HYDROEUROPE 2023
Hydroinformatics for water resources and water related hazards management in Europe

UNCERTAINTIES FOR RUNOFF AND DISCHARGES ASSESSMENT

TEAM - 2

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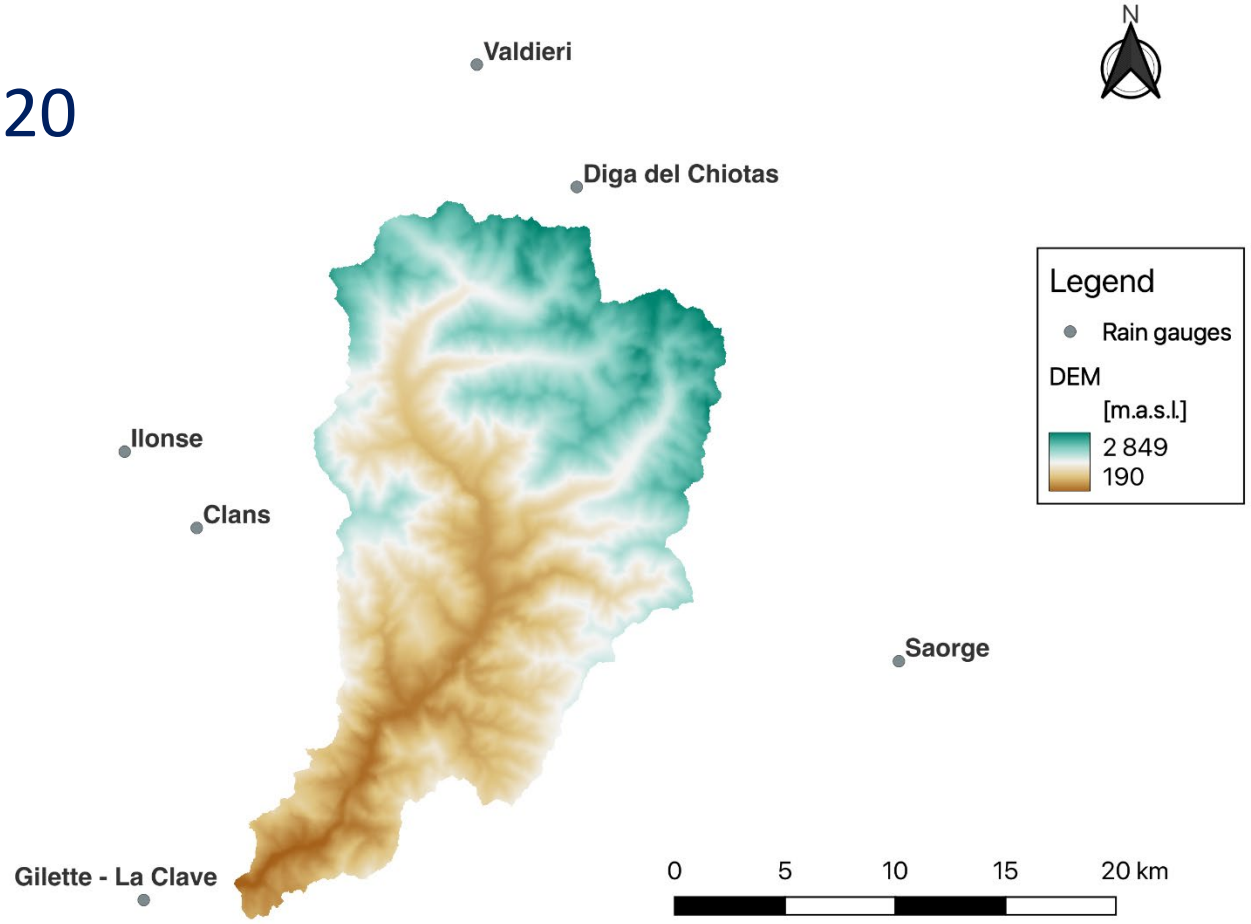
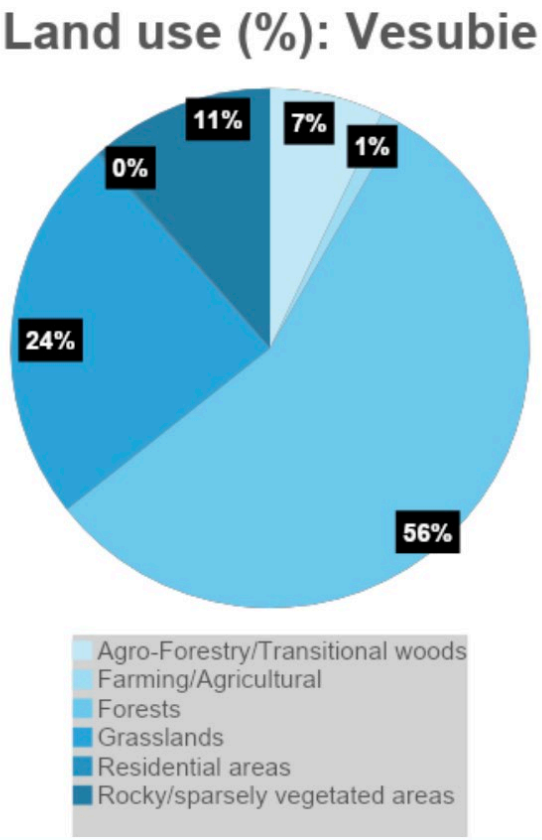
CASE STUDY: VÉSUBIE CATCHMENT

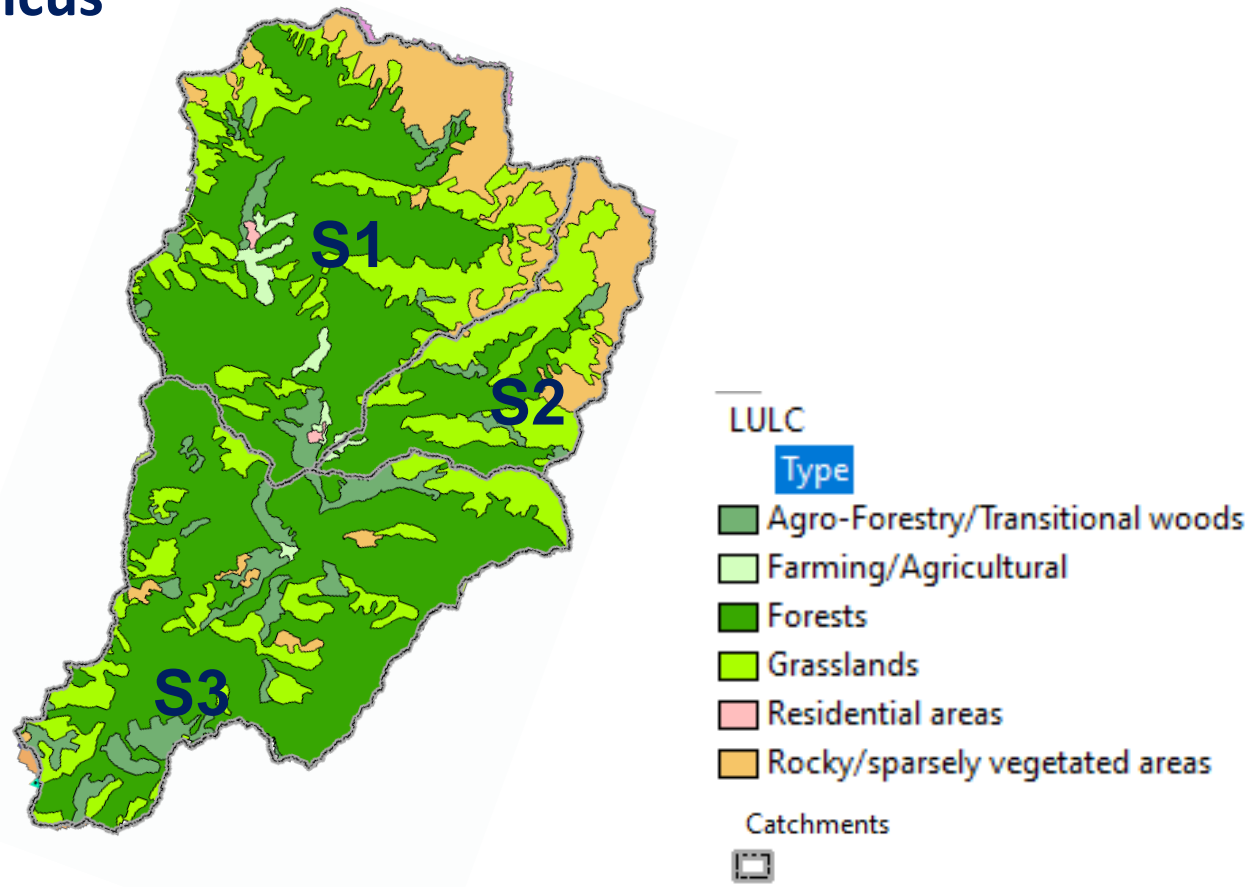
- Alex Storm: Oct 2nd to Oct 3rd, 2020
- Daily rainfall: >500mm/day
- Catchment area: 400 Km^2
- Average slope: <10%
- 6 rain gauges
- Spatial interpolation method: Thiessen polygons



METHODOLOGY FOR SENSITIVITY ANALYSIS

Land use/ Land cover (LULC) from Copernicus





METHODOLOGY FOR SENSITIVITY ANALYSIS

DEM Resolution

- 300m
- 75m
- 25m

Curve Numbers (CN):

- 41.4
- 69.66
- High CN: S1(71.93) S2(75.5) S3(69.01)
- Low CN: S1(47.30) S2(48.61) S3(41.54)

Loss Method

- SCS Curve Number (CN) Method

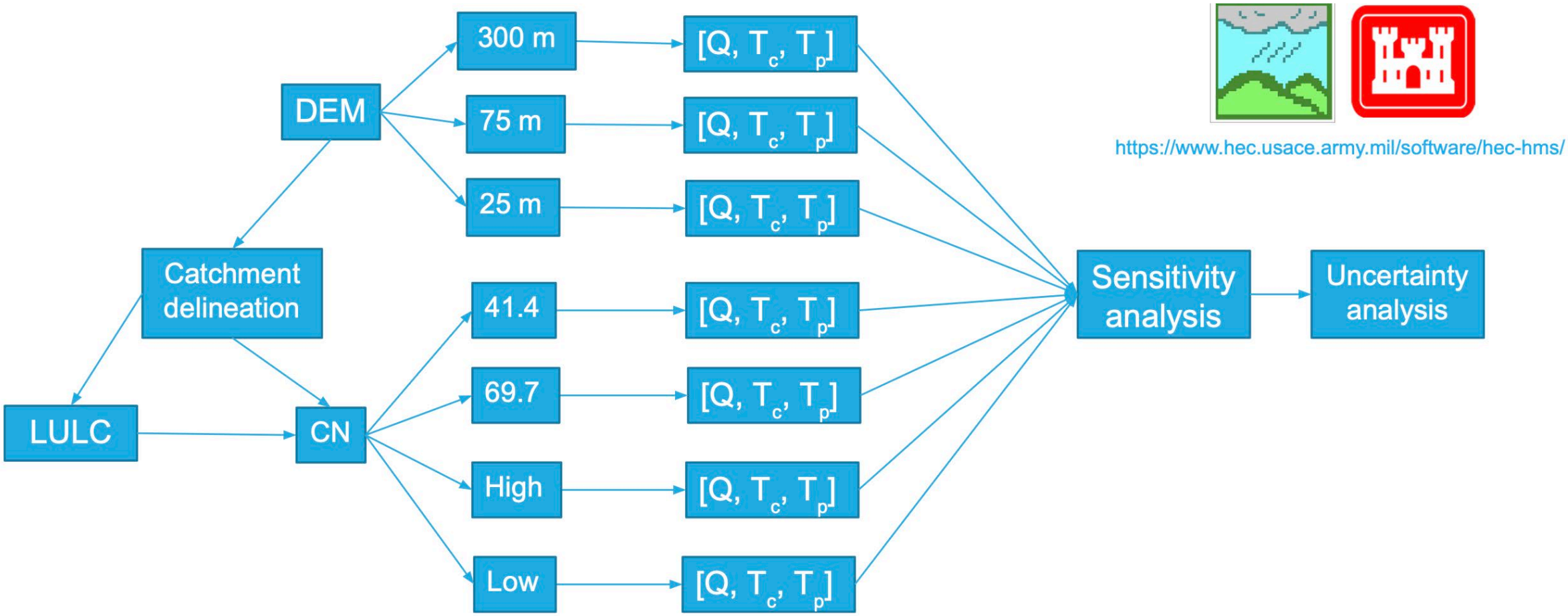
CN values from TR-55 manual appendix 4B

Time of concentration

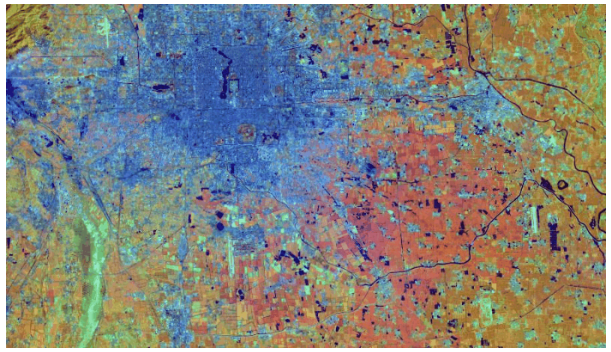
- Kirpich Formula

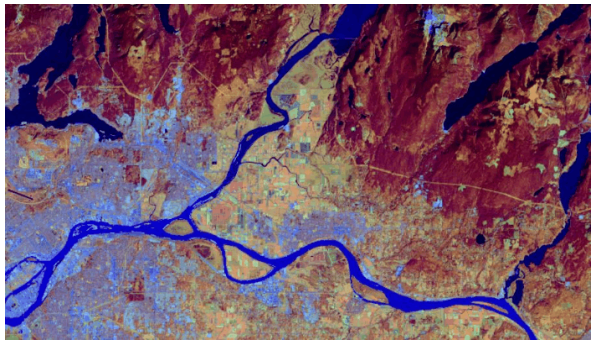
$$T_c\,(h) = \frac{0.06628L^{0.77}}{S^{0.385}}$$

METHODOLOGY FOR SENSITIVITY ANALYSIS

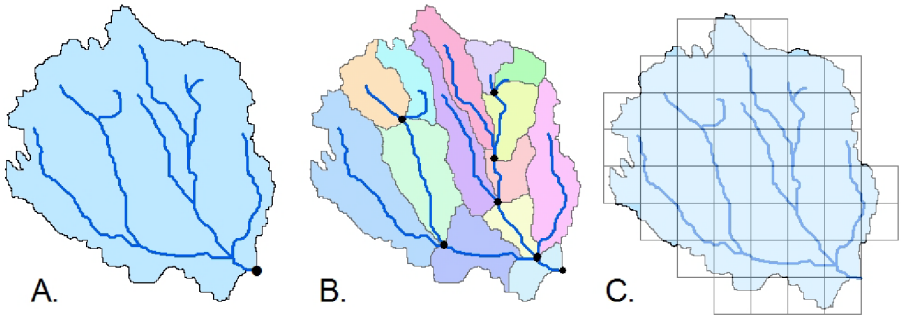


UNCERTAINTIES… NON-EXHAUSTIVE

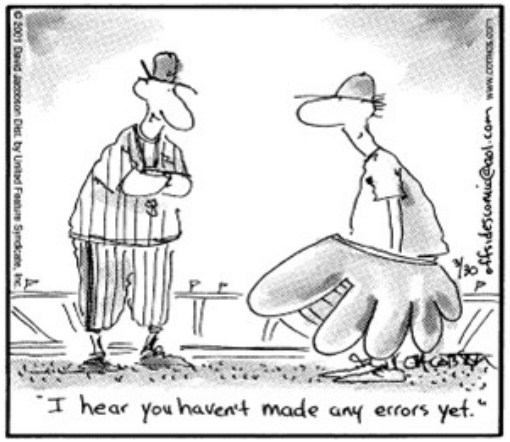




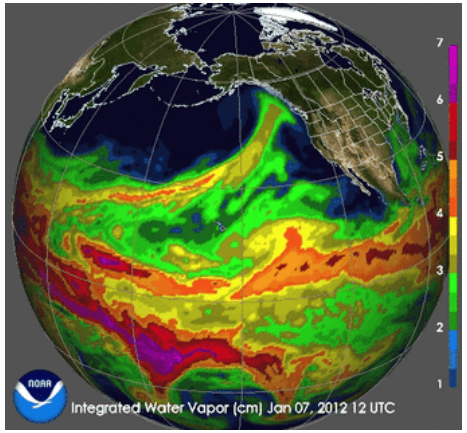
Source: geo-jobe.com



Source: images.app.goo.gl



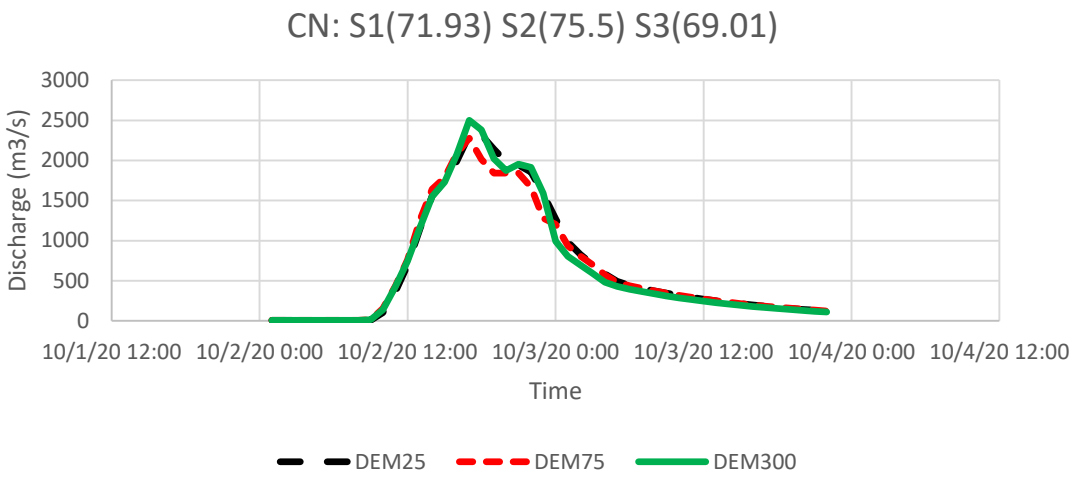
Source: slideplayer.com

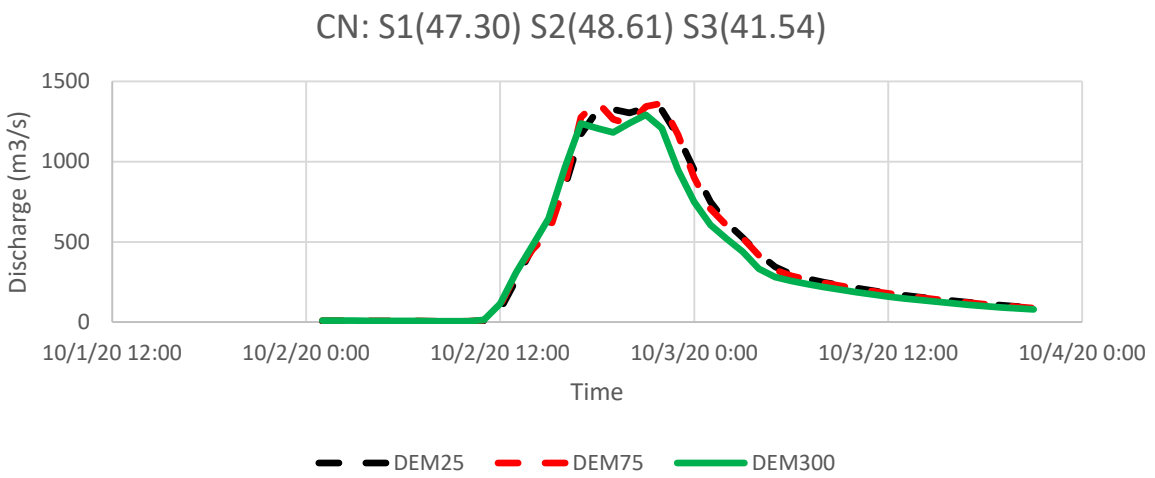


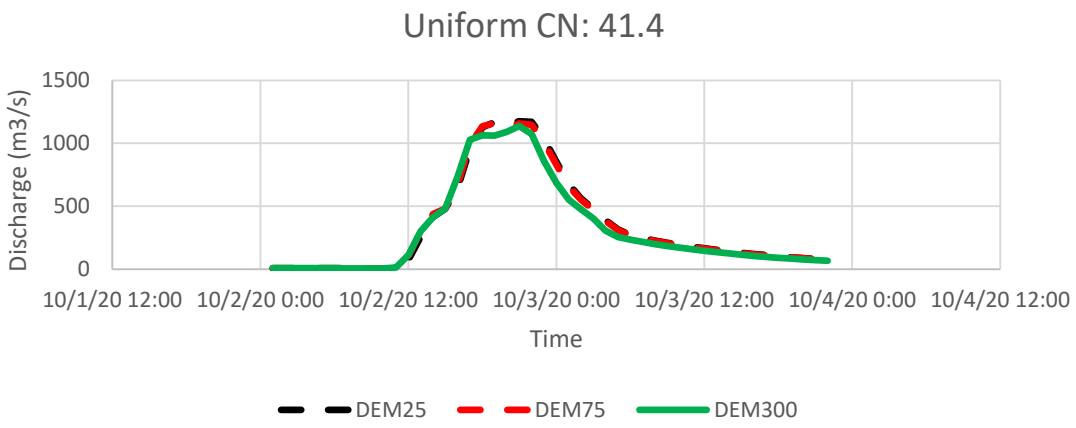
Source: USGS

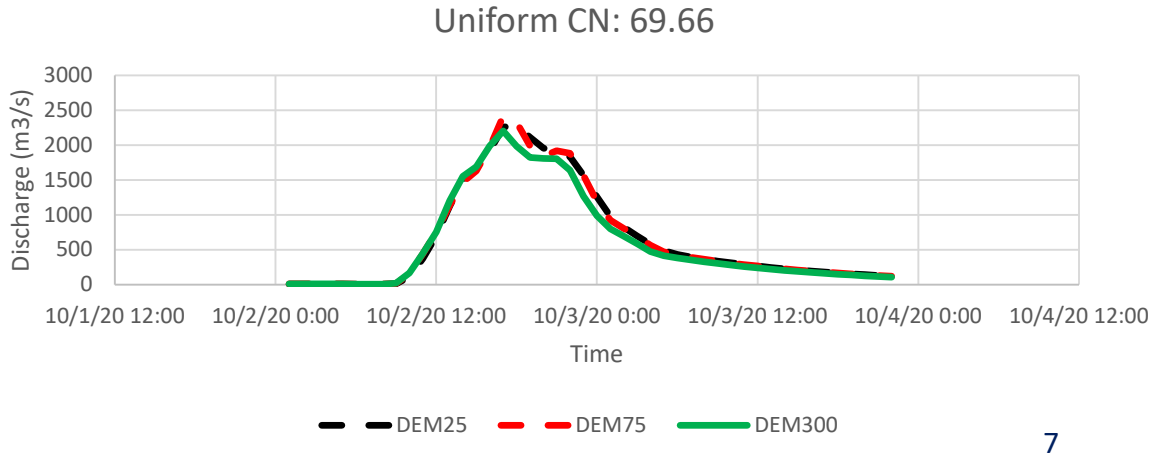
Source: images.app.goo.gl

RESULTS – HYDROGRAPH COMPARISON



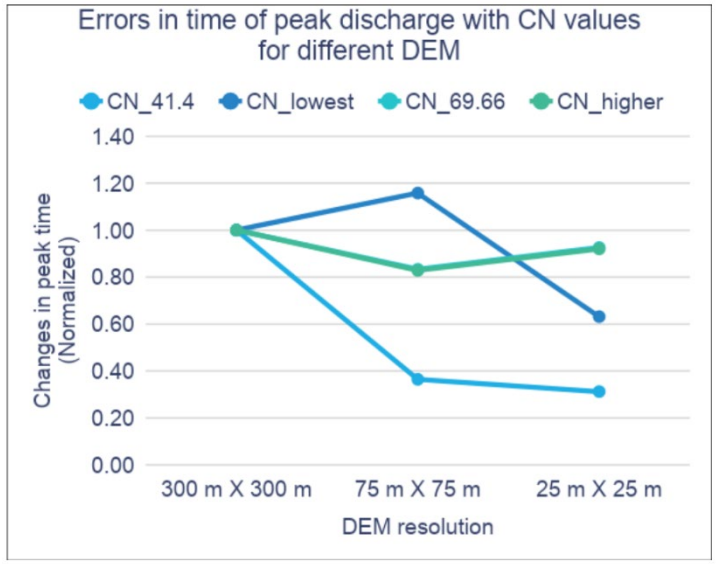


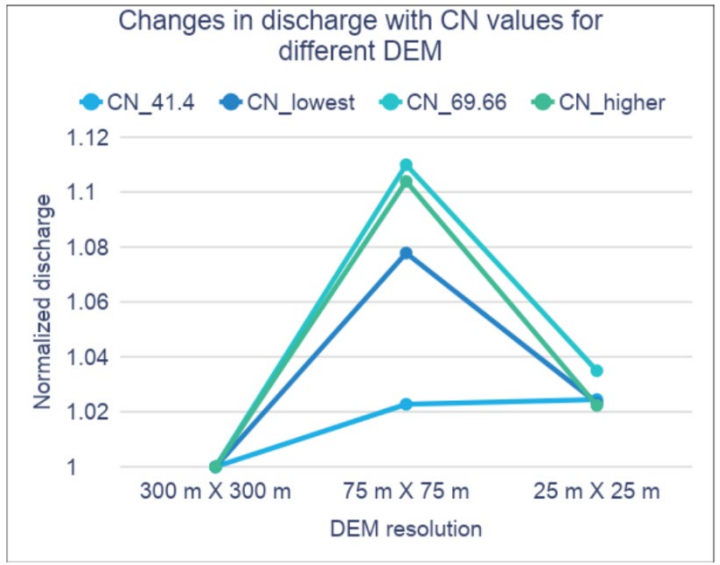


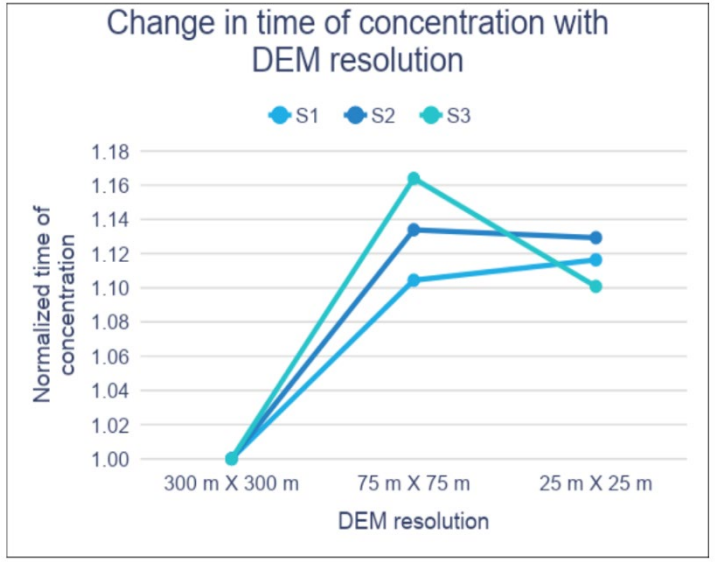


SENSITIVITY ANALYSIS

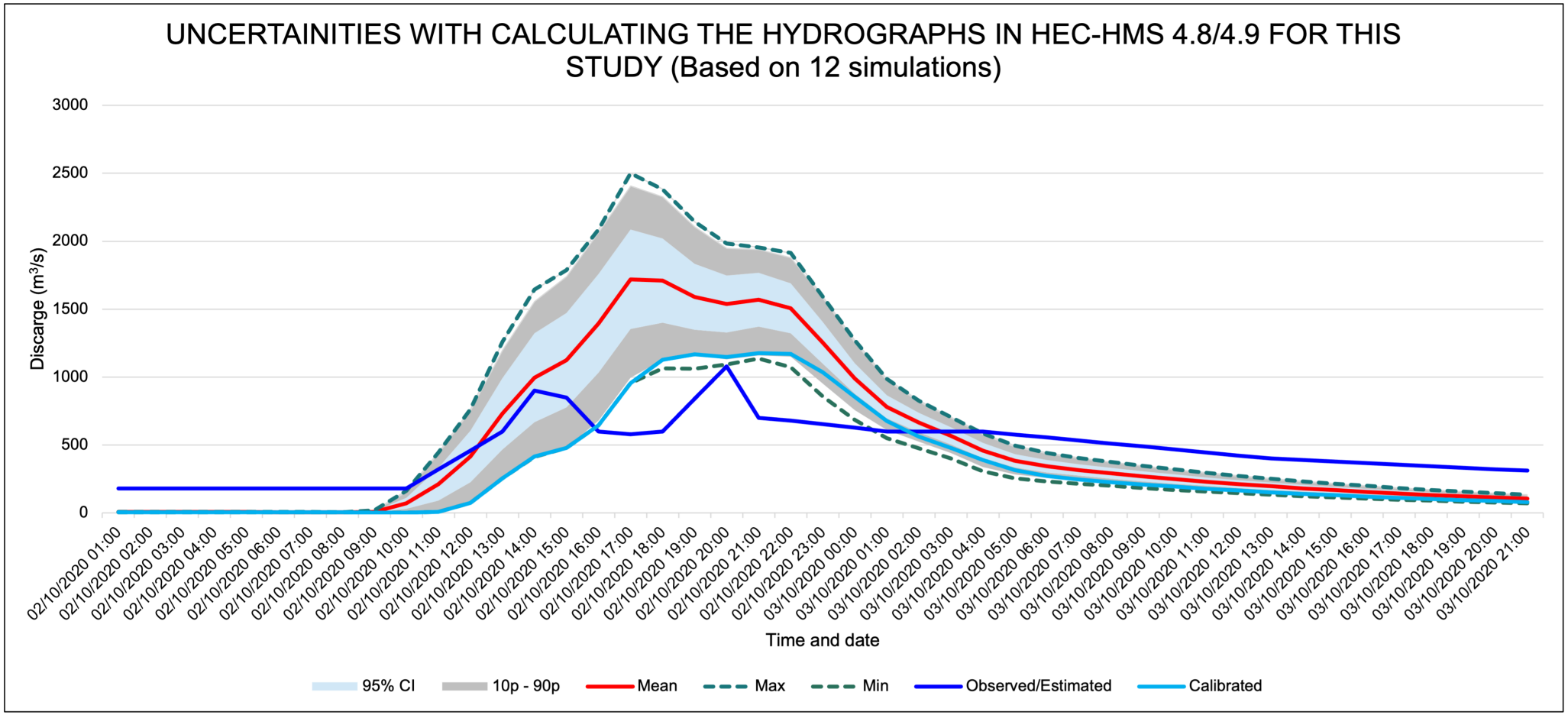
- Approx. 10 – 16 % change to time of concentration (Tc) due to change in resolution with finer resolution of DEM
- Approx. 2 – 11% change in discharge due to change in CN values and DEM resolution
- Erratic changes observed when it comes to errors in time of peak discharge







UNCERTANITIES



CONCLUSIONS

- Changes in the DEM resolution do not have a considerable impact on peak discharge, time to peak and runoff volume.

- Changes in Curve number values (Land type) have a significant impact on peak discharge, time to peak and runoff volume.

- When changing the CN values from High (69.66) to Low (41.4) the impact was about 50% less in terms of Volume and Peak discharge amount and the time to peak occurred 3.5 hours later (delayed).

- Finally, the analysis showed that the hydrological model for this study case was more sensitive to land type changes (Curve number) than to DEM resolution.

REFERENCES

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THANK YOU FOR YOUR ATTENTION!