

Short course **Monitoring flow, discharge, turbulence and suspended sediment from ADCPs**

August 28 – August 30, 2015, Iquitos, PERU

Contact person: Dr. A.J.F. Hoitink, Ton.Hoitink@wur.nl

Lecturers: Dr. A.J.F. Hoitink¹, Dr. R.N. Szupiany² and B. Vermeulen, MSc¹

¹Department of Environmental Sciences, Wageningen University, The Netherlands

²National University of Litoral, Santa Fe, Argentina

Language of instruction: English (Spanish support will be provided)

Pre-requisite: fluid mechanics, sediment transport, basic Matlab programming

Contents: The course addresses techniques to monitor flow, river discharge, turbulence and suspended sediment using acoustic Doppler current profilers (ADCPs). Students will become acquainted with setting up an ADCP boat survey for river monitoring. Lectures will provide both theoretical background and practical aspects to be considered when setting up an ADCP survey. Introductory topics, which can be grasped by students without a background in ADCP data processing, will be followed by advanced topics. A computer practical is offered to obtain hands-on experience with ADCP data processing.

Learning outcomes: After completion of the short course, the students are expected to:

- comprehend the principles of operation of ADCPs
- be able to setup a basic ADCP boat survey using the literature offered in the course
- be able to process repeat-transect ADCP data to obtain mean flow velocity in a cross-section
- convert ADCP backscatter to suspended sediment concentration (SSC) when calibration information is provided.
- have an overview of state-of-the-art methods to process ADCP data for monitoring flow, discharge, turbulence and suspended sediment

Calendar:

Friday, August 28:

10:00 – 12:00 Introduction lecture

12:00 – 14:00 Lunch

14.00 – 17.00 Lectures on monitoring flow, discharge, turbulence and SSC

Saturday, August 29:

09:00 – 10:00 Explanation about setting up an ADCP survey

10:00 – 16:00 Data collection using boats from the Peruvian Navy. Cold lunch.

16:00 – 17:30 Joint discussion of the collected data

Sunday, August 30:

09:00 – 11:00 Explanation computer practical

11:00 – 12:00 Processing repeat-track data collected on day 2

12:00 – 14:00 Lunch

14:00 – 16:00 Processing repeat-track data collected on day 2

Literature:

Course notes will be provided based on the following literature:

- Gordon, R.L. "Principles of operation, a practical primer". *RD Instruments*, San Diego (1996).
- Hoitink, A. J. F., Buschman, F. A., & Vermeulen, B. "Continuous measurements of discharge from a horizontal acoustic Doppler current profiler in a tidal river". *Water resources research*, 45(11). (2009).
- Mueller, D.S. & Wagner, C.R. (2009) Measuring discharge with acoustic Doppler current profilers from a moving boat. [Online] U.S. Geological Survey Techniques and Methods 3A-22, 72 p. Available from: <http://pubs.water.usgs.gov/tm3a22>
- Oberg, K. A., and Mueller, D. S. (2007). "Analysis of exposure time on streamflow measurements made with acoustic Doppler current profilers." Proc., Hydraulic Measurements and Experimental Methods Conf., ASCE, Reston, VA, 6.
- Parsons, D. R., P. R. Jackson, J. A. Czuba, F. L. Engel, B. L. Rhoads, K. A. Oberg, J. L. Best, D. S. Mueller, K. K. Johnson, and J. D. Riley. "Velocity Mapping Toolbox (VMT): a processing and visualization suite for moving-vessel ADCP measurements." *Earth Surface Processes and Landforms* 38, no. 11 (2013): 1244-1260.
- Sassi, M. G., A. J. F. Hoitink, and B. Vermeulen. "Impact of sound attenuation by suspended sediment on ADCP backscatter calibrations." *Water Resources Research* 48, no. 9 (2012).
- Latosinski F. G., Szupiany R. N., García C. M., Guerrero M. and M. L. Amsler (2014). Concentration and suspended load assessments by means of ADCP recording in a large river. *Journal of Hydraulic Engineering*, DOI: 10.1061/(ASCE)HY.1943-7900.0000859.
- Vermeulen, B., A. J. F. Hoitink, and M. G. Sassi. "Coupled ADCPs can yield complete Reynolds stress tensor profiles in geophysical surface flows." *Geophysical Research Letters* 38, no. 6 (2011).
- Vermeulen, B., M. G. Sassi, and A. J. F. Hoitink. "Improved flow velocity estimates from moving-boat ADCP measurements." *Water Resources Research* (2014).