Geophysical Research Abstracts
Vol. 15, EGU2013-3996, 2013
EGU General Assembly 2013

Secondary flows in rivers.

Hugo Chauvet, Olivier Devauchelle, François Métivier, Eric Lajeunesse, and Angela Limare

IPGP, Univ Paris Diderot, Institut de physique du globe de paris, Mécanique des fluides géologiques, Paris, France (chauvet@ipgp.fr)

Secondary flow cells are commonly observed in straight laboratory channels. However, their existence in rivers is still unclear, despite the recent development of field measurement techniques such as Acoustic Doppler Current Profilers (ADCP). A possible explanation is the limited spatial resolution of these instruments, which precludes ADCPs from detecting flow structures smaller than the flow depth. Here, we present velocity measurements acquired with an ADCP in a straight reach of the Seine river in Paris, France, where the cross-section is nearly rectangular. Despite ADCPs limitations, we show that stationary flow cells spanning across the entire river can be evidenced by averaging the velocity measurements over a period long enough.

Although the physical origin of these secondary structures is unknown, their velocity is sufficient to significantly impact the distribution of streamwise momentum. We propose a depth-averaged model to evaluate this impact. Preliminary results are in good agreement with field measurements.