

Plant distribution simulation and observation on habitable planet

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Outline

Background

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Method

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Results

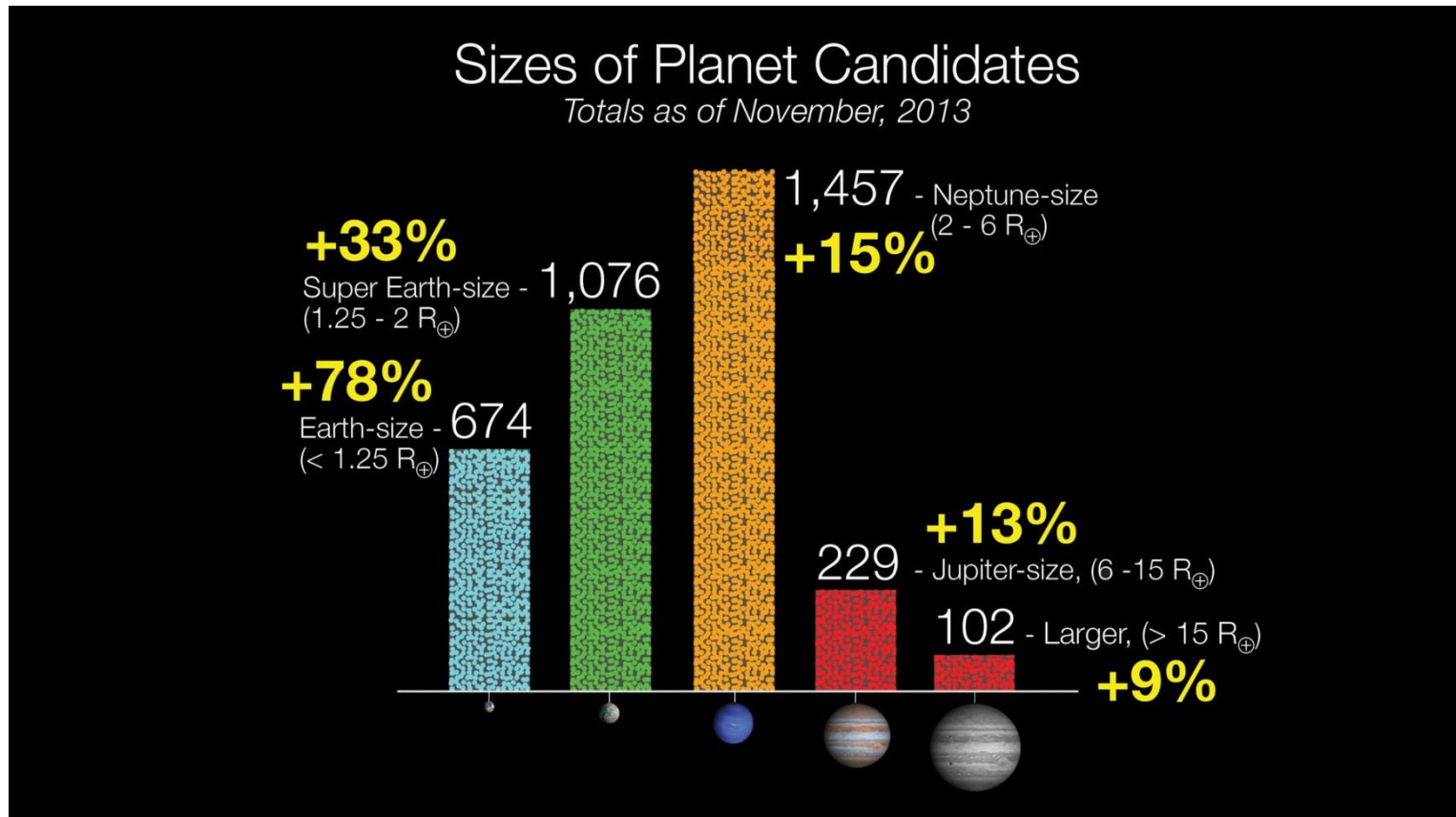
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conclusions and future work

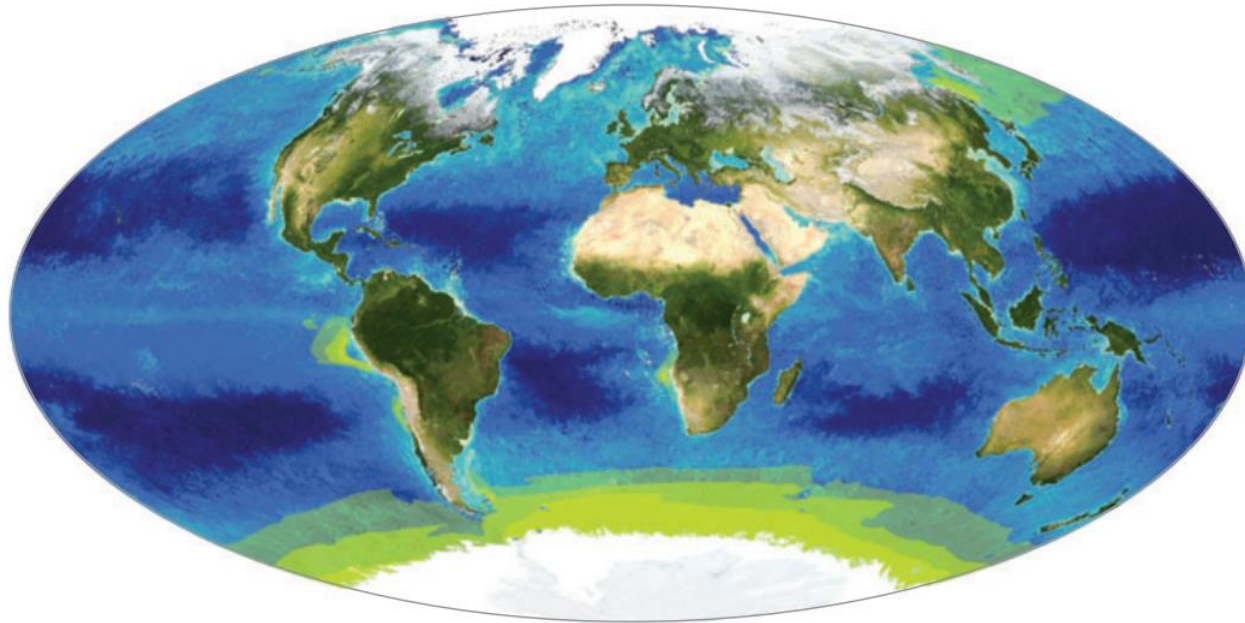
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Background

Kepler Mission---many habitable planets



Why the green plants can exist on earth?



Water deserts

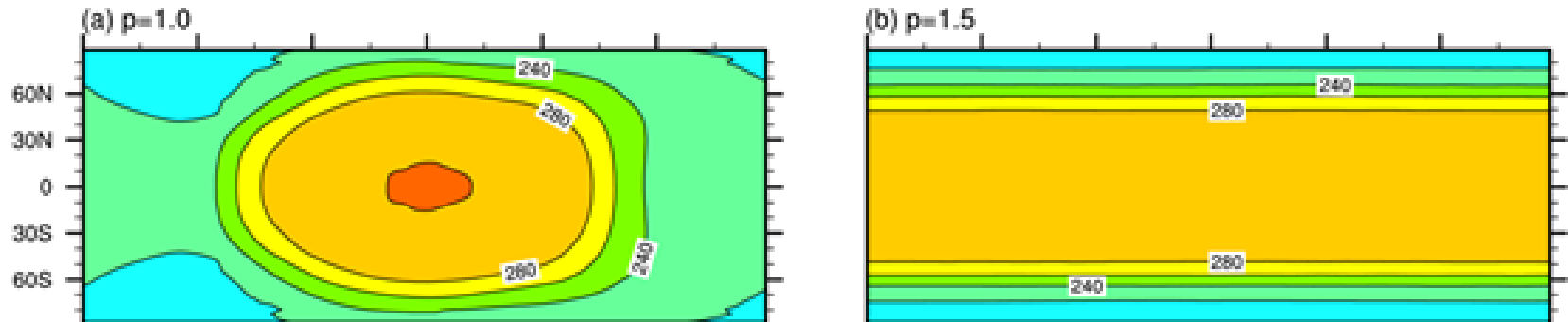
Low-temperature deserts

Nitrate deserts

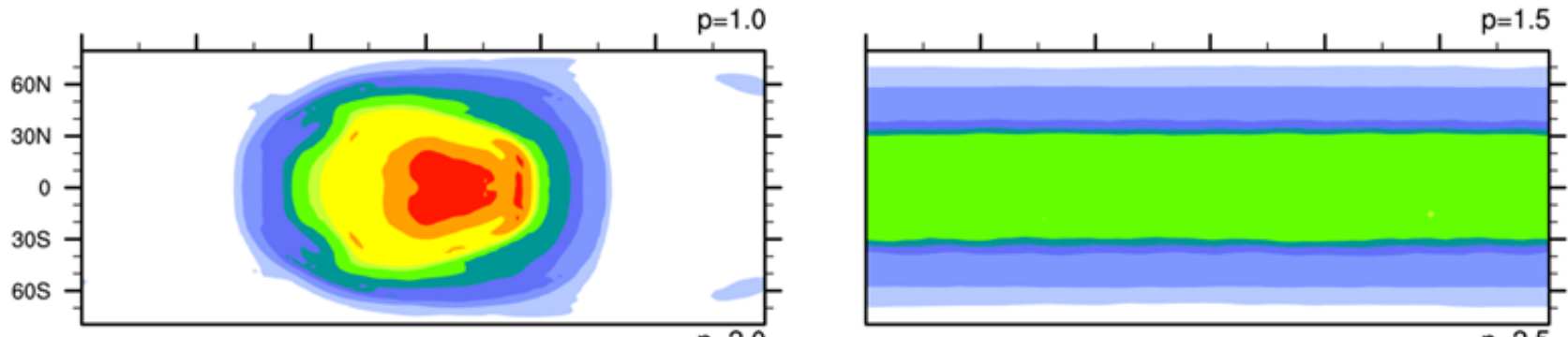
Iron deserts

(Lineweaver, et al., 2012, Annual reviews)

- Why the plant can grow on habitabl planet?

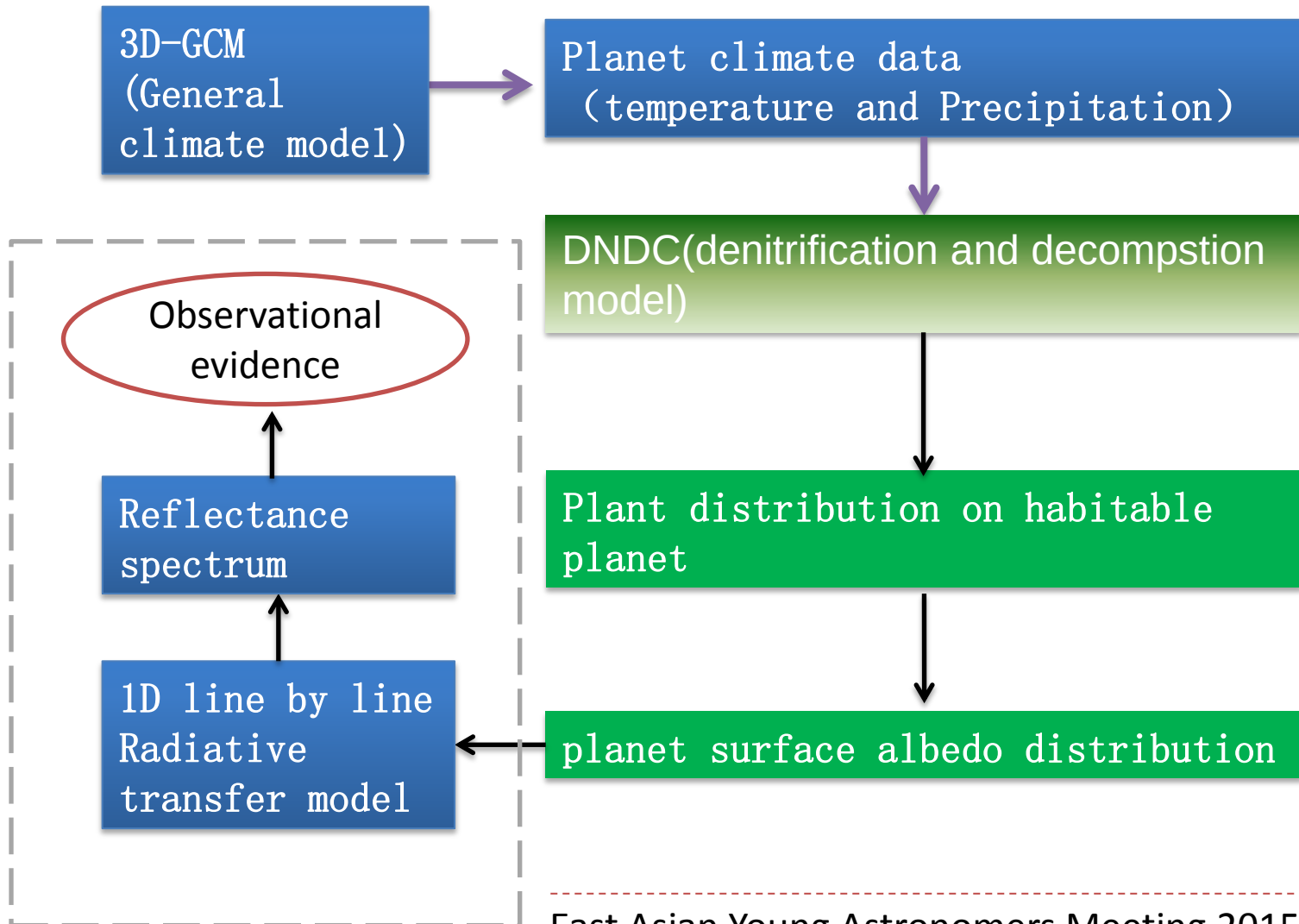


The top figure, the average temperature of habitable planet under eyeball-pattern and striped-ball pattern.



The bottom figure, the average temperature of habitable planet under eyeball-pattern and striped-ball pattern.

Method



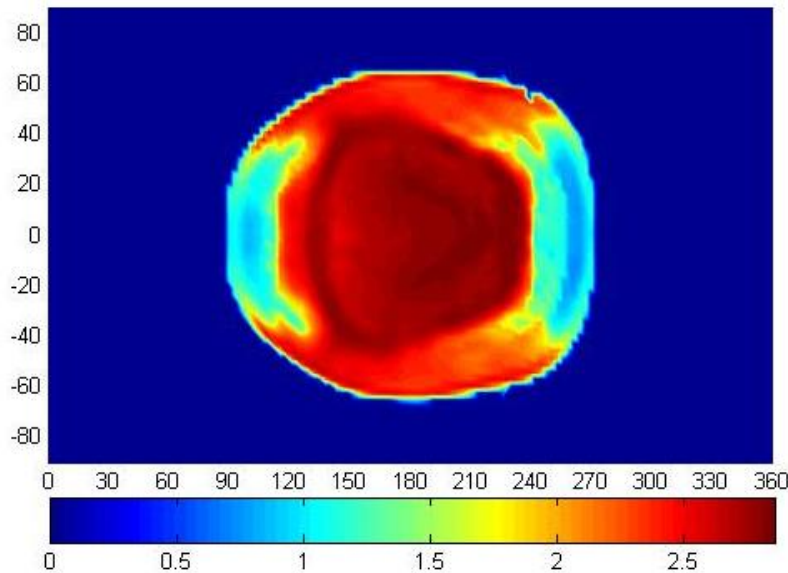
Plant parameters

	Earth (1year=365day)	Habitable planet (1year=27day)
Max yield (g/m ² /year)	350	51.25
Thermal degree days for maturity	2500	175
Water demand (g water/g DW)	200	14

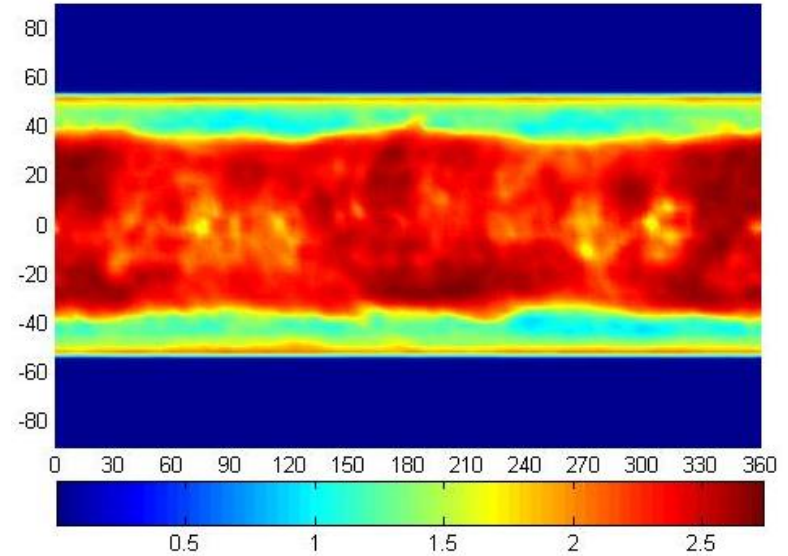
Giant King Grass

Result—plant distribution

Case1, we assumed that islands are uniform distributed on the ocean



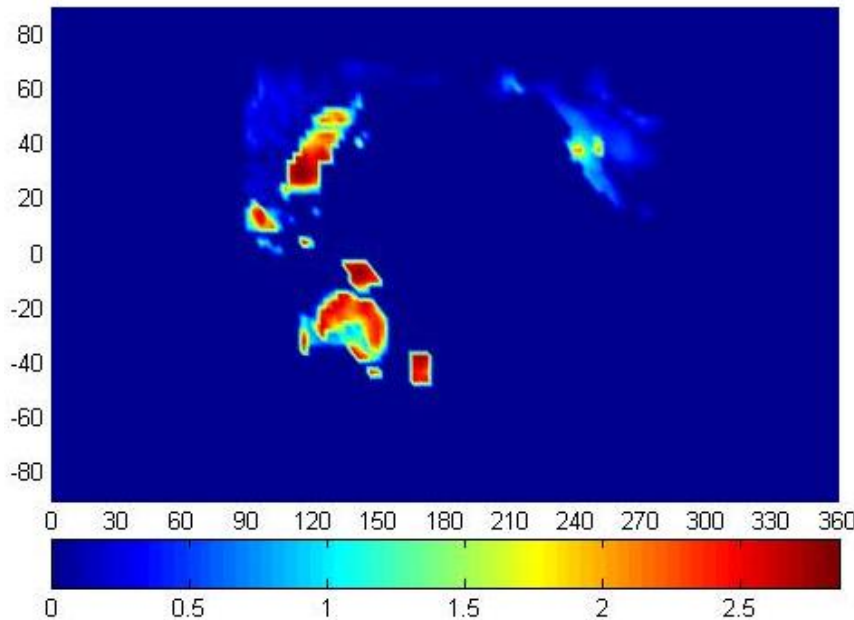
biomass lg (g/m²)



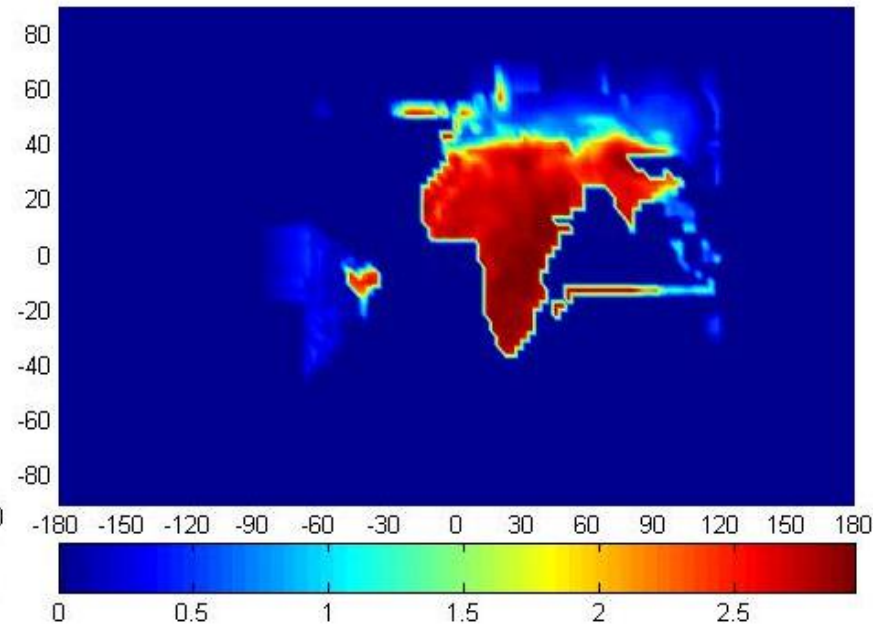
biomass lg (g/m²)

Result—plant distribution

Case2 , the plant distribution considered the earth land-sea distribution under eyeball pattern



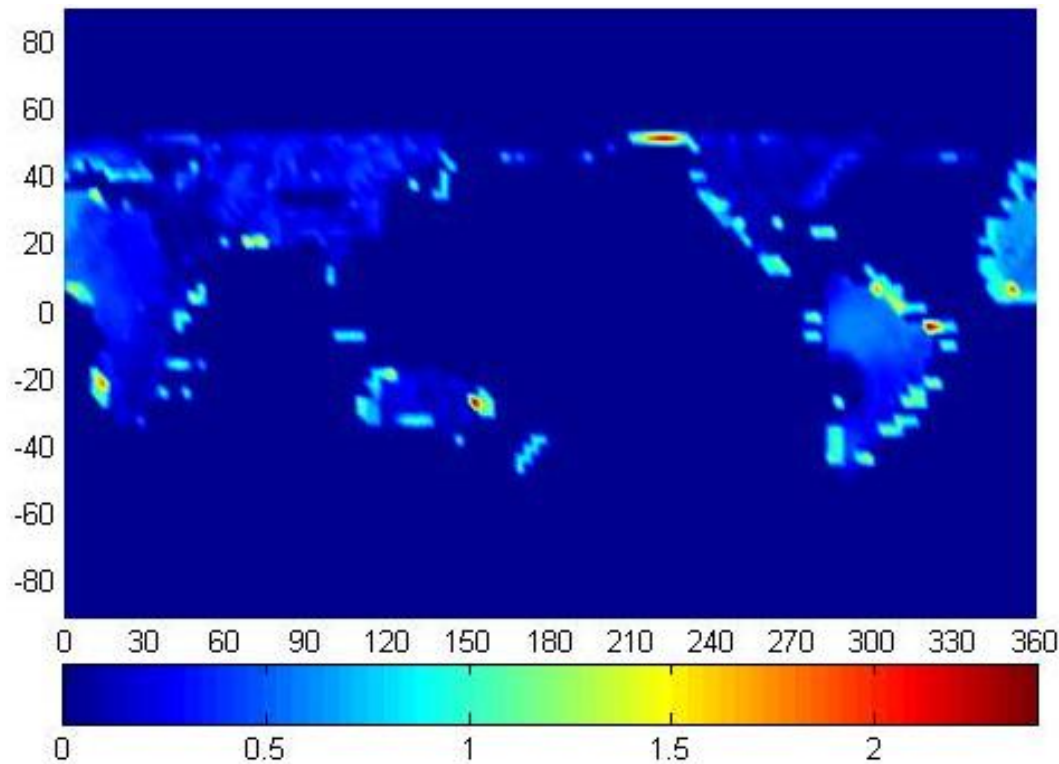
biomass lg (g/m²)



biomass lg (g/m²)

Result—plant distribution

Case2 , the plant distribution considered the earth land-sea distribution under striped pattern



biomass lg (g/m²)



Conclusions

- ◆ Plants growth conditions depend on Temperature and precipitation conditions on habitable planet
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- ◆ Land-sea distribution would effect the plants growth by changing the habitable planets environment
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Future work

Put the surface albedo based on plant, soil, ocean and ice into the atmosphere radiative transfer model to test whether the plant distribution is detected.

A new method to detect habitable exoplanet



Thank you!

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