Groundwater and vegetation: Carbon and water fluxes from pasture

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Talk outline

1. Groundwater-vegetation interaction
2. Paired catchments at the Grampians site
3. Eddy covariance (very early stage)
Groundwater-Vegetation-Atmosphere Interactions

Aim: to estimate how much groundwater disappears through evapotranspiration
\[ P = R + E + \Delta S + D \]
Groundwater research at the Grampians

- Interaction between groundwater and vegetation
- Paired catchments, similar geology, one under pasture and one under blue gum plantation
- Measuring main components of the water balance in each catchment
- Model interaction between groundwater and plants under two very different land uses
Progress

- Bores: ongoing monitoring since late 90’s
- Stream gauges 2000’s
- Soil water content, sapflow, weather station early 2011
- Eddy covariance tower March 2012
Results

- CO$_2$ umol m$^{-2}$s$^{-1}$
- H$_2$O mmol m$^{-2}$s$^{-1}$
- Rain mm
- Air Temperature °C

Graphs showing daily temperature, precipitation, CO$_2$, and H$_2$O concentrations over the course of a year.
Results

- **CO₂ (µmol m⁻² s⁻¹)**
  - 16-Mar
  - 28-Apr
  - 19-May
  - 20-Jun

- **H₂O (mmol m⁻² s⁻¹)**
  - 16-Mar
  - 28-Apr
  - 19-May
  - 20-Jun

Hour of day: 0:00 4:48 9:36 14:24 19:12 0:00

Data collected from 16-Mar to 20-Jun.
Where to from here?

- Move tower in to plantation
- Use EC water fluxes to upscale sapflow measurements
- Add soil respiration measurements
- Use EC CO$_2$ fluxes and groundwater quality to relate plant growth to groundwater depth and salinity
- Integrate evapotranspiration data into groundwater model
- Extend to other catchments
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