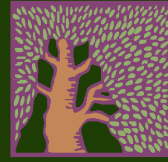


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Ecohydrological Controls Over ET Partitioning At a Semi-Arid Forest

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Yatir Forest



SeaWiFS Project, NASA



Yatir Forest



Precipitation	280 mm yr ⁻¹
	November - March
Soils	Lithosols
	20 – 40 cm
Vegetation	<i>Pinus halepensis</i> Mill.
	LAI ~ 1.5
	Sparse understory

The Water Balance



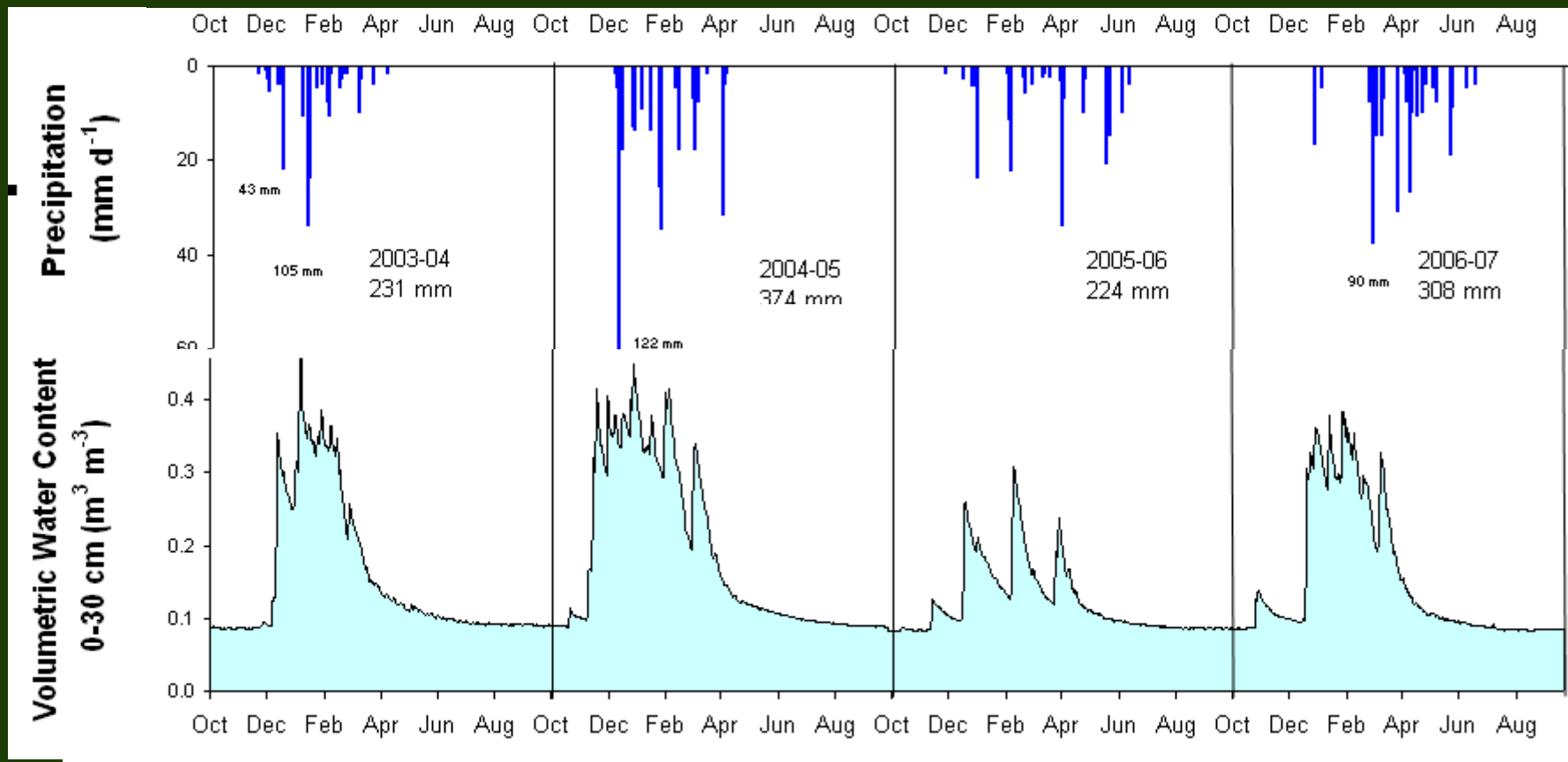
$$P = Q + ET + D$$

$$P \sim ET$$

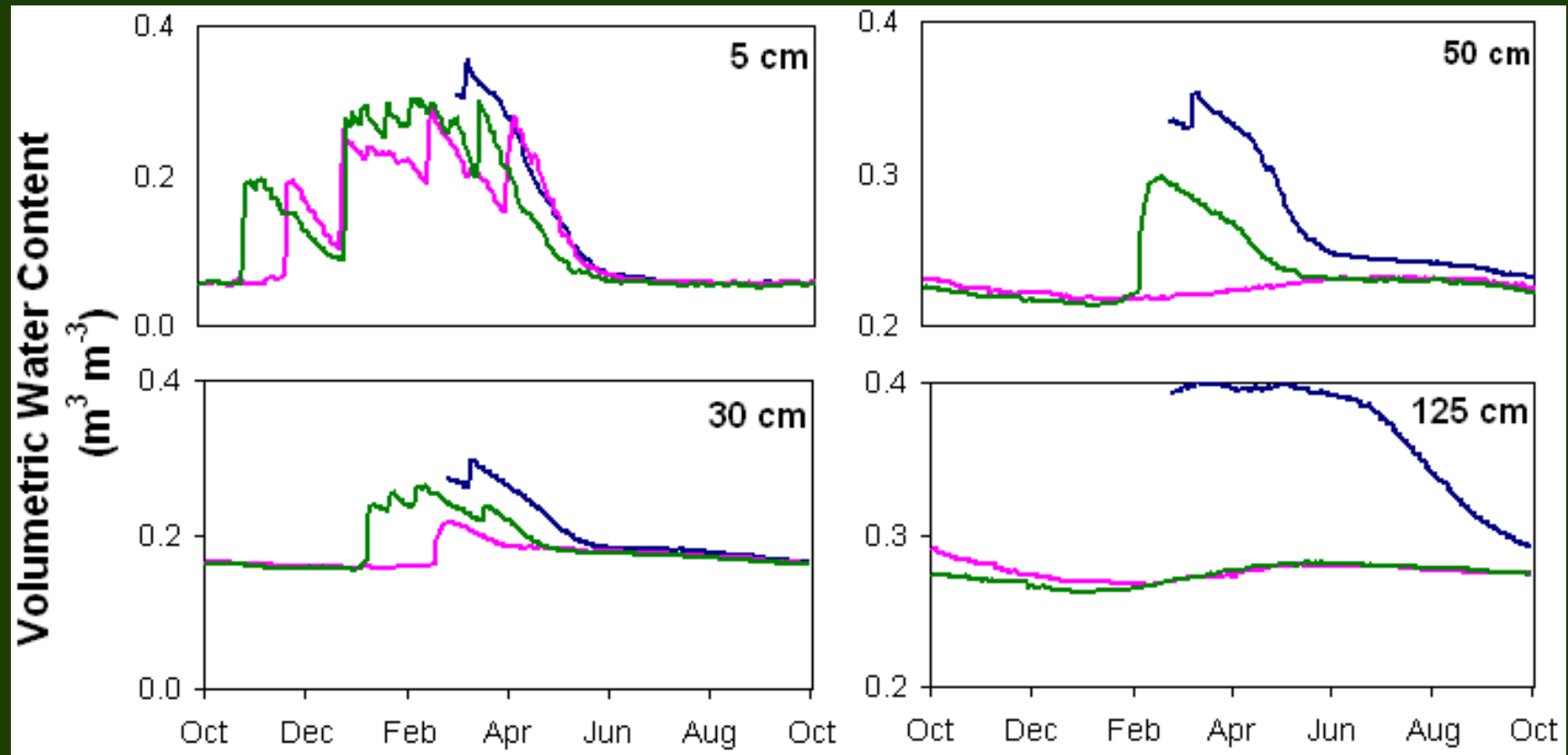
$$ET = T + E + I$$

Objective: Partitioning the ET flux

Inter-annual variability of precipitation amount and pattern

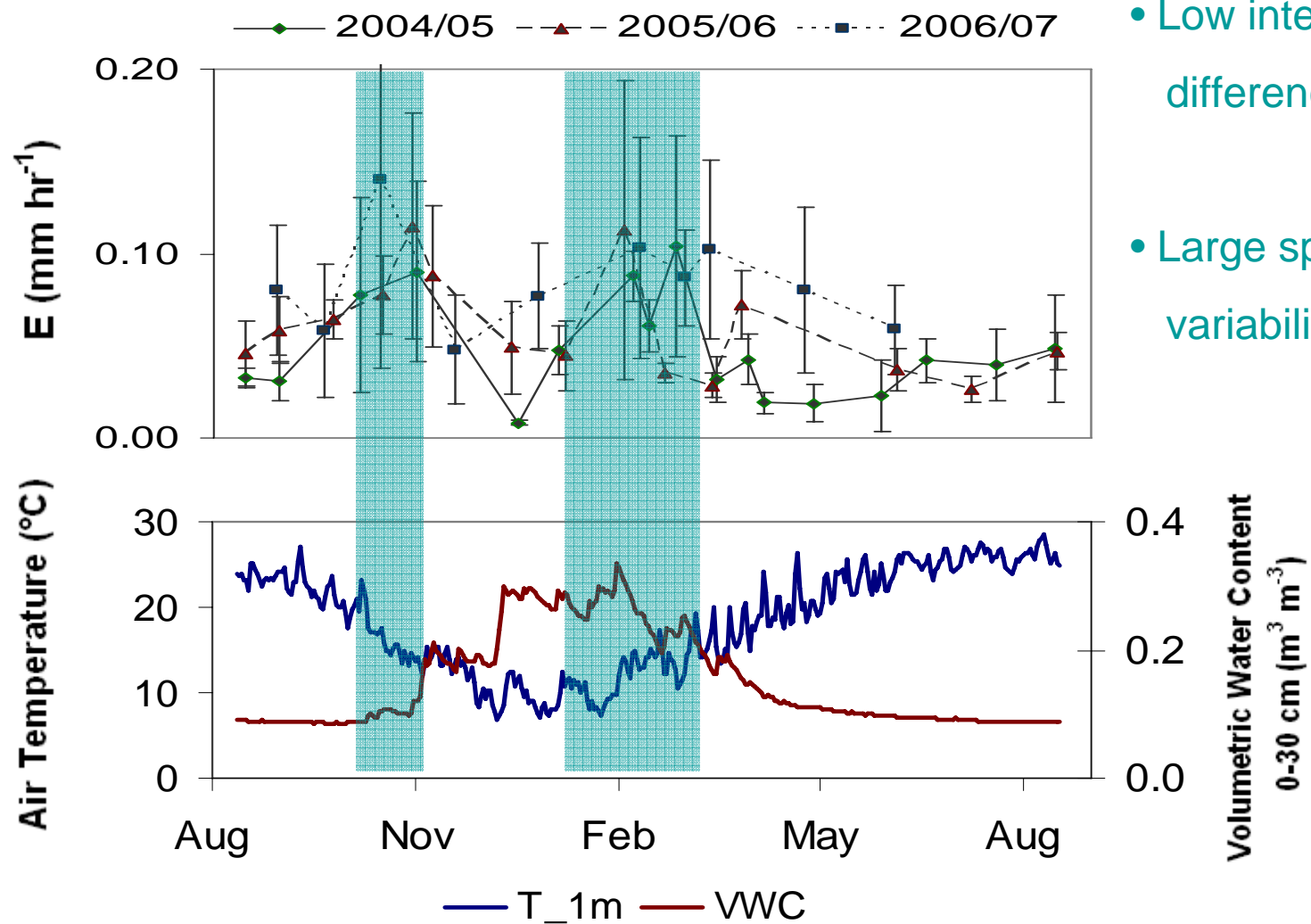


Infiltration to deeper soil layers



Annual Precipitation:	2004/5	374 mm
	2005/6	224 mm
	2006/7	308 mm

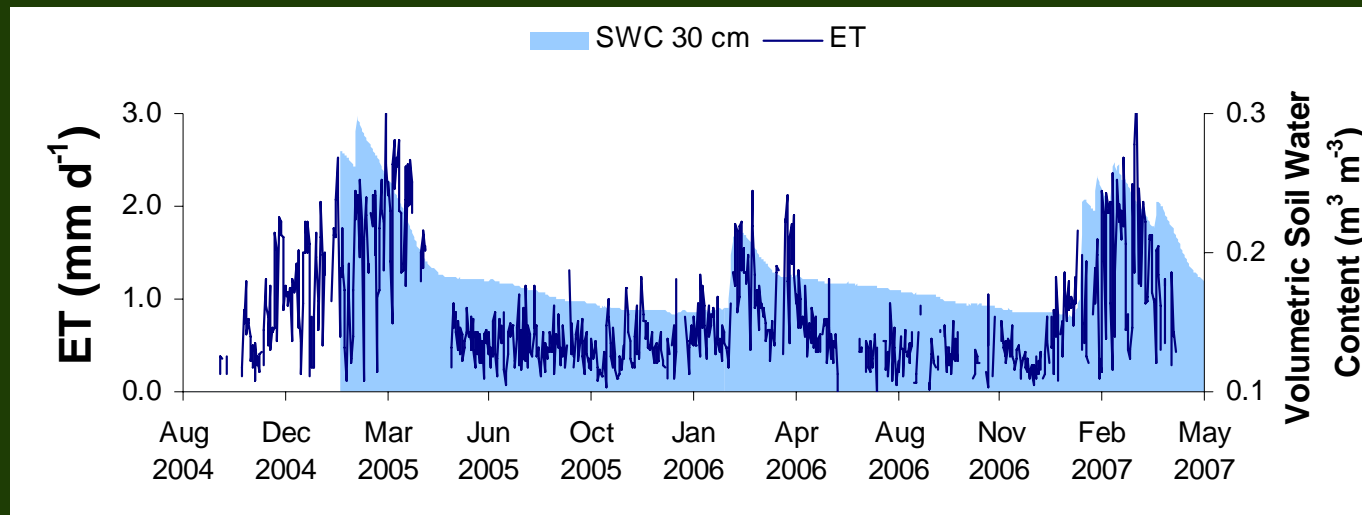
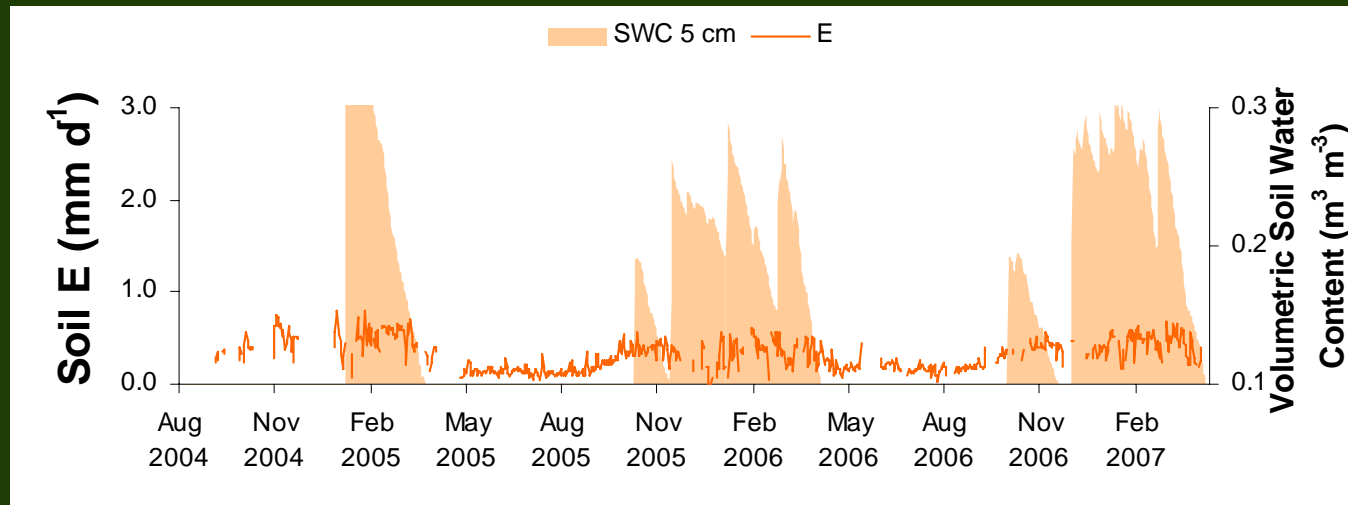
Soil Evaporation



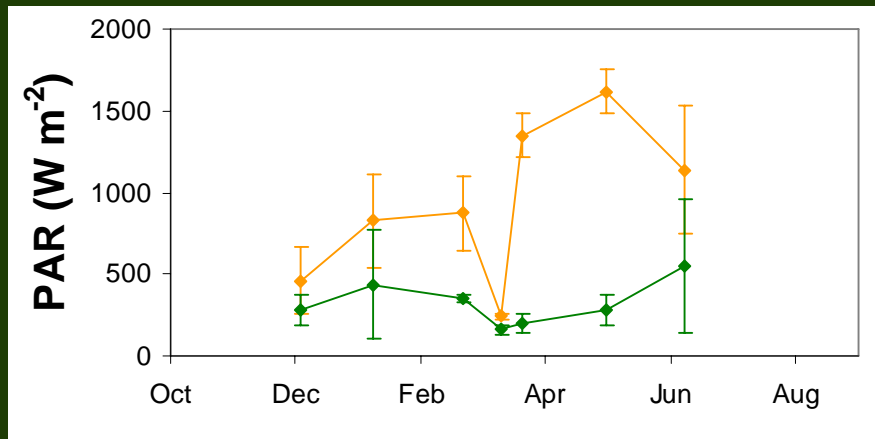
- Low inter-annual difference

- Large spatial variability

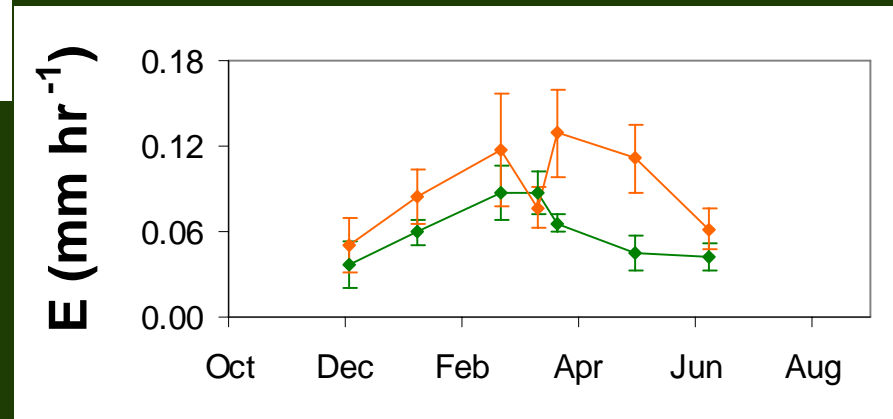
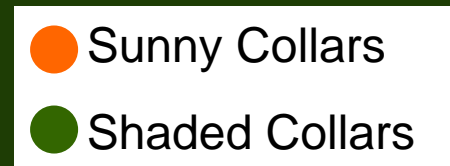
Soil water control on ET partitioning



Below Canopy Spatial Variability



Energy Load

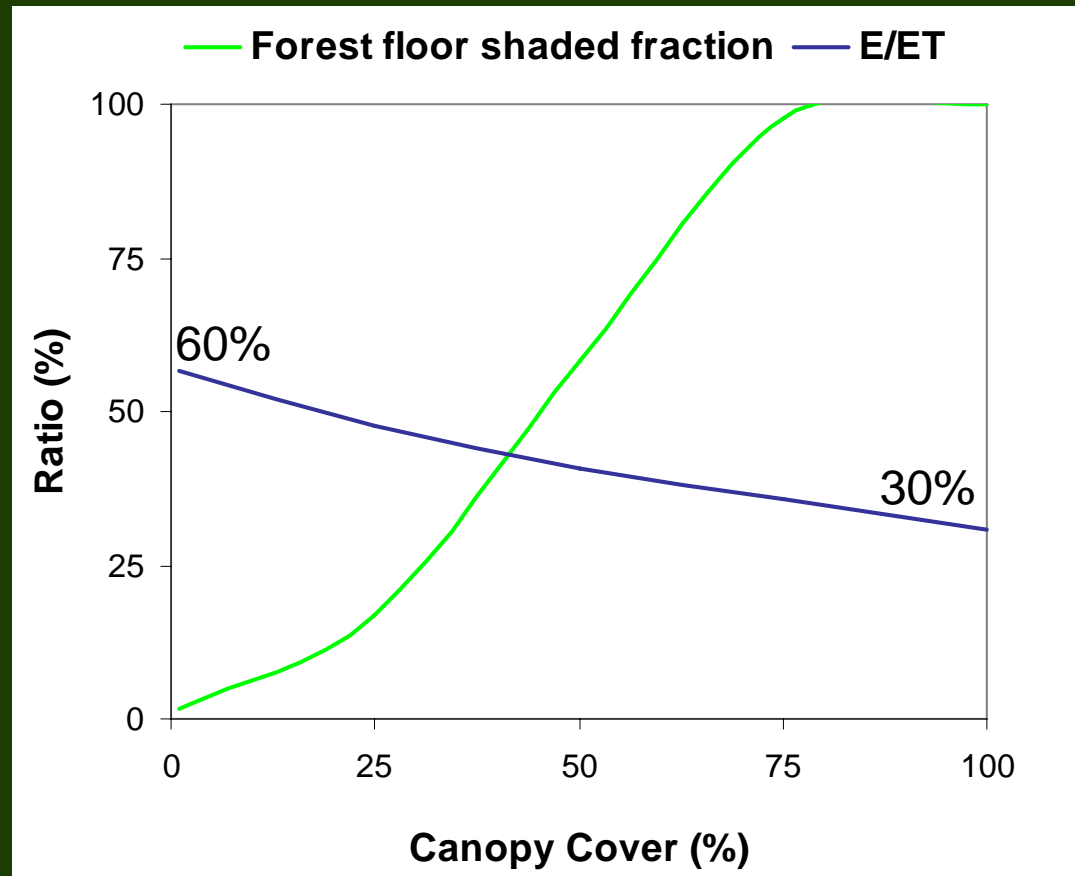


Soil Evaporation

SF – forest floor shaded fraction
(tree density & dimensions, solar angle)

$$E_s = SF \times E_{\text{shade}} + (1-SF) \times E_{\text{sun}}$$

Soil evaporation losses vary according to canopy cover



Summery and Conclusions

- Soil evaporation: high autumn and spring fluxes (up to 0.8 mm d^{-1}) and low summer and winter fluxes ($\sim 0.1 \text{ mm d}^{-1}$). *The inter-annual pattern was insensitive to variability in precipitation. Climatic warming is expected to raise fluxes during the wet season.*
- Within the forest, large precipitation events enable deep infiltration and enlarge soil water content at the root zone. *Intensification of the hydrological cycle will not create floods but rather improve plant water availability.*
- Spatial variability of soil evaporation within the canopy was large (S.D. of 47% on average). The most prominent difference was between below canopy and inter-canopy areas. *The measured relation between shaded fraction and E can be used as a management tool:*
- Current annual E is 40%. *Canopy growth will alter the ratio from 60% (young trees) to 30% (fully grown trees).*