

Canopy process in changing Climate 参加報告
渡辺 誠

IUFRO

(International Union of Forest Research Organizations)

Division 1 – Silviculture

Division 2 – Physiology and Genetics

Unit 2.01.12 – Canopy processes

Division 3 – Forest Operations Engineering and Management

Division 4 – Forest Assessment, Modelling and Management

Division 5 – Forest Products

Division 6 – Social, Economic, Information and Policy Sciences

Division 7 – Forest Health

Division 8 – Forest Environment



オーストラリアへ

6-7日 移動

新千歳 10/6 17時発

→成田

→シドニー

→メルボルン10/7 11時着



初日（開始まで1時間ほど散歩）



初日(ウェルカムレセプション～パブリックレクチャー)



ビクトリア州での滞在

8日 移動(8:00-17:00)

メルボルン

→フォールスクリーク

9-10日

カンファレンス



移動日(メルボルン→フォールスクリーク)



フォールスクリークでのセッションテーマ

- Theme 1:
Water and Carbon Fluxes, pools and turnover
- Theme 2:
Structural and Physiological acclimation of forest canopies

Unsolved problems in whole tree physiology



The Known Unknowns!

- Carbohydrate storage^o: how it works, what it does
- Respiration^o: role in C balance, mechanistic model
- Phloem transport: measurement, regulation
- Carbon sinks: controls, mechanisms
- Sink versus source: control of photosynthesis^o: occurrence and mechanism
- Mycorrhizae: costs, benefits, regulation
- Size-related growth decline^o: mechanism(s)
- Carbon and nutrient partitioning: mechanism

Examples of how tree physiology affects ecosystem fluxes

Water fluxes change with tree size



Went et al. 2000. *Oecologia* 124:124-134

The Known Unknowns!

- Water transport under water stress: mechanism
- Water storage: importance for water flux
- Crown architecture: optimization of hydraulic capacity (delivering water to keep stomata open), biochemical capacity (partitioning N to gain the most from a limited resource) both reflecting the light environment which is the result of both the crown architecture and surrounding system.
- Molecular control of physiology and allocation

Dr. Michael Ryanの発表で示された The known unknowns

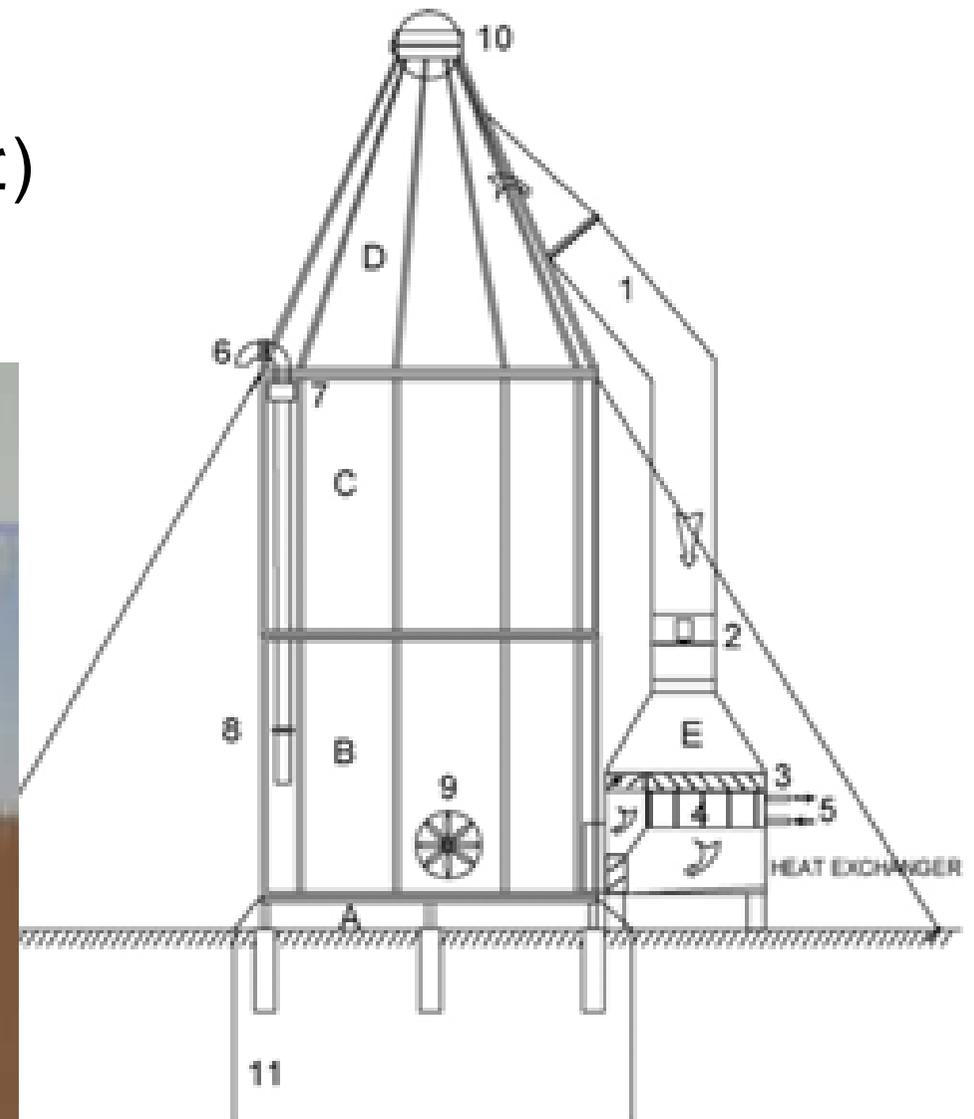
1. The role of stored carbohydrates in sustaining physiology in lean time
2. The mechanisms that control storage input and release
3. The regulation of phloem transport at different time scales
4. The role of autotrophic respiration in regulating plant carbon balance and mechanistic model for autotrophic respiration
5. Controls over processes that regulated plant 'sinks' for carbon
6. Sink regulation of tree photosynthesis: mechanisms and occurrence
7. The costs and benefits of mycorrhizal symbionts
8. The mechanisms of size-related decline on wood growth
9. The mechanisms that regulate carbon and nutrient allocation
10. Maintenance of water transport under water stress
11. The role of stored water in maintaining water transport
12. The molecular control of physiology

Whole-Tree Chamber

CO₂と温度などの複合影響

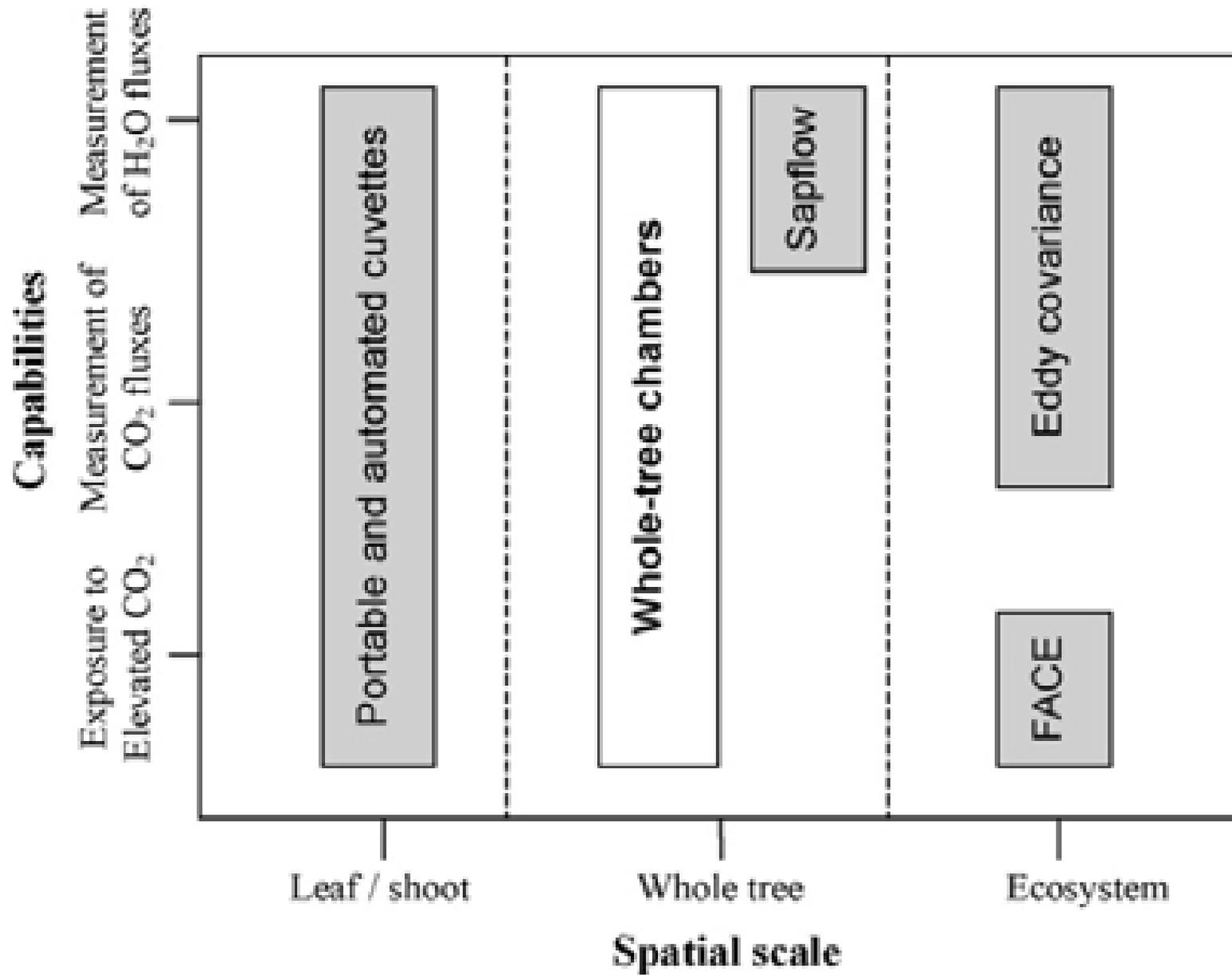
個体レベルでの光合成・蒸散応答

- ・スウェーデン(40年生のドイツウヒ)
- ・シドニー(ユーカリ)



Medhurst et al (2006, PCE)

実験手法と対象スケール



Prof. David Tissueの発表(温室実験)



Eucalypt Growth and Physiology in Past and Future Environments
Understanding the Impacts of Atmospheric CO₂ and Temperature



Glasshouse Experiment



CO₂ - Sub-ambient (280 ppm); Ambient (400 ppm); Elevated (640 ppm)

Temperature - Ambient; Ambient + 4°C

Nutrients - Field soil with initial fertilisation

Water - Well Watered

Tree Species - *E. saligna* and *E. sideroxylon*

青空ポスターセッション



小エクスカーション



移動日(フォールスクリーク→メルボルン→タスマニア)



タラリアでの滞在の様子



12日 カンファレンス

13日 エクスカーション

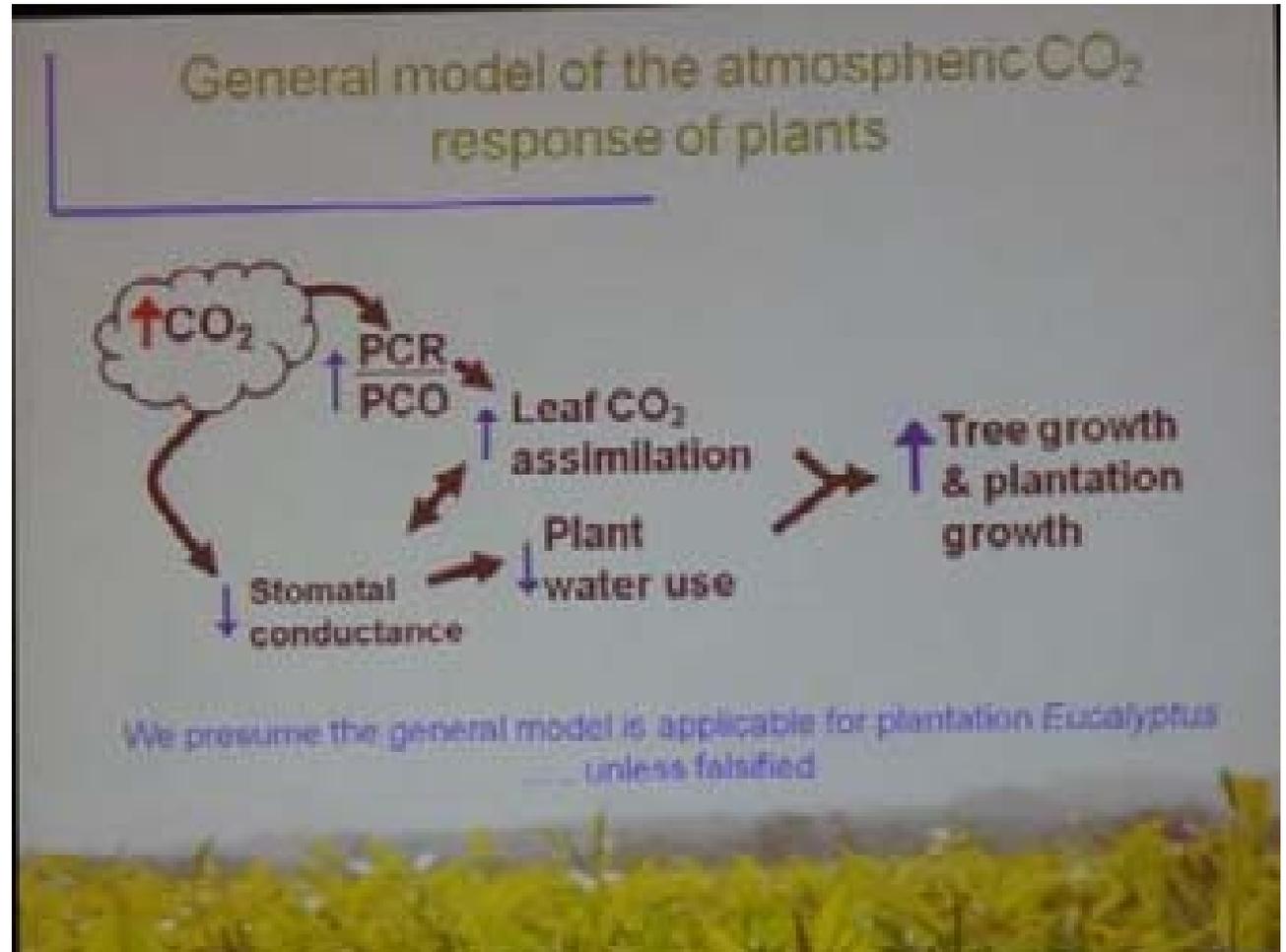
14日 カンファレンス



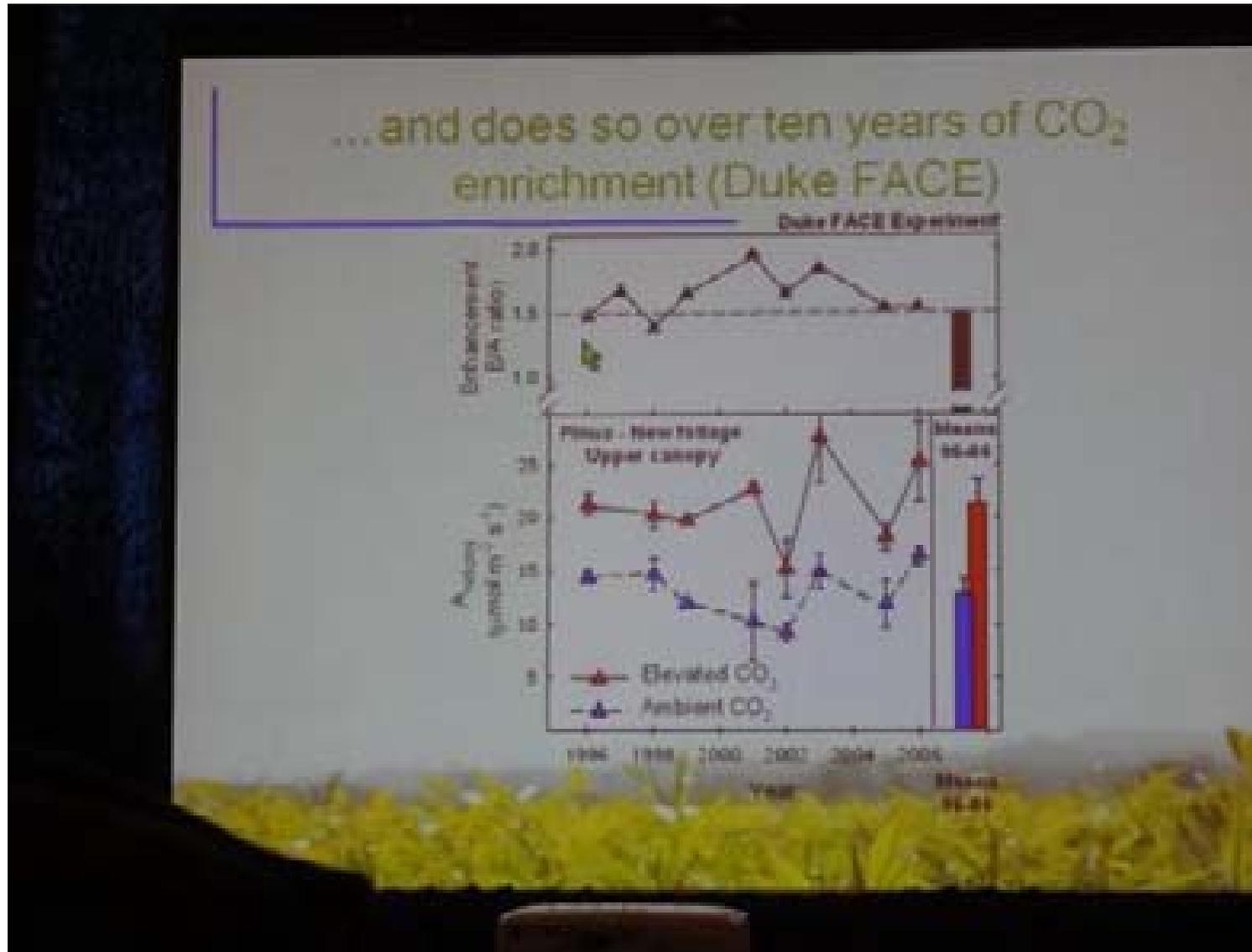
タラリアでのセッションテーマ

- Theme 3:
Land and atmosphere exchanges from the leaf to the region
- Theme 4:
Emerging technologies and approaches-
the canopy processes toolkit
- Theme 5:
Prediction and uncertainty in mechanistic
models of forest canopies

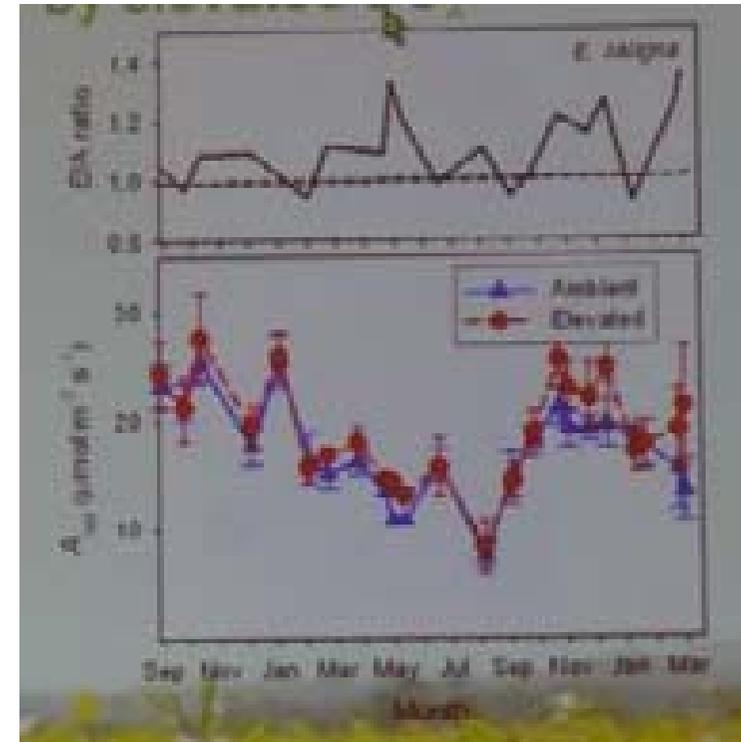
Prof. David Ellsworthの発表(WTC)



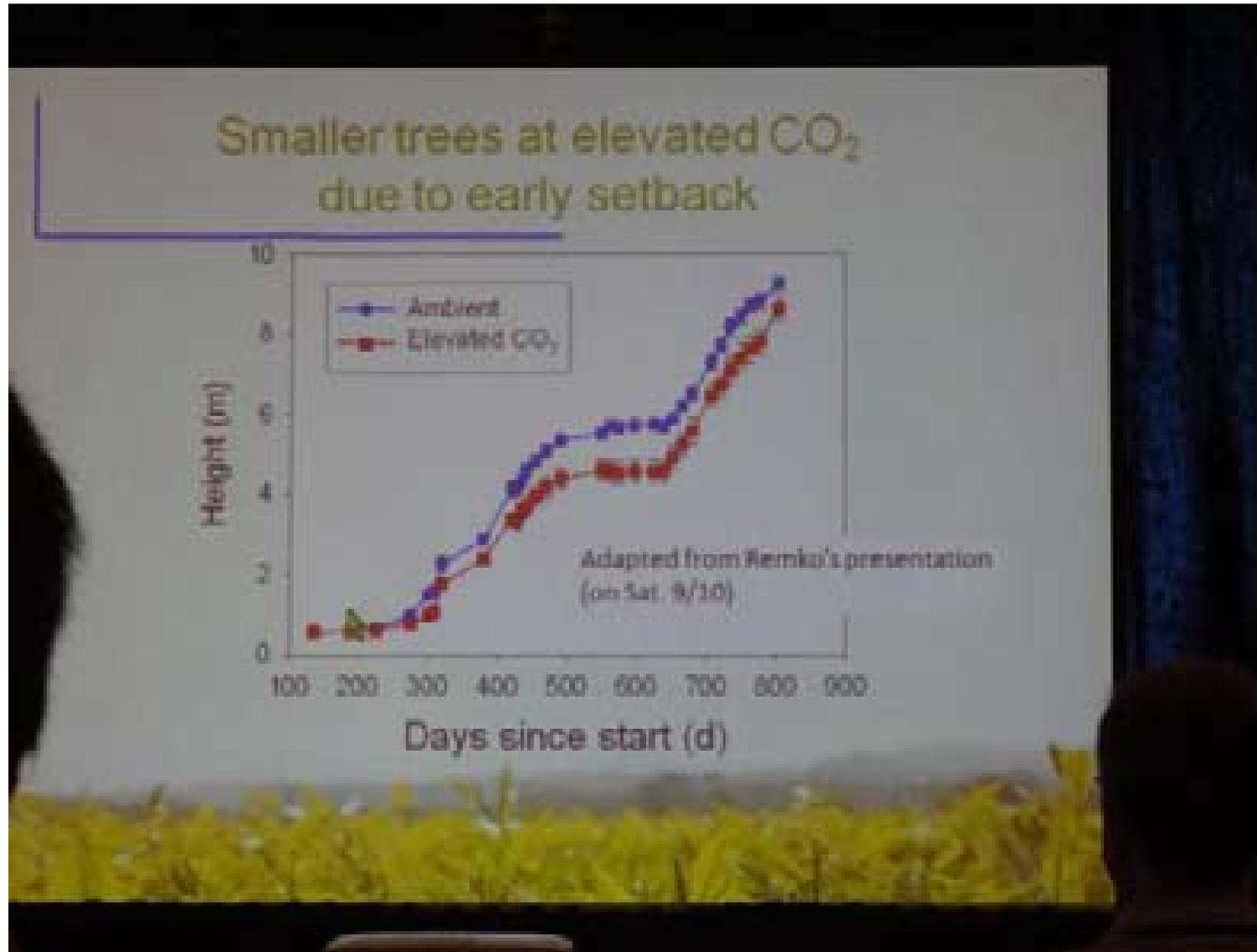
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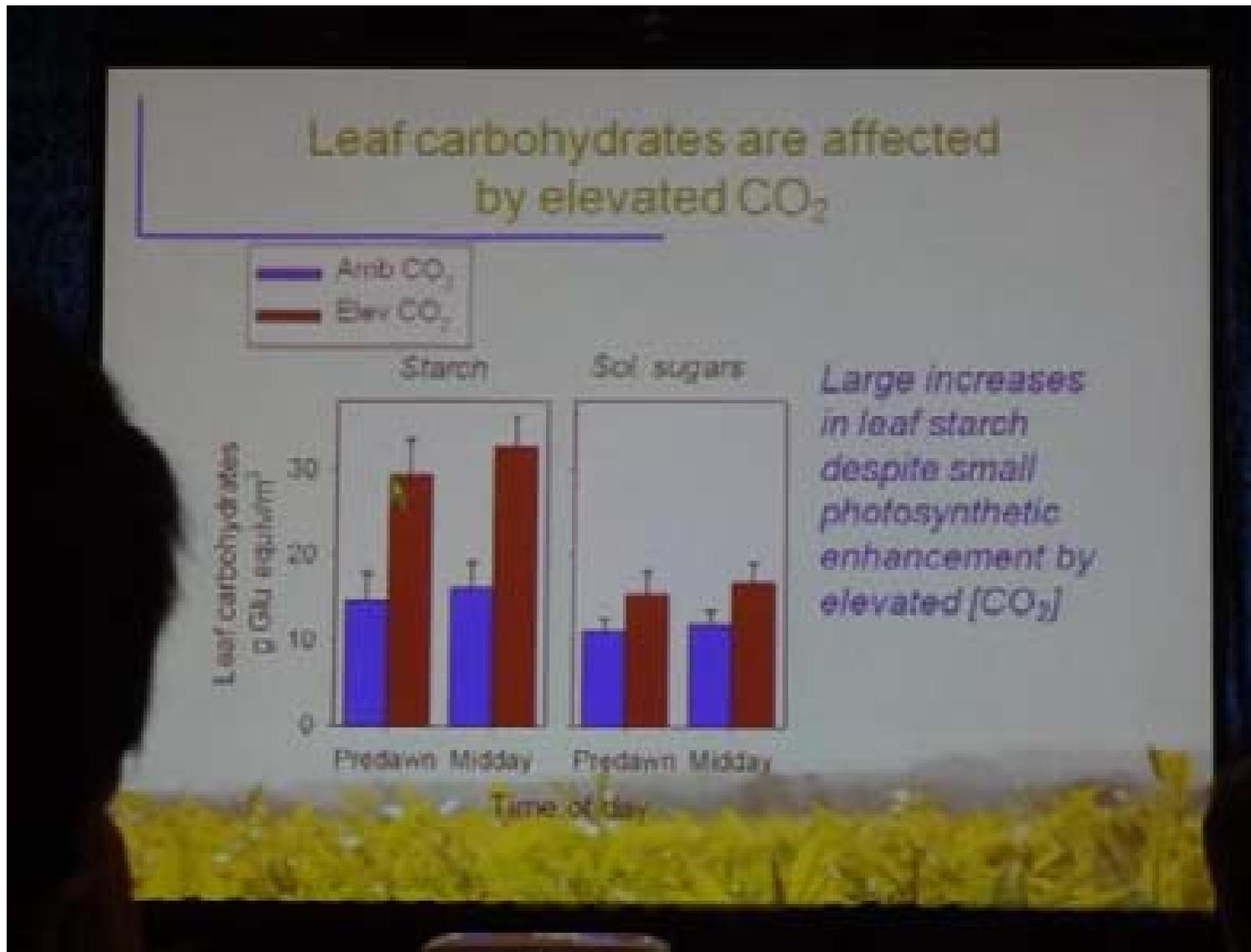
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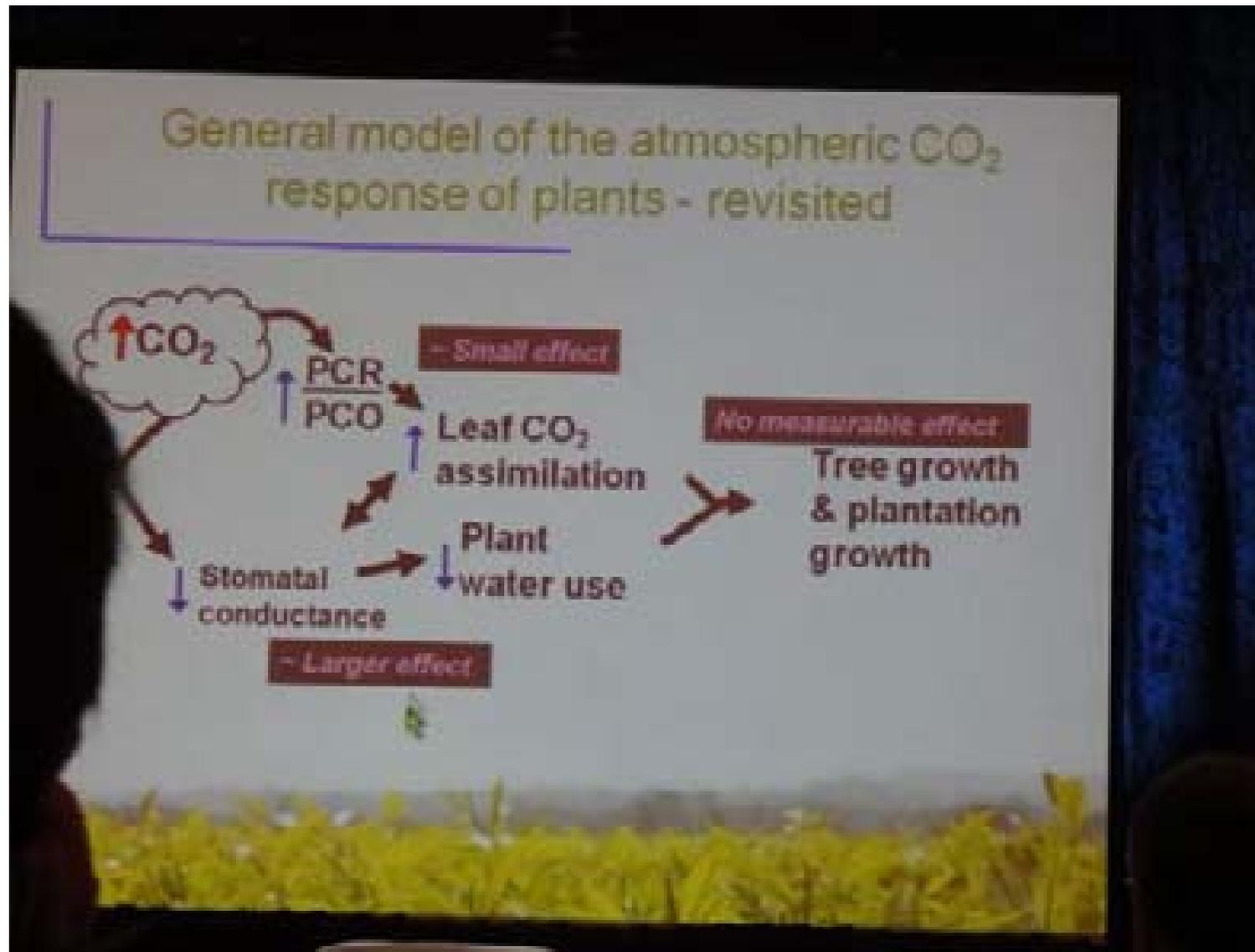
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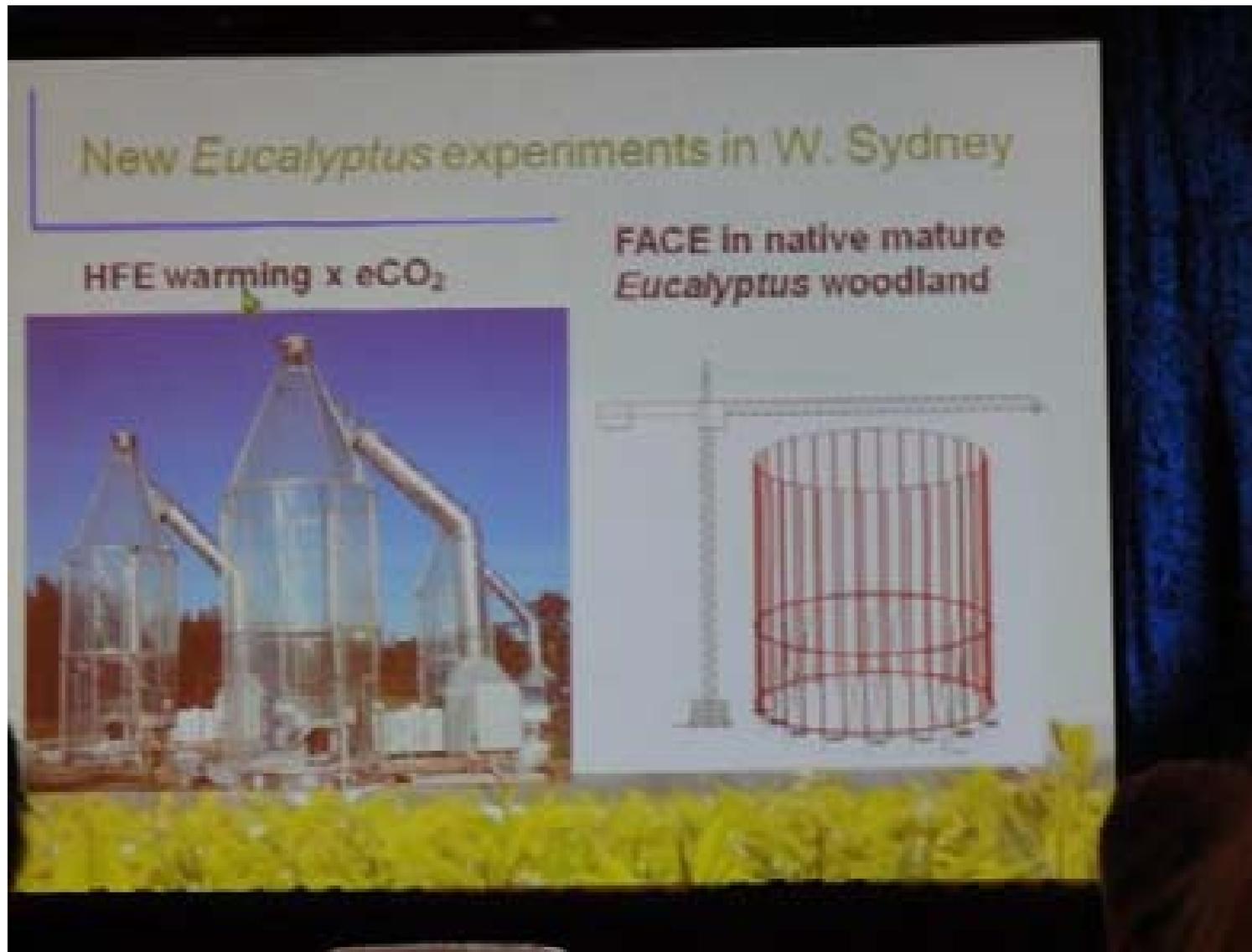
Prof. David Ellsworthの発表(WTC)



Prof. David Ellsworthの発表(WTC)



オーストラリアで新しいFACE実験



エクスカージョン



エクスカージョン2



エクスカベーション3



タラリアでのトレッキング



ウォンバット

最終日（移動日）

タラリア10/15 9:00発
→ホーバート
→メルボルン
→シドニー
→成田
→新千歳 10/16 12:45着



おしまい(飛行機より)

