River Basin / River Basin (according EU-WFD)

Mean precipitation, temperature and others.

The MARVEX campaign focused on spatial variability of hydrological variables

• Hydrogeology
• Geology:
• Vegetation:
• Average slope:
• Elevation:
• Catchment Area:

• Gauge coordinates / Gauge datum:
• Podsolic brown earth, brown (alpine, mountainous, lowland)

Mean monthly values for rain, runoff and pan evaporation

Rainfall – Tipping bucket gauges
Rainfall – C band radar
Rainfall – X band radar

Soil Moisture (pseudo-TDR)

Measured hydrological parameters

Measuring period
Temporal resolution
Number of stations

Rainfall – Tipping bucket gauges 1997 – 2001 2 mins 13
Rainfall – C band radar 1997 – 2001 15 mins 1 km grid
Rainfall – X band radar Individual events 5 secs / 2 mins 150 m grid
Streamflow
Soil Moisture (pseudo-TDR) 1997 – 2001 2 mins 29

5. Model Complexity: During winter periods the soils are wet and accurate predictions of stormflow can be achieved using lumped models. Conversely, during summer periods the soils are dry, and complex and fully distributed models are required for accurate predictions of stormflow (Atkinson et al., 2003). The storage-discharge relationship varies through the year depending on recharge history, and hence models require multiple storage reservoirs (McMillan et al., this workshop).

Key references for the basin

Applied models
Mahurangi catchment has been used as a test site to explore model building techniques and model complexity (e.g. Chirico et al., 2003; Atkinson et al., 2003; McMillan et al., this workshop), rather than as a site for application of standard models.

Main scientific results
1. Streamflow spatial variation: Rainfall is the dominant source of spatial pattern in streamflow at space scales of 1 km2 and greater, for all timescales
2. Streamflow generation: The runoff process is associated with a clear threshold in soil moisture, with significant runoff being generated only for moisture contents above about 42%. It is also thought that at these high average moisture contents, the spatial distribution of soil water is critical in the control of runoff behaviour.
3. Soil Moisture: at space scales from 10 m to 1 km, topography is a relatively weak control of soil moisture. Small-scale variability (<100m) of soil moisture is associated with soil structure and preferential flow pathways.
4. Flow pathways: “The soils have residence times of at least several months to a few years. The streams are reactive, but this appears to be driven by a combination of direct channel interception and local runoff from the near-stream margin. One quarter to one third of total runoff occurs as quickflow. The largest portion of streamflow originates as baseflow from soil and regolith reservoirs that may be several metres to perhaps several 10’s of metres deep” (Bowden et al., 2000).
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