THE METEOROLOGICAL DATA QUALITY MANAGEMENT OF THE ROMANIAN NATIONAL SURFACE OBSERVATION NETWORK

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Romanian surface observation network

➢ **The observation network:**

    since 1887 : 30 observation stations

… some meteorological observations even before 1884 when the Meteorological Institute was settled

➢ **Dynamic structure, permanently undergoing transformation, improvement and modernization processes.**

✓ <u>at present</u> 160 meteorological stations with a relative uniform spatial distribution

✓ 1995-2000 : 12 Automatic Surface Observation Stations (ASOS): Vaisala MILOS 500, Vitel 1040, Thies AWS 7800, and Thies DL 15.

✓ Since 2000 : **60 ASOS from Vaisala**

    within the **SIMIN** (National Integrated Meteorological System) project

⇓

co-existence of two station types – manual and automatic

New procedure for surface observation processing (SOP)
improving the data quality management

Meteorological observation programs

❑ **SYNOP program**

hourly measurements of the air temperature, air pressure, relative air humidity,
wind direction and speed, atmospheric precipitation, snow cover depth, atmospheric phenomena,
sunshine duration, clouds type, cloud base height, cloud cover, ice deposits,
soil and sea temperature

❑ **Climatological program**

evolution of the meteorological parameters within the climatological interval

❑ **Agrometeorological program**

specialized measurements, performed in standardized platforms, of soil humidity, plant density
and development.

❑ **Solar radiation program**

net solar radiation, diffused solar radiation, reflected solar radiation, global solar radiation,
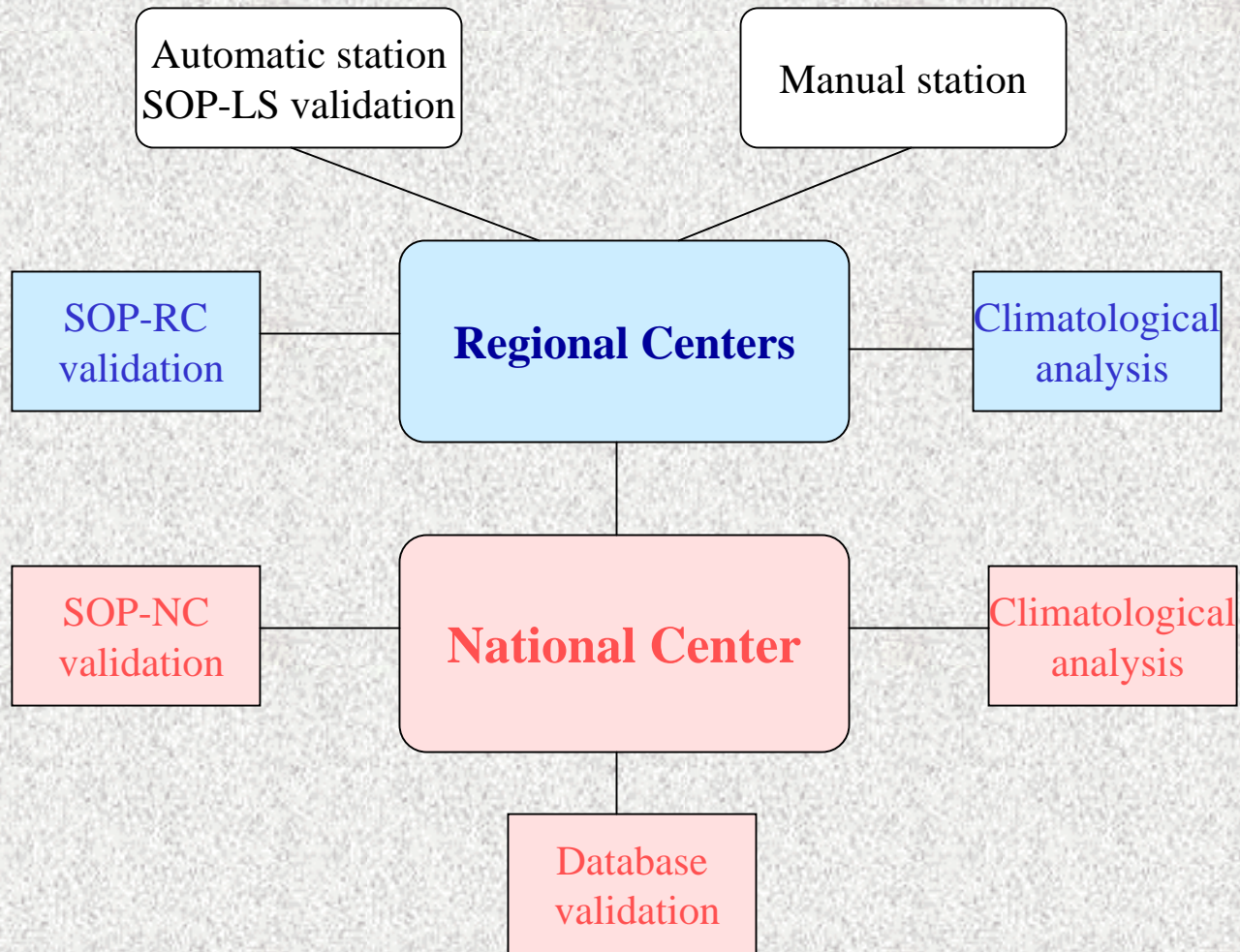solar radiation balance.

❑ **Snow program**

snow characteristics and layer structure

❑ **Alert program**

## Surface observation data flow

Data quality management

The meteorological data quality management of the Romanian national surface observation network

Surface observation processing (SOP) applications

✓ **support data collection, validation and distribution**
✓ **ensure the data processing for all observation stations (manual and automatic)**
✓ **quite similar with the old procedure, involving 3 processing levels:**
   local (SOP-LS), regional (SOP-RC) and central (SOP- NC)

but with a higher level of sophistication and capabilities:

- **flexibility in defining new message (through specific templates)**
- **pre-configured time schedule for generation/sending/receiving messages**
- **activation of the message transmission with higher frequency**
- **the possibility for local configuration and control of all applicable parameters and features of the sensor stations**
- **non standard formats (higher precision and compression for communications) between applications and standard formats**
- **possibility to interrogate a missing station (SOP-RC/NC)**
- **a more elaborate validation and parameter correction, including a tracking modification system**

Local sensor surface observation processing application SOP-LS

✓ **data retrieval from the automatic station for further processing**

✓ **real-time display to allow the operator (at local sites) to continuously monitor the measured meteorological parameters**

✓ **automatic generation of messages from measured data and human observation in accordance with to the defined template for each specific message type**

✓**automatic message transmission to SOP-RC, using GSM/SMS technology**

✓ **data storage in local databases; database (automatic compression and archiving)**
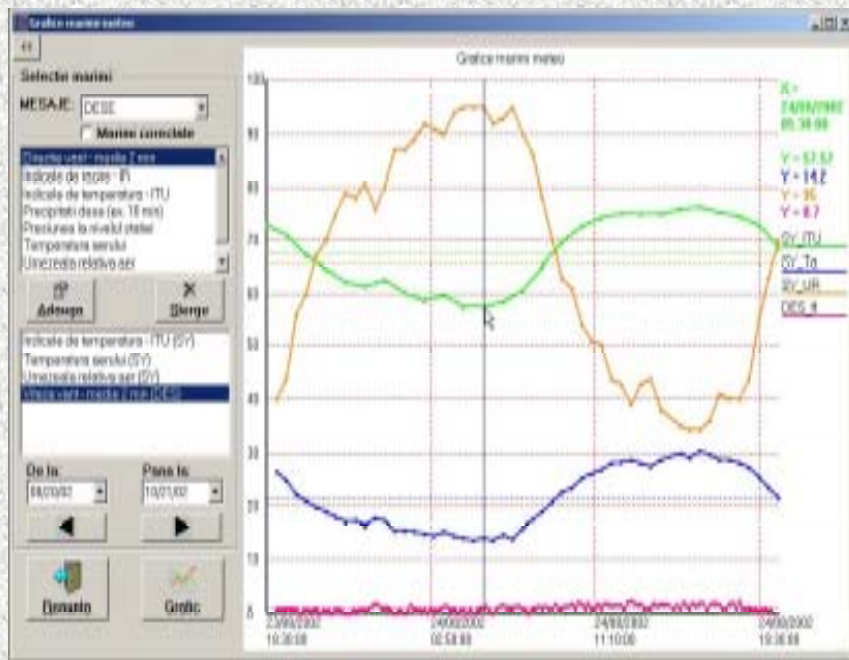
✓ **computations of derived parameters**

✓ **data validation and parameter correction**

✓ **data editing function**

✓ **alphanumeric and graphical visualization**

✓ **survey of sensors functioning**

✓ **log file downloading, processing and storage**

✓ **back-up transmission by PSTN, FTP, e-mail**

✓ **missing data recovery system**

✓ **supports ASOS remote management**

Regional and central level SOP applications

SOP-RC

- ✓ **collection of the messages sent by automatic (through SOP-LS) and manual stations**
- ✓ **data decoding and storage**
- ✓ **computation of derived parameters**
- ✓ **automatic generation of individual and collective messages (standard and non standard formats)**
- ✓ **automatic transmission of collective messages to the National Center**
- ✓ **station interrogation and remote control**
- ✓ **data validation and editing function**
- ✓ **alphanumeric and graphical visualization (full GIS interface)**
- ✓ **automatic database management**
- ✓ **printing and graphical product export**

SOP-NC

- ✓ **messages collection SOP-RCs**
- ✓ **supports all the capabilities of SOP-LS and SOP-RC**
- ✓ **additional features (**administrative and controlling station messages management, feeding the historical database, taking over of all RFC's functions, for a period of time, controlling of all automatic station and SOP-RCs, etc.)

Alert scheme
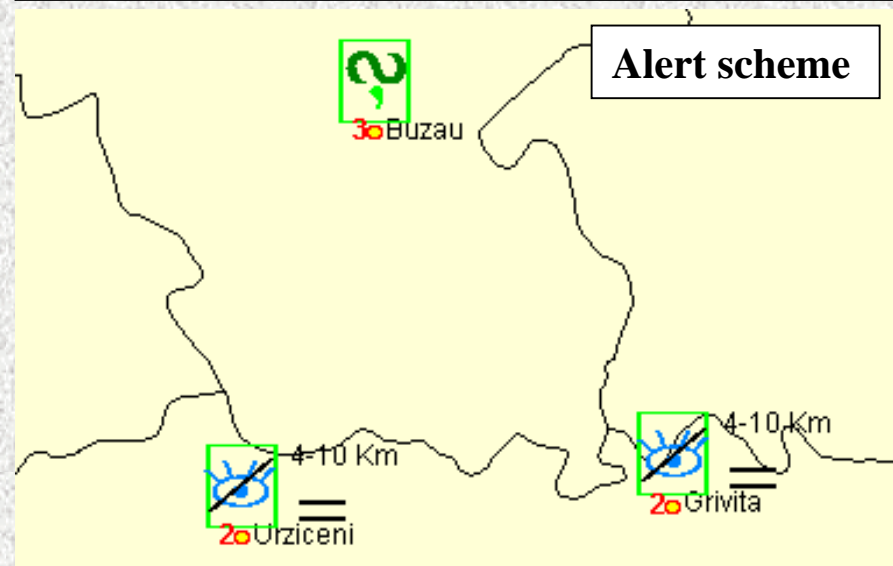
SOP Data validation

❖ **To all SOP application levels, depending on the level and message type**

❖ **Automatic validation**

 ✓ message format structure according to specific presets (for message type, time schedule, derived parameters)
 ✓ checking against the validity range
 ✓ multiple correlation between measured and observed parameters

❖ **Manual validation**

 ✓ temporal validation by graphical visualization of the parameter evolution for each station
 ✓ spatial validation by visualization geographically plotted forms (one parameter, Bjerkness scheme, time differences and sums)
 ✓ comparison with the climatological values and numerical weather prediction model output

Bjerknes scheme