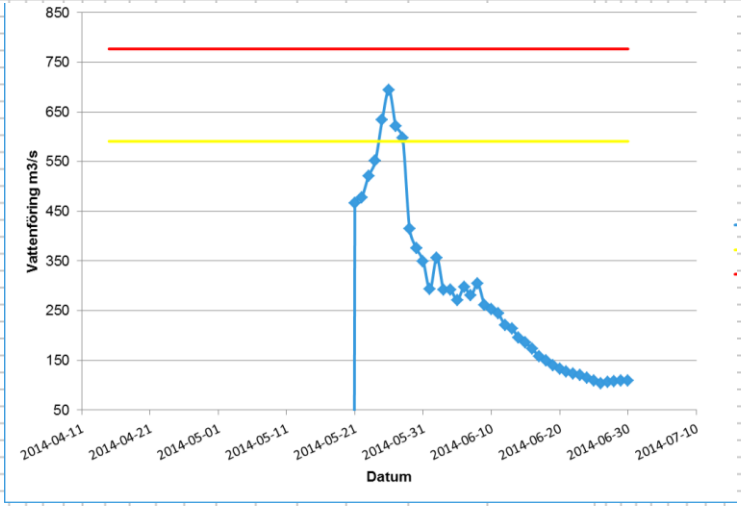
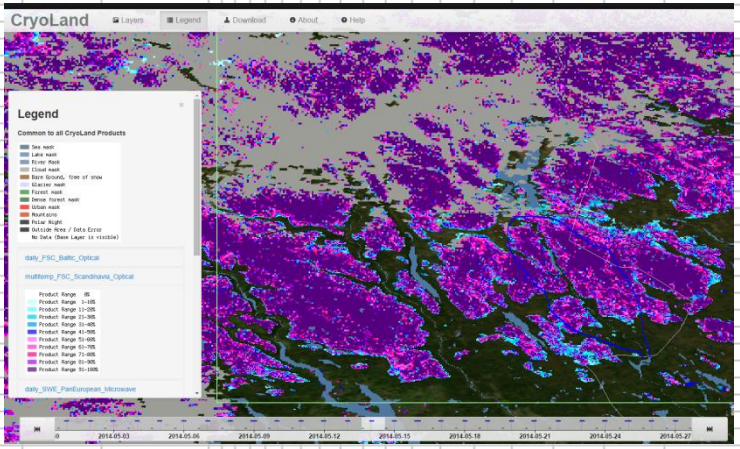


SMHI

CryoLand Dissemination Workshop – Nordic, Oslo 2014-10-08

Snow melt and Flood warning at SMHI - use of satellite snow data

Judith Olofsson, Gustav Carlsson, David Gustafsson

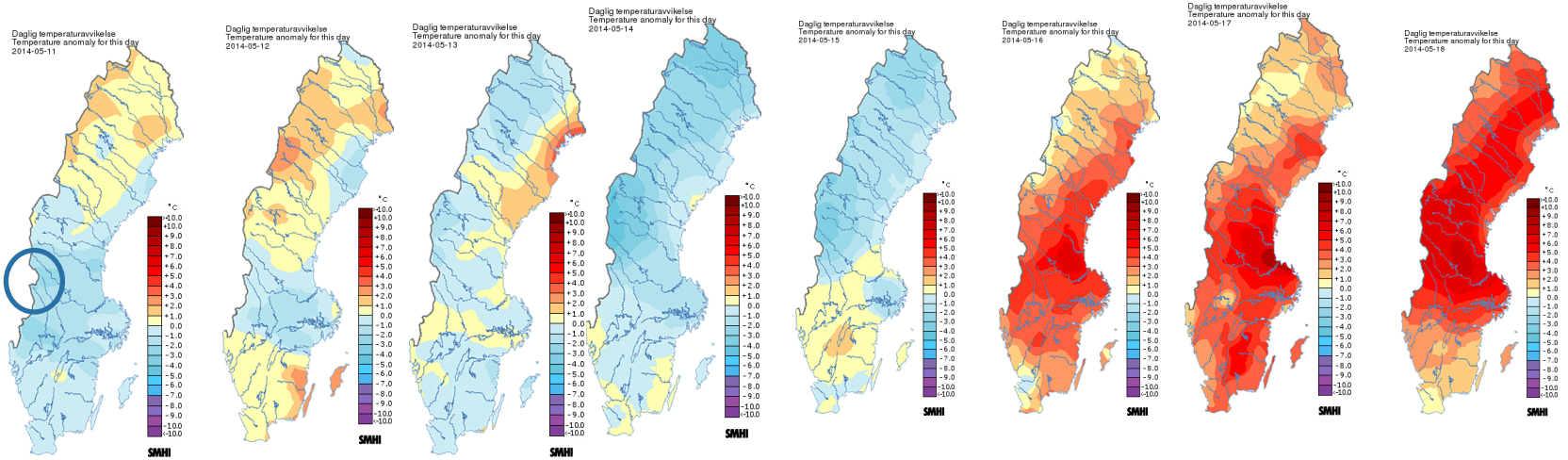


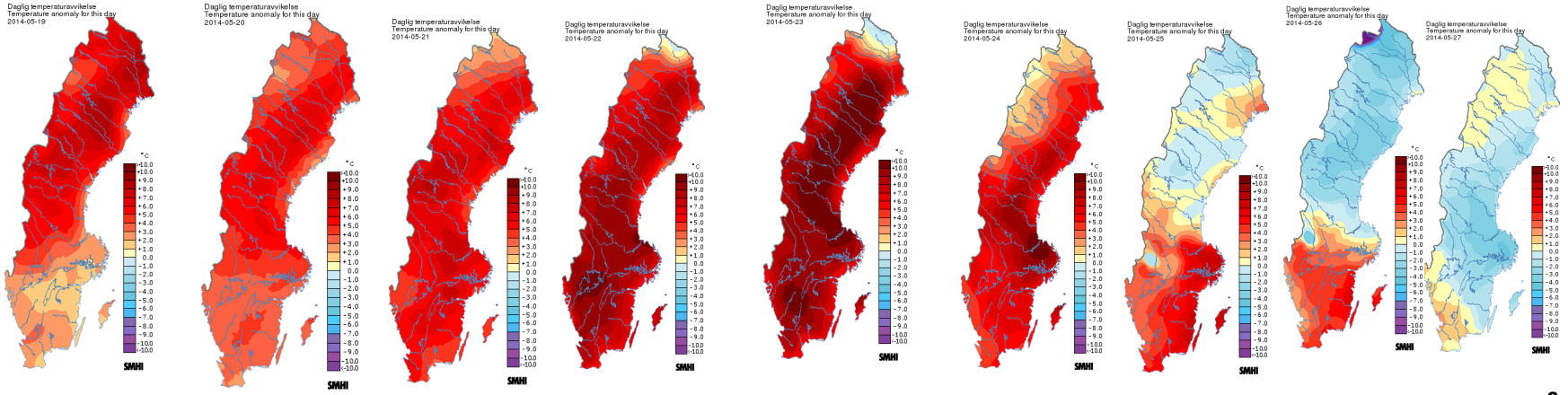
SMHI CryoLand User activities

- **Research and development** (David Gustafsson) – project partner
  - Assimilation of CryoLand Satellite Snow data in hydrological models
  - Tools for download, pre-processing, evaluation
  - Support to Swedish users
- **Flood warning** (Judith Olofsson, Gustav Carlsson)
  - Evaluation of simulated snow condition in high flow situations:
    - ”Is the snow conditions in the model correct for the forecast?”
- **Ice break up Tornionjoki** (David and Judith)
  - Attempt to monitor river ice break-up in Tornionjoki, in collaboration with SYKE, NORUT and ENVEO.

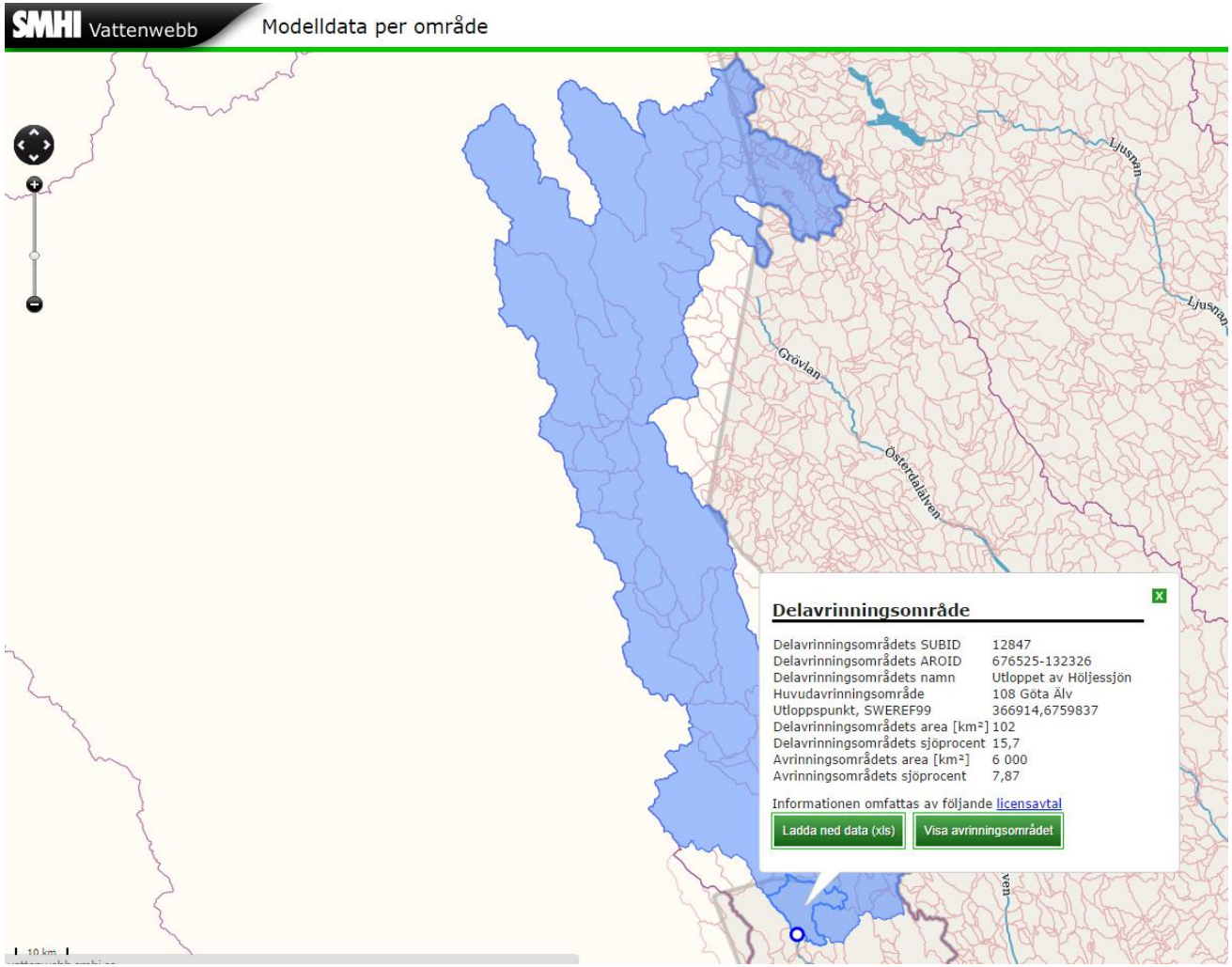
May 11 to May 27. The forecast says 12 days with temperatures about +5ºC above normal in south west of Sweden.

Höljes

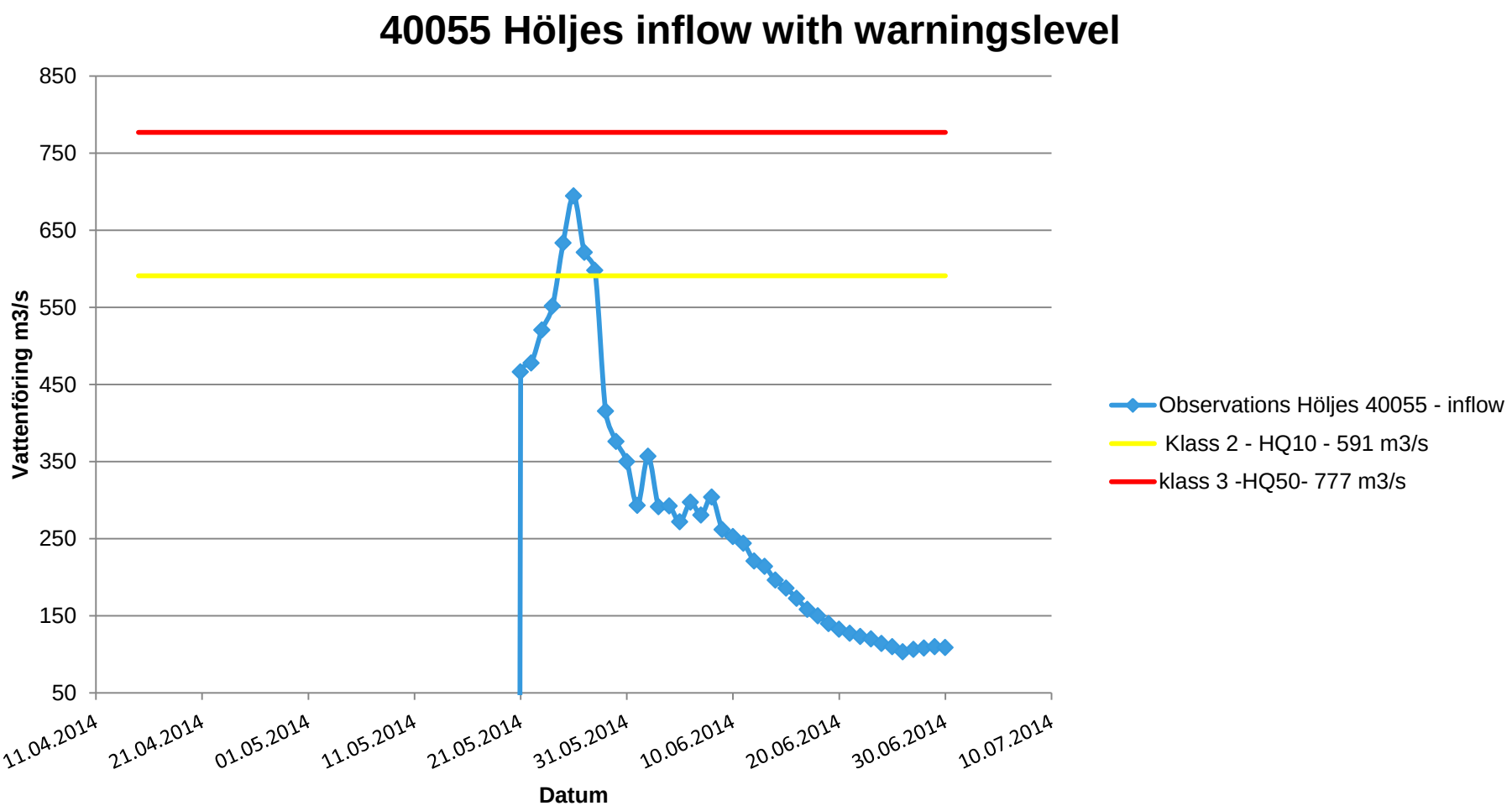




Höljes basin on border between Norway and Sweden



Actual flow – warning level 2

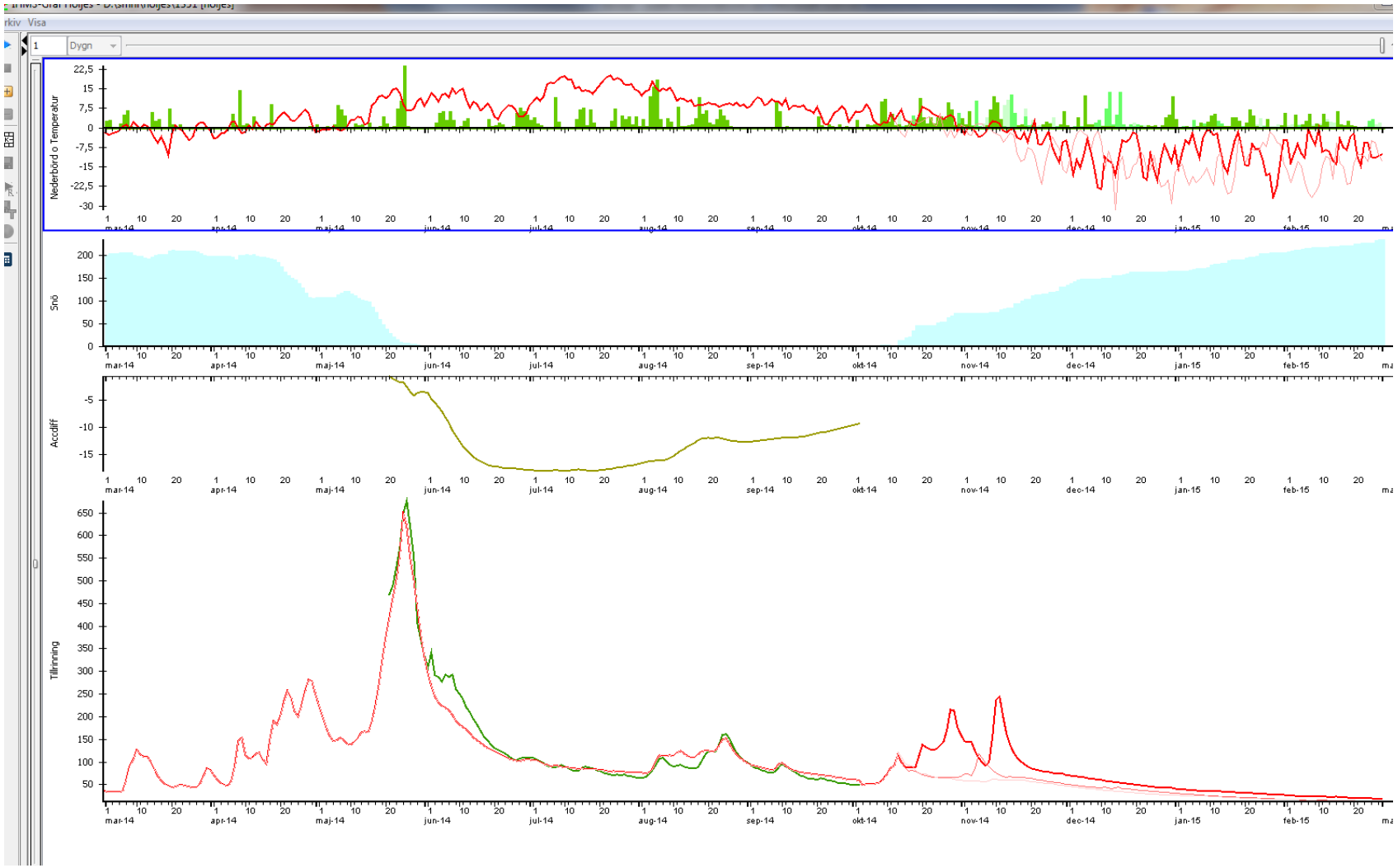


Klass2-warnings 26/5 Klarälven downstream the reservoir of Höljes
27-29/5 upper part of Klarälven down to Edebäck

Observed inflow, m3/s
25/5 - 633.5 ----- misses to warn here
26/5 - 694.4
27/5 - 621.4
28/5 - 597.8
29/5 - 415.5 ----- warning but inflow below warningslevel

Observed outflow
Above warninglevel klass2 for 26/5, 27/5, 28/5

Simulation with real observations (not forecast)

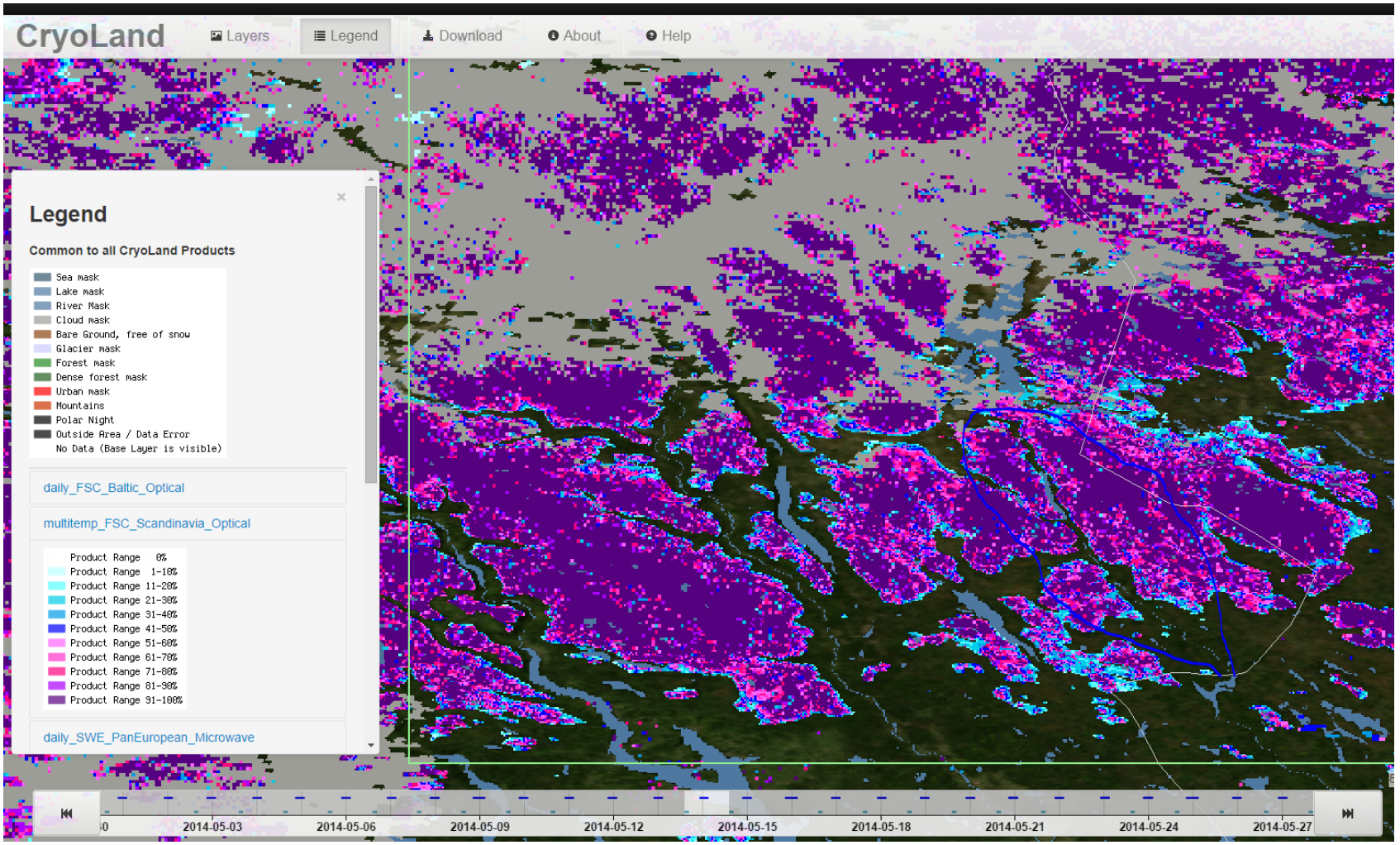


SMHI

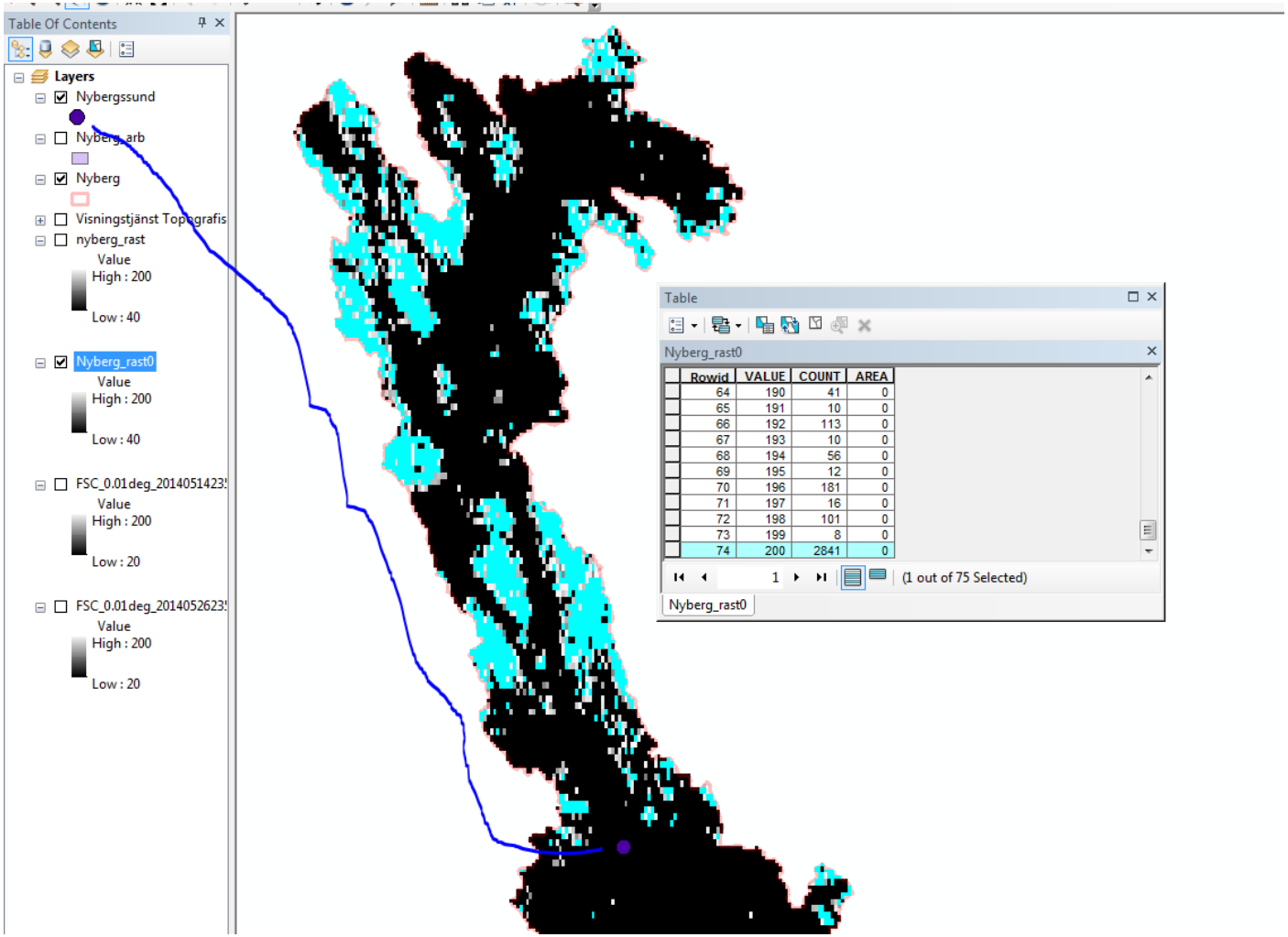
Questions at forecast time

- Is the amount of snow in the model correct?
- Can we estimate the amount of snow from CryoLand data
- Visual comparison based on maps?
- Comparison of pre-processed time series?

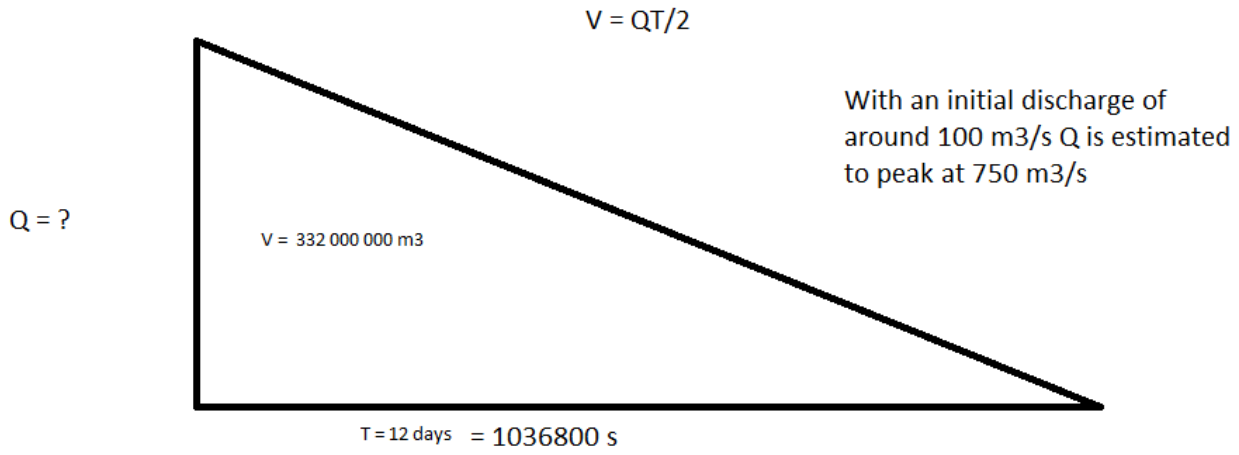
”Real-time” use (Gustav Carlsson)



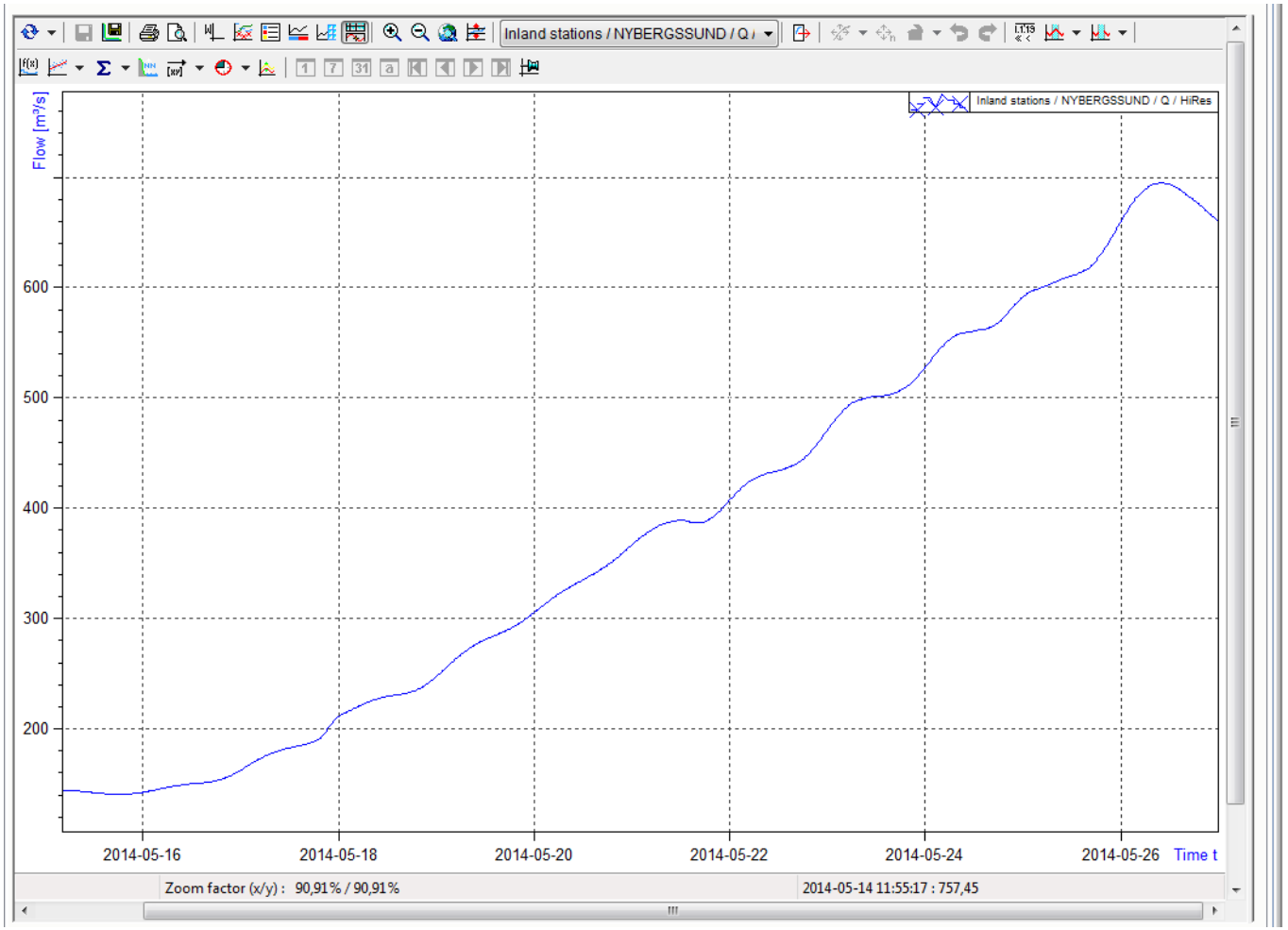
I select pixels with a high snow cover and I calculate an area 1022 km². The measured snow depth around 0,3 m.



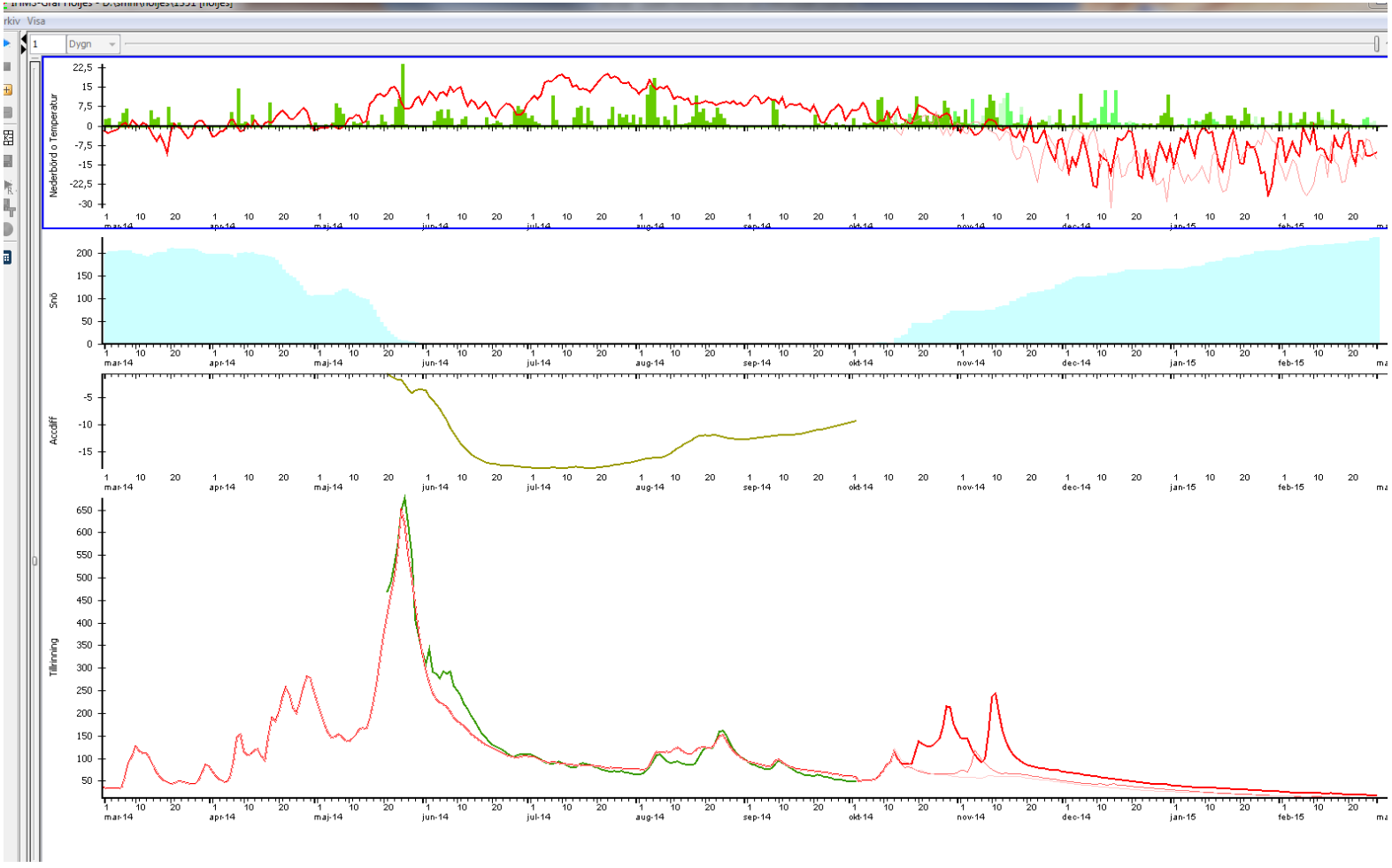
An area of 1022 km² and a snow depth of 0,3 m makes a volyme of 332 million m³ of satured (estimated) snow to be melted during 12 days starting on the 14th of May. A calculation :

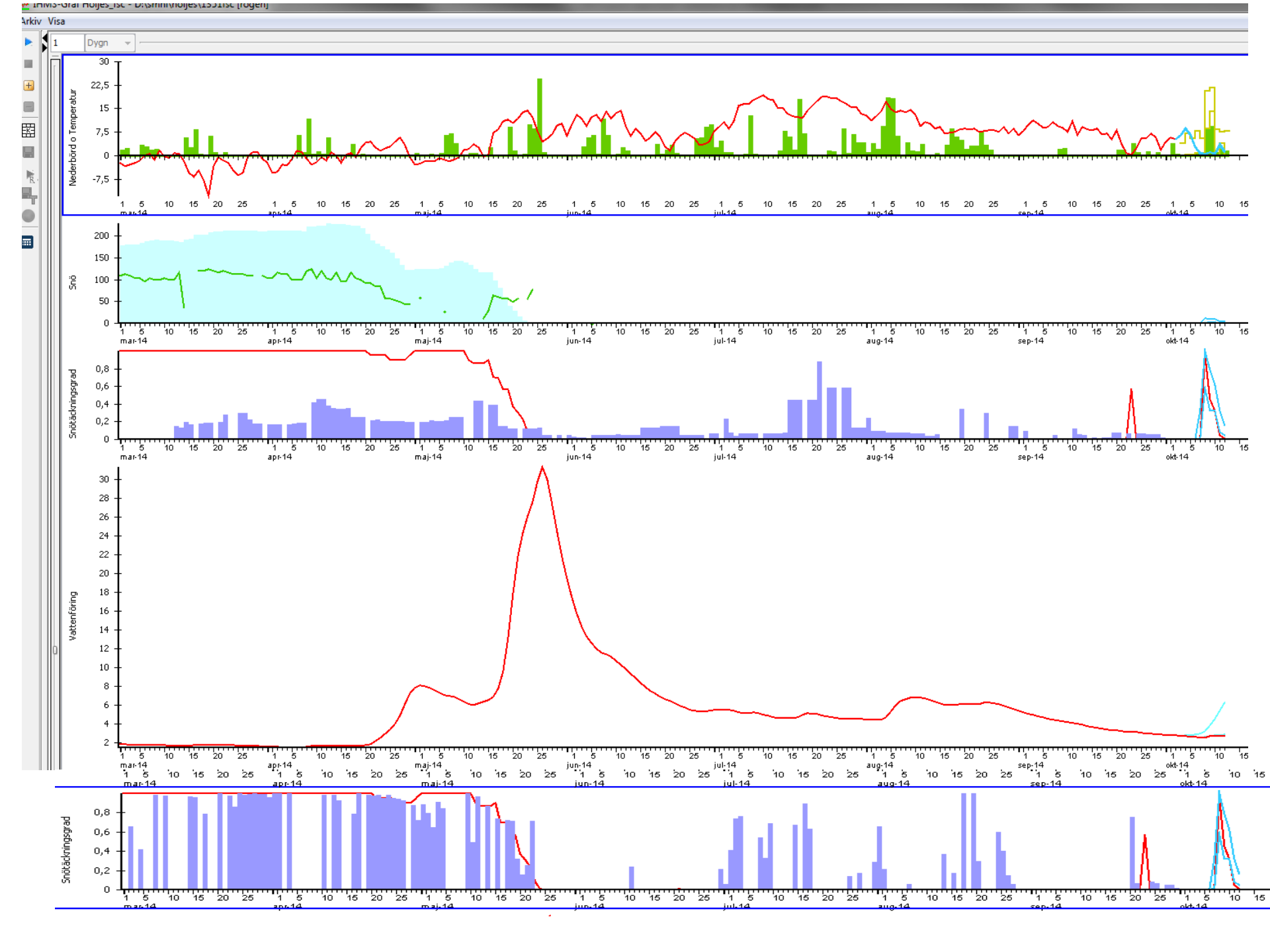


The reality at Nybergssund was ~700 m3/s:



Post-analysis using time series of CryoLand SWE and FSC data (Judith Olofsson)

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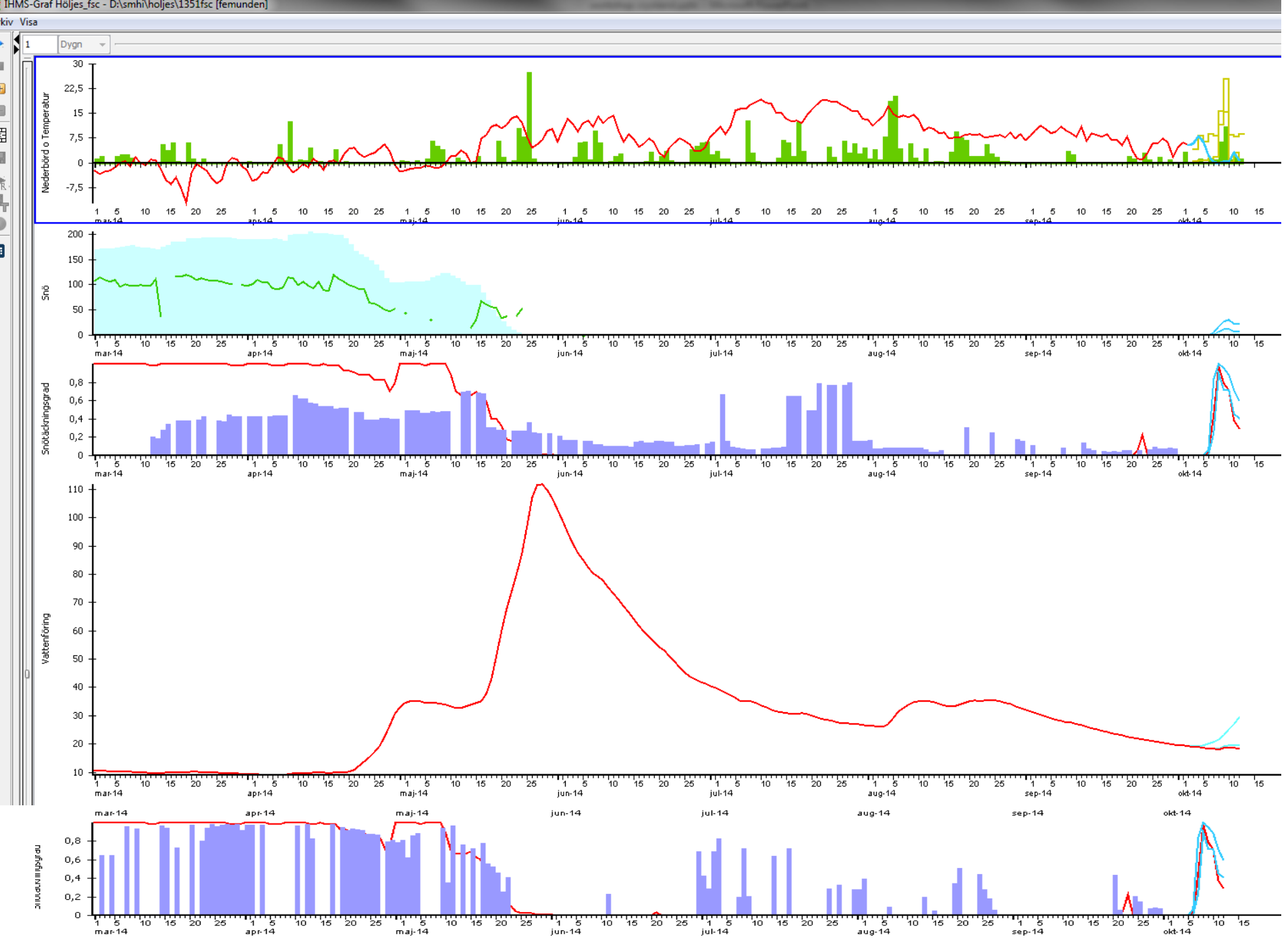
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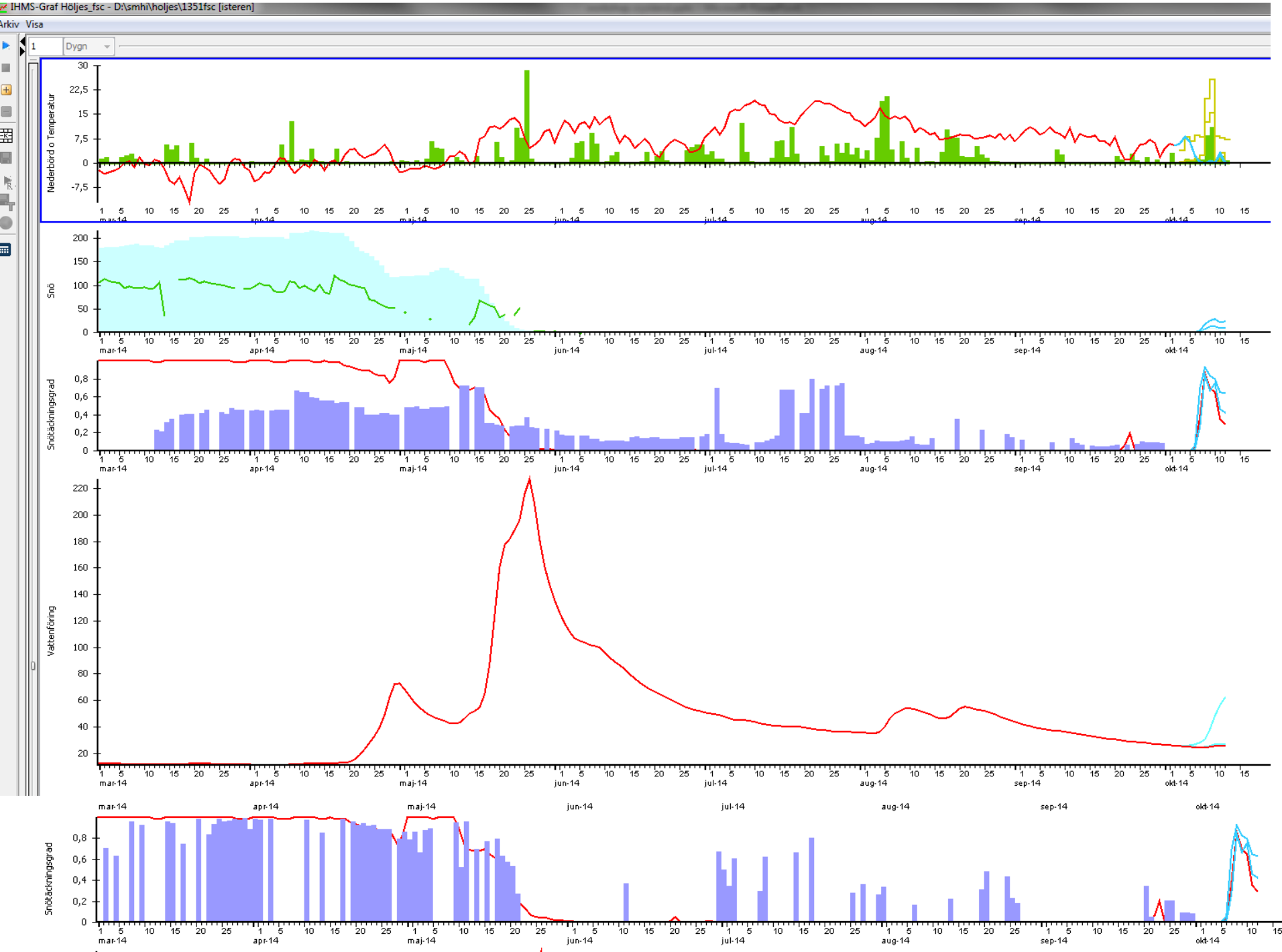
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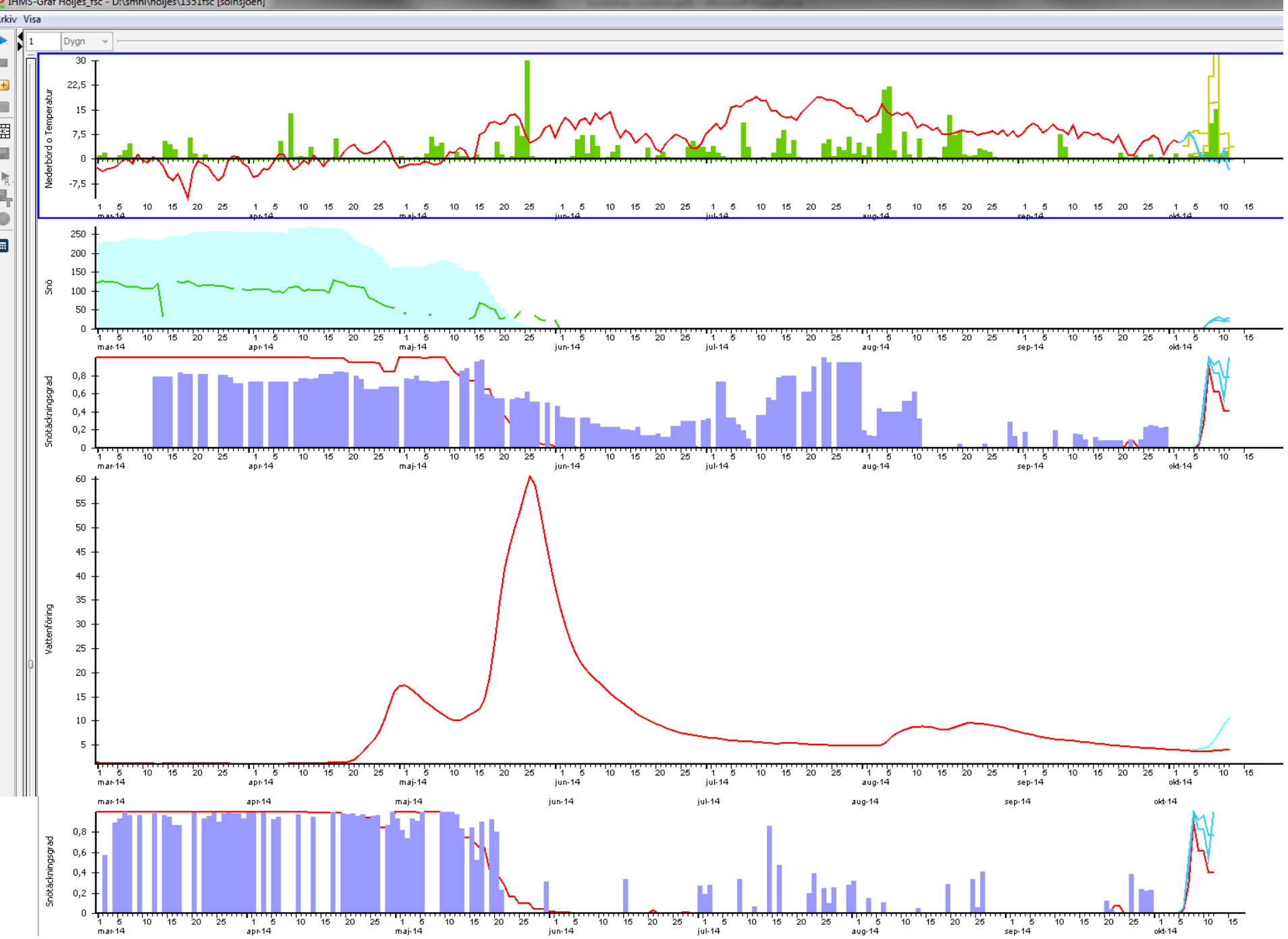
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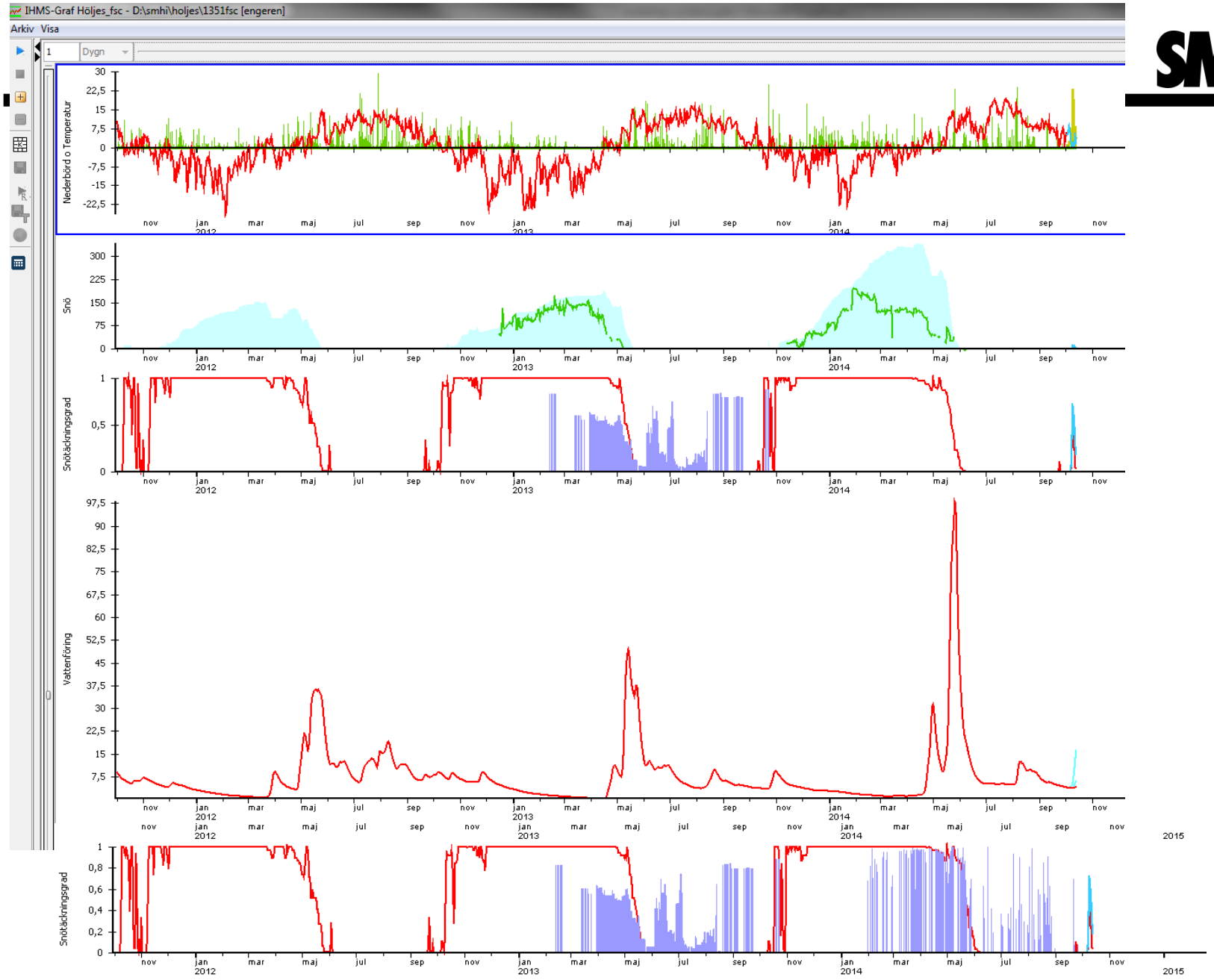
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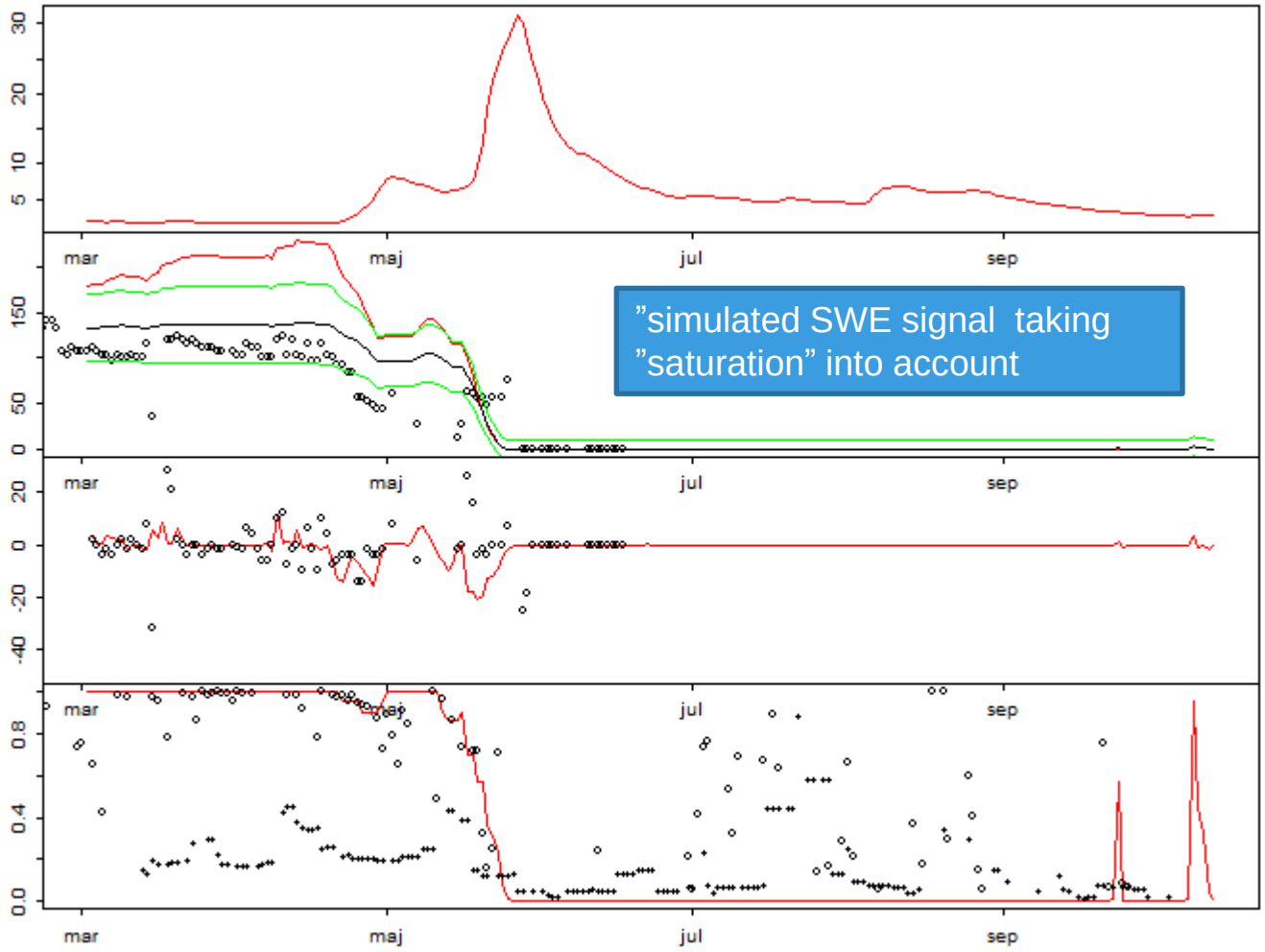
2015

Some attempts to take snow distribution into account



Final remarks

- Evaluation of CryoLand data in SMHI flood warning on-going and will continue 2014-2015

- Fractional snow cover
  - good correlation and added information for snow melt dynamics

- SWE
  - Maximum level ”saturates” (known issue)
  - Temporal variation agrees well with simulations!
  - Taking snow distribution into account might be useful

- Outlook: overall increased use of EO data in hydrology at SMHI