

A weather-based prediction method to forecast regional emissions from wildfires in African grasslands

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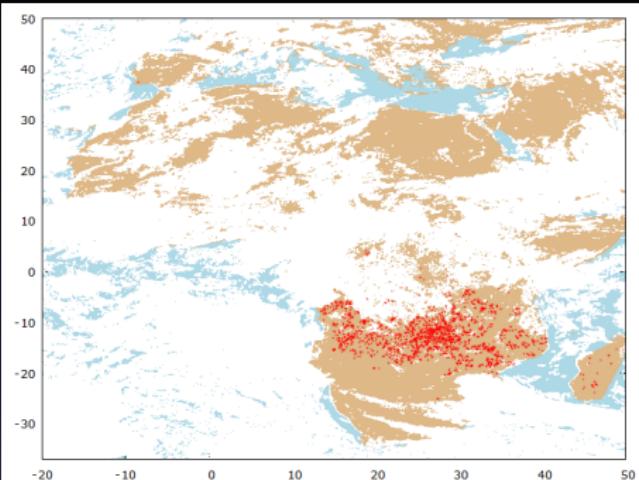
Finnish Meteorological Institute

12th EARSel Workshop
Rome, Italy
Oct. 3-5, 2019

Outline

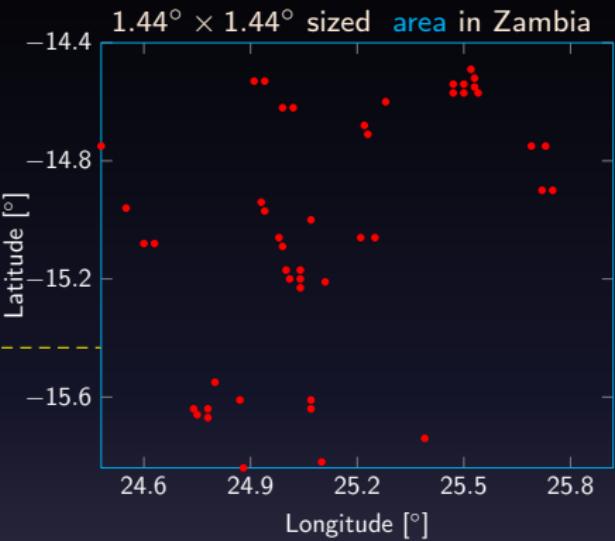
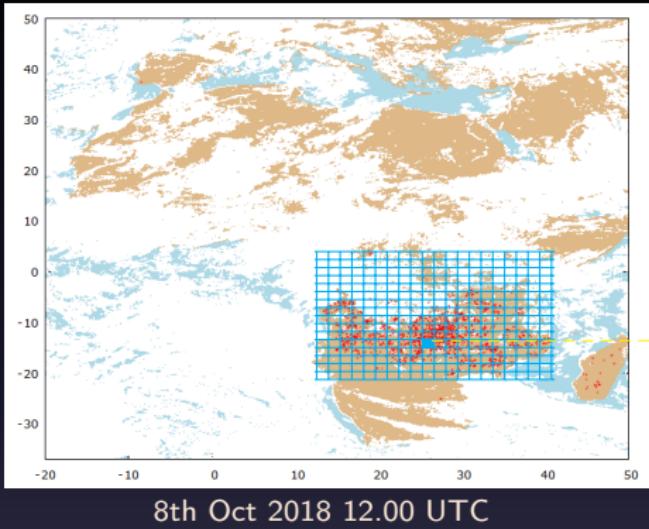
- ① Wildfire prediction method description
- ② Method's performance on African grassland fires

Fires in Africa observed by SEVIRI/MSG

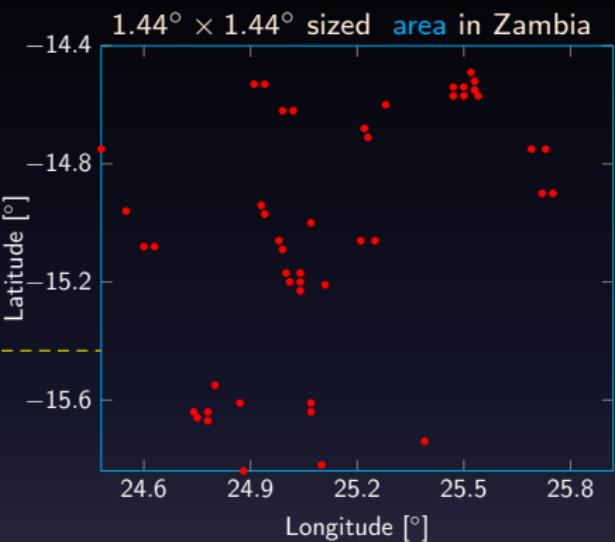
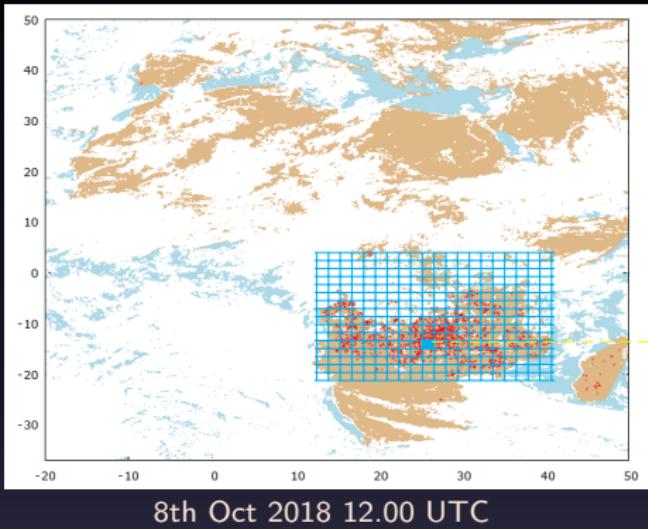


8th Oct 2018 12.00 UTC

Fires in Africa observed by SEVIRI/MSG



Fires in Africa observed by SEVIRI/MSG

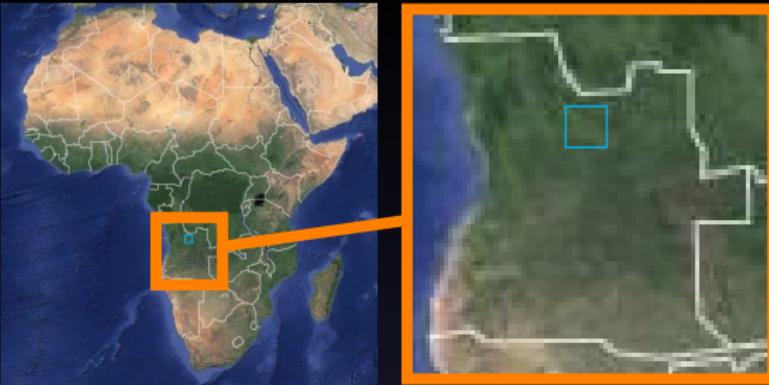


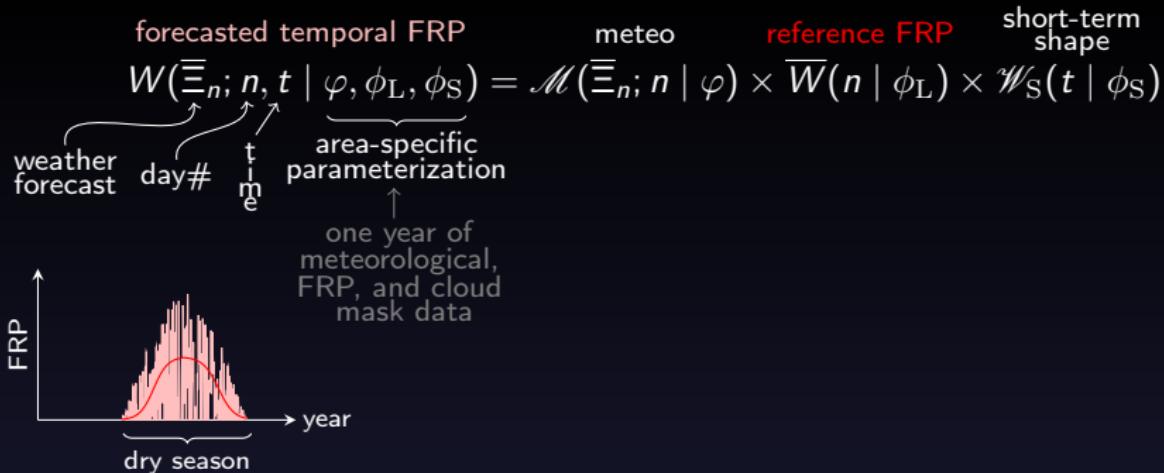
$$\text{temporal FRP} \propto \frac{d}{dt} M_{\text{bio}}(t)$$

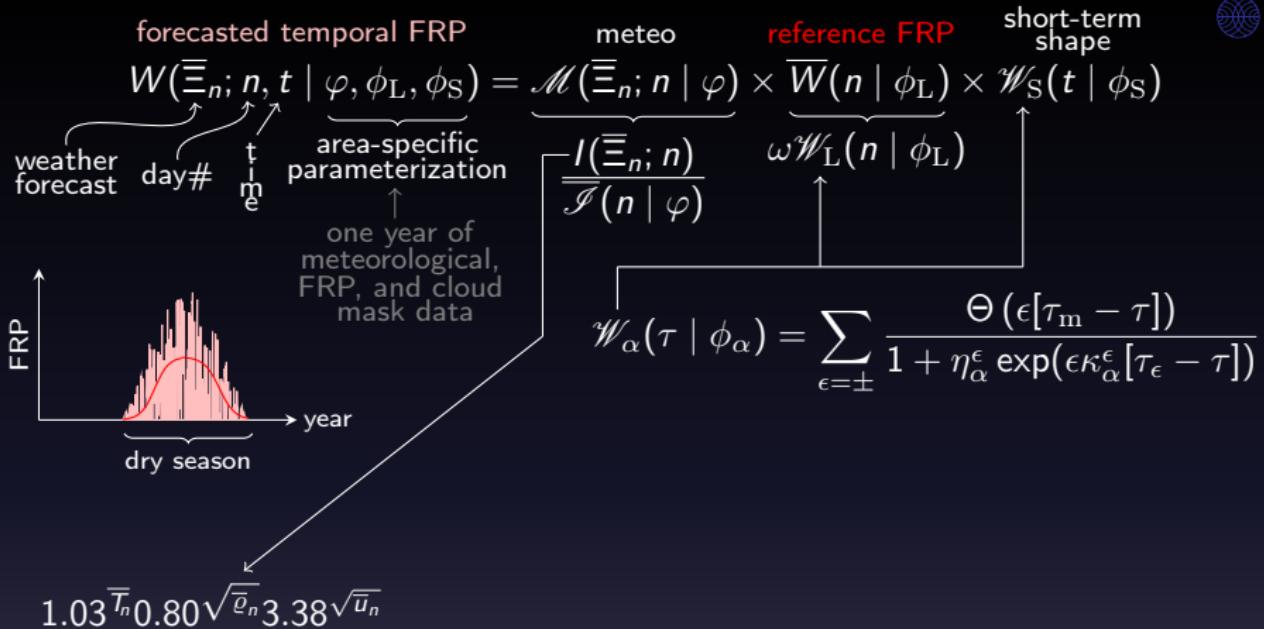
$1.44^\circ \times 1.44^\circ$ sized area at 18.00°E 9.36°S in Angola

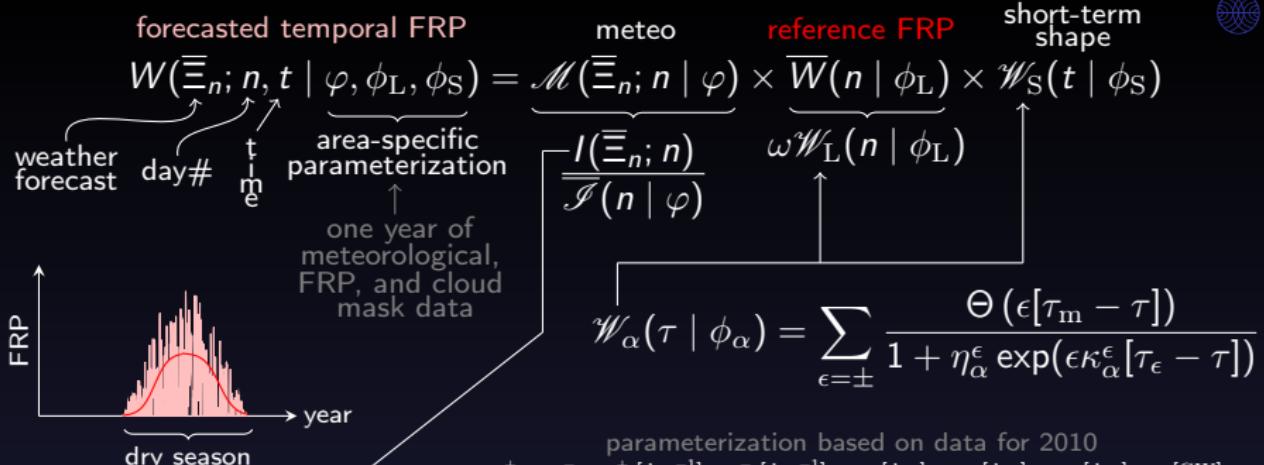


$1.44^\circ \times 1.44^\circ$ sized area at 18.00°E 9.36°S in Angola



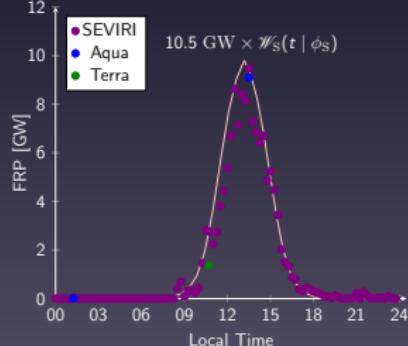
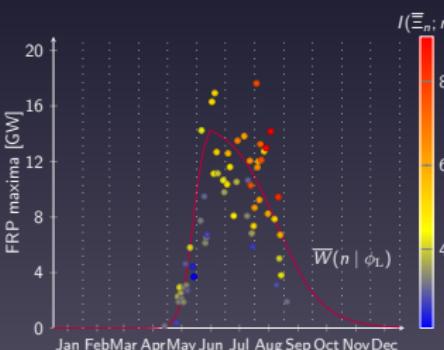
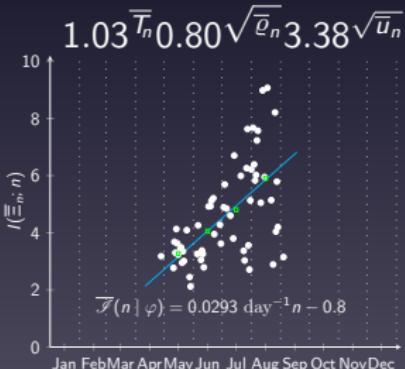




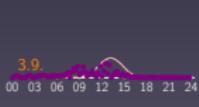
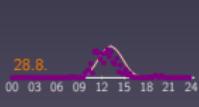
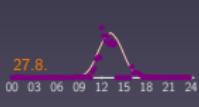
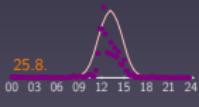
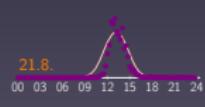
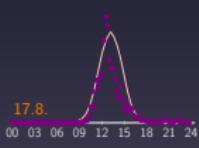
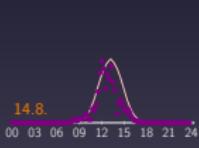
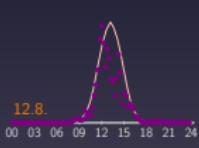
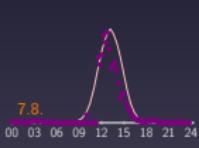
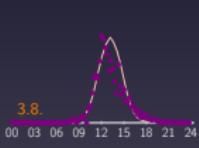
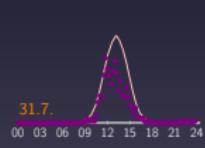
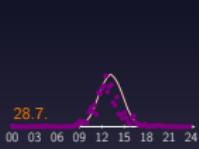
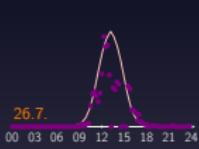
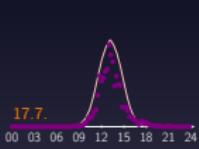
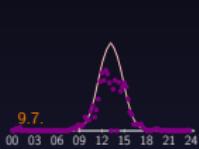
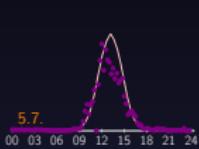
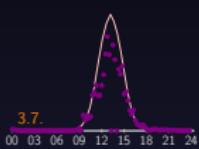
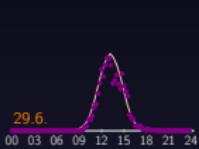
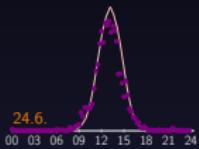
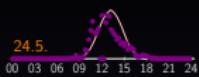


$$\mathcal{W}_\alpha(\tau \mid \phi_\alpha) = \sum_{\epsilon=\pm} \frac{\Theta(\epsilon[\tau_m - \tau])}{1 + \eta_\alpha^\epsilon \exp(\epsilon \kappa_\alpha^\epsilon [\tau_\epsilon - \tau])}$$

| parameterization based on data for 2010 | | | | | | | |
|---|------------|--------------------------------|--------------------------------|--------------------|--------------------|--------------------|----------------------|
| η_L^+ | η_L^- | $\kappa_L^+ [\text{day}^{-1}]$ | $\kappa_L^- [\text{day}^{-1}]$ | $n_+ [\text{day}]$ | $n_- [\text{day}]$ | $n_m [\text{day}]$ | $\omega [\text{GW}]$ |
| 100 | 100 | 0.16 | 0.042 | 118 | 345 | 165 | 15.0 |
| η_S^+ | η_S^- | $\kappa_S^+ [\text{min}^{-1}]$ | $\kappa_S^- [\text{min}^{-1}]$ | $t_+ [\text{min}]$ | $t_- [\text{min}]$ | $t_m [\text{min}]$ | |
| 100 | 100 | 0.025 | 0.025 | 500 | 1080 | 790 | |



2010



The presented phenomenological weather-based prediction method

Current status

- shows promise in predicting African grassland fires
- tested completely on two different areas + some random checks on random areas

Future actions

- all the areas in the region will be parameterized
- the method will also be tested on other types of wildfires

Thank You!