

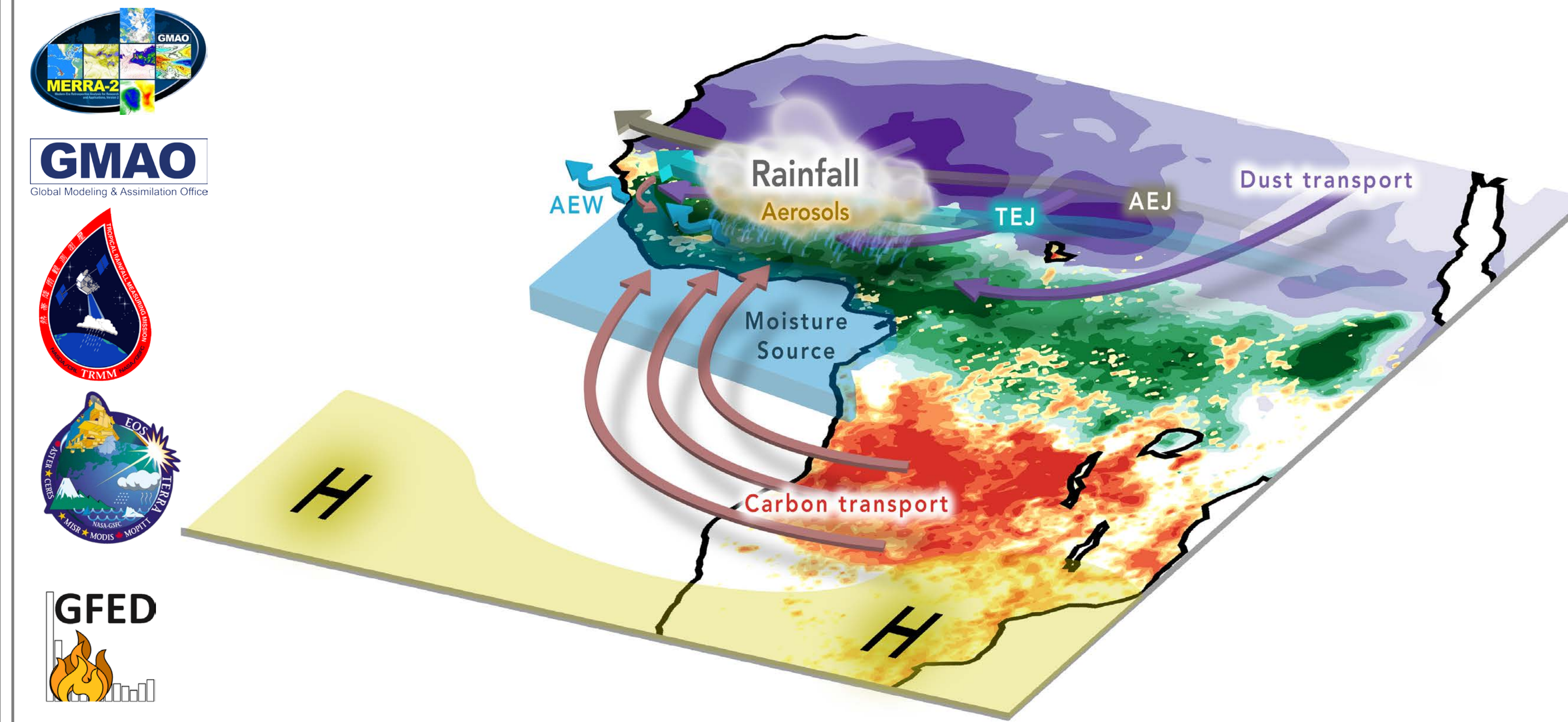
Recent rainfall decline in West Africa due to enhanced biomass burning and dust emission

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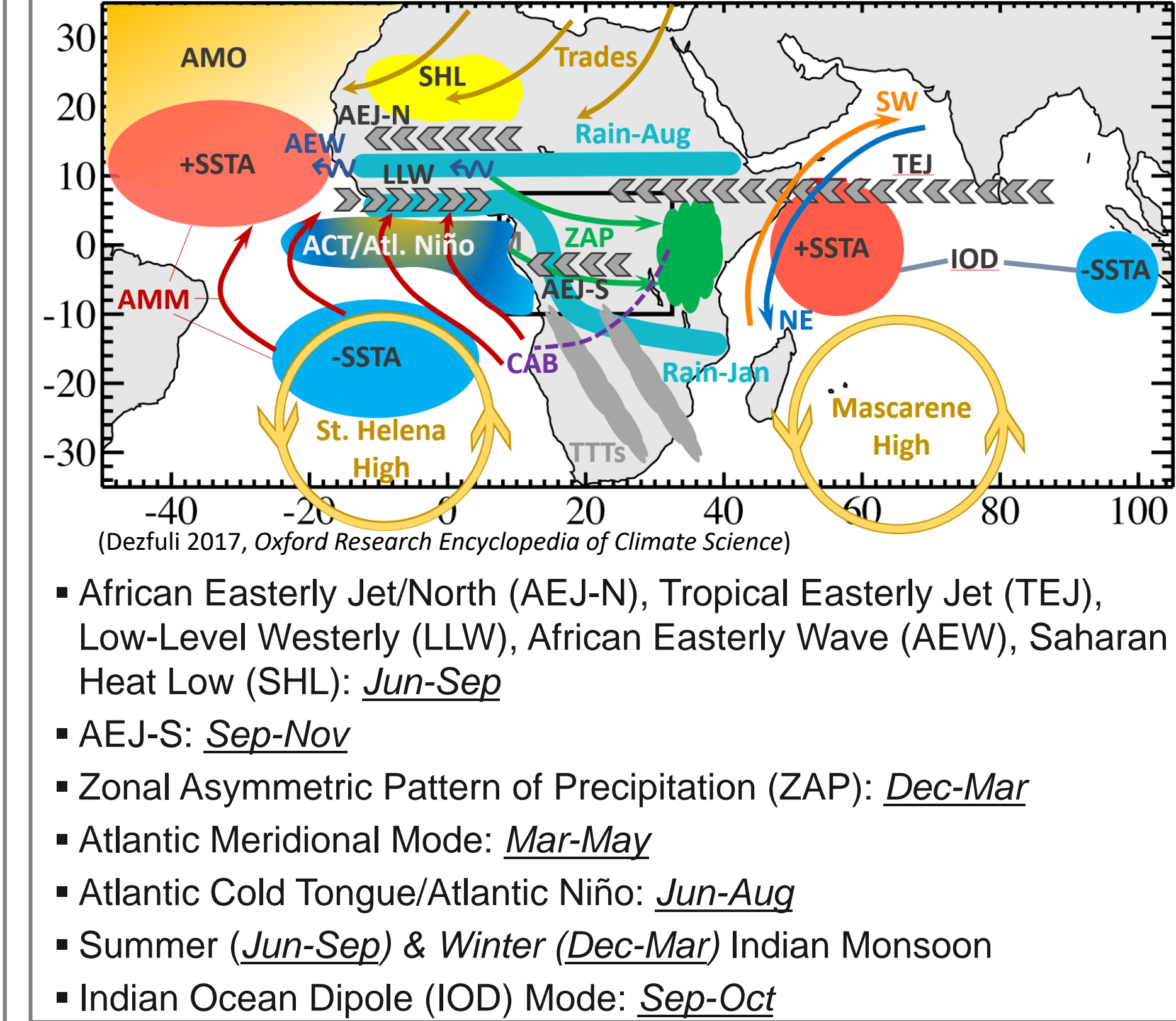
Overview:

- West African monsoon (WAM), the dominant climatic feature in Africa, is most active over Southern West Africa in June.
- Livelihoods of more than 200 millions of people in SWA are affected by rainfall as they rely on rainfed agriculture, fishing, hydropower, and inland waterway systems.
- Rainfall characteristics have also health implications, for example:
 - Dry & dusty conditions → high risk of meningitis
 - Extreme precipitation → cholera outbreaks
- Unlike dynamical features of WAM, the role of aerosols on SWA rainfall variability is not well-understood.
- We found a two-decade negative trend in SWA's rainfall that is inversely related to the combined loadings of black carbon (BC) and dust. A possible mechanism is provided.
- Improvements in seasonal predictions, using a hybrid dynamical-statistical approach.
- The results are crucial because land use change, deforestation, and rapid urbanization growth are projected to increase aerosols in the region. Therefore, SWA could experience an increase in drought intensity and frequency in future.

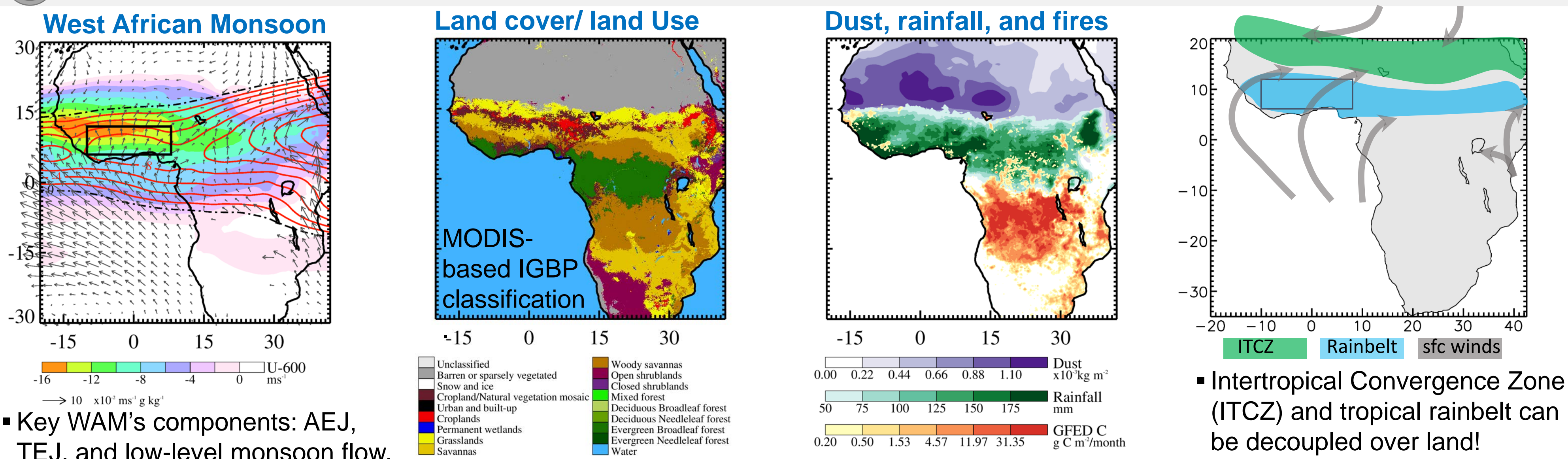
Graphical Abstract: Dynamical Features & Aerosols Affecting SWA's Rainfall in June



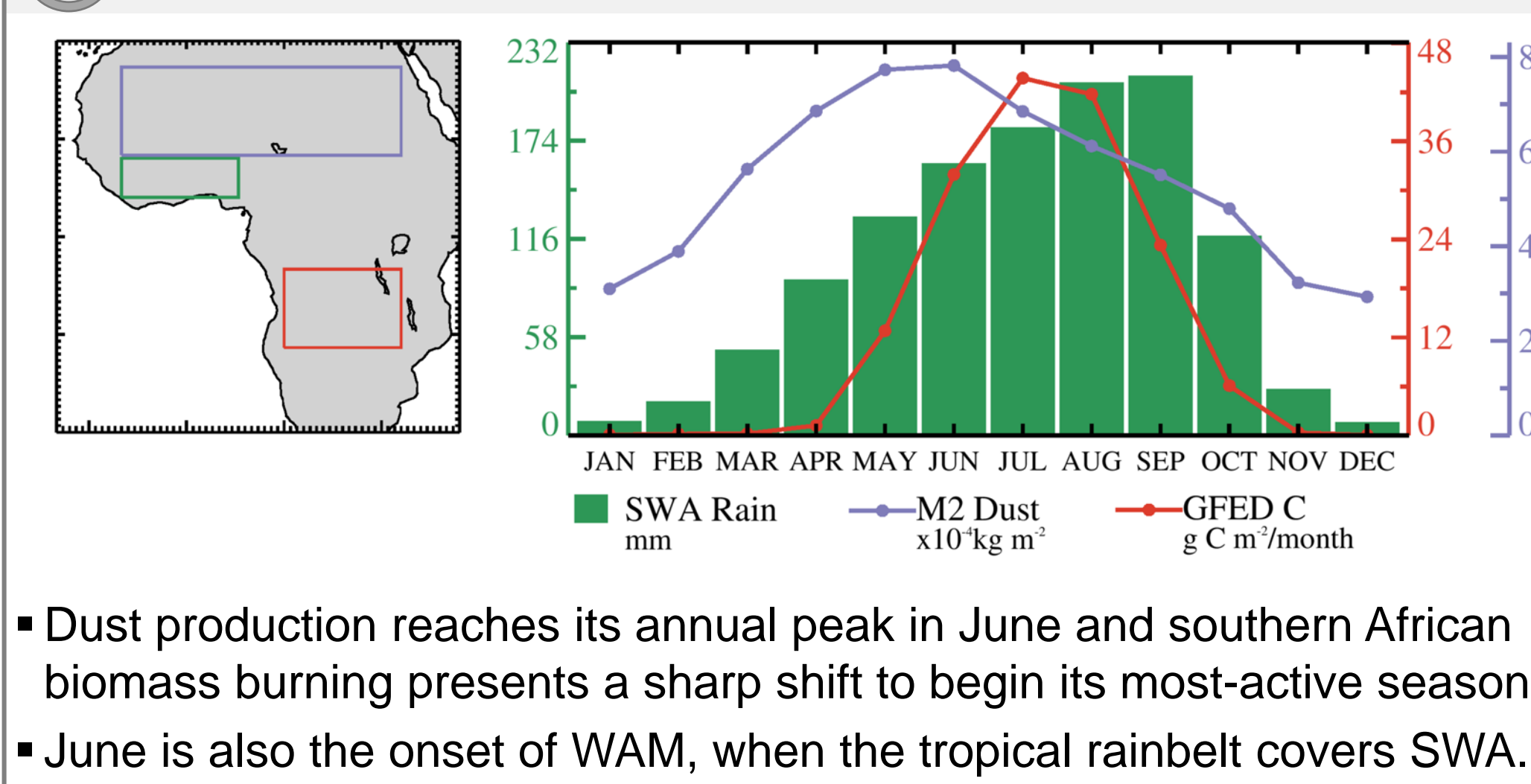
1 Climatic Features Affecting Africa



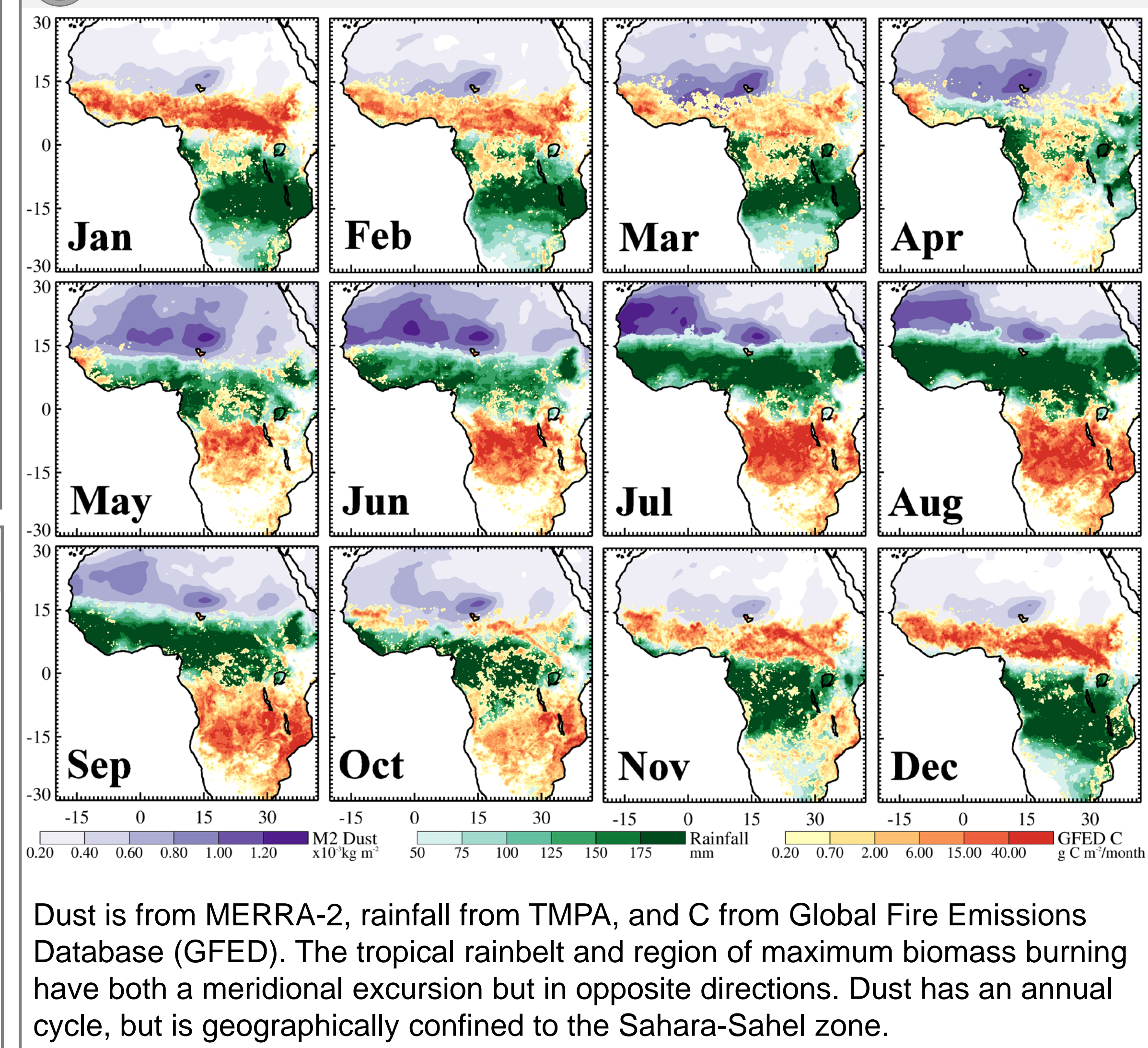
2 Climatic Characteristics of Southern West Africa in June



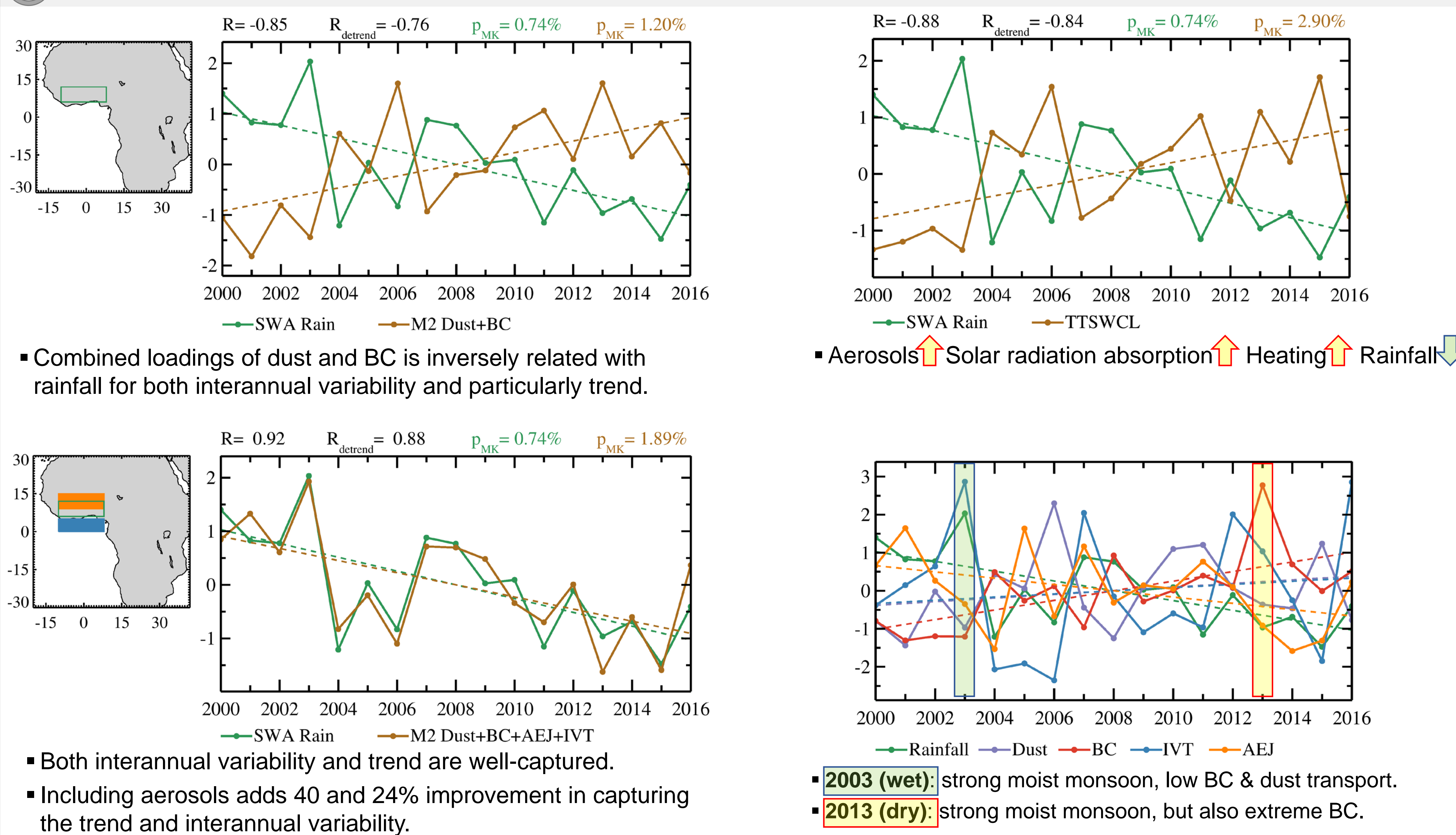
3 Annual Cycle: Rainfall, M2 Dust, C Emissions



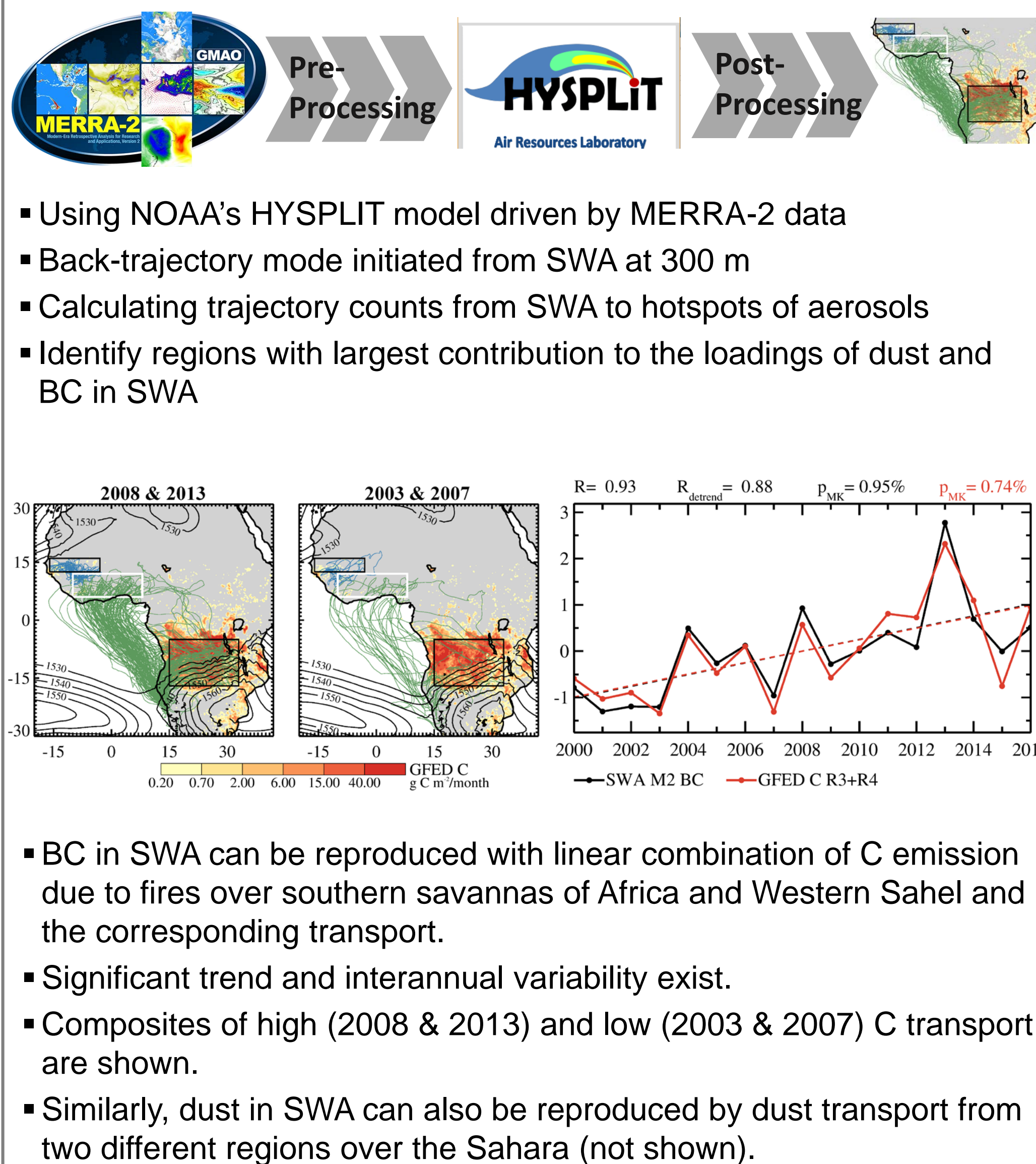
4 Monthly Mean Patterns of Dust, Rainfall & C Emission



5 Role of Aerosols vs. Traditionally-Known Dynamical Features in Rainfall Variability and Trend



6 Source of Aerosols: Local or Remote?



7 Potential Seasonal Prediction Skill

