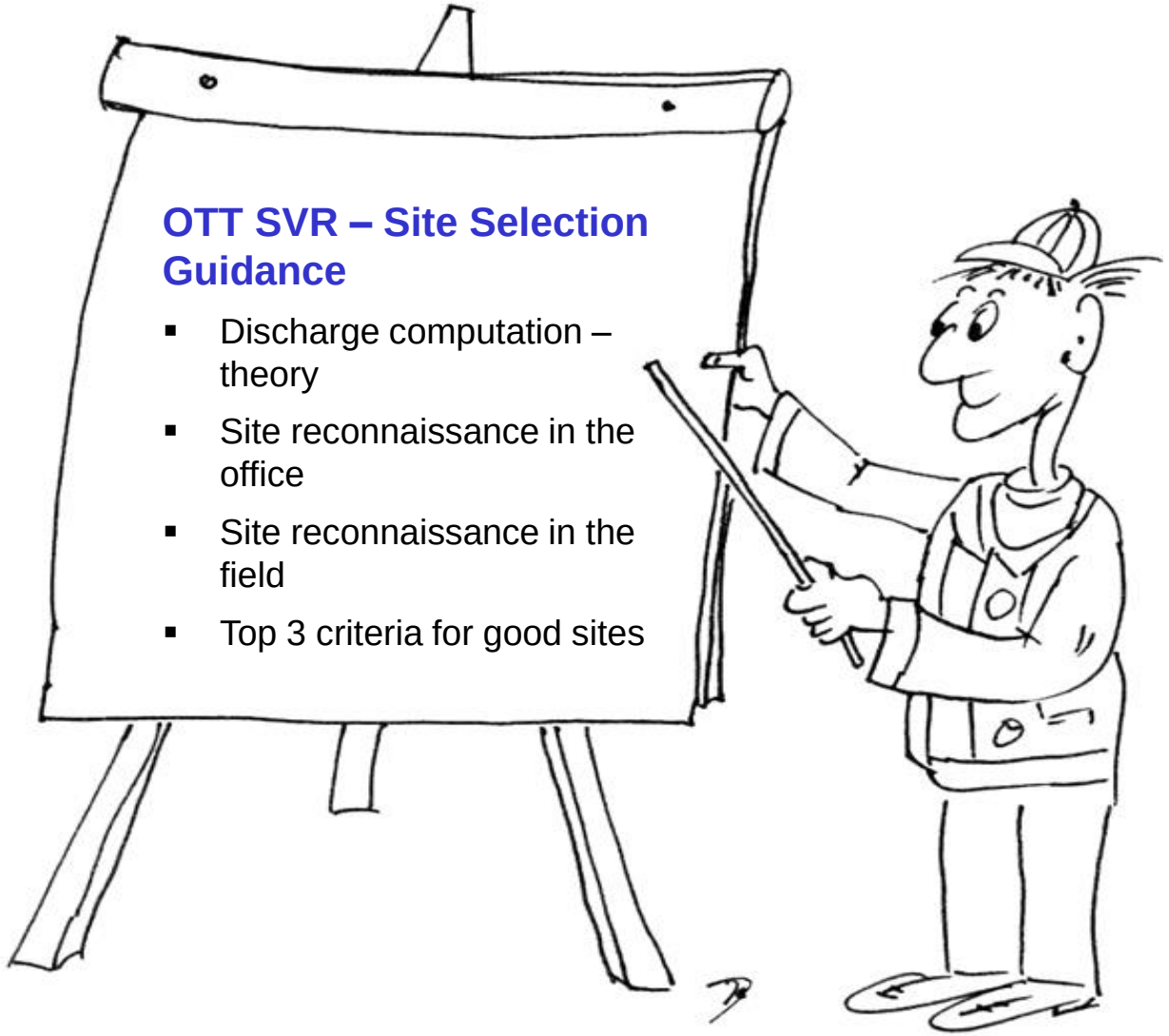
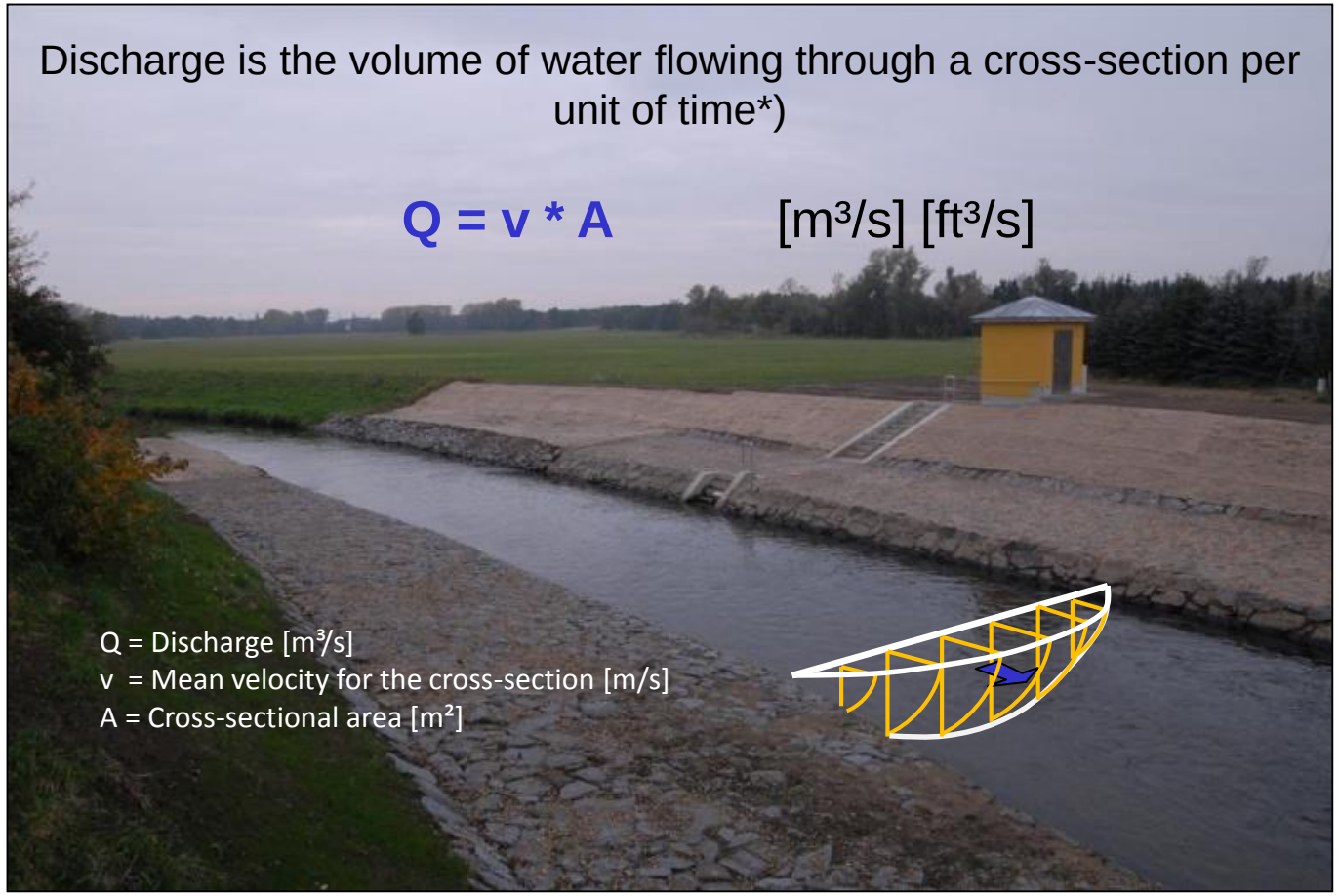
Tech – Tipp: OTT SVR 100
Site Selection Guidance

Agenda



Discharge Definition



Picture: SBUL Radebeul

*) ISO 772:2011, Hydrometry – vocabulary and symbols

Discharge Computation

Surface water velocities measured by the OTT SVR 100 are applicable to compute discharge based on the Velocity – Index – Method. This method determines the mean velocity for the cross-section (v_m) from locally measured index velocities (v_i) by applying a calibration factor k.

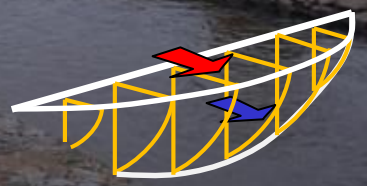
$$Q = v_m * A = v_i * k * A \qquad [m^3/s]$$

A reliable index relation requires that:

1. the hydraulic situation at the measuring site is predictable
2. the sample volume at the water surface is setup in an area where the maximum surface velocity is located.

Mean velocity for the cross-section [m/s]

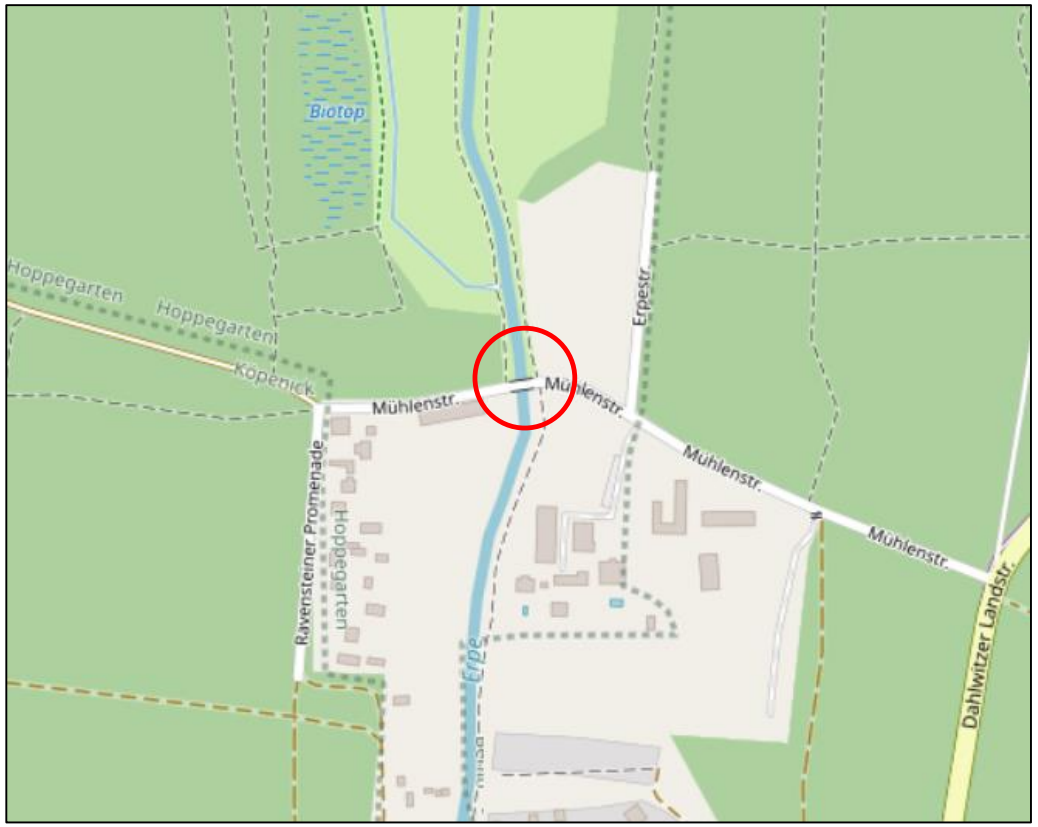
Index velocity measured at the water surface [m/s]



Picture: SBUL Radebeul

A good site reconnaissance starts in the office

- Use topographic and geologic maps or aerial photos (e.g. satellite images) to get a better overview of the territory, where the measuring site shall be set up. Mark potential sites on the map.



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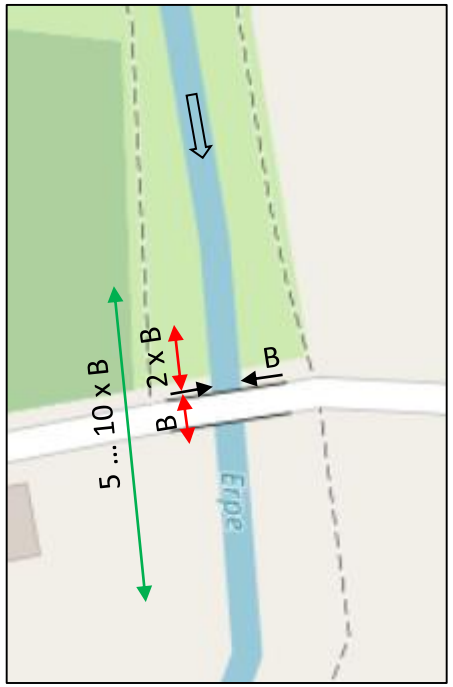
A good site reconnaissance starts in the office

- Check the course of the water. The course should be as straight as possible, providing flow which is parallel to the banks, without irregular velocity distributions.



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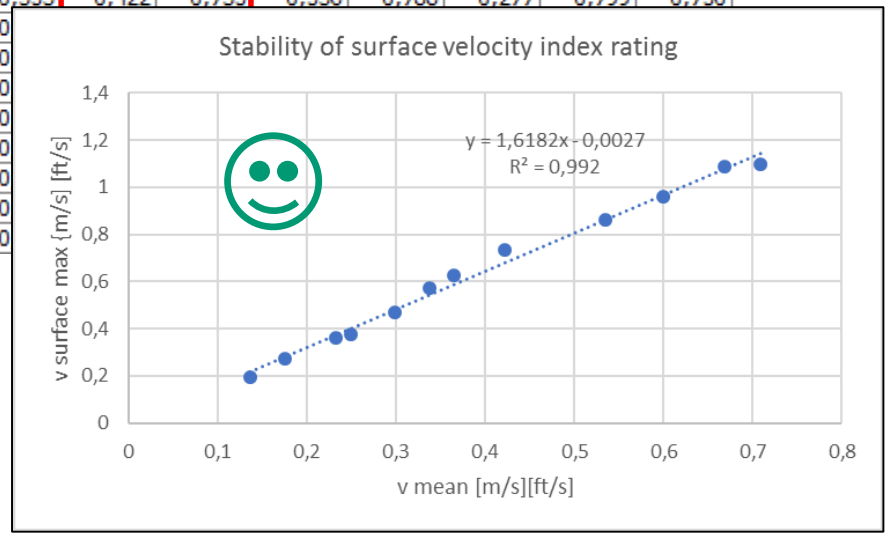
As a rule of thumb one can assume that the water is flowing parallel to the banks if the water course is straight over a distance of 5 – 10 times the channel width.

It is recommended to ensure that the straight distance has at least the double length in the upstream direction as it has downstream from the measurement cross-section.

A good site reconnaissance starts in the office

- If available take a look at existing discharge measurement records from your selected site in the database. Check for stability of the surface velocity index rating.

Date	Type	W [cm]	Q [m³/s]	A [m²]	b [m]	h-m [m]	h-max [m]	v-m [m/s]	vo-max [m/s]	vo-m [m/s]	v/vo-m	r-hy [m]	P [m^5/2]	CwI [m^1/2/
21.12.2016	Vielp.	51,0	0,641	0,903	4,50	0,201	0,250	0,709	1,100	0,816	0,869	0,188	0,417	1,540
13.12.2016	Vielp.	68,0	0,964	1,610	4,50	0,357	0,394	0,600	0,961	0,714	0,841	0,320	0,977	0,987
08.12.2016	Vielp.	60,0	0,648	1,210	4,50	0,269	0,299	0,535	0,860	0,552	0,970	0,241	0,631	1,030
25.11.2016	Vielp.	80,0	0,598	2,010	4,50	0,446	0,475	0,298	0,468	0,360	0,829	0,374	1,340	0,446
18.11.2016	Vielp.	64,0	0,600	1,420	4,50	0,316	0,353	0,422	0,735	0,536	0,788	0,277	0,799	0,750
11.11.2016	Vielp.	65,0	0,608	1,330	4,40	0,303	0							
08.11.2016	Vielp.	68,0	0,488	1,440	4,45	0,325	0							
19.07.2016	Zweip.	75,5	0,240	1,770	4,50	0,392	0							
13.07.2016	Zweip.	80,0	0,351	2,010	4,50	0,447	0							
07.07.2016	Einp.	82,0	0,545	2,190	4,50	0,486	0							
16.06.2016	Zweip.	62,0	0,482	1,320	4,45	0,297	0							
19.05.2016	Vielp.	76,0	0,463	2,000	4,50	0,444	0							
04.05.2016	Vielp.	53,0	0,581	0,870	4,45	0,195	0							



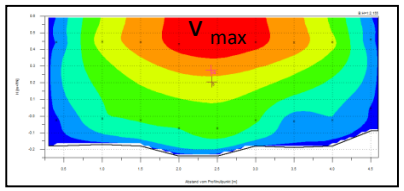
If the results from existing measurements at your selected site reflect a stable ratio between the mean channel velocity and the max surface velocity the likelihood of succeeding with a surface velocity radar is great.

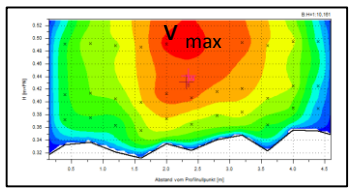
Site reconnaissance continues in the field

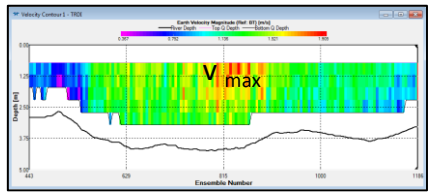
- Apply portable flow meters (e.g. ADCP, mechanical type meters, magnetic-inductive flow meters) to determine the position (vertical) of the maximum in-stream respectively the maximum surface velocity as well as the velocity distribution across the river.
- Conduct a cross-section survey to setup stage – area – ratings.
- Good sites provide stable position of the maximum surface velocity even if hydraulic conditions vary.

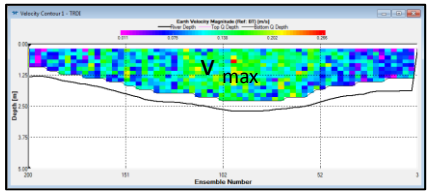






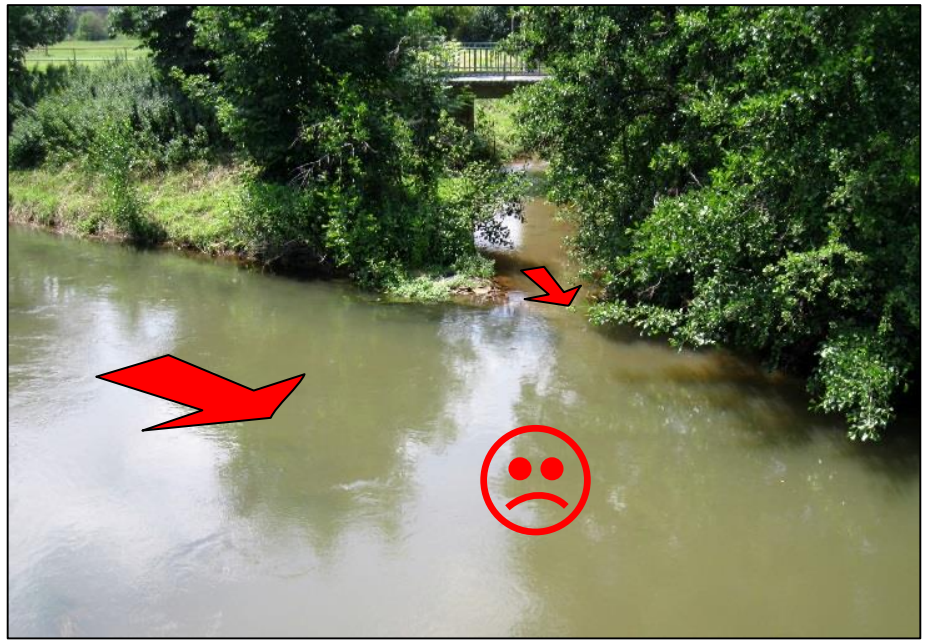






Site reconnaissance continues in the field

- Watch out for inflows of tributaries or drainage systems. Those may cause cross flow and a shifting of the position of the maximum surface velocity which in the end causes unstable index velocity ratings.



Site reconnaissance continues in the field

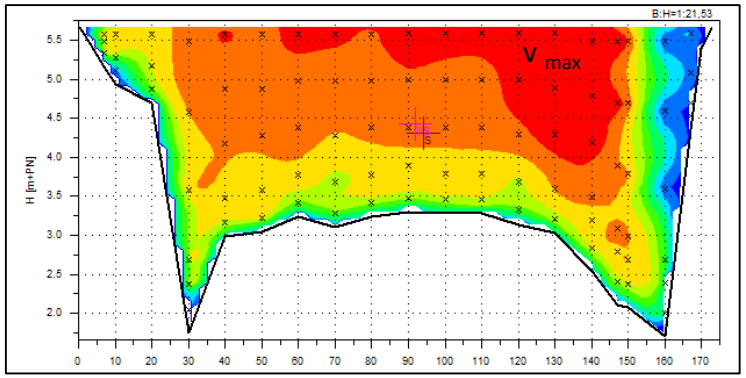
- Watch out for highly turbulent flow conditions. Those may effect the accuracy of the velocity measurement.

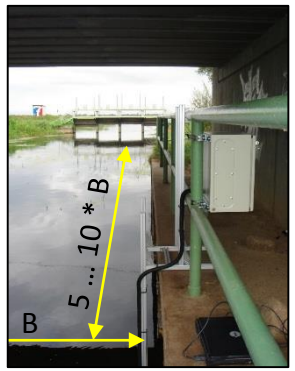
Site reconnaissance continues in the field

- Watch out for large rocks or other obstructions. Those may create turbulence or slack water.

Site reconnaissance continues in the field

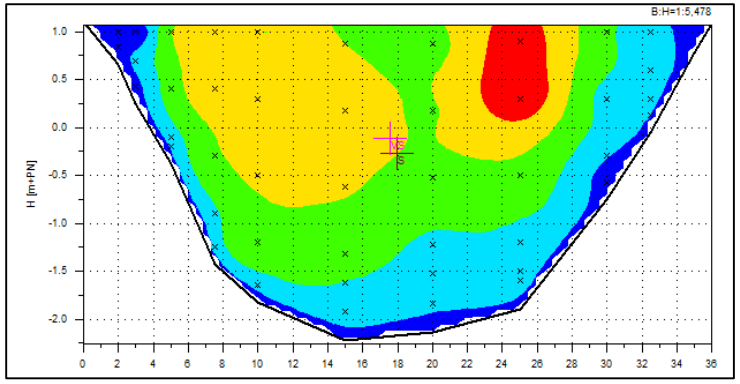
- Watch out for variable flow conditions downstream of channel obstructions (e.g. weirs). Those may cause inhomogeneous velocity distributions and a shifting of the position of the maximum surface velocity which in the end causes unstable index velocity ratings. Stay away from those structures at least 5 … 10 times the channel width upstream and downstream.





Site reconnaissance continues in the field

- Watch out for variable flow conditions upstream and downstream of piers. Those may cause standing waves and macro turbulences which effect the accuracy of the velocity measurement and the .

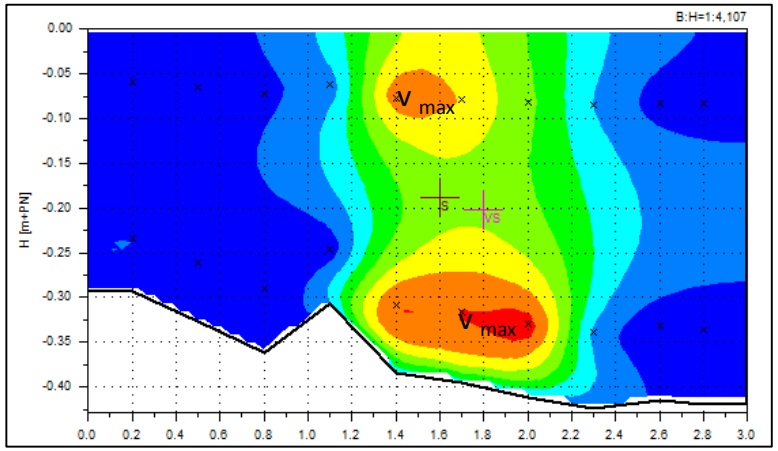


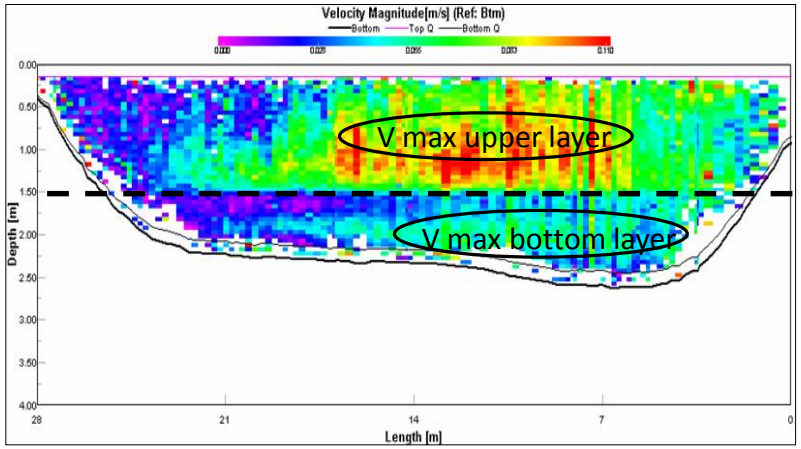
Site reconnaissance continues in the field

- Watch out for growing weeds within the cross-section. Those may create slack water and cause inhomogeneous velocity distributions.

Site reconnaissance continues in the field

- Watch out for stratified flow. Stratified flow provides irregular velocity distributions which in the end causes unstable index velocity ratings.





Top 3 criteria for good sites

- Straight channel / river with parallel streamlines, free of growing weeds, channel obstructions, rocks and macro turbulences.

- Uniform shaped cross-sections with stable river bed and banks, a regular velocity distribution and a stable position of the maximum surface velocity.

- Rough water surface structure (min 3mm wave height) with velocities greater than 0.1 m/s and minimized influence of wind gradients.

Picture: Corr-Tek