Monitoring **Droughts** in East Africa

A (not so) modest proposal

reliance on **agriculture** for subsistence

abundance of **remotely sensed** measurements

uncertainty around future **drought variability**

new computational and statistical **techniques**

Rationale

The Telegraph

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Ethiopia struggles with worst drought for 50 years leaving 18 million people in need of aid

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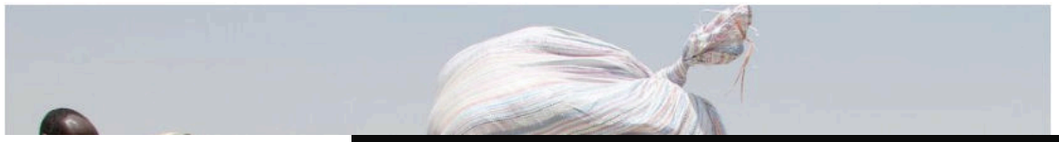
Ethiopia Warns Emergency Drought Aid to Run Out Next Month

THE ASSOCIATED PRESS (ELIAS MESERET)

10 June 2017, 11:34 BST *Updated on 10 June 2017, 11:57 BST*



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Ethiopia drought: Millions of people urgently in need of food aid after string of natural disasters

The UK's International Development Secretary, Priti Patel, urges the world to do more to help people 'at risk of starving to death as extreme hunger stalks East Africa'

Ian Johnston Environment Correspondent | @montaukian | Saturday 19 August 2017 22:27 | 6 comments

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Ethiopia is facing a killer drought. But it's going almost unnoticed.

By Paul Schemm May 1, 2017 Email the author

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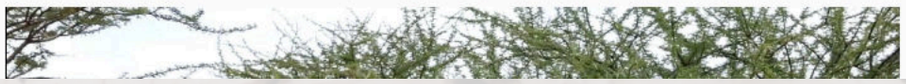
NEWS / ETHIOPIA

Ethiopia drought: Food supplies 'dangerously' low

Aid agencies are warning that Ethiopia will run out of emergency food aid by the end of this month. Almost eight million people are affected by a severe drought and they need the aid to survive.

by **Victoria Gatenby**

11 Jun 2017



TRENDING

"science is **the** vehicle for the proliferation of opportunity and the betterment of the human condition"

Rationale

high-resolution **evapotranspiration dataset**

compare and **validate drought indices**

quantify drought **relationship** with **agriculture**

identify **drivers of drought** in East Africa

Objectives

inadequate resolution of **key parameters**

Fisher et al (2017), Friedlingstein et al (2014)

space to develop **new indices**

Aghakouchak et al (2015), Vincente-Serrano et al. (2018)

new datasets, new techniques, old applications

Enenkel et al (2015), Belayneh et al (2016)

Rationale

bayesian data analysis methods

machine learning

deliver clarity from complexity

Objectives

CHIRPS

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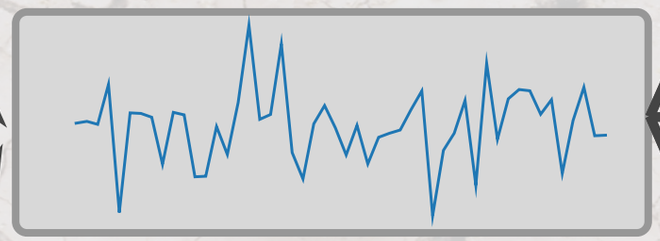
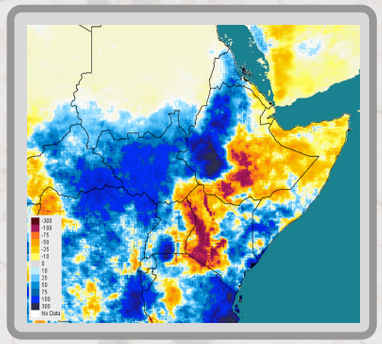
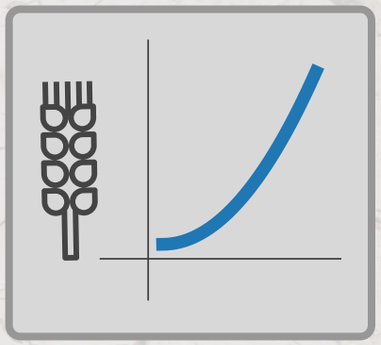
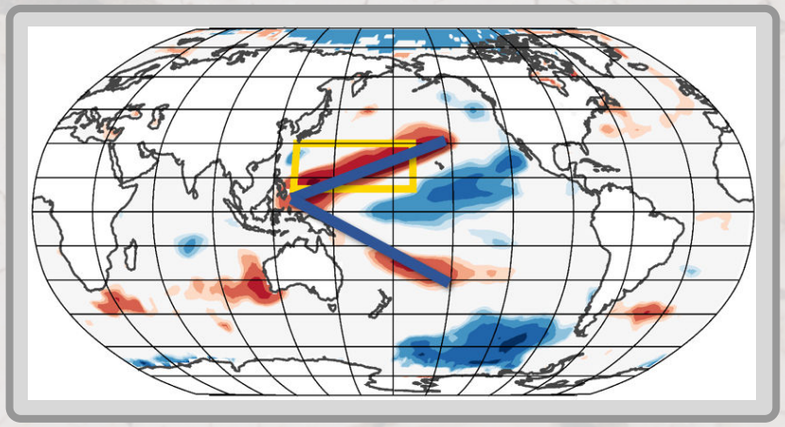




Drought Monitoring



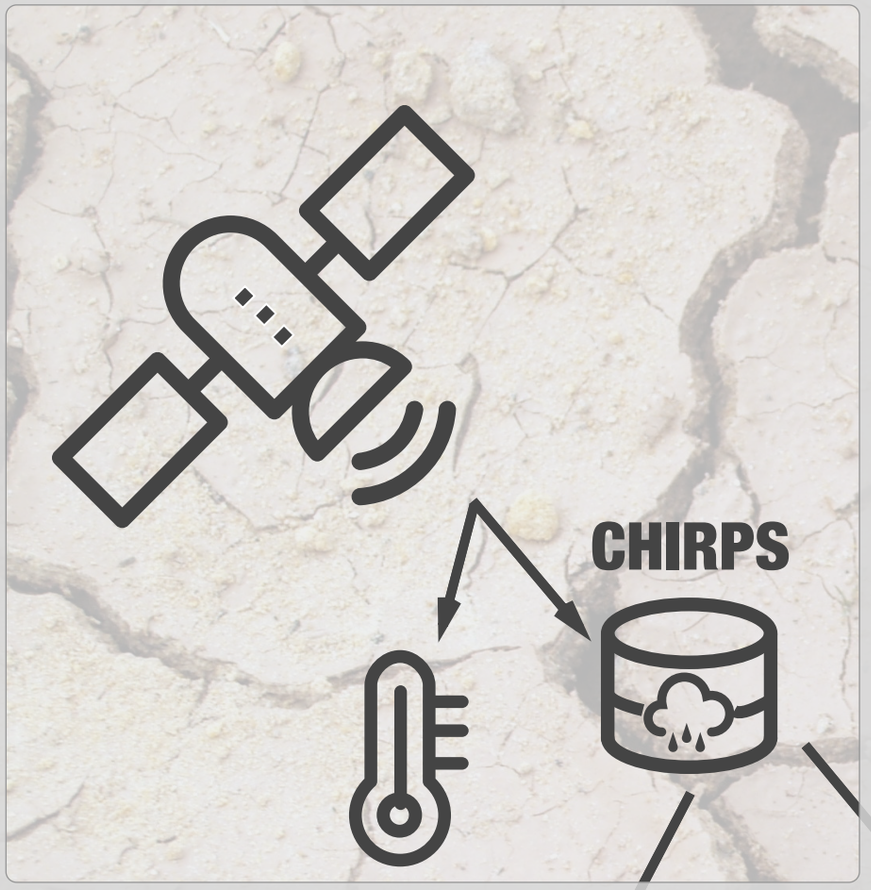
Crop Yield Impact

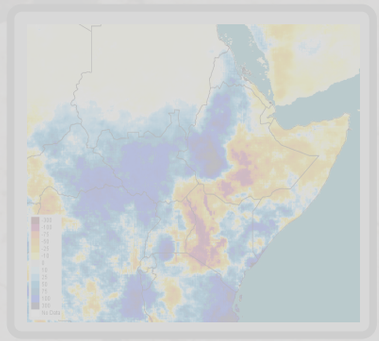


Teleconnections

HOLAPS

Methods





Drought Monitoring

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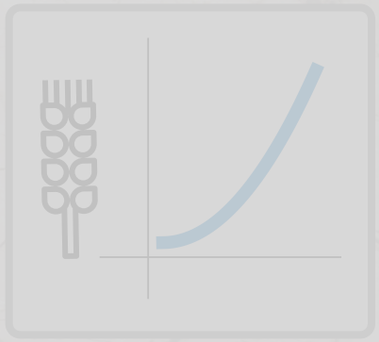
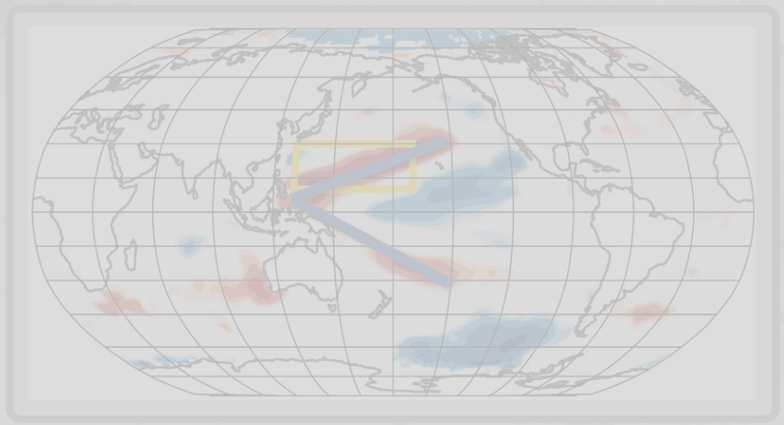


Crop Yield Impact



Teleconnections

HOLAPS

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HOLAPS

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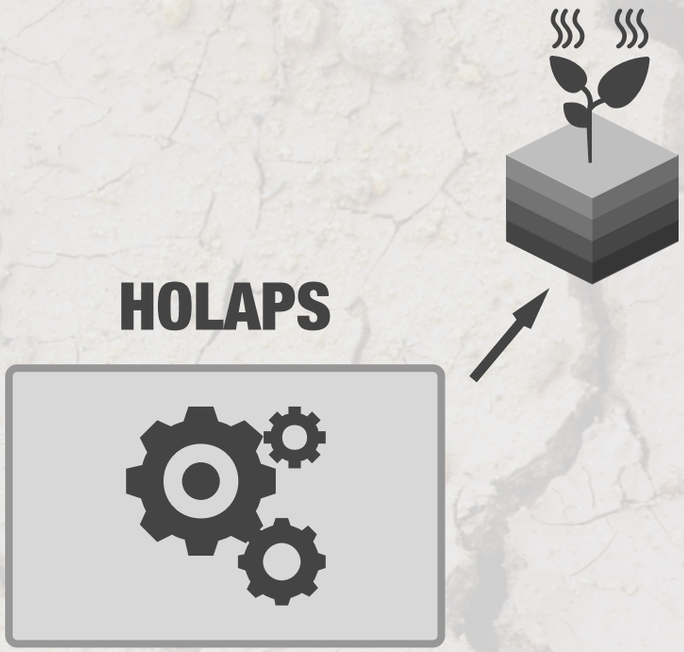
Drought Monitoring

Crop Yield Impact

Teleconnections



1

already existing framework

Loew et al (2016)

adapt to produce gridded outputs

pan-African soil moisture & evapotranspiration

Dorigo et al (2017), GLEAM (2016)

land-surface model (physically based)

Methods

2

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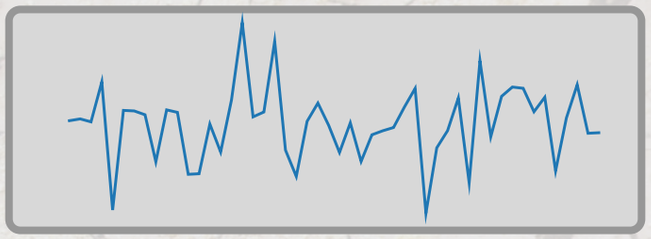


2

develop composite drought indicators

Aghakouchak et al (2015), Vincente-Serrano et al. (2018)

combining meteorological and vegetation paramaters

Rojas et al (2011)

validate against crop yield data

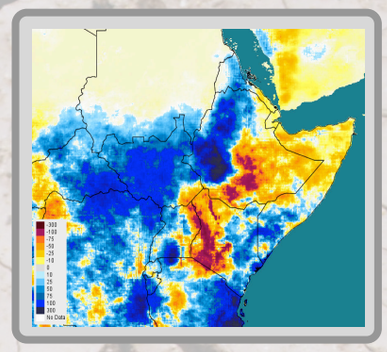
Mann and Warner (2018)

ensemble approach using machine learning

Reece and Isupova (personal communication)

Methods

3



Drought Monitoring

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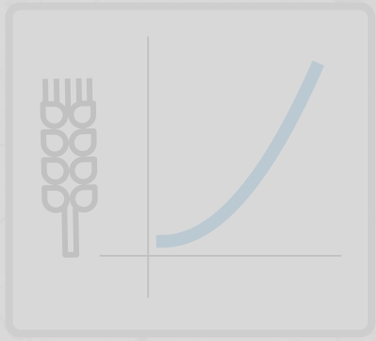
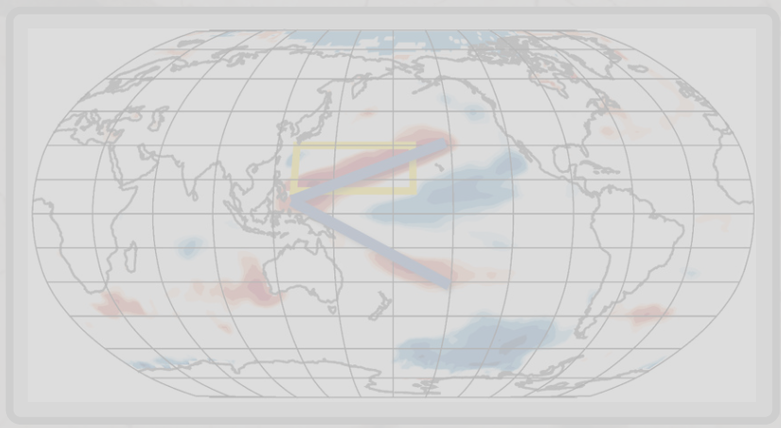


Crop Yield Impact



Teleconnections

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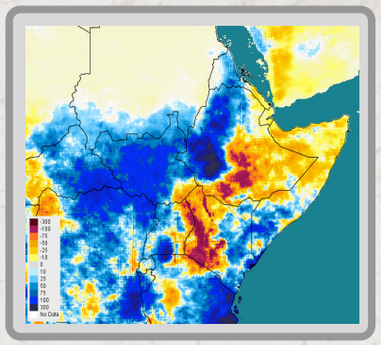

Drought Monitoring

3

spatio-temporal patterns in drought

Mann and Warner (2018), Zhao et al (2018)

decision support tools for insurers

Enenkel et al (2015), Airbus (Personal Communication)

quantify critical thresholds for droughts

Rong Fu (in press)

Methods

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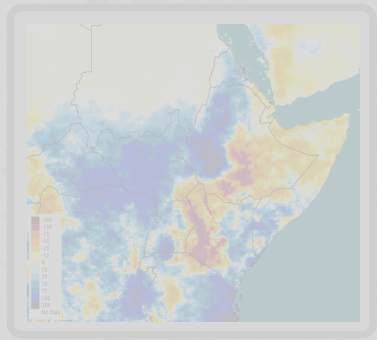

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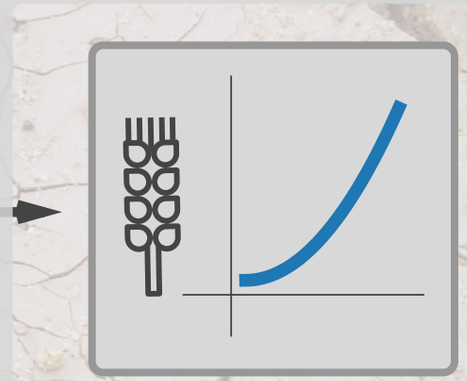

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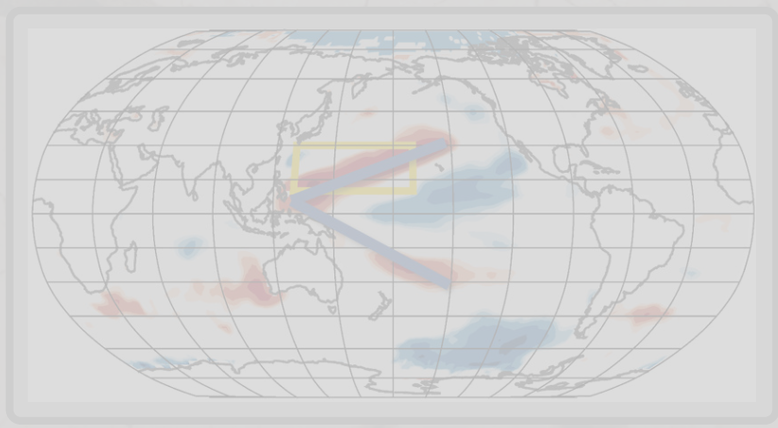

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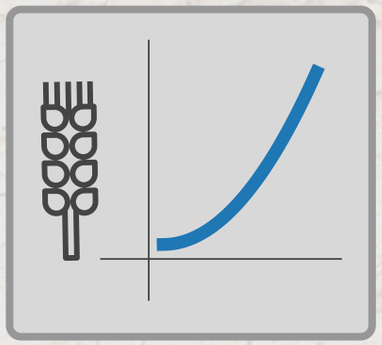

Crop Yield Impact

4

crop yield ~ drought index

Salam el Vitaly et al (2018)

quantify the impact of drought on agriculture

Vivid (personal communication), Naumann et al (2015), Zipper et al (2016)

ABMs - insurers, farmers, governments

Methods

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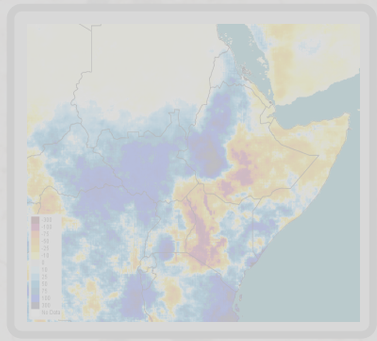

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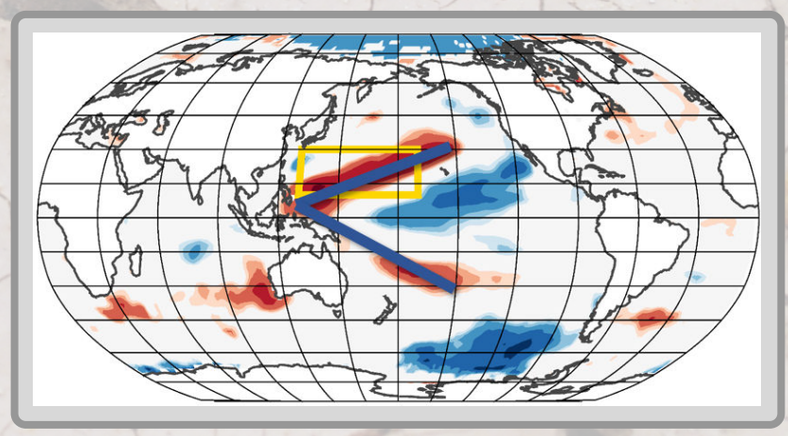

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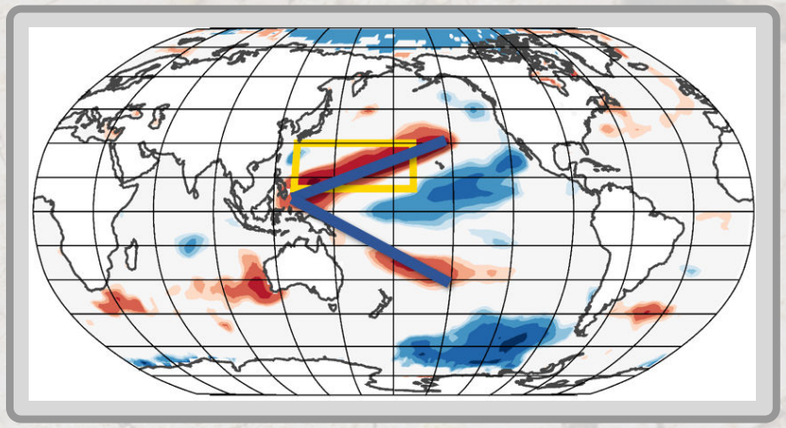

Teleconnections

5

drought ~ ocean-atmosphere anomalies

Oliviera-Junior et al (2018), Funk et al (2018) , Vellinga (2018)

increased resolution data to quantify correlation

FORPAC group, Macleod et al (in press)

increased resolution data to quantify correlation

FORPAC group, Macleod et al (in press)

Methods

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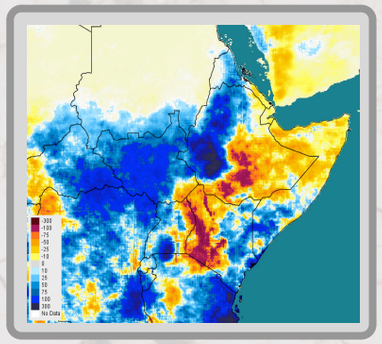

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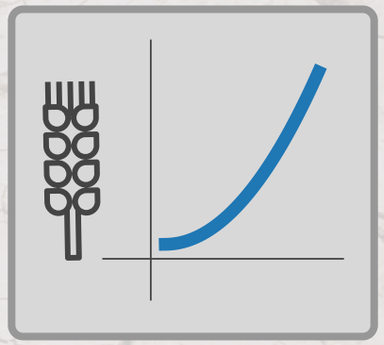

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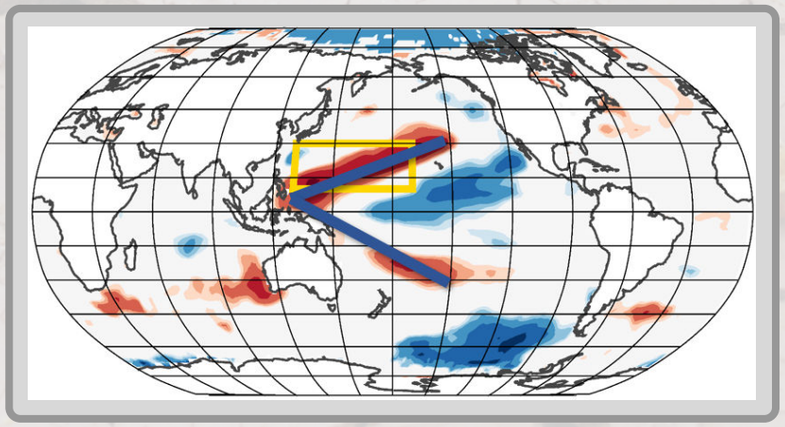

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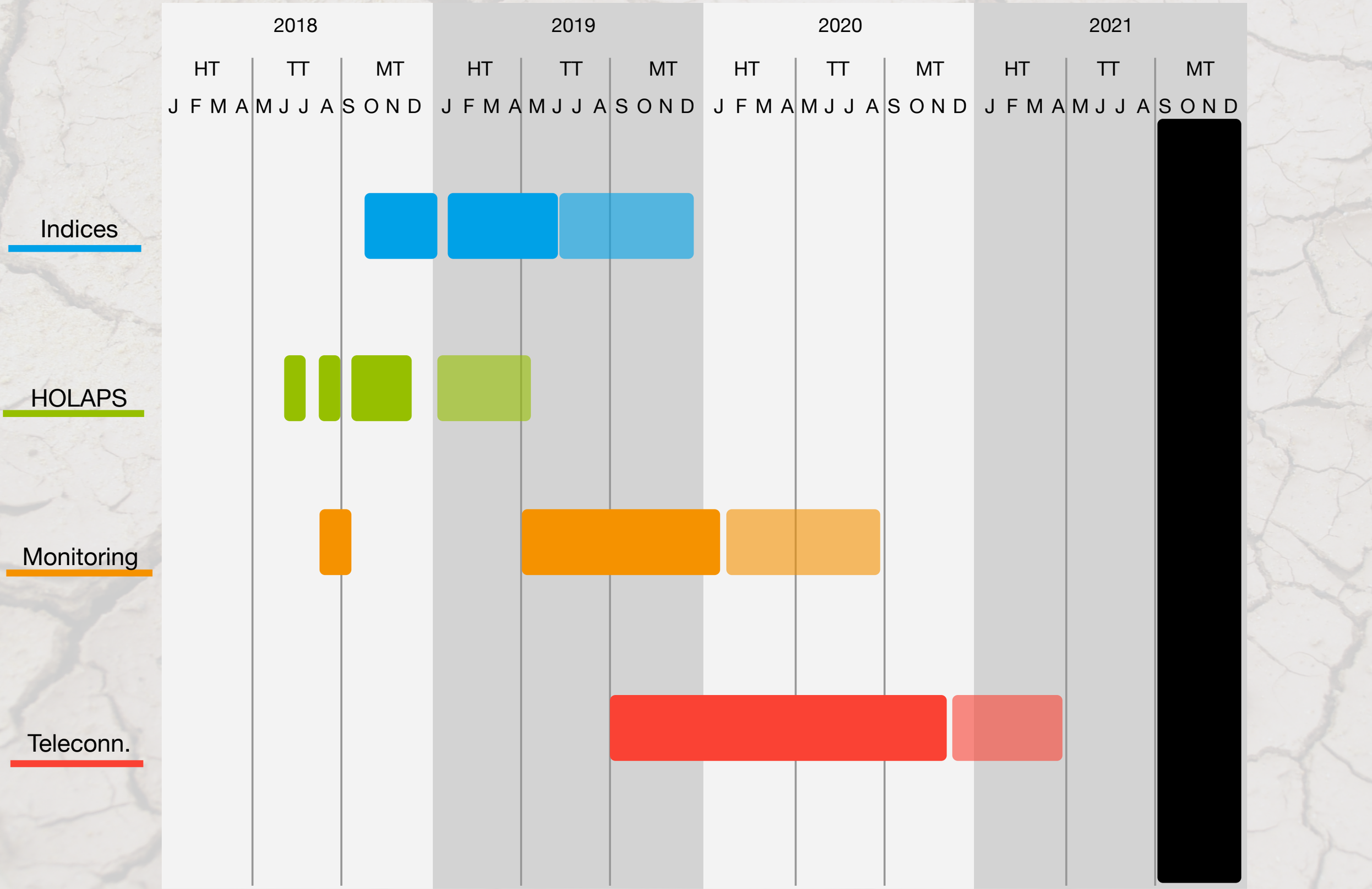
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