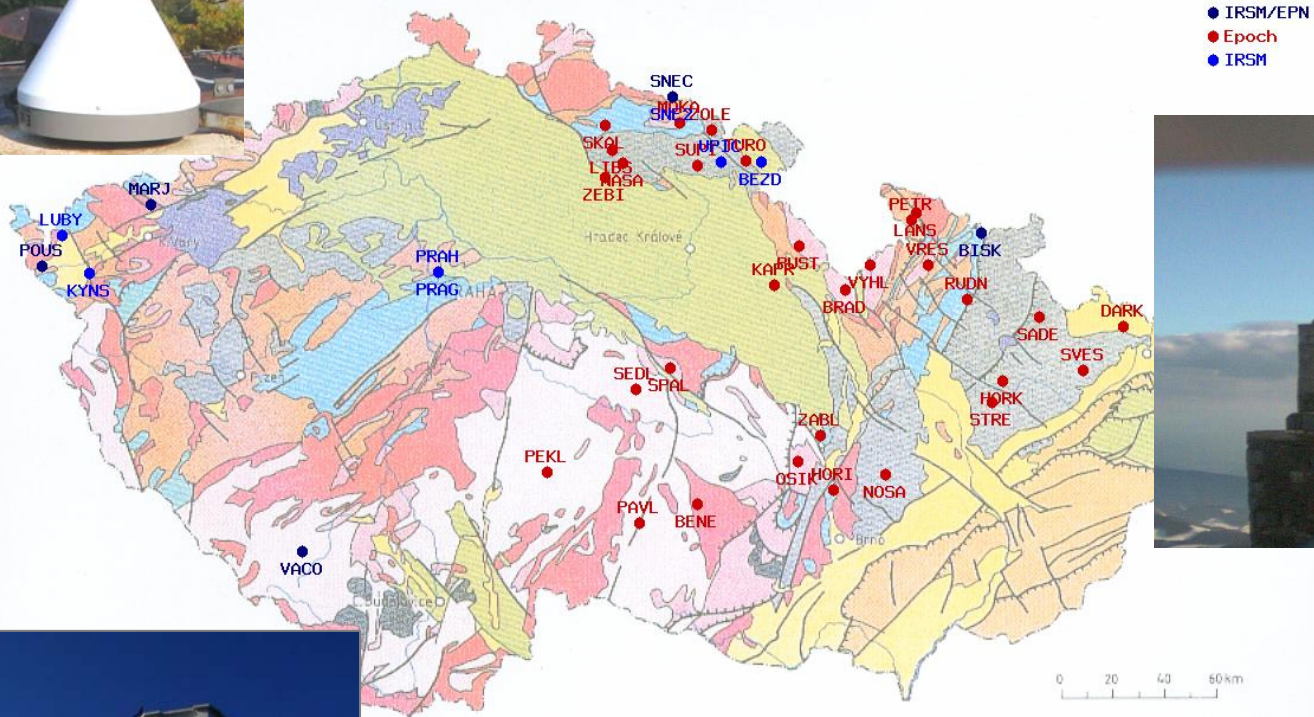
Overview

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Outlook





THE END
Thank you for your attention.