ESTIMATING INTERCEPTION USING A NEW METHODOLGY: APPLICATION IN AN UNDISTURBED FOREST IN CENTRAL AMAZONIA

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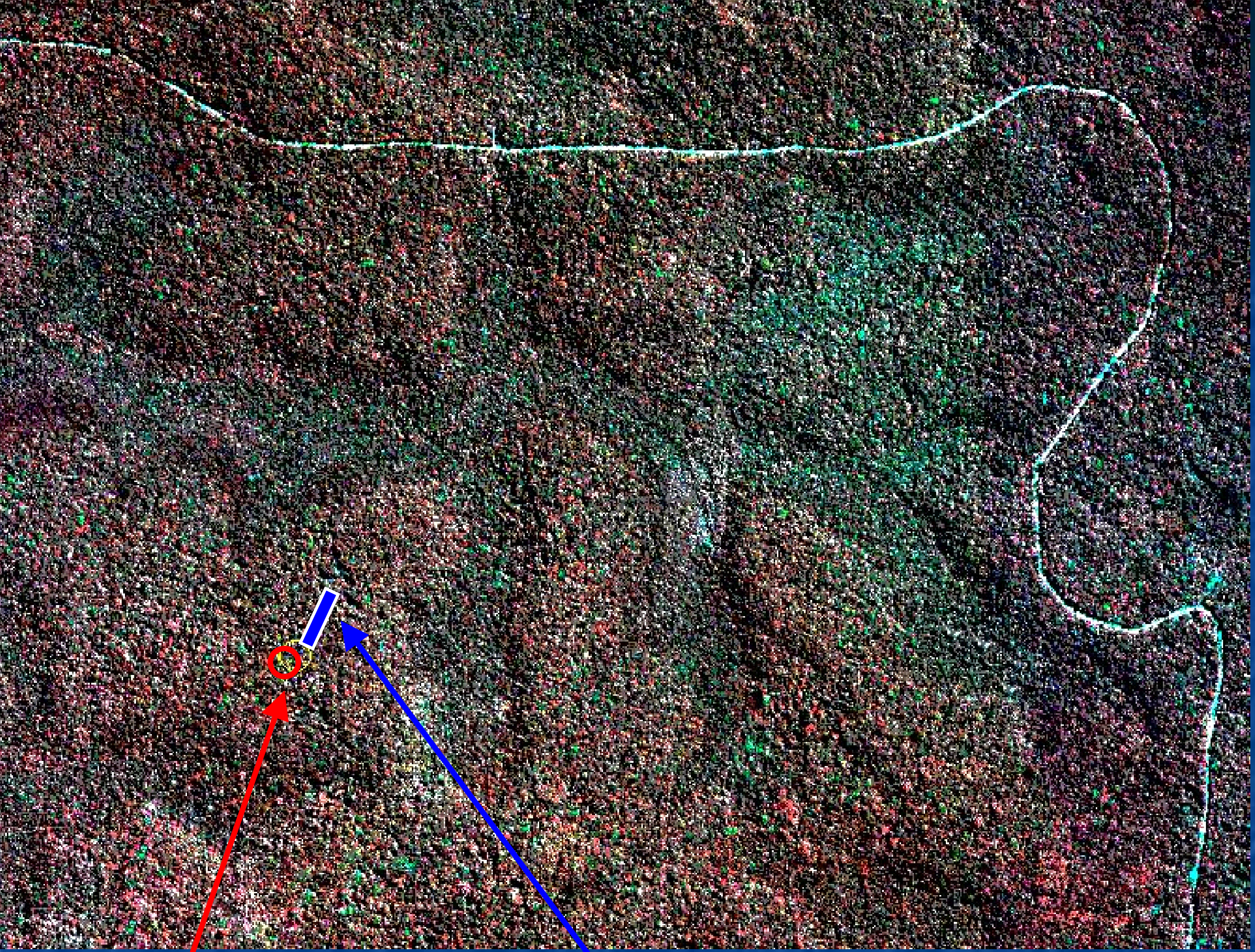
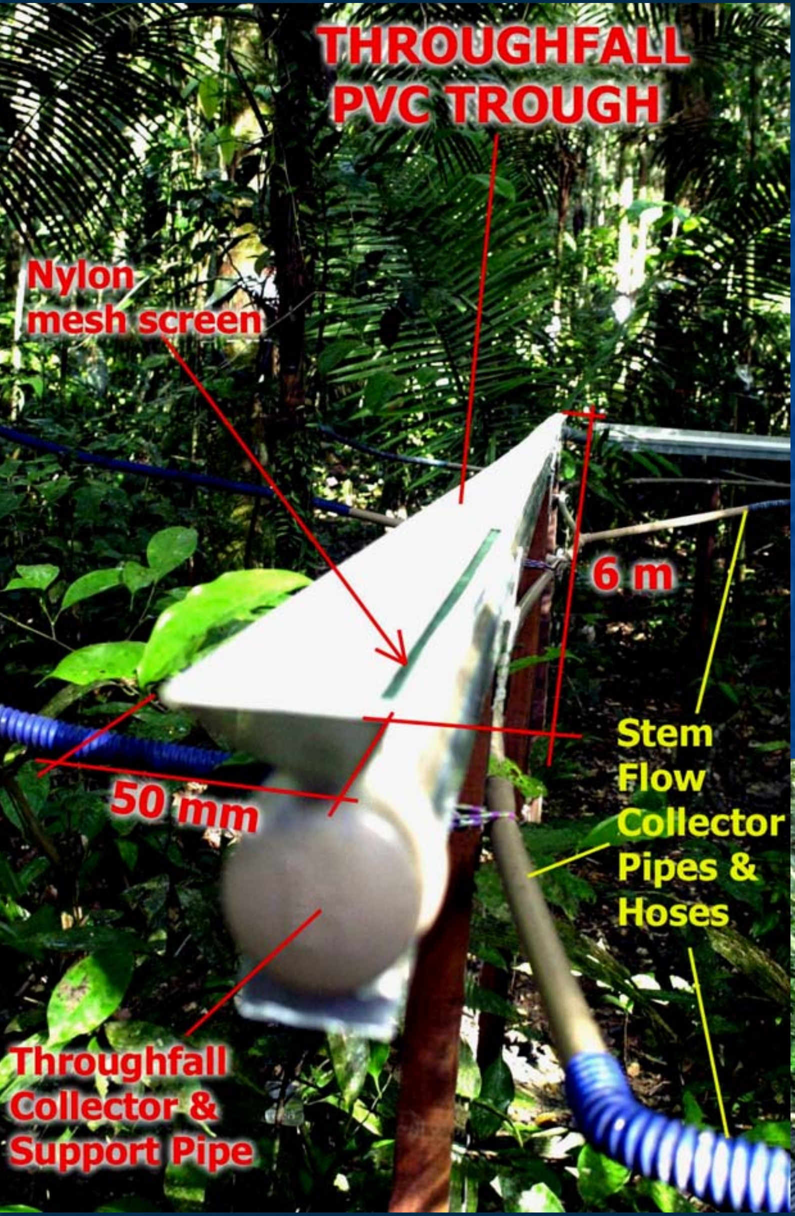
Experiment description



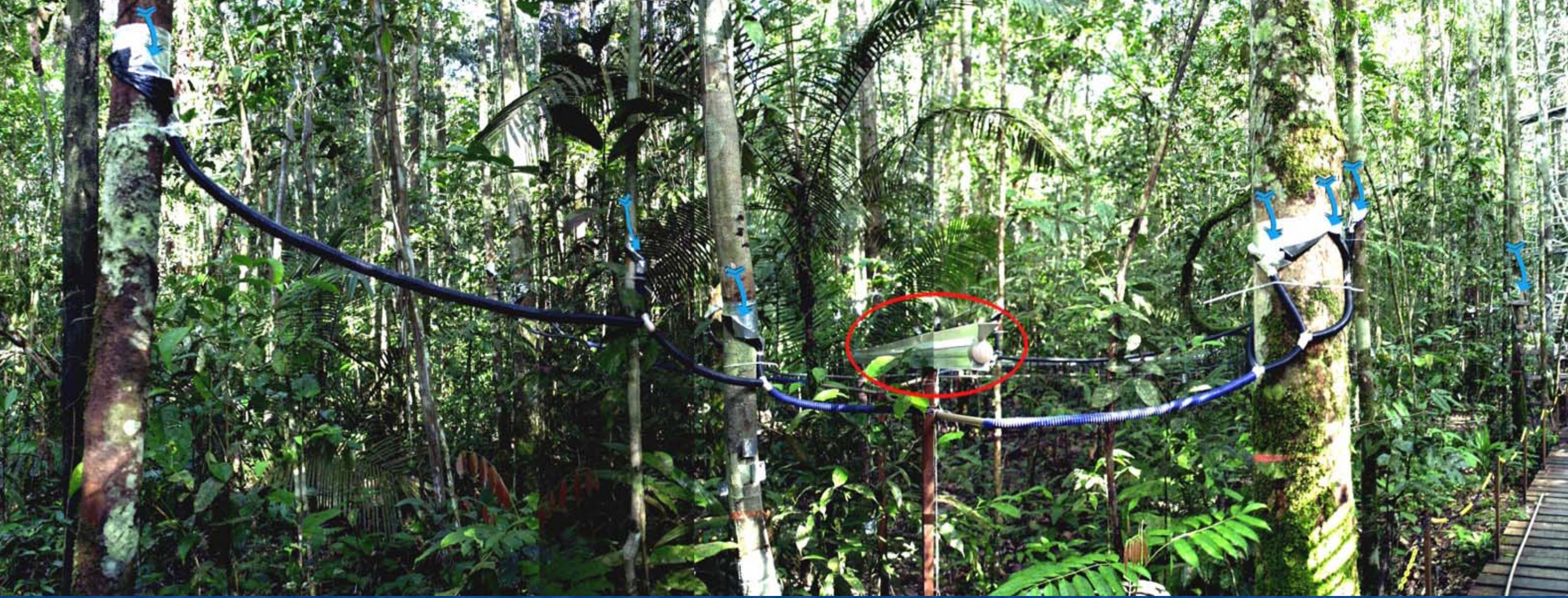
Asu catchment

Gross rainfall is measured by raingauge installed at the top of the K34 eddyflux tower.

The experiment is placed on a plateau area, under dense rainforest (uppermost canopy at approx. 33 m). It consists of two replicate sets of throughfall and stemflow measurement systems.



Throughfall is gauged using two sets of 5cm x 36 m V shaped troughs, connected each to a large volume tipping-bucket (125ml).



Stemflow is collected from 65 trees, using encircling-aluminum/asphalt tape shaped to divert the flow to a pipe system that join all the flows into two tipping-bucket gauges.

Canopy Wetness

Three surface wetness logging sensors are installed offset from the towers at three heights:
canopy top (32 m),
canopy base (25 m)
near the forest floor (3m)

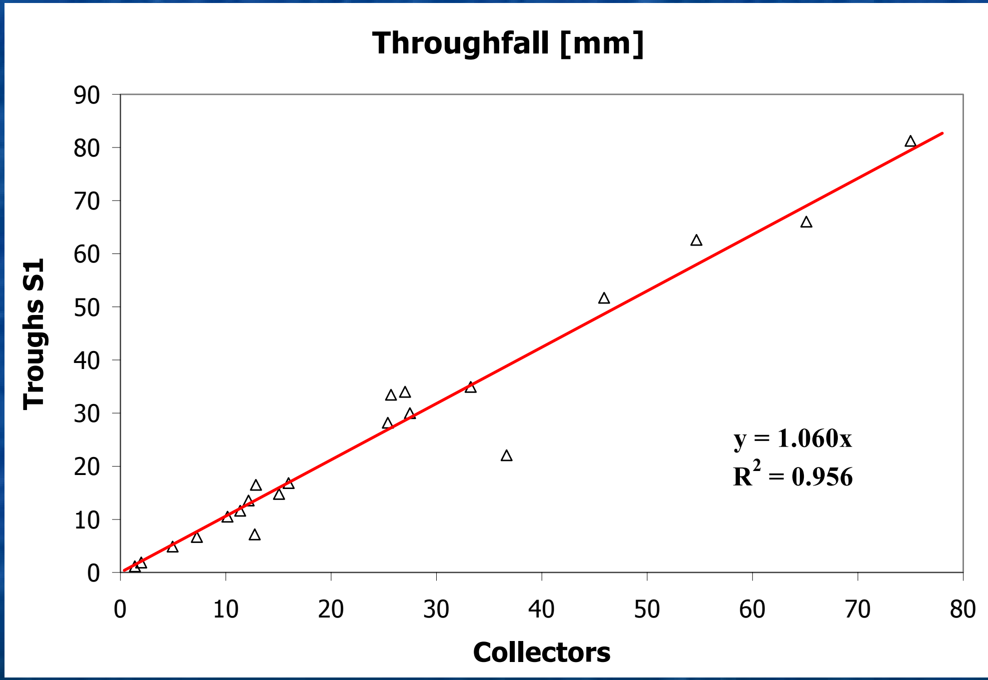
Evaporation

At ecosystem level Water Vapor Fluxes are measured directly by eddyflux covariance technique

Experiment Results: the first 22 months

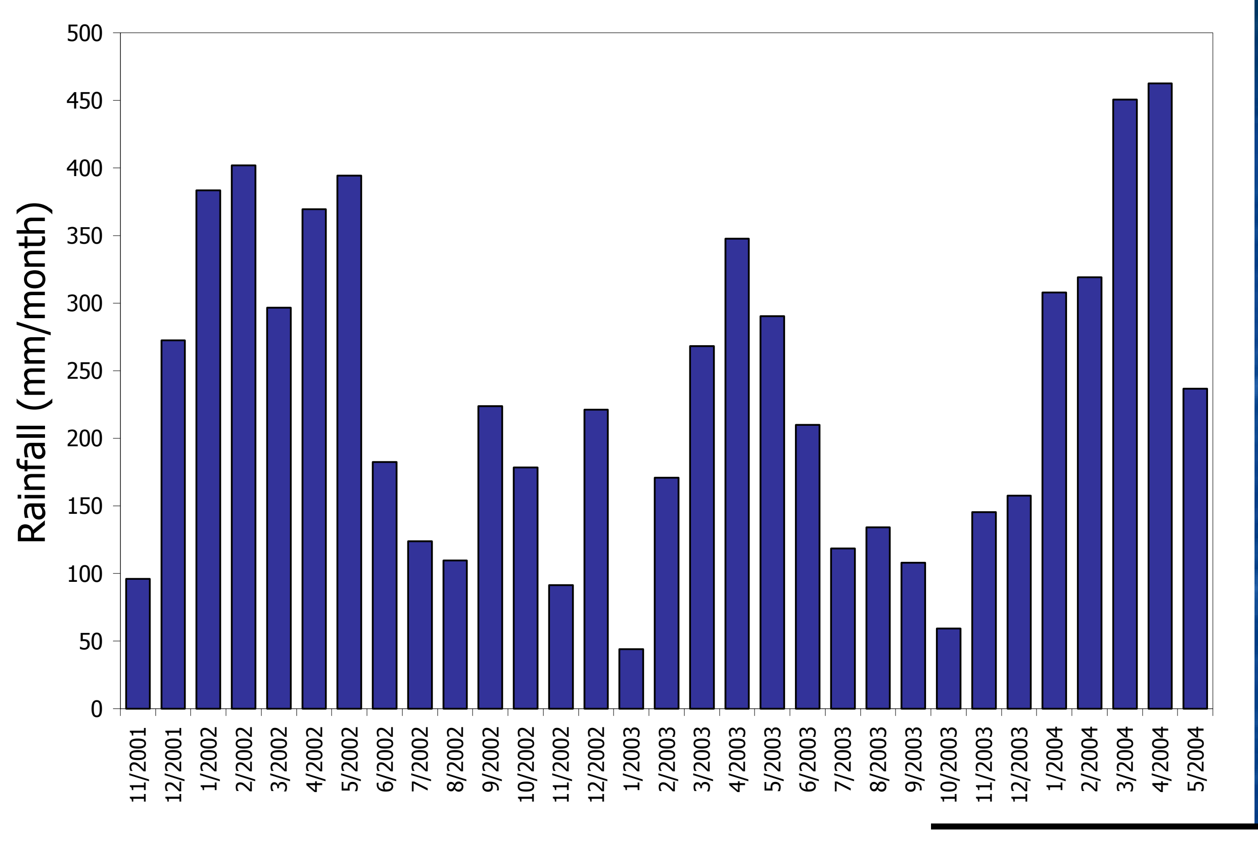
Throughfall

Troughs vs random collectors



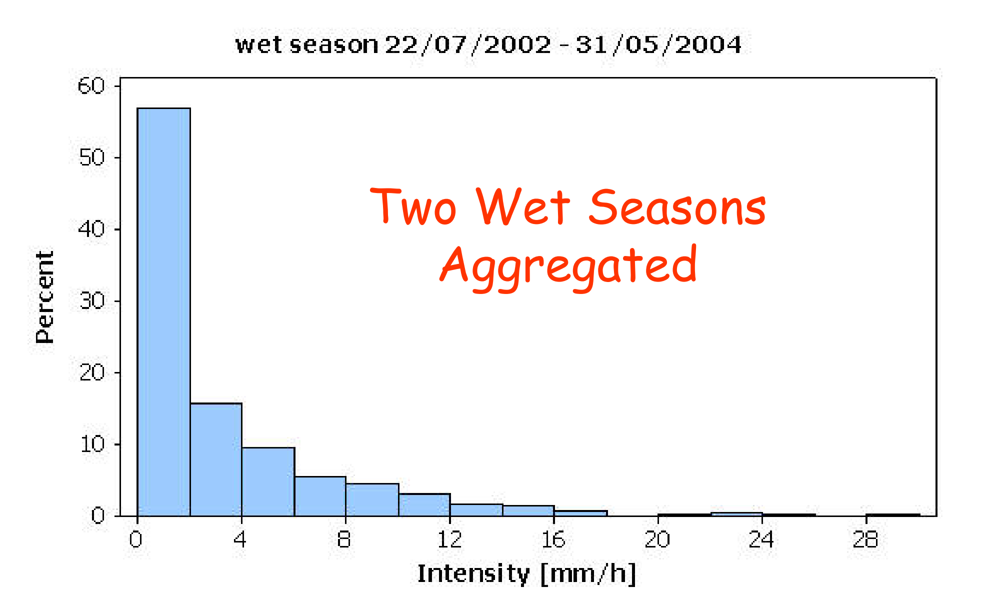
PG (mm)	635.81	
TF troughs	549.88	86.49 %
TF collectors	522.07	82.11 %

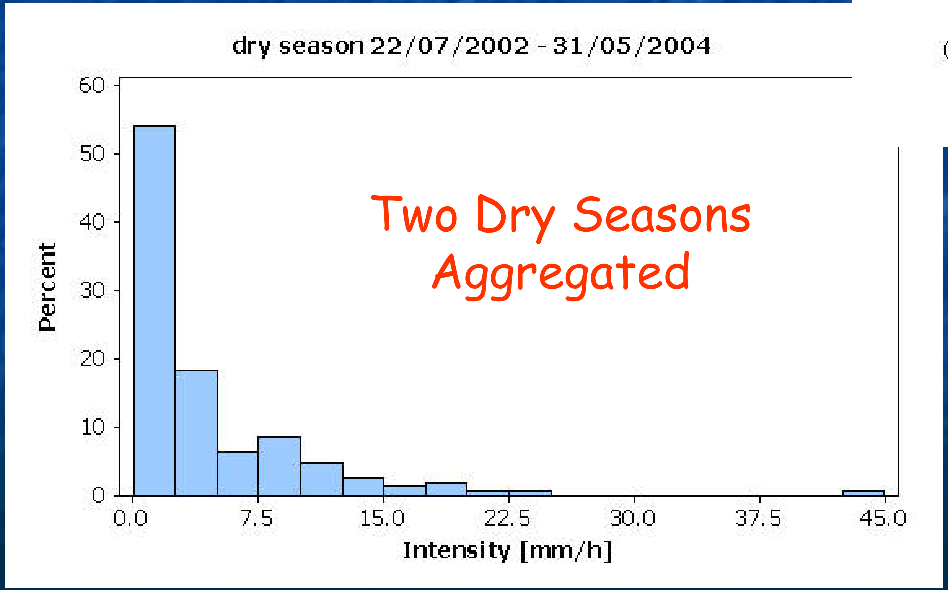
Rainfall



	P (mm)
01/10/2001 – 30/09/2002	2800.4
01/10/2002 – 30/09/2003	2189.0
01/10/2003 – 31/05/2004	2139.2

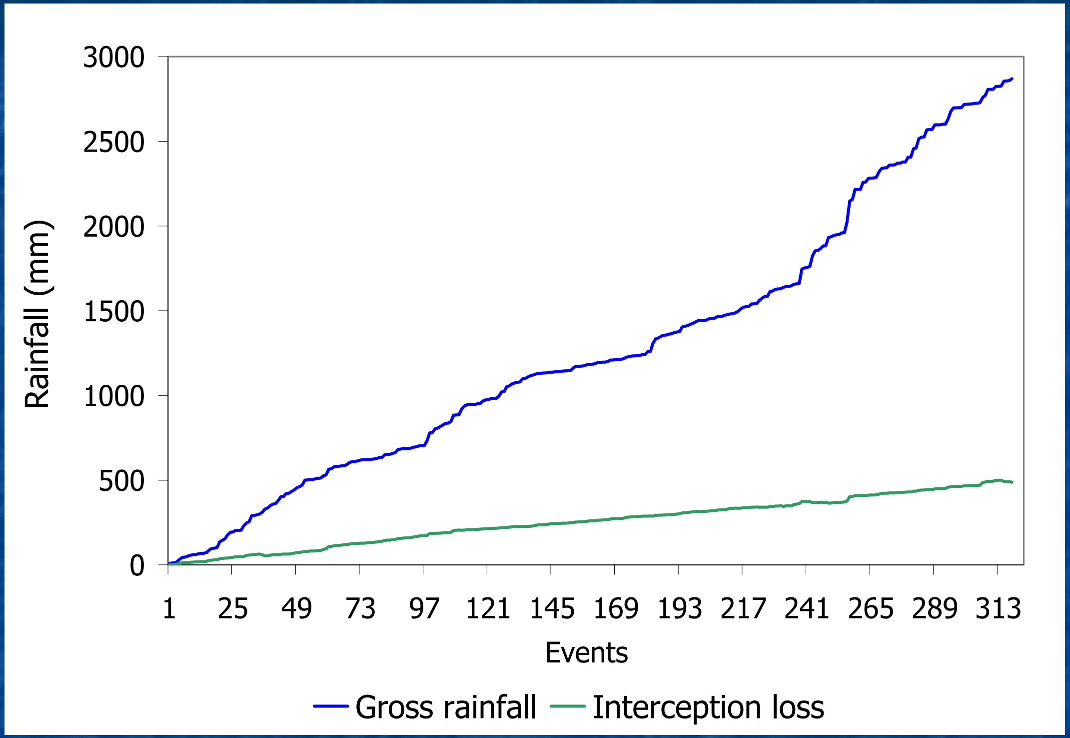
Rainfall Jul/2002 - Apr/2004





	$\overline{R}$ (mm/h)	$\overline{d}$ (h)
Jul /2002 – Sep /2003	4.19	2.09
Oct /2003 – Apr /2004	5.42	2.63

Accumulated Interception Loss



	(mm)	%
Gross rainfall	2869.12	
Throughfall	2357.43	82.2
Stemflow	23.81	0.8
Interception	487.89	**17.0**

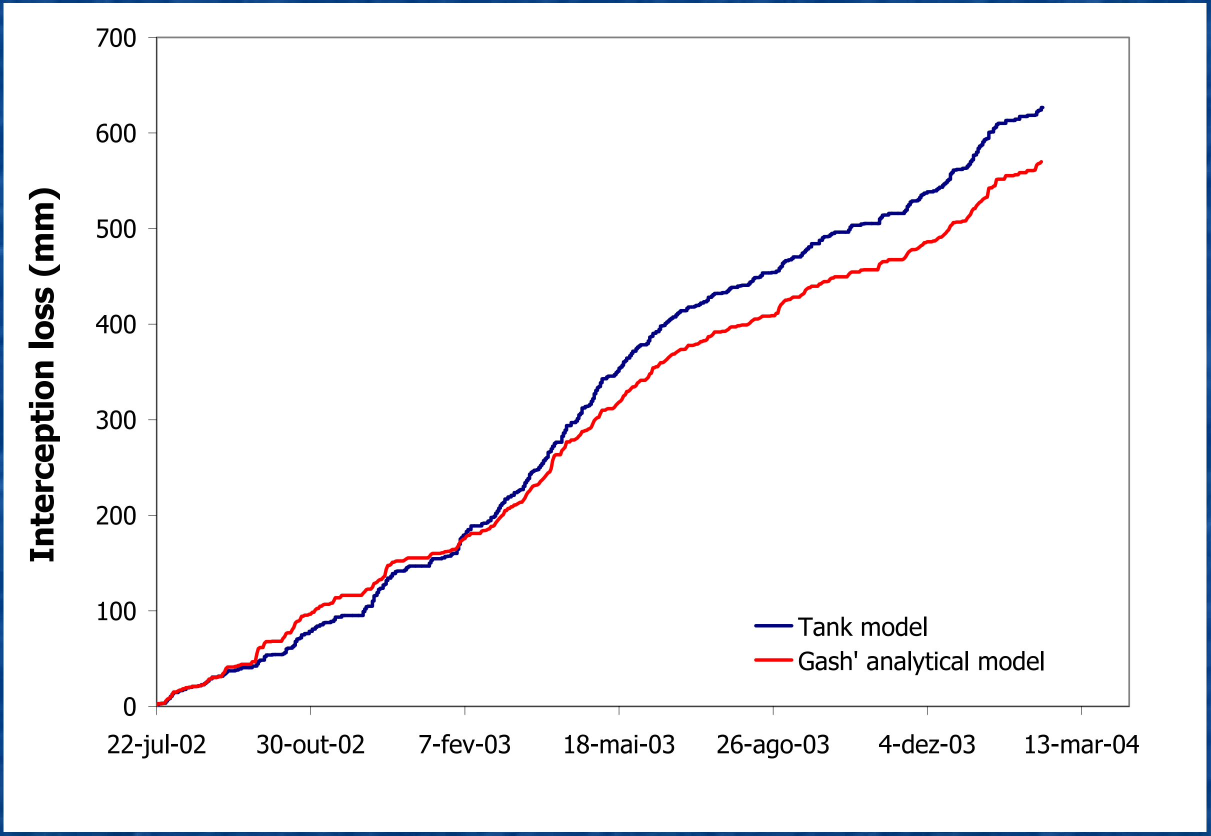
	Interception %
Jul /2002 – Sep /2003	**21.9**
Oct /2003 – Apr /2004	**12.1**

Comparisson with Previous Studies

Site	Throughfall (%)	Stemflow (%)	Interception loss (%)	Reference
Brazil	80.2	-	19.8	Franken et al. (1992)
Brazil	87-91	1.8	8.9 (±3.6)	Lloyd e Marques (1988)
Brazil	86-87	0.8-1.4	11.6-12.9 (±5.9)	Ubarana (1996)
Colombia	82-87	0.9-1.5	12.0-17.0	Tobón et al. (2000)
Brazil	**82.2**	**0.8**	**17.0**	**Cuartas et al. (2004)**

Modelling

Model Parameters	
S_C	0.891
S_t	0.065
p	0.08
p_t	0.014
$\overline{E}\ (mm/h)$	0.428
$\overline{R}\ (mm/h)$	4.64



Tank model 18.77%
Gash' model 17.07%

Interception Effects on Water Balances

	Discharge (mm day^{-1})	Rainfall (mm day^{-1})	Transpiration (mm day^{-1})	Interception (mm day^{-1})	ΔStorage (mm day^{-1})
01/10/2001-30/09/2002	3.941	8.538	3.464	0.0	1.133
01/10/2002-30/09/2003	2.445	5.98	3.28	0.0	0.255
01/10/2003-31/12/2003	2.943	6.932	3.346	0.0	0.643

	Discharge (mm day^{-1})	Rainfall (mm day^{-1})	Transpiration (mm day^{-1})	Interception (mm day^{-1})	ΔStorage (mm day^{-1})
01/10/2001-30/09/2002	3.941	8.538	3.464	0.984	0.149
01/10/2002-30/09/2003	2.445	5.98	3.28	0.901	-0.646
01/10/2003-31/12/2003	2.943	6.932	3.346	0.906	-0.263

(Tomasella et al. 2004)

Conclusions

- The new Automated and Integrative Method of measuring interception used here has shown satisfactory performance and proved much less complicated to operate over long periods than classic distributed grid of throughfall gauges.
- The troughs integrate throughfall along a sampling line, collecting data as an "integral" accross environments affected by several different canopies
- Although the few events recorded have discrepancies, similar results were obtained between both interception systems. Those differences are caused by spatial variability of rainfall, particularly in the dry season; and differences in vegetation architecture which is currently being analysed.

Conclusions

- The events analysed has a total rainfall of 2869.1 mm; a throughfall of 2357.4 mm (82.2%); and a stemflow of 23.8 mm (0.8%). We can conclude that stemflow is not significant and can be disregarded.

- Interanual and intraseason variability of rainfall has significant impact on interception: measurements shown interception loss varying from 15.3% to 24.6% between the dry and wet season; and from 12.1% to 21.9% from a wet to a dry year.

- Further results form the Asu catchment (Tomasella et al. 2004) indicates that interception has a significant impact on the hydrological balance.