Integrating user perception into climate based research: how Caribbean farmers drive climate research.

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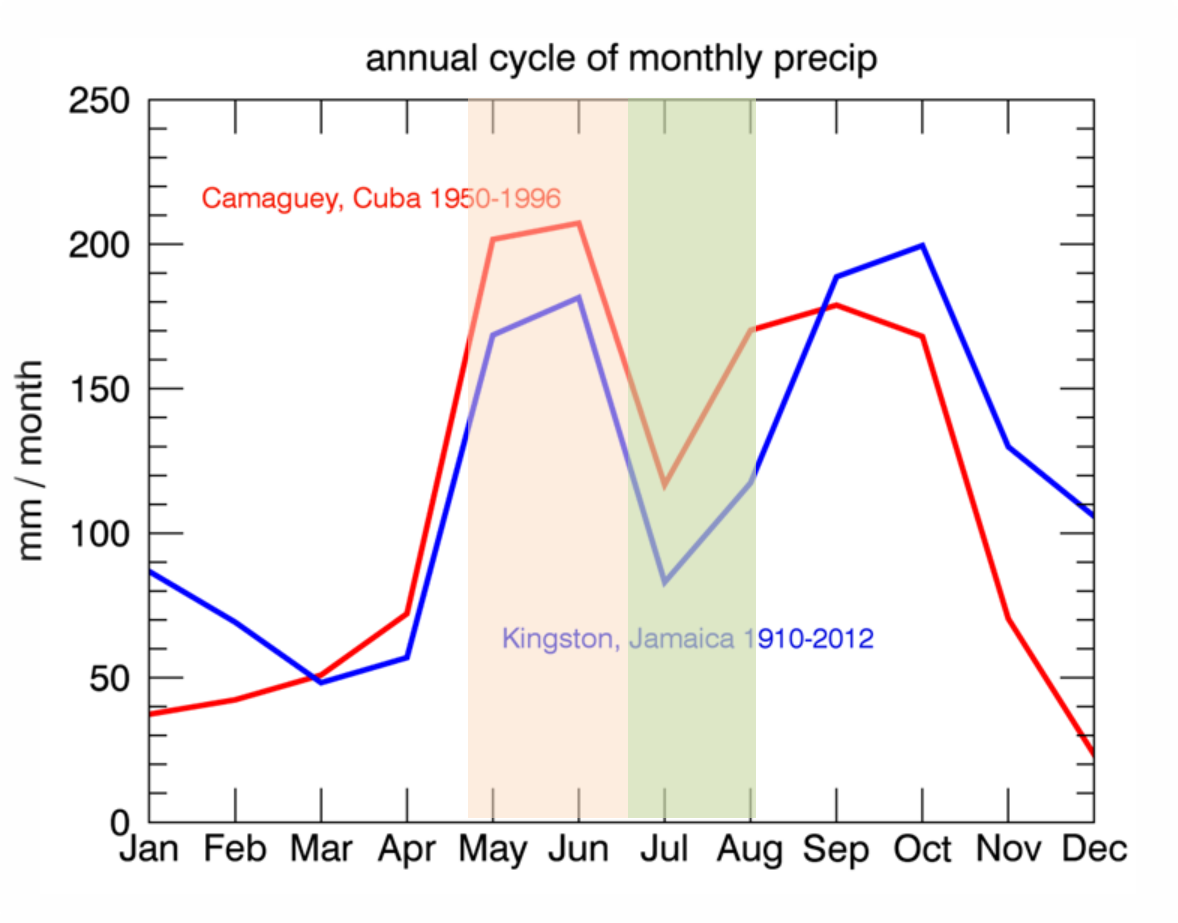
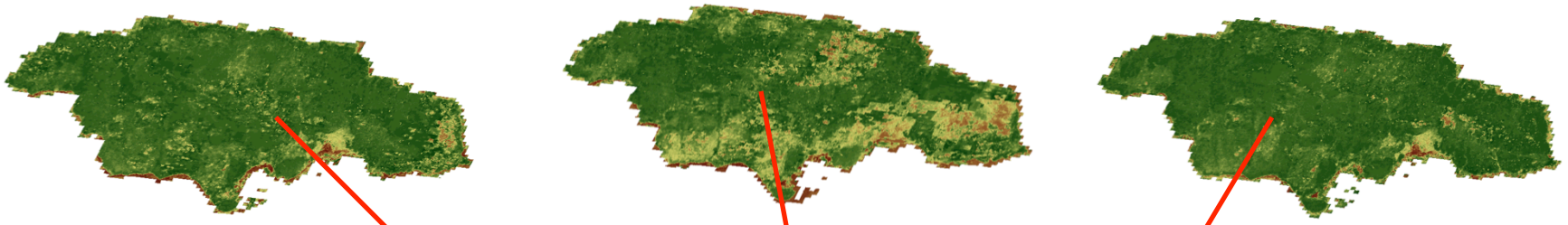
Caribbean bi-modal rainfall pattern



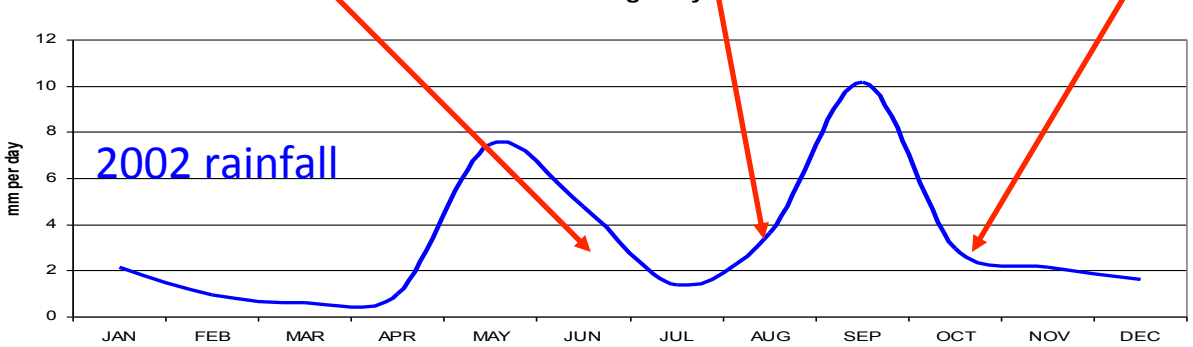
The impact of ERS rains and the MSD response: *why important*

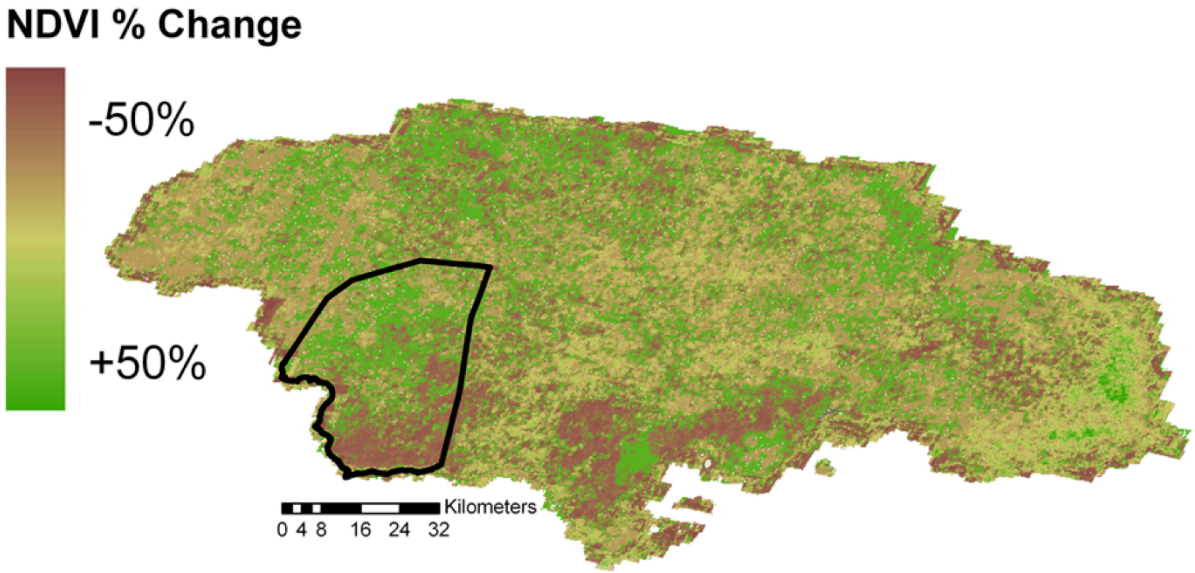


June 10, 2002 NDVI 0.625

August 13, 2002 NDVI 0.519

October 16, 2002 NDVI 0.672



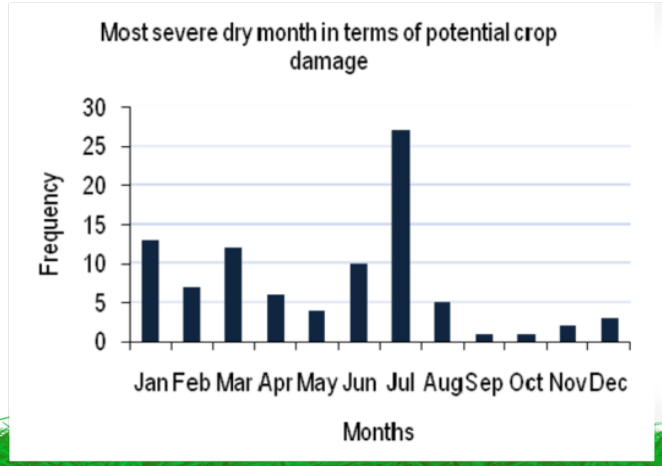


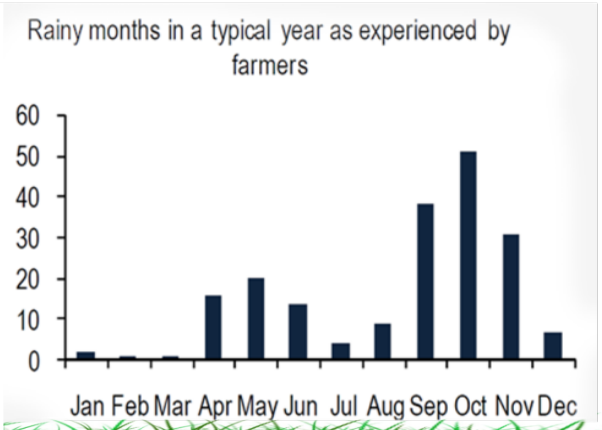
Farmer Interviews

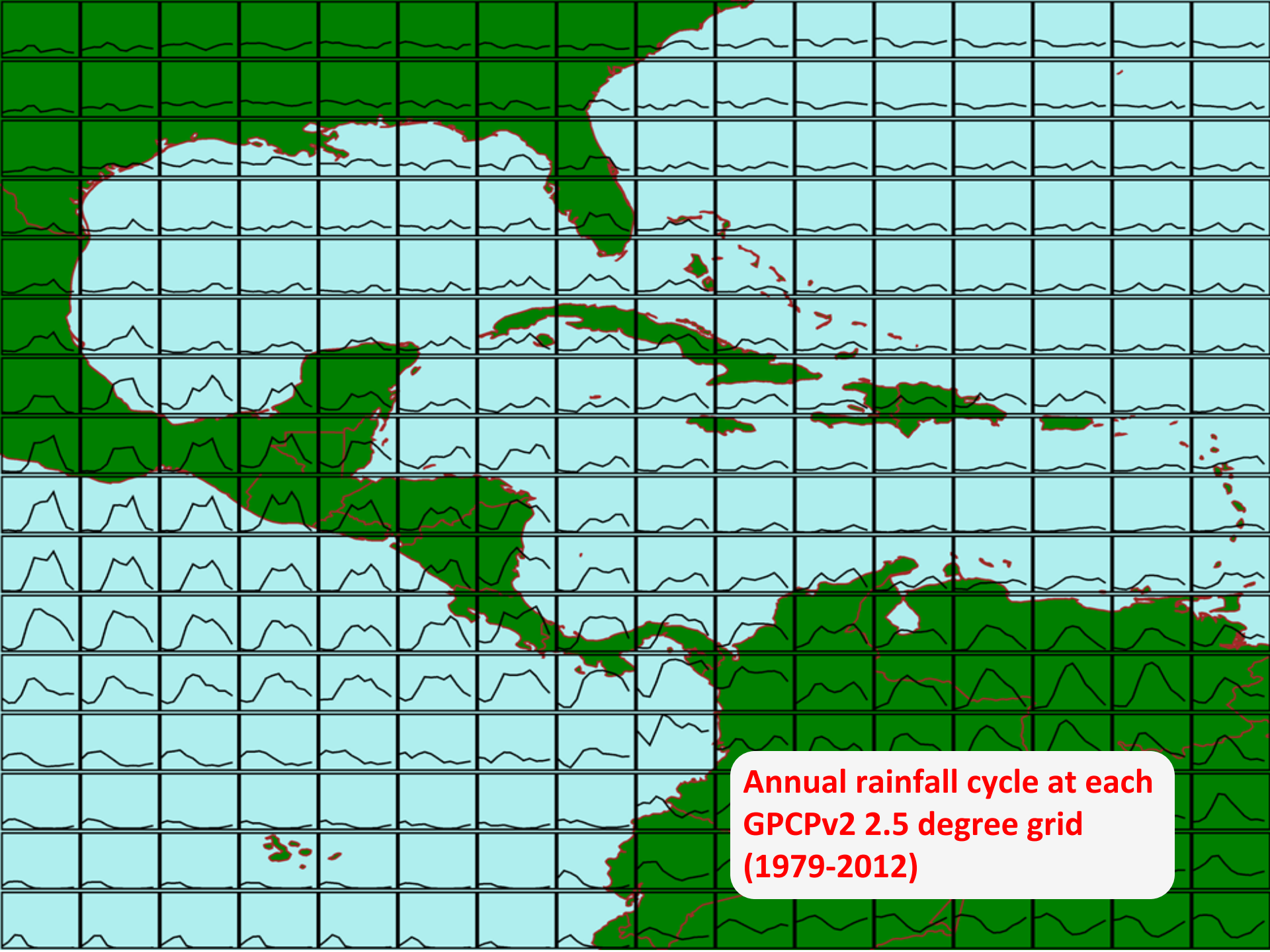
Farmer
St. Elizabeth

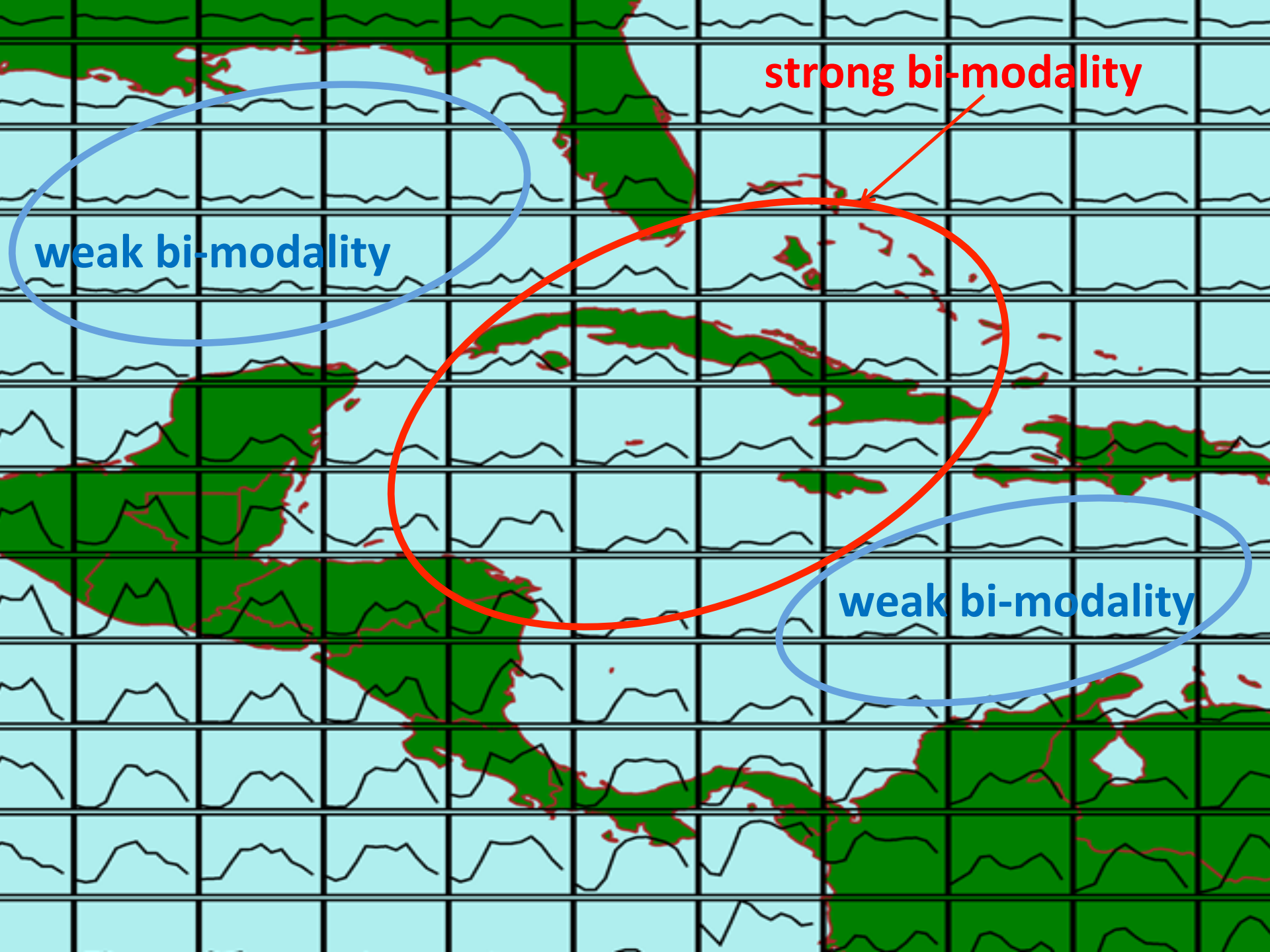
guinea grass in July

We perceive the presence of the mid-summer dry spell in Jamaica and it has a significant impact on our crops. In fact, it represents a very high period of potential crop damage for us.





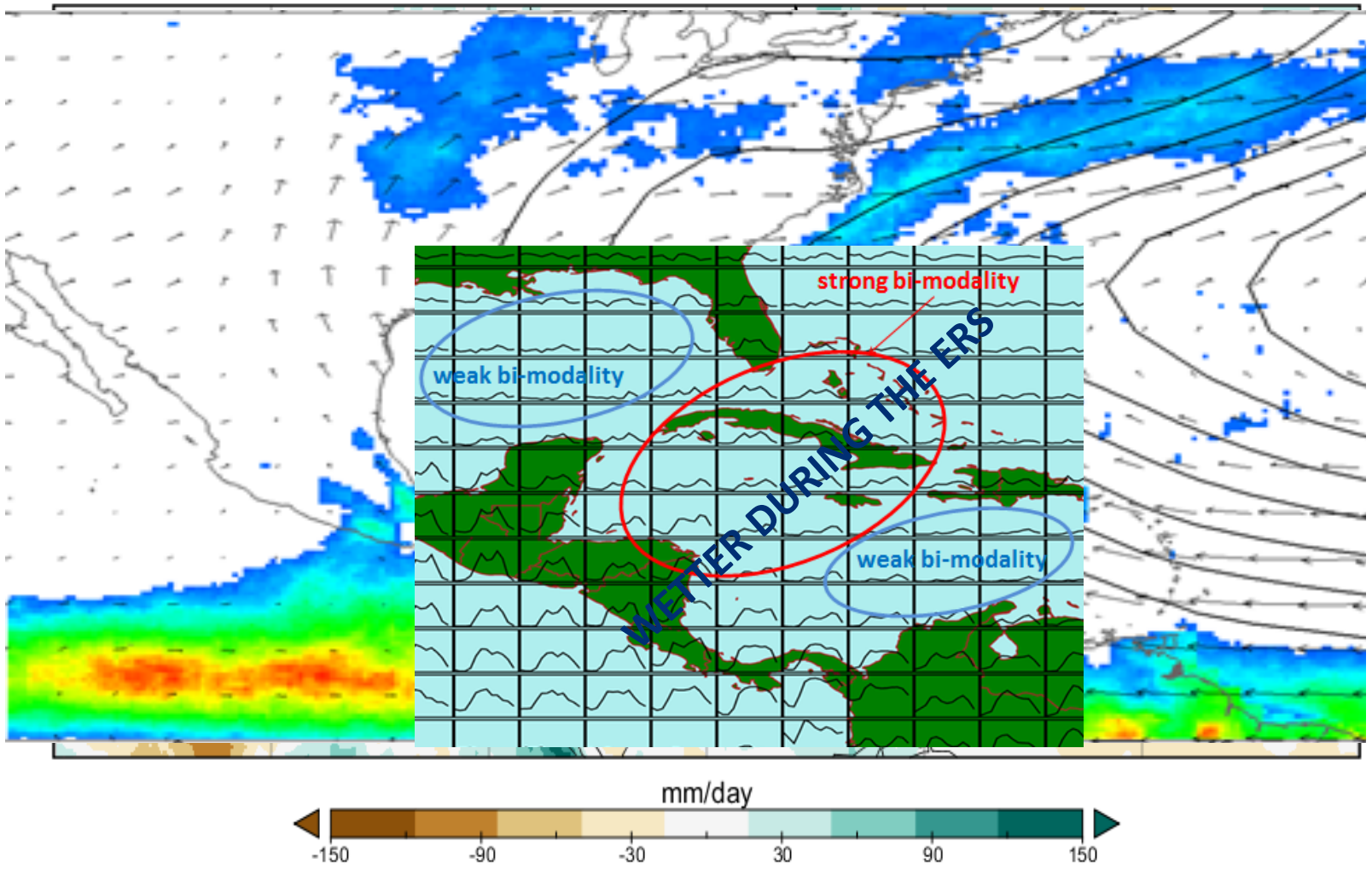

Annual rainfall cycle at each
GPCPv2 2.5 degree grid
(1979-2012)


strong bi-modality
weak bi-modality
weak bi-modality

In the eastern Caribbean we don't feel the mid-summer dry spell even though it is present in the rainfall records. But, for us, it is getting hotter just like what the model projections describe.

Eastern Caribbean Farmers

Early Rain Season (ERS)

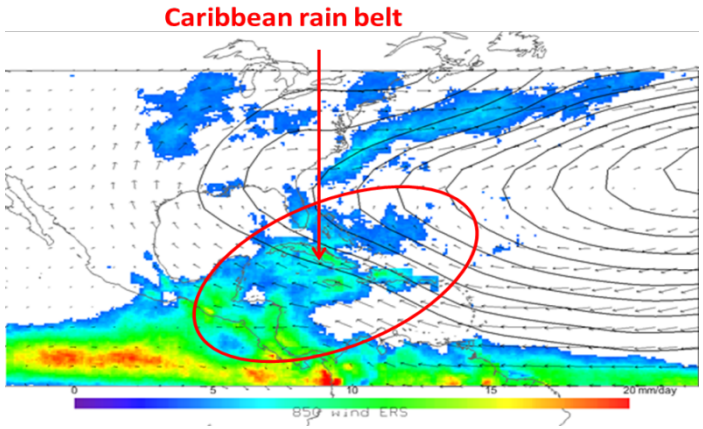


Induction of Caribbean rain-belt rainfall:

What makes it rain in the Caribbean rain-belt time/space pattern?

rainfall = moisture + uplift

moisture advection from the tropics
(PW > 50mm)



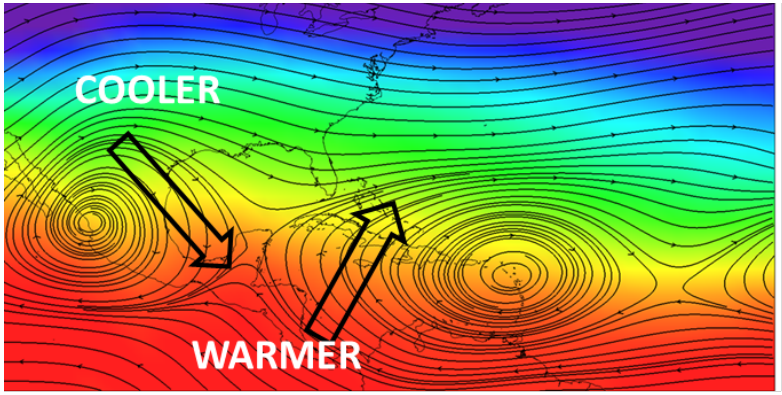
$$\left(\nabla^2 + \frac{f_0^2}{\sigma}\frac{\partial^2}{\partial P^2}\right)\omega = -\frac{f_0}{\sigma}\frac{\partial}{\partial P}\left(-\vec{V}_g \cdot \nabla \eta_g\right) + \frac{1}{\sigma}\nabla^2\left[-\vec{V}_g \cdot \nabla\left(\frac{\partial \Phi}{\partial P}\right)\right]$$

DIFFERENTIAL VORTICITY TERM
(jet streaks and troughs)

THICKNESS ADVECTION TERM
(horizontal temperature advection)

QG forcings for ascent

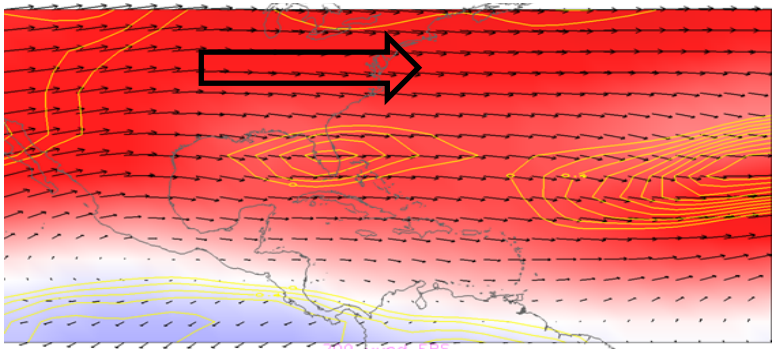
Early Rainfall Season dynamics



Warm air from the tropics in the middle troposphere

$$\frac{1}{\sigma}\nabla^2\left[-\vec{V}_g\cdot\nabla\left(\frac{\partial\Phi}{\partial P}\right)\right]$$

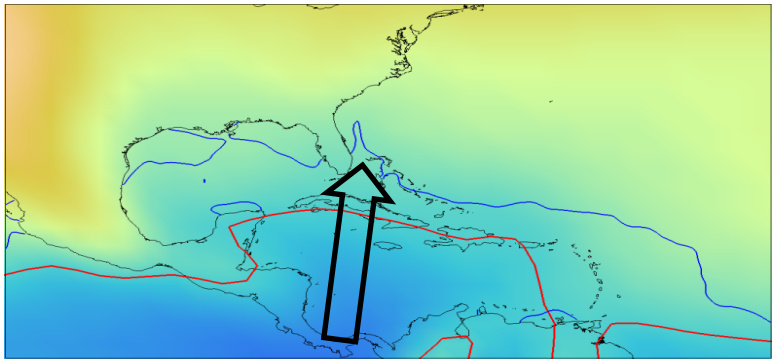
thermal advection term



Upper level troughs propagating into the area

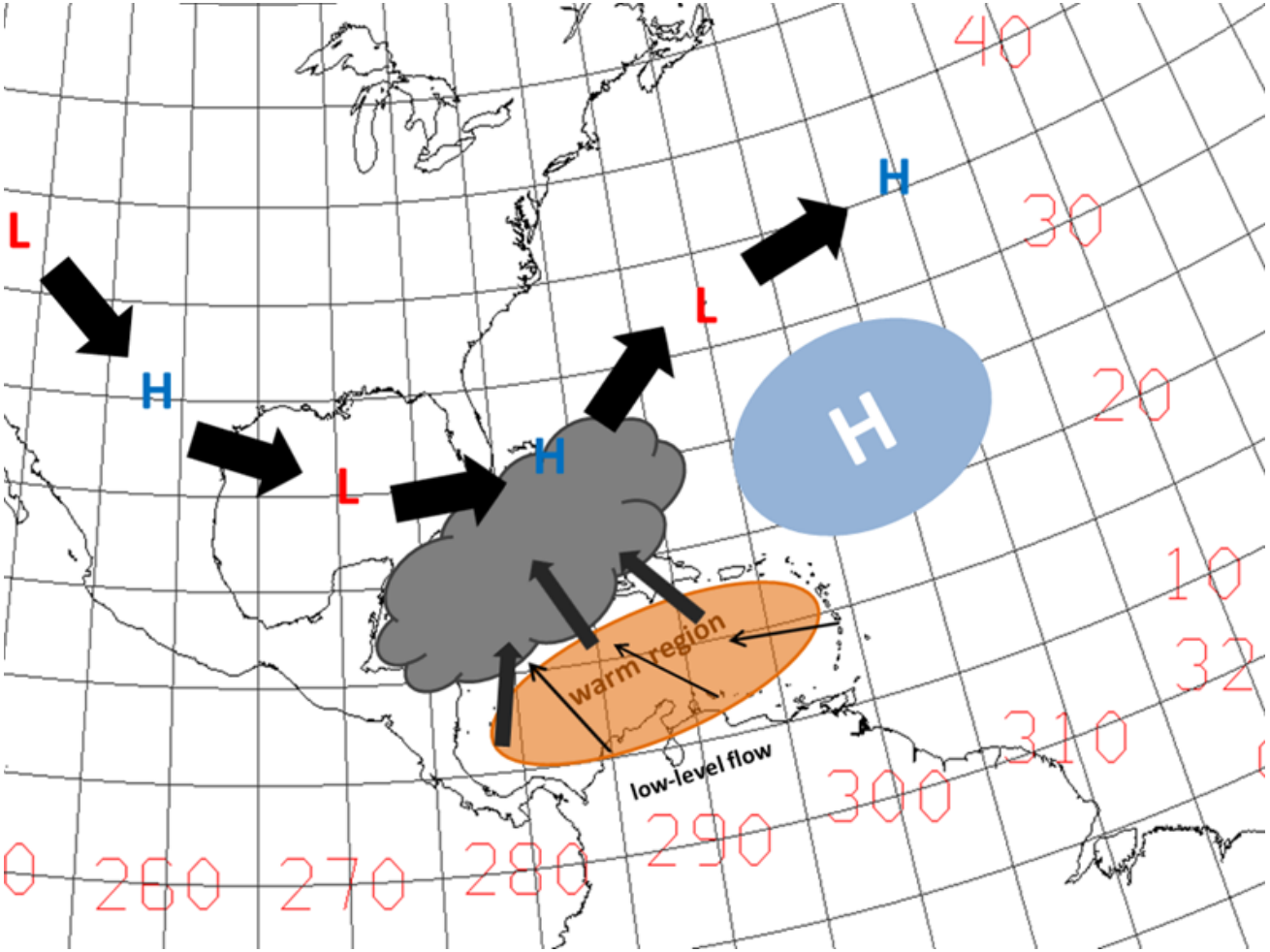
$$-\frac{f_0}{\sigma}\frac{\partial}{\partial P}\left(-\vec{V}_g\cdot\nabla\eta_g\right)$$

differential vorticity advection term



Low level moisture advection

Early season Caribbean rainfall conceptual model



upper-troposphere circulation

mid-troposphere circulation

lower-troposphere circulation

conclusions

1. “users” can be “providers”

2. “providers” can reality check the direction of applied climate science – understanding the Early Rain Season is more important than the mid-summer drought period!

3. The researcher becomes the user and can provide information to local agencies who have the expertise at the interface of climate services.

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Trinidad Ministry of Agriculture
The Jamaican Weather Service
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