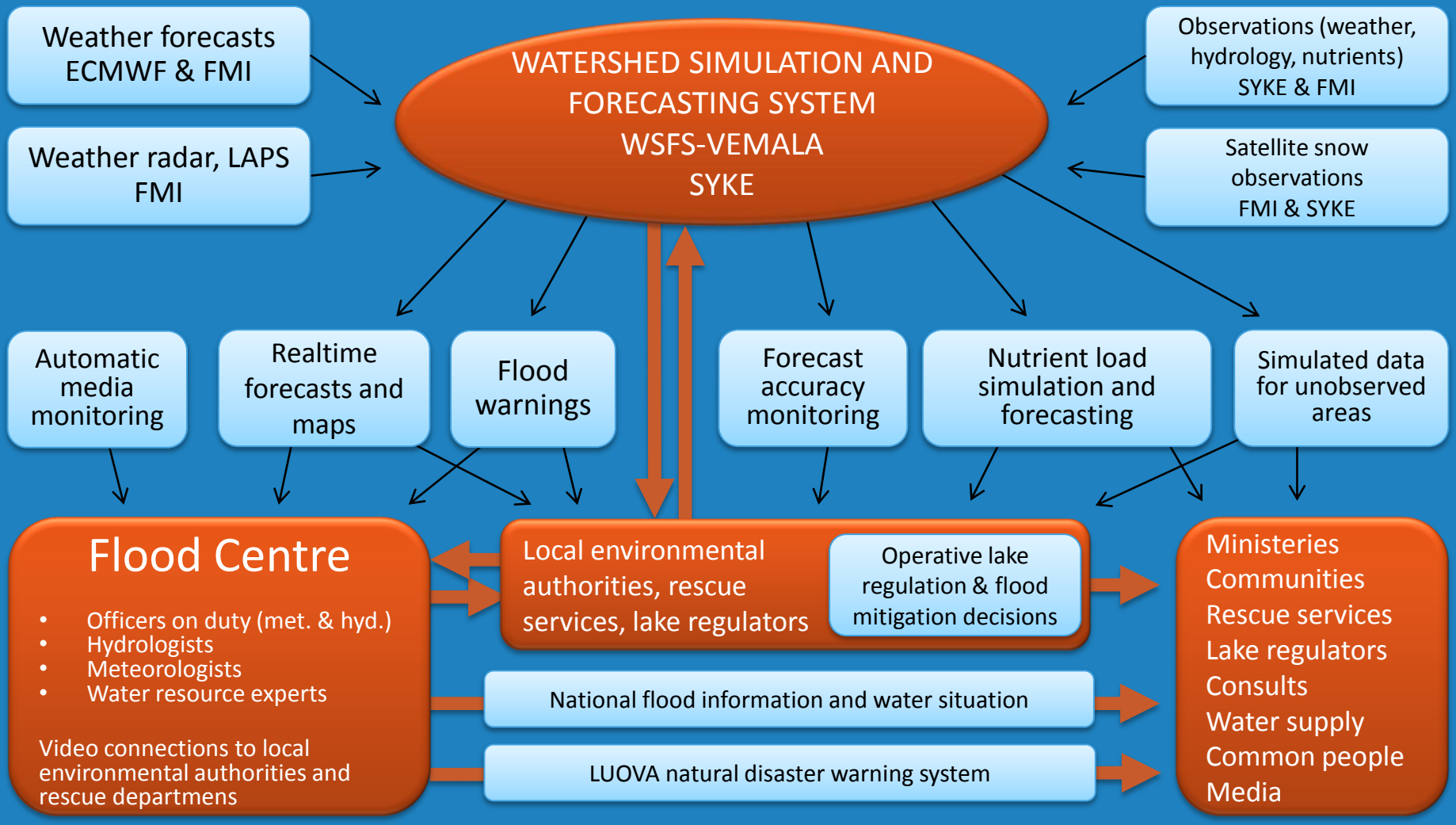
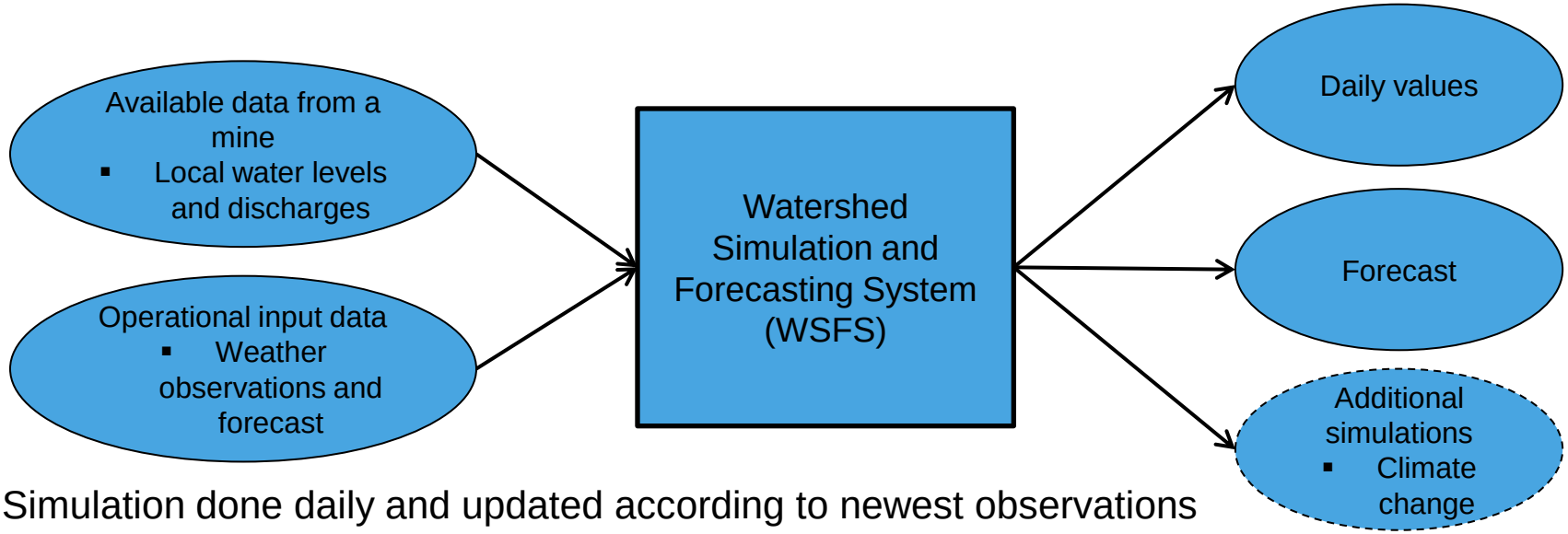
Integrated use of weather, climate and water expertise in hydrological services in Finland



R & D

- Climate change
- Simulations for planning, design floods
- High temporal resolution model
- Process models: water quality, lakes, soil moisture, ice, frost & snow, corrected precipitation, evaporation
- Pictures, maps, products
- Water balance for mines
- Inter-national projects

Work flow for water balance simulation for mines



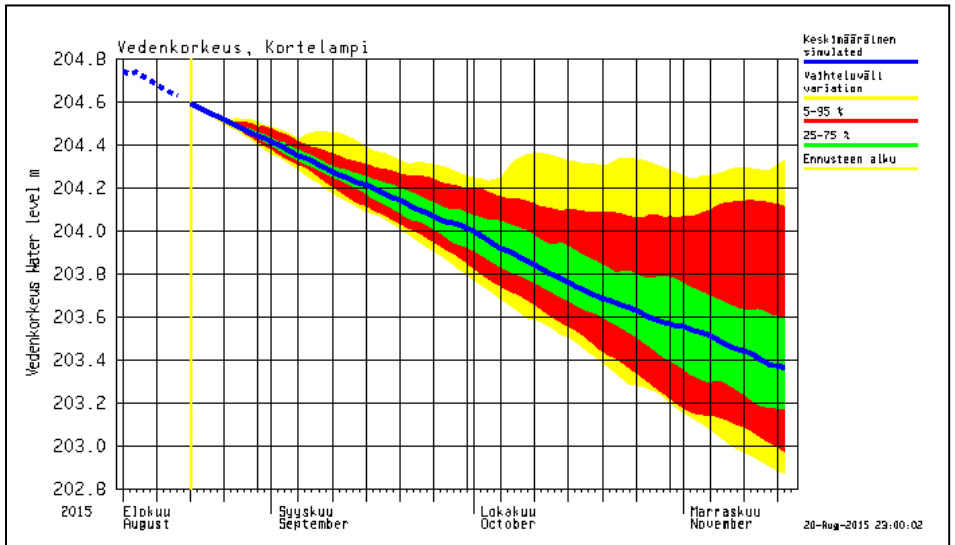
Simulation done daily and updated according to newest observations

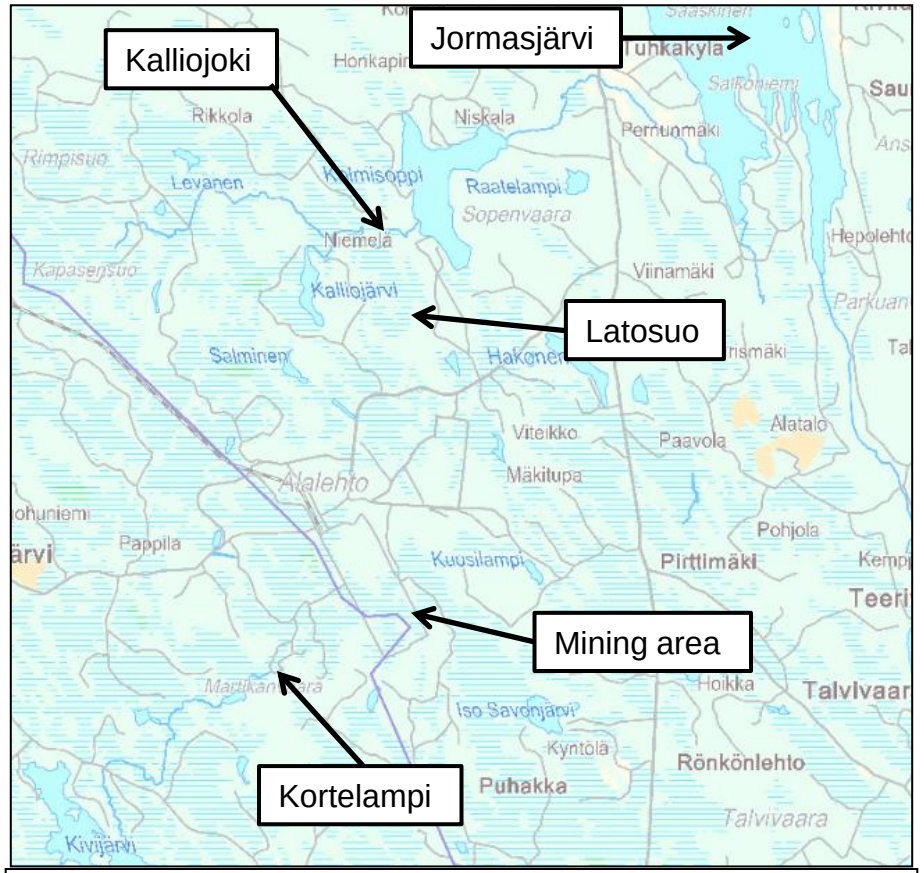
Case Kittilä mine in SAM project

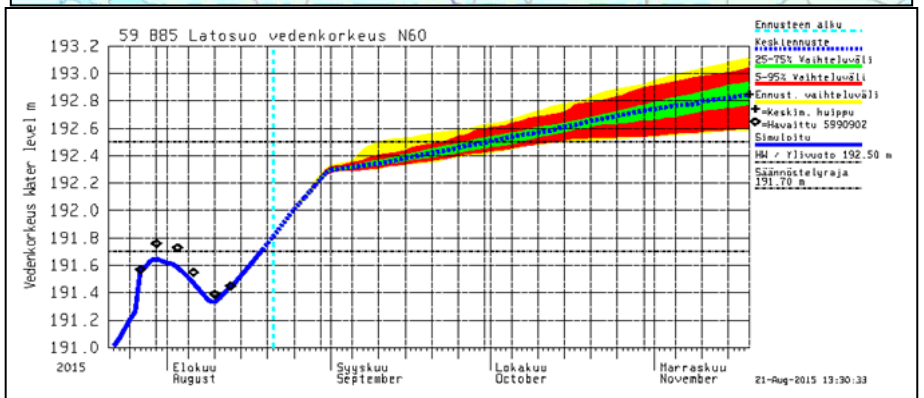
- Areal water balance simulation of Kittilä mine local area as a case subject
- A part of the operational system
- Results and forecasts presented in the webpage for easier accessibility
  - Daily updates
  - Figures and numerical forecasts

Operative forecasts for Talvivaara mining area

- Main lakes and water flows between them in Talvivaara mining area are in the operative WSFS model
- Forecast also for runoff of Kalliojoki, which is the limiting factor for discharge of Latosuo and Kortelampi
- Forecasts run daily and are sent directly to Talvivaara
- Weekly reporting of Talvivaara water situation (also daily reporting if needed)

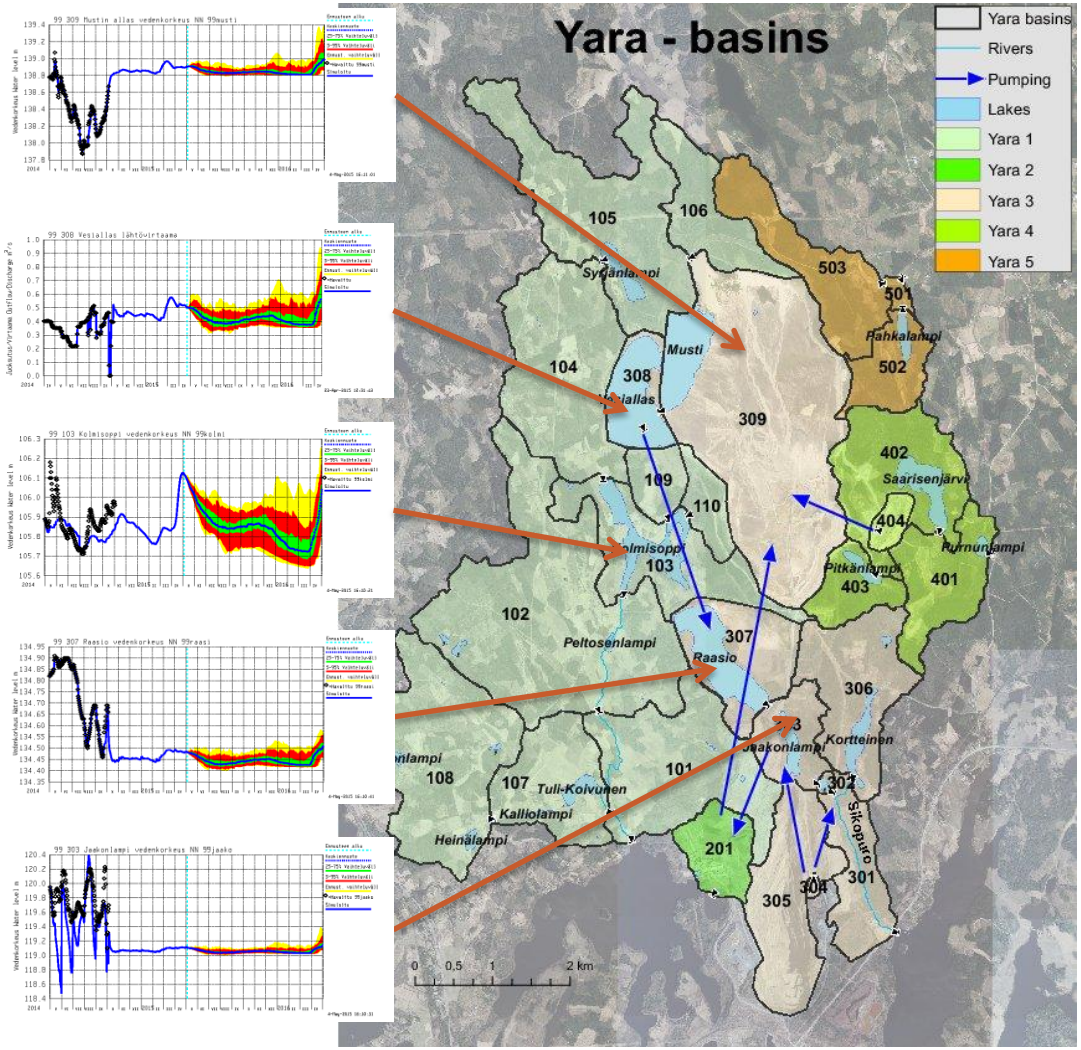






Watersmart: simulating water balance of mining areas

- **Aims to** simulate water balance of mining areas
  - Water level, discharge
  - Ground water
  - Water balance components
  - Real-time forecasts
  - Transport of marker substances
- Currently developed in YARA Siilinjärvi mine
- WSFS modified to mining area
  - Description of watersheds in the area
  - Observations from area (water level, discharge, pumping) or from nearby weather stations



Water balance for mines (4/5)

VEMALA can simulate the transport of inert components in rivers downstream of an industrial leak for determining toxicity risks (MINEVIEW project):

- Simulation of a hypothetical 1 tonne of Nickel discharged on the 09/11/2014 into the freshwater ecosystem from Talvivaara