Influence of Atmospheric Teleconnections on Interannual Variability of Boreal Fires

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1. Research Focus

Do atmospheric teleconnection patterns affect fires in boreal area? & How?

2. Data and Methods

- **Atmospheric teleconnection indices**: Nine indices from the CPC
- **Climate**: Relative Humidity(RH), Temperature (T), Wind Speed (WS) from the NCEP/NCAR reanalysis data
- **Atmosphere**: Wind and geopotential height (500hPa/850hPa/700hPa) from the NCEP/NCAR Reanalysis data
- **Burned area fraction (BAF)**: GFED4s
- **Vegetation**: AVHRR's NDVI
- **Nino 3.4**: from the CPC

Methods: Regression, Correlation.
All data were detrended in June-July-August-September (JJAS).

3. Results

JJAS burned area-teleconnection correlation

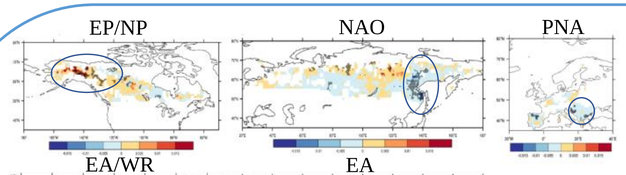
	BONA	BOAS	EURO
NAO	0.34	-0.46**	-0.18
EA	-0.11	0.48**	0.13
WP	-0.02	-0.34	0.19
EP/NP	0.61**	-0.27	0.05
PNA	0.15	-0.05	-0.56**
EA/WR	-0.46**	-0.17	-0.10
SCA	-0.25	-0.45*	-0.14
POL	-0.07	-0.31	-0.07
PT	-0.40*	0.19	-0.12

Nino3.4	0.19	-0.12	-0.29

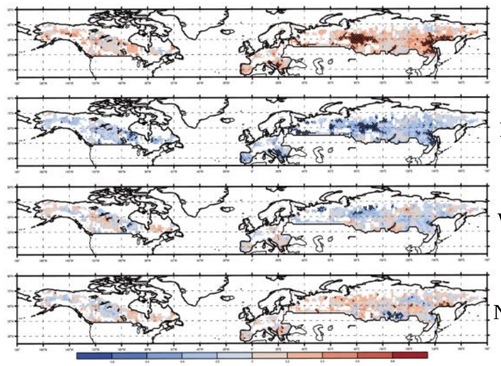
NAO: North Atlantic Oscillation **EA:** East Atlantic
WP: West Pacific **EP/NP:** East Pacific-North Pacific
PNA: Pacific/North American **EA/WR:** East Atlantic/Western Russia
SCA: Scandinavia **POL:** Polar/ Eurasia
PT: Pacific Transition

BONA: Boreal North America **BOAS:** Boreal Asia
EURO: Europe

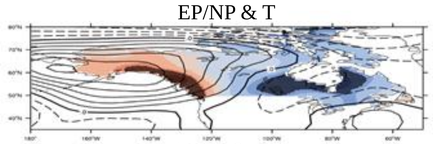
*(**) means the correlations are significant at the 90%(95%).



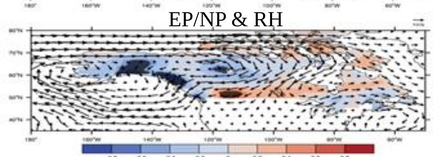
Significant regions after regressing BAF against five indices

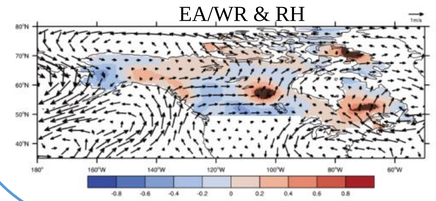


Cor. with JJAS BAF → T and RH are two key factors of fires

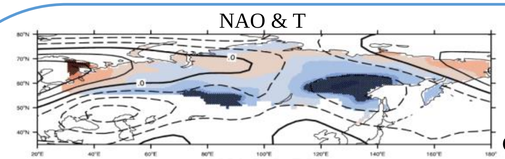


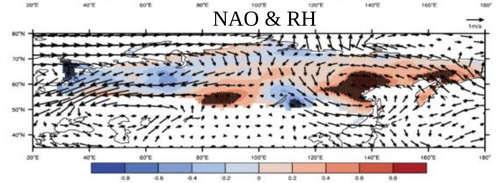
Warmer air due to a local high-pressure system, and a dry northeast airflow → more fires in northwestern North America



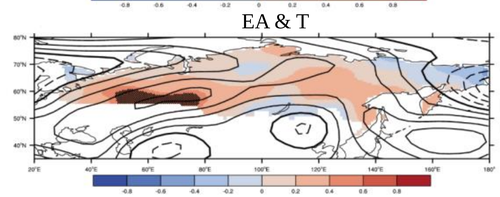


A wet airflow from the Atlantic to central Canada → fewer fires in central Canada

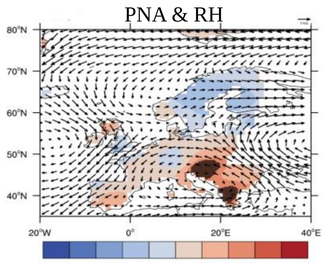




Colder air due to a low-pressure system, and a wet airflow from the Pacific → fewer fires in eastern Russia



Warmer air due to a high-pressure system → more fires in western Russia



A wet airflow from the Black Sea and the Mediterranean Sea → fewer fires in southeast Europe

Shading: correlation coefficients
Contour: regressed anomalies of geopotential height at 500hPa
Vector : regressed anomalies of horizontal wind at 850/700hPa

4. Conclusions

- EP/NP ↑ → BA ↑ (T ↑、RH ↓) in northwestern North America
- EA/WR ↑ → BA ↓ (RH ↑) in central Canada
- NAO ↑ → BA ↓ (T ↓、RH ↑) in eastern Russia
- EA ↑ → BA ↑ (T ↑) in western Russia
- PNA ↑ → BA ↓ (RH ↑) in southeast Europe