

Breakout Topic on Shift in Biome Seasonality

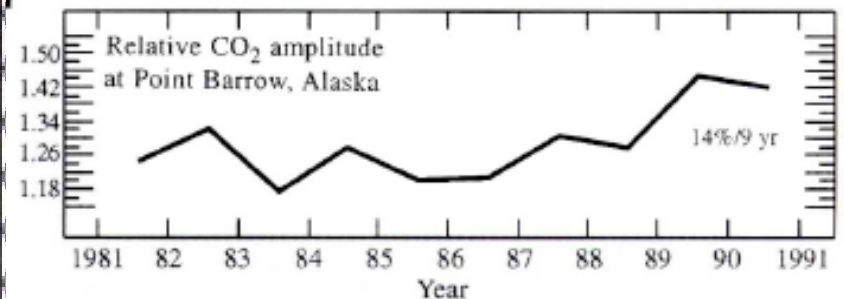
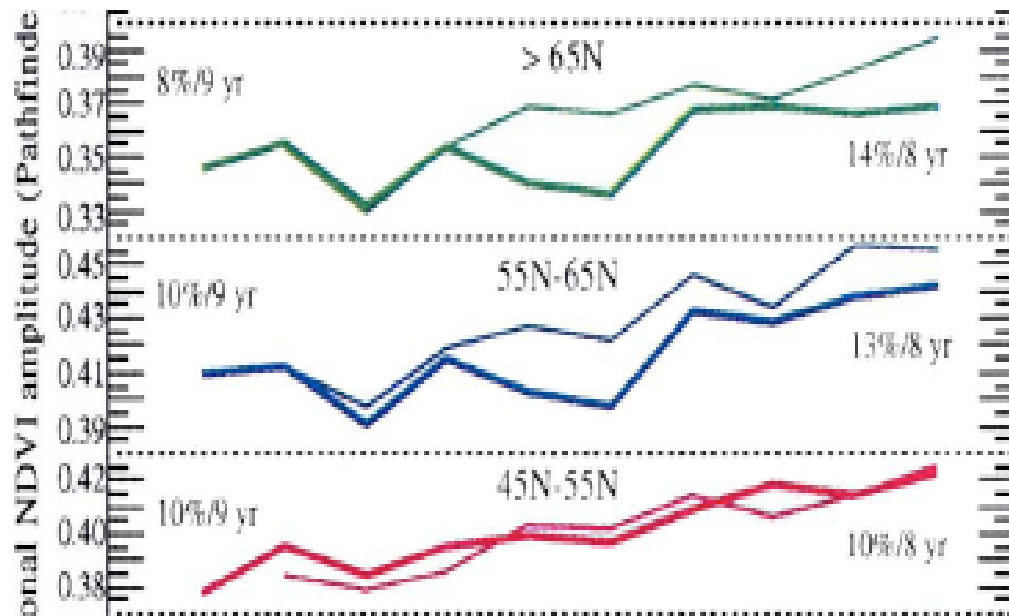
the role of climate change and human impacts on seasonal biome shifts (length of growing seasons; disrupted seasonal cycles)

Summary

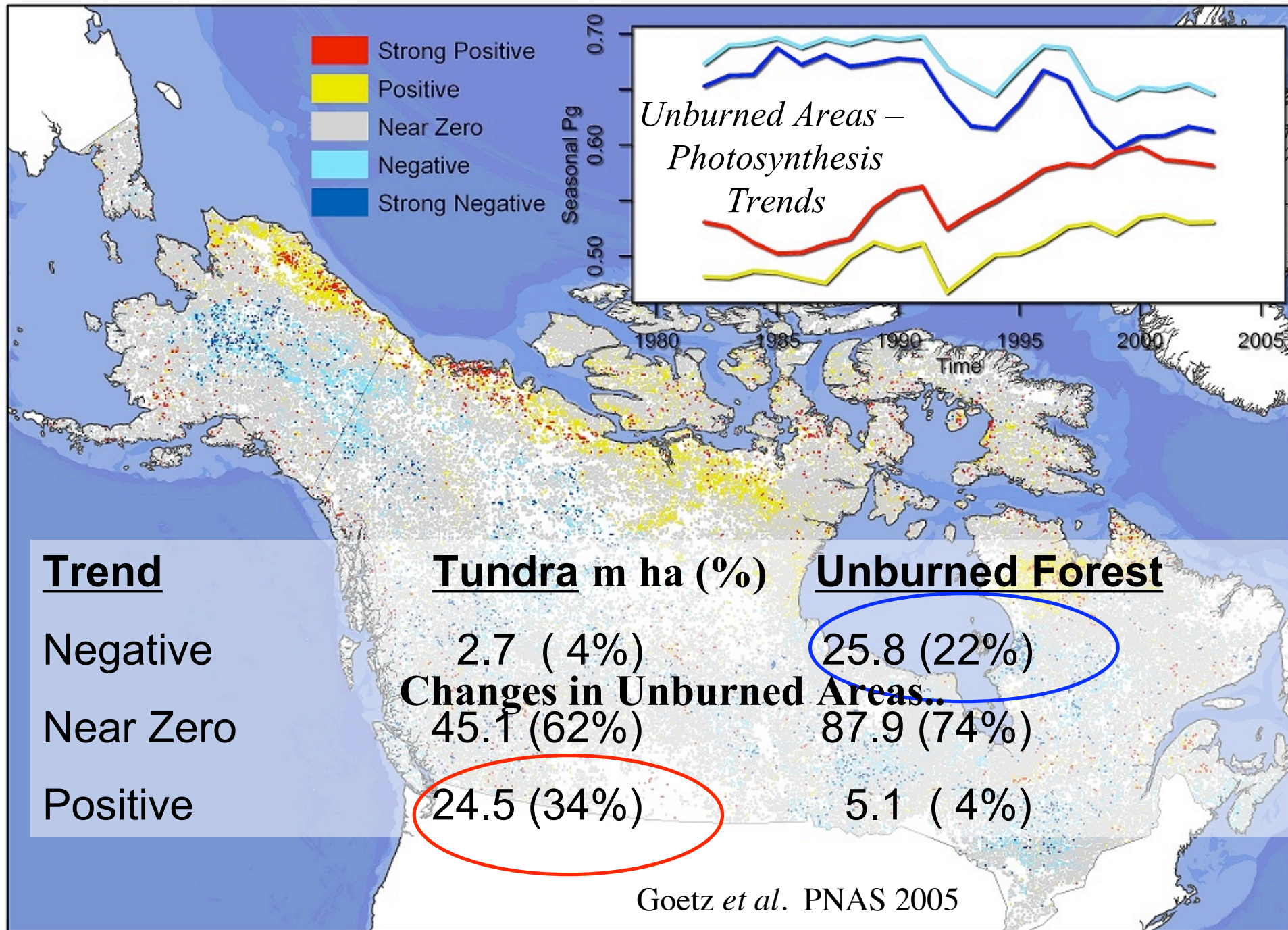
Monday: Saleska plenary talk on ecosystem seasonality & metabolism

Tuesday: NASA Media Event on Earth's Changing Ecosystems

(http://www.nasa.gov/topics/earth/features/ecosystem_media.html)



Ranga Myneni

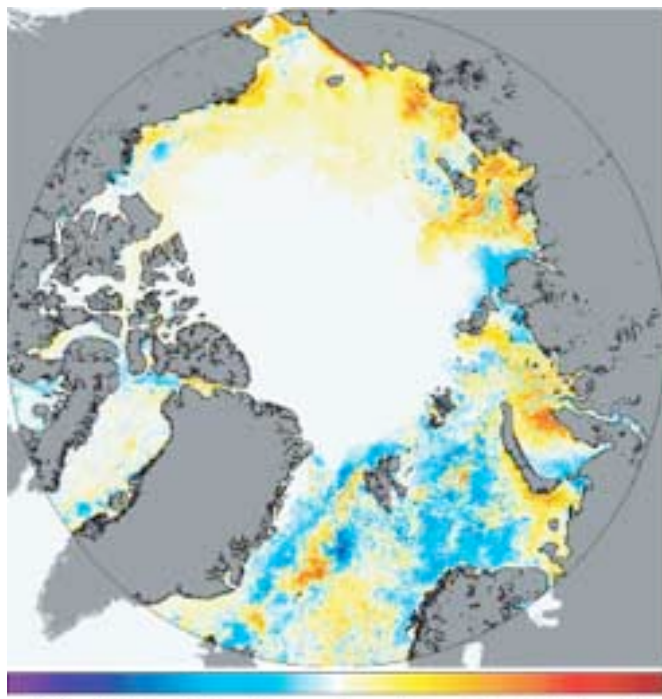




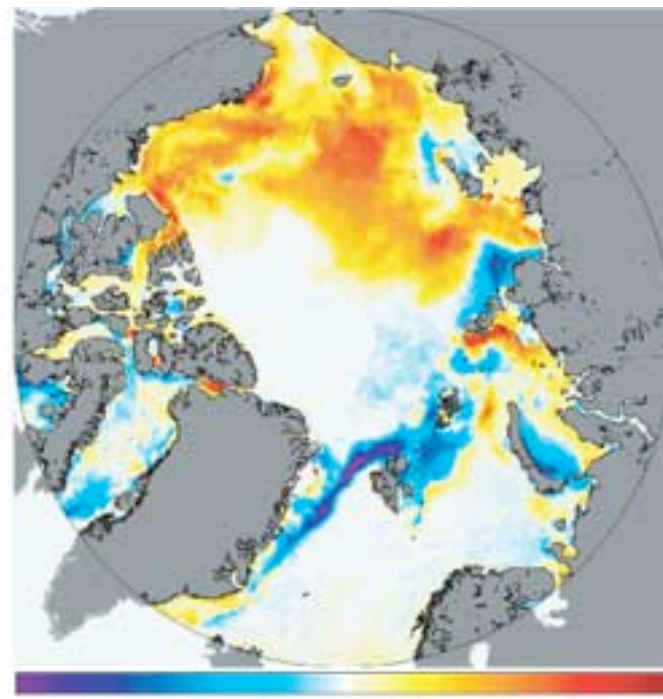
Minimum sea ice extent, 2006

Minimum sea ice extent, 2007

Difference in minimum sea ice extent, 2006-2007



-300 -225 -150 -75 0 75 150 225 300
Difference in algal photosynthesis ($\text{g C m}^{-2} \text{ yr}^{-1}$),
2007-2006



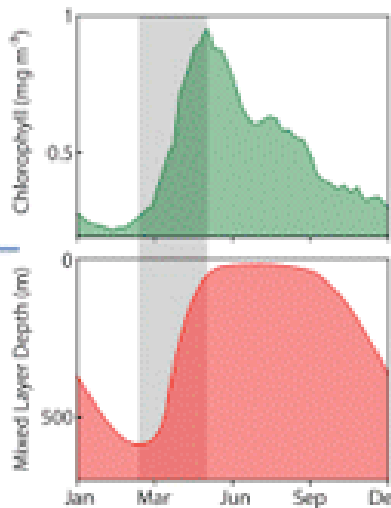
-100 -75 -50 -25 0 25 50 75 100
Difference in growing season (days),
2007-2006

*longer growing
seasons in the
Arctic Ocean
promote greater
phytoplankton
growth*

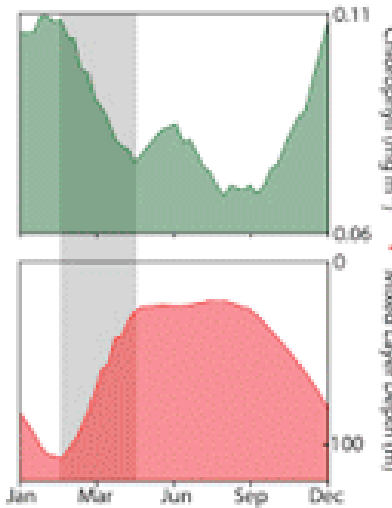
Kevin Arrigo

Chlorophyll increases when mixed layer shallows

Light limited systems

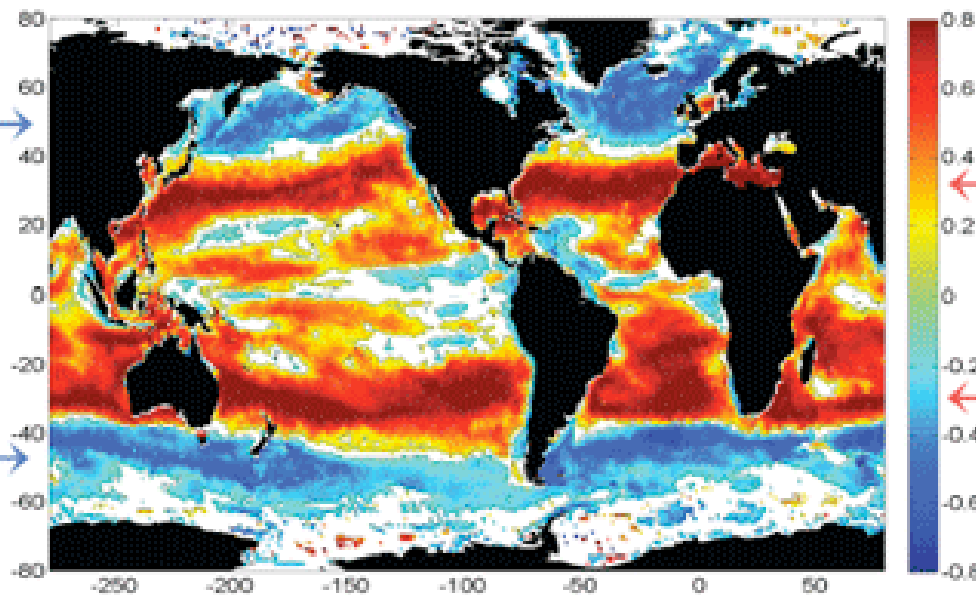


Nutrient limited systems



Chlorophyll decreases when mixed layer shallows

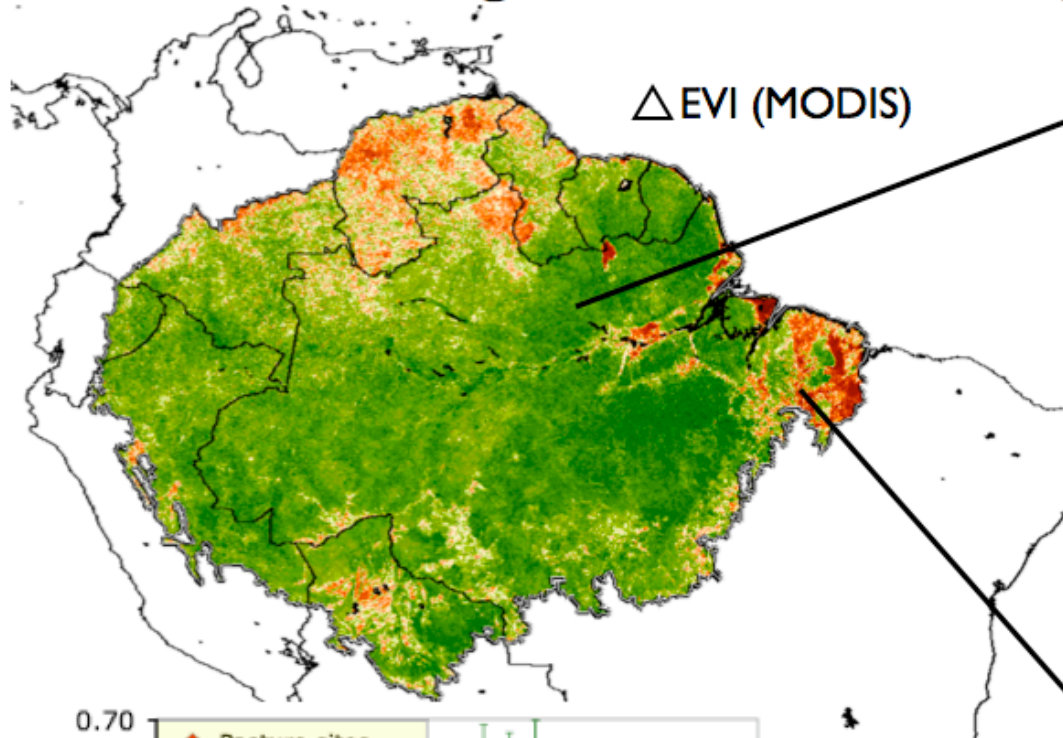
Correlation between satellite chlorophyll and mixed layer depth



Satellite observations of ocean color have been used to determine how seasonal blooms of microscopic floating plants, or phytoplankton, are related the thickness of the ocean surface's mixed layer – water

Jorge L. Sarmiento

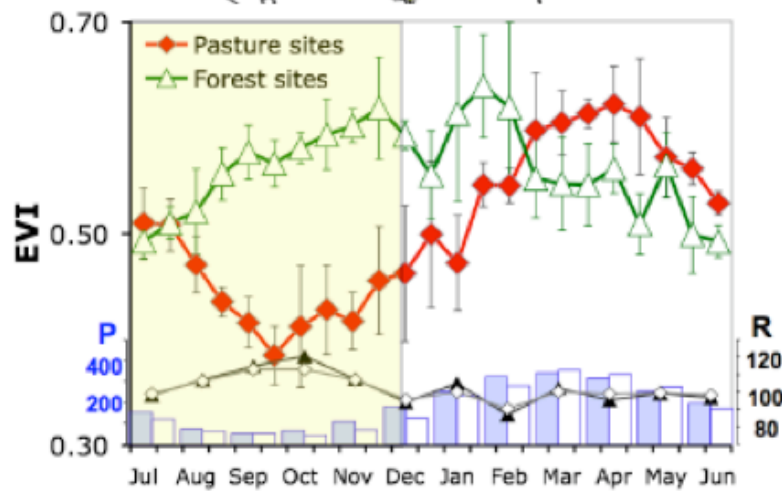
Seasonal change in satellite vegetation 'greenness'



Old-growth rainforest



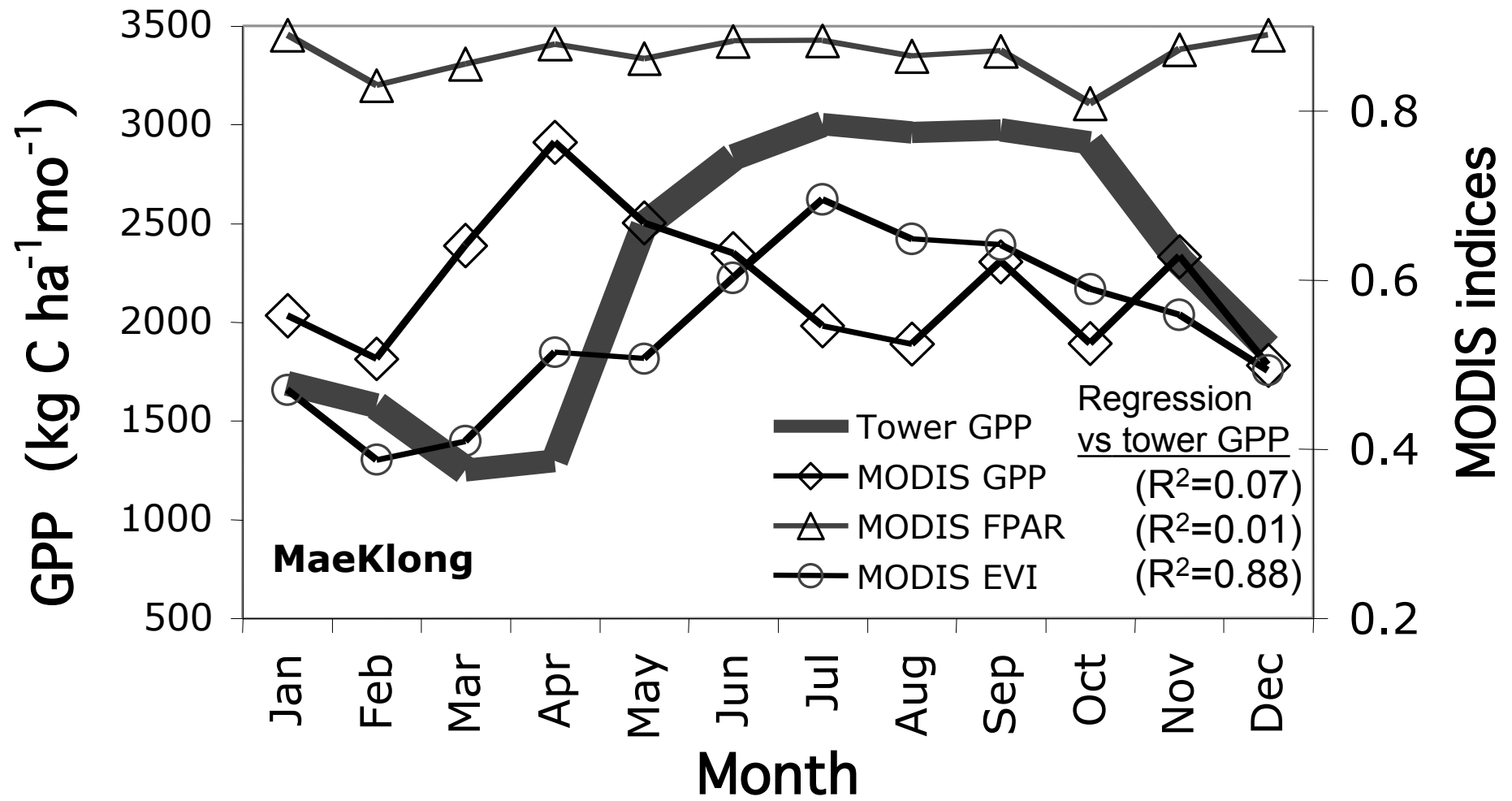
Converted pastures in dry season



dry 'sunny' season

rainy season

Different satellite products vs. ground: need to improve understanding of relation between satellite and the ground



Outline

- Start with brief, invited presentations on the topic, “*Shift in Biome Seasonality*”
- Aim is to address,
 - why this topic is important?
 - the role of remote sensing in addressing it,
 - what has been done and what may be proposed in the near future in this regard.

General discussion in order to raise and address questions and issues.

Purpose

- Suggest studies or actions that would enable remote sensing data and NASA research results to make stronger contributions to contributions to future scientific assessments, especially those focused on ecosystem impacts and consequences (including feedbacks to the climate system).
- Specific questions should be posed to particular breakouts.

Research Questions

- * What research can we conduct to better address the impacts and consequences of global change?
- What actions would be most useful to or supportive of future assessments?
- What are the greatest challenges and opportunities (relevant to this breakout topic)?
- Individual topic breakouts will identify opportunities and priorities for NASA as well as raise issues or concerns for the Focus Area to address.

Specific questions

1. What are the nominal variations in biome seasonality and metabolism (photosynthesis and transpiration)
2. What are the controls in biome seasonality? (precipitation, temperature, energy (sunlight), human activities, nutrients)
3. What are the drivers of change/ shifts in seasonality? (stress agents, multiple stressors)
4. What are the *resilience* properties of biomes to change?
5. Are there thresholds to abrupt changes in seasonality? (extreme events)
6. What are the role of models and in-situ observations? (model representations of seasonality; in situ flux measures)

Requirements

- Do we have specific requirements on evaluating/ testing/ validate satellite measurements with surface observation
- Critical evaluation of satellite vs. surface intercomparisons with respect to seasonality
- Need for long-term inter-comparability of long-term datasets: MODIS vs. AVHRR (looking backwards) and MODIS vs. VIIRS (looking forward)