

# Understanding Southern Ocean-specific phytoplankton ecophysiological response to iron availability

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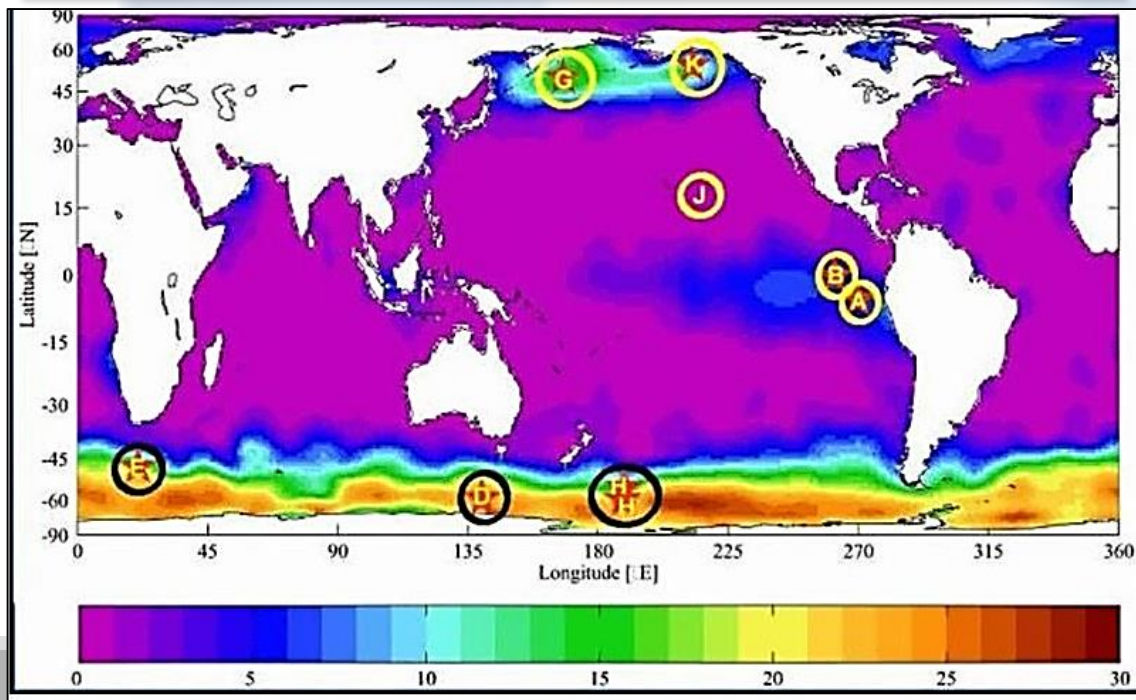
Dr. Sandy Thomalla (SOCCO - CSIR, CT)



# The Southern Ocean and Iron

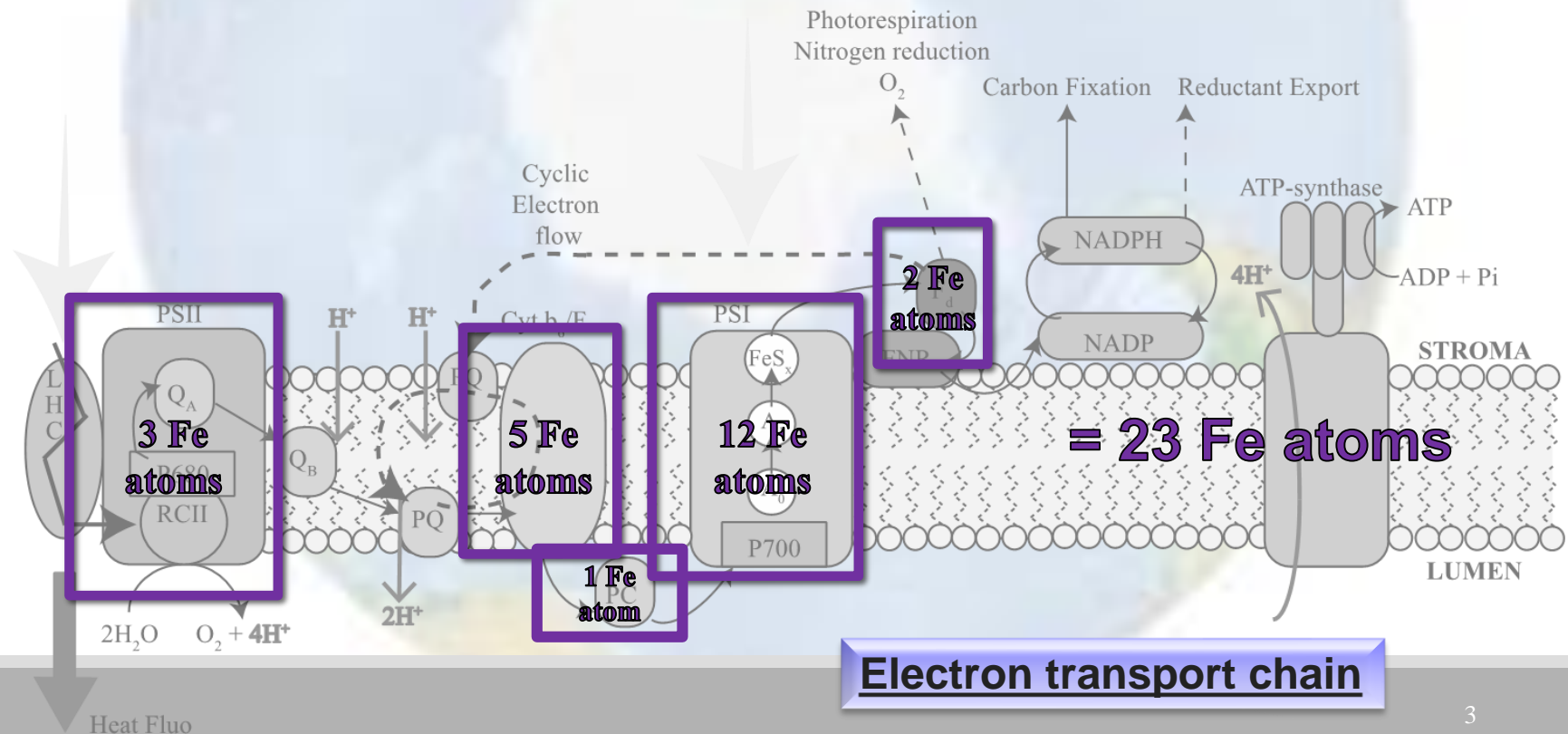
- Plays a significant role in the global drawdown of atmospheric CO<sub>2</sub>
- The biological carbon pump – constrained by micronutrients (**Iron**) and light
- Nutrient availability alters growth and primary production of phytoplankton
- Iron – essential nutrient for photosynthetic proteins in plants and phytoplankton

## Macronutrient rich, trace metal limited regions



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# Ecophysiological response of Phytoplankton

- Previous studies have examined the role of iron limitation in the Southern Ocean
- Experimental results: physiological data and community structure signals
- Short-term incubation experiments: advantageous – focusses only on the phytoplankton physiology
- A series of *in situ* iron addition experiments will be performed across:

Winter

Spring

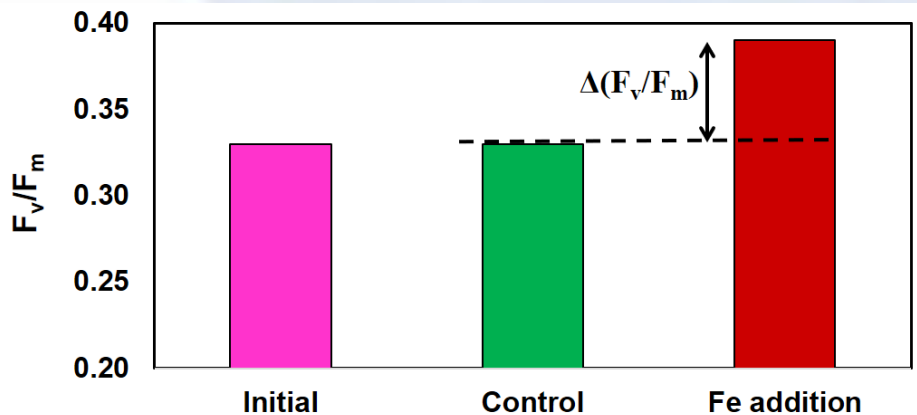
Summer

- To “map” areas of iron limitation using changes in photosynthetic efficiency
- Examine the effects of other drivers on
- community structure, light, macronutrients

$$\frac{F_v}{F_m}$$

$$\Delta \frac{F_v}{F_m}$$

$$\Delta(F_v/F_m) = F_v/F_m (\text{Nutrient Addition}) - F_v/F_m (\text{Control})$$



High  $\frac{F_v}{F_m} = \text{Happy Phytoplankton}$



Low  $\frac{F_v}{F_m} = \text{Sad Phytoplankton}$





Winter

SCALE  
2019

Spring/  
Summer

SA RV Agulhas II



S.Ocean Research  
Cruises

French RV  
Marion Dufresne

Norwegian RV  
Kronprins Haakon



SWINGS  
2020

SOPHY-  
CO<sub>2</sub>  
2019



Summer

Summer