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The FluxSAP 2010 hydroclimatological experimental campaign over an heterogeneous urban area

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With some fifteen partners, the research institute in urban sciences and techniques (IRSTV) launched a large federative research programme, VegDUD, aimed at assessing the role of vegetation in sustainable urban development. This 4-year programme (2010-2013) is funded by the French National Research Agency.

Two 'FluxSAP' measurement campaigns are associated to this project in 2010 and 2012. They focus on urban climatology and combine a ground-based experimental set-up with airborne remotely-sensed observations. Their objective is to obtain reference data allowing validation of models for heat and water vapour transfer over an heterogeneous urban site. One key issue is to identify their sources, and to separate the contributions from bare soils and soils covered with buildings or vegetation. The study area spreads over part of the north-east sector of Nantes, between the Erdre and Loire rivers.

The first campaign took place throughout May 2010 mainly around the Pin Sec district, which has been instrumented since 2006 by the IRSTV for a permanent monitoring of the urban hydrology and meteorology. This campaign was mainly oriented towards measurement feasibility and quality assessment. It involved the following measurements:

- meteorological variables and turbulent fluxes from 8 instrumented telescopic masts of 10 to 30 m, at several open areas of the district or over building roofs;
- temperature and water content in the soil and at the surface at 7 locations;
- temperature and humidity at 3 m above the surface at 10 locations;
- integrated heat fluxes from 5 large-aperture and one small-aperture scintillometers set on flat roofs of elevated buildings;
- passive tracer concentrations at the ground, along a mast and under a small tethered balloon;
- surface temperature using two airborne thermal infrared cameras and two hand-held radiometers;
- ground and soil surface characteristics using two very high spectral and spatial resolution airborne hyperspectral spectro-imagers and a hand-held spectrometer.

The communication presents the experimental rationale, the set-up, some of the first results, and preliminary conclusions on the measurement feasibility over an urban heterogeneous area.