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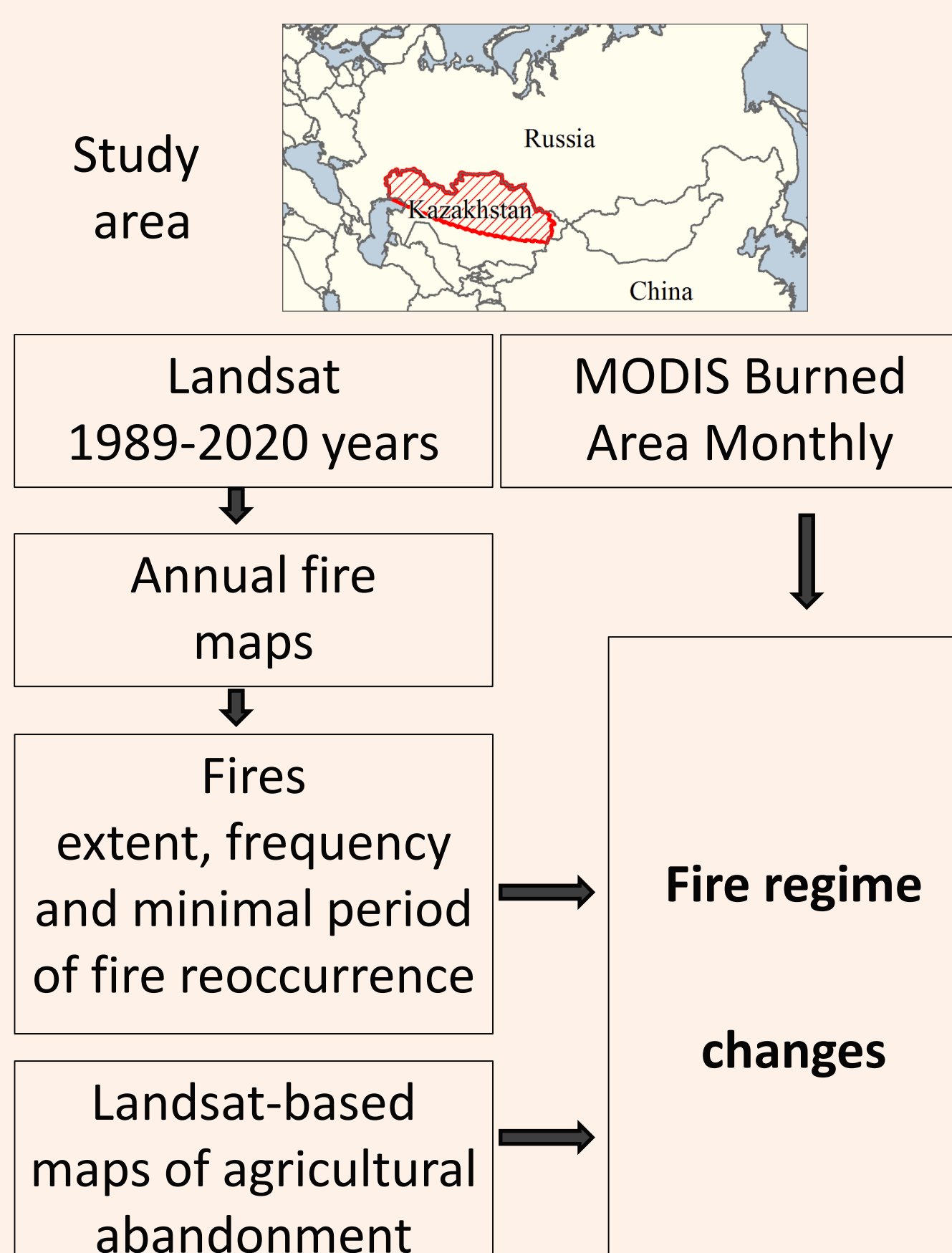
Introduction

- Kazakhstan is a global hotspot of agricultural abandonment: 70% decrease in arable land and in grazing pressure
- During the Soviet era, applying fires as an agricultural tool was restricted
- In post-Soviet Kazakhstan, agricultural fires became uncontrolled
- Both fuel accumulation and uncontrolled human-made fires can cause changes in fire regimes
- Understanding fire dynamics is necessary for ecosystem-based fire management and conservation

Goals

- To map annual extent of fires in Northern Kazakhstan since 1989
- To evaluate changes in fire extent, frequency, seasonality and minimal reoccurrence intervals in abandoned croplands and natural steppe

Methods



Results and discussion

Fire regime changed drastically. Tenfold average increase in annual burned area.
Fires concentrated near settlements and roads.
Similar fire dynamics in grasslands and abandoned croplands.

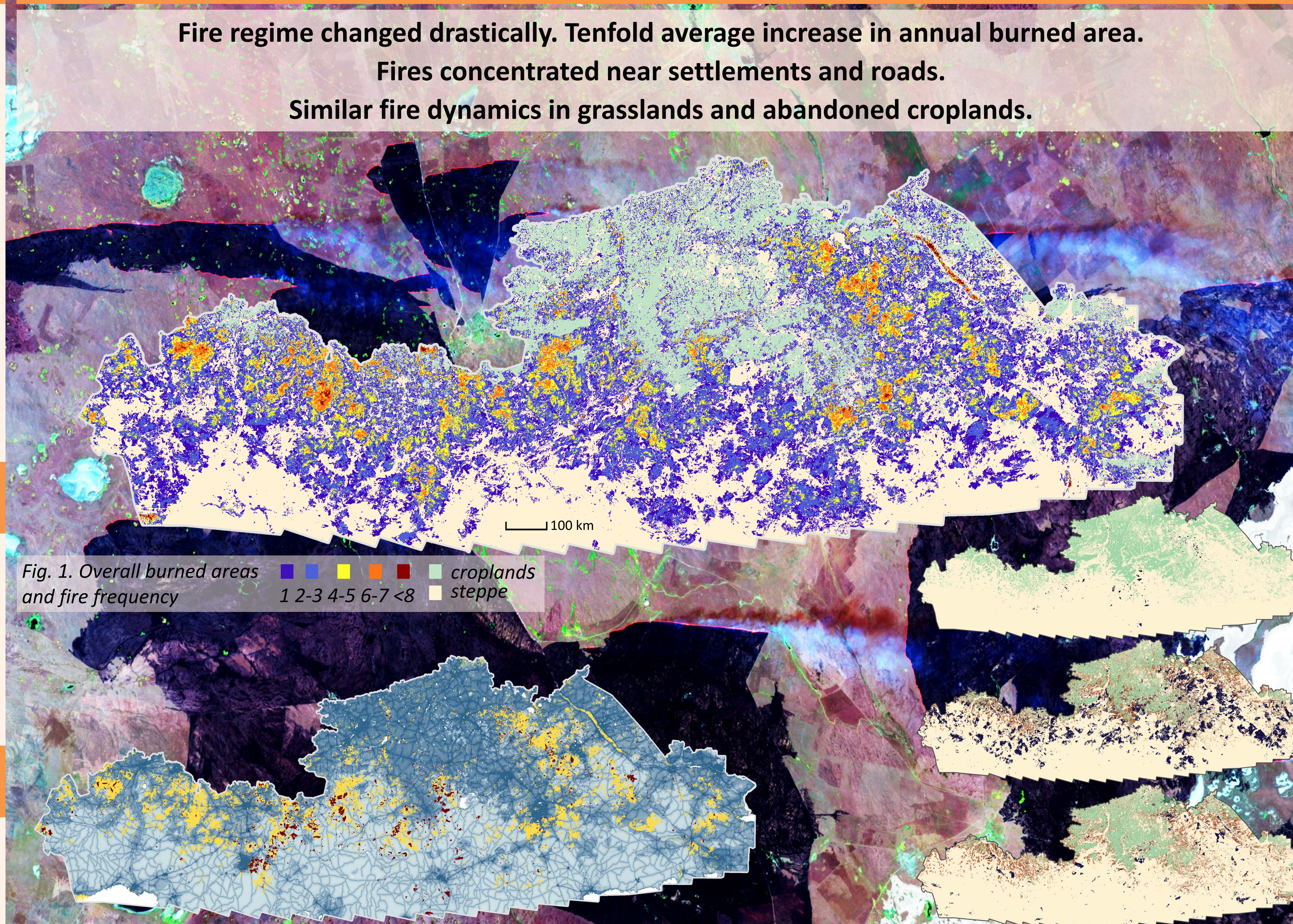


Fig. 2. Frequently burned clusters and fires in the Soviet era in relation to Human Influence Index (HII, source: WCS)

Legend: HII (blue), fires 1989-1991 (red), fire clusters 1992-2020 (yellow)

Fig. 3. Burned area in 1989, 2002, and 2020

Legend: fires (dark blue), croplands (light blue), abandonment (orange)

- Annual burned areas rapidly increased during the 1990s, peaking 5–10 years after the start of agricultural abandonment
- Annual fire extent varied strongly, especially during in the 2000s, when the minimum value (2013) was close to pre-abandonment era
- Fire frequency varied strongly in space, from 1-18 times; most of the study area burned 1-3 times
- In those areas that burned repeatedly, the minimal reoccurrence interval was short. 47% of those areas had another fire within two years
- The clusters of the most frequent fires are located in areas with low human influence indices (HII), but close to those with HII
- Peaks in annual fires usually occurred in summer; however, in some years, spring or late fall fires accounted for most of the burned area
- Since abandoned croplands area is relatively small, they did not contribute substantially to the general increase in burned area
- There was no clear association between burned area and either seasonal temperatures or precipitation

