

**Effects of desert dust on air
quality and human health.
What do we know about West
Africa compared to other regions?**

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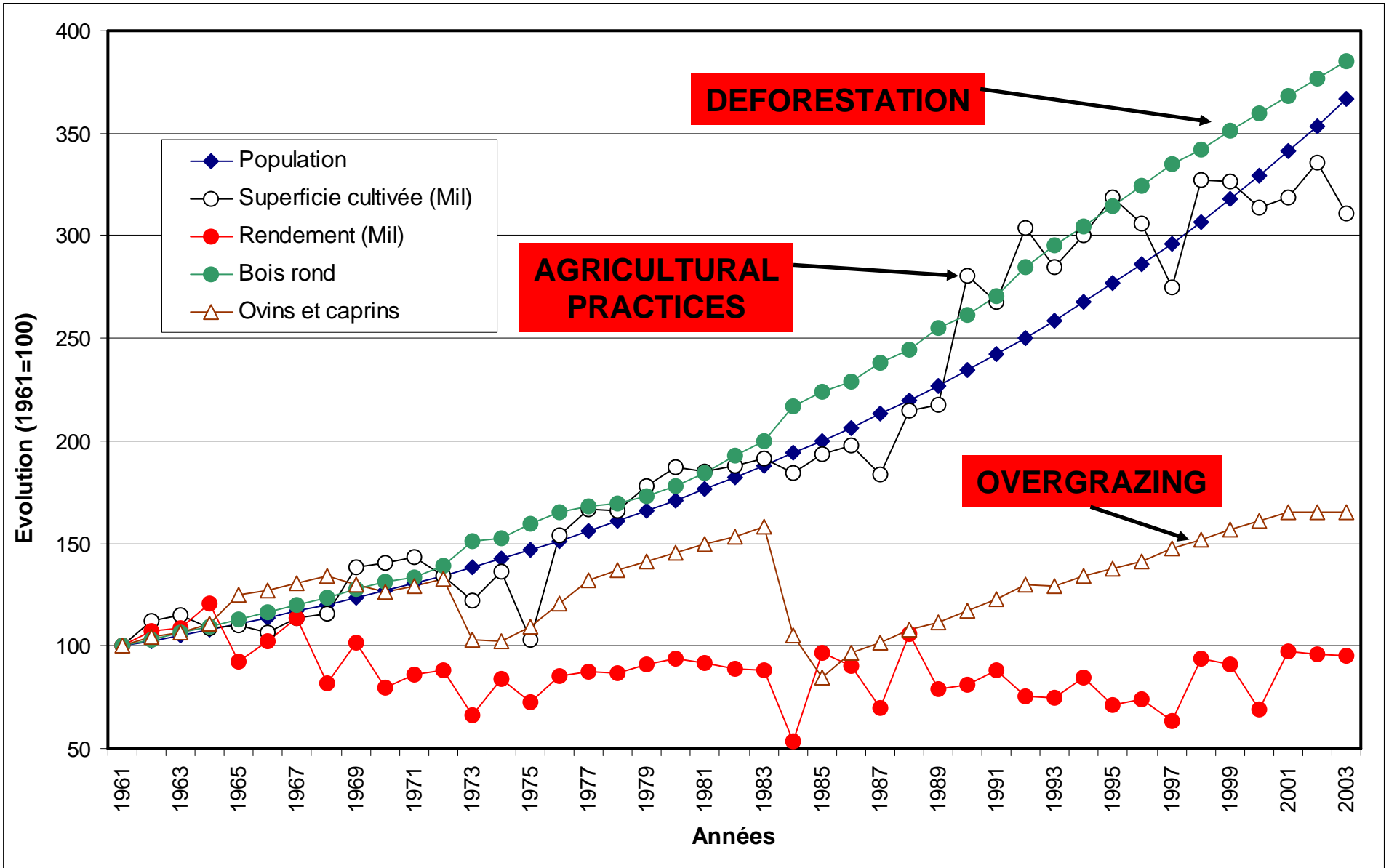
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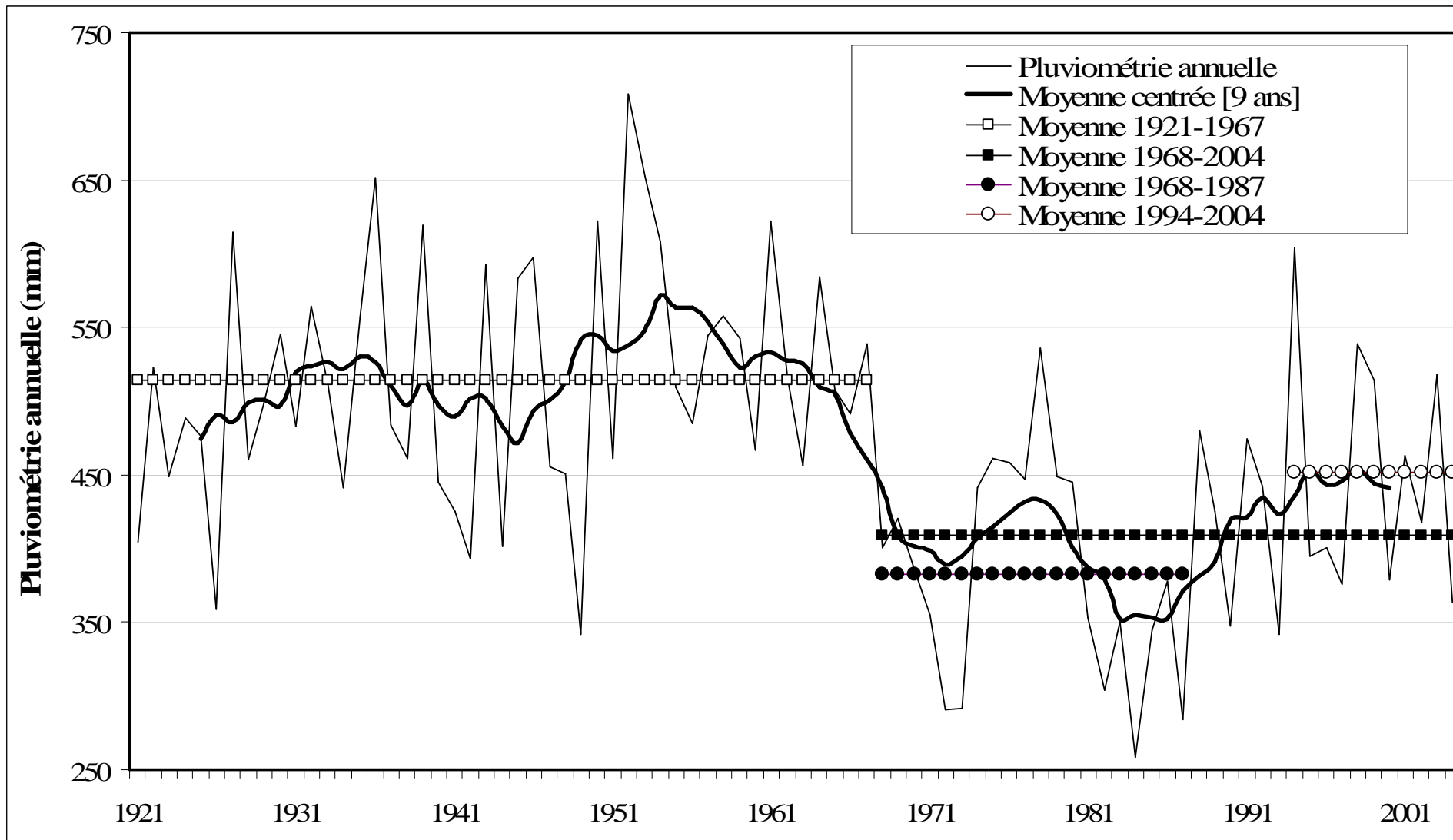
Introduction

Desertification is taking place due to population pressure, socioeconomic and policy factors which lead to overgrazing, deforestation and poor agricultural practices. In addition, rainfall shortages enhance degradation in the fragile drylands ecosystems.

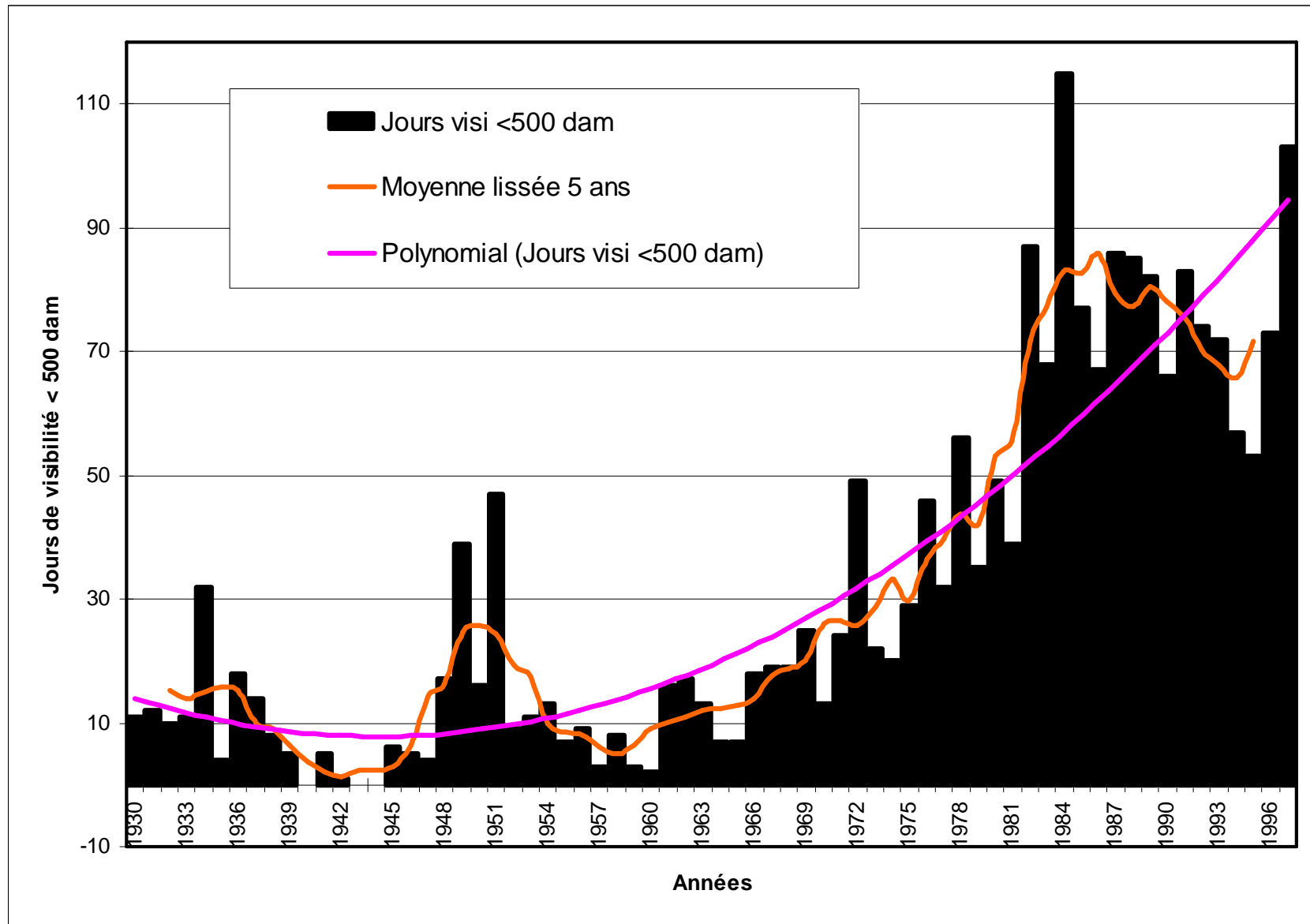
Human pressure in the Sahel (1961 – 2003) (1961 = 100)



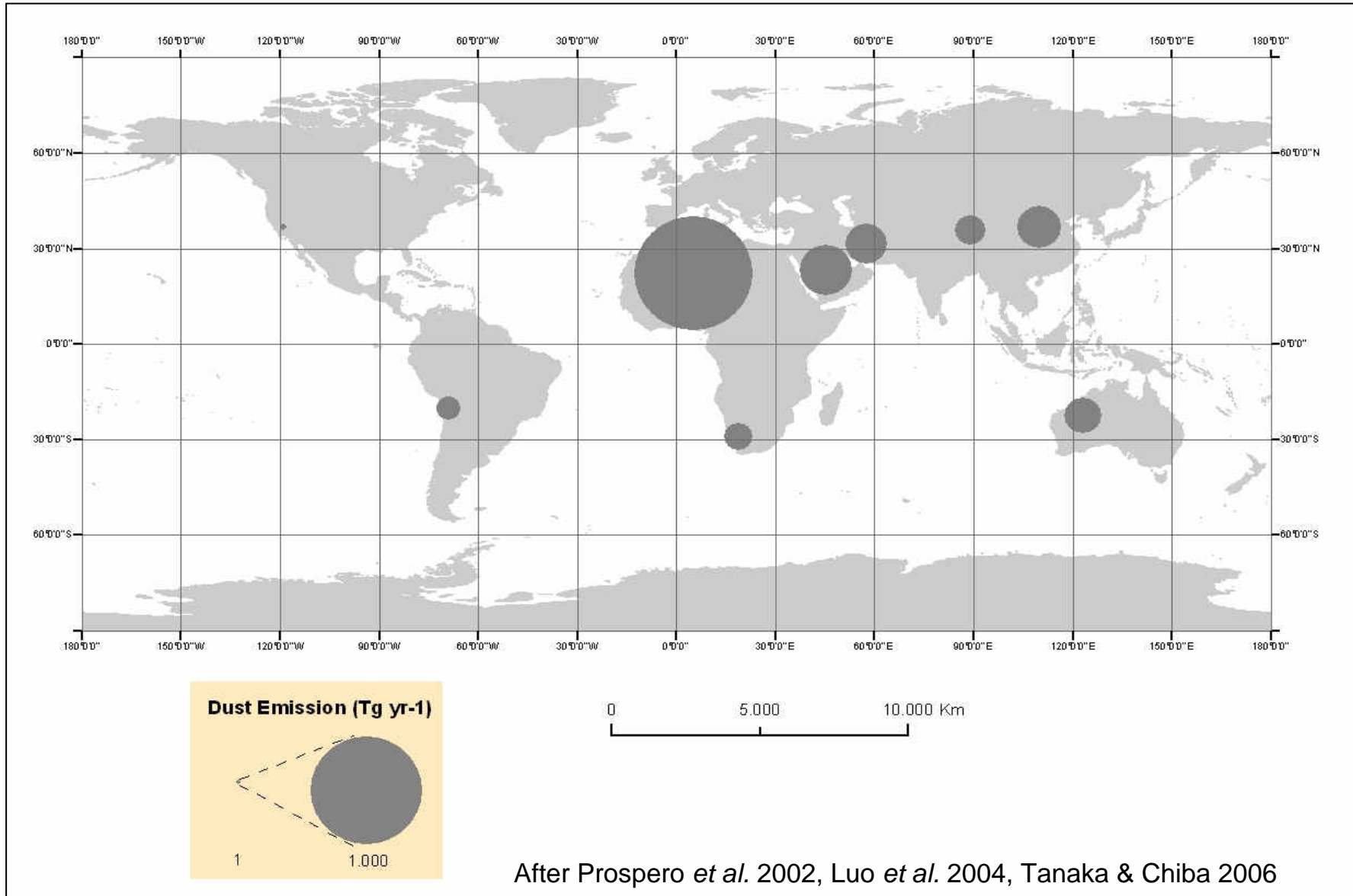
Sahelian rainfall (1921 – 2004)



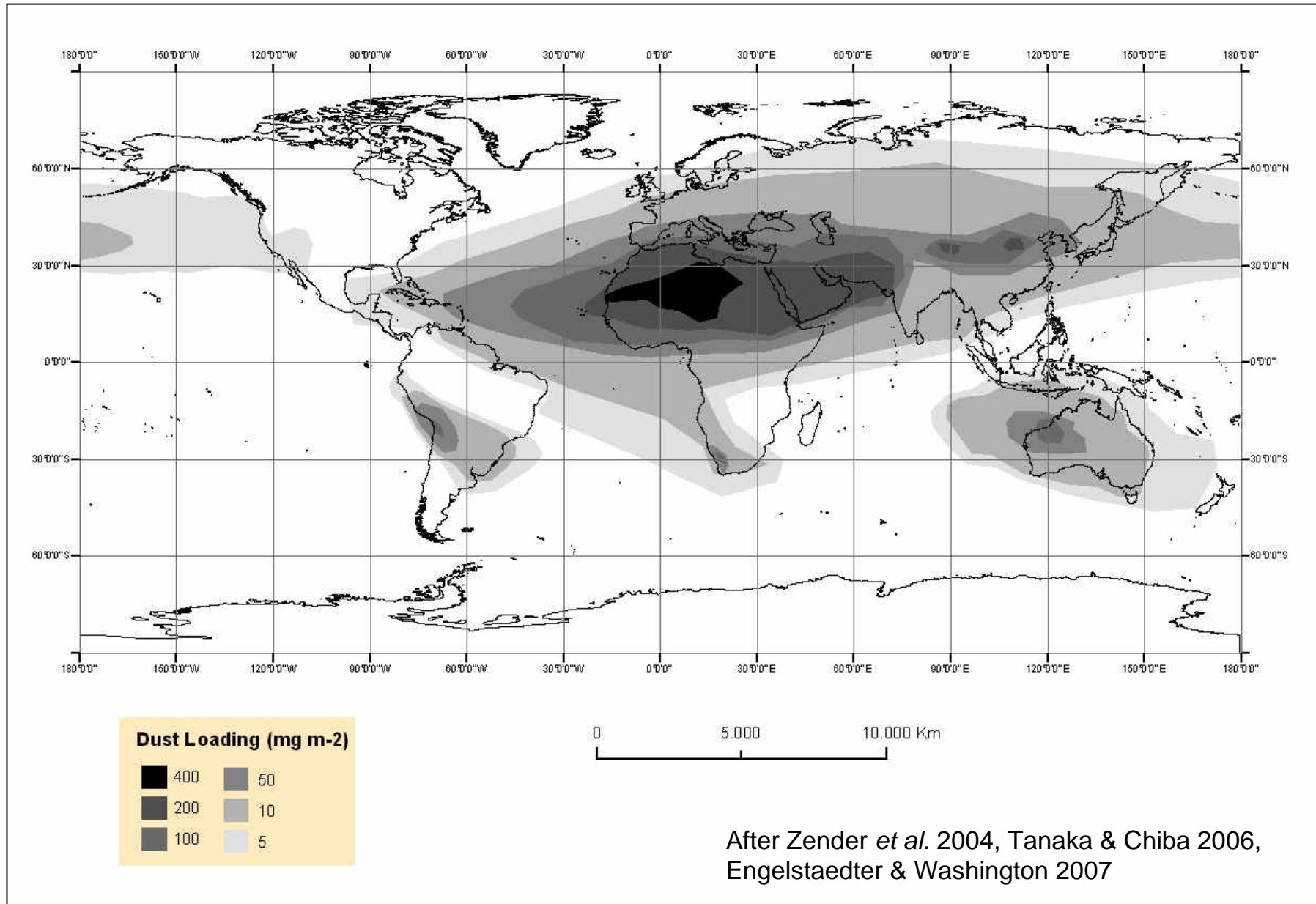
Dust storm days in the Sahel during the dry season (1930 – 1997)



Locations of mineral dust sources areas and importance in terms of dust emissions



Geographical distribution of atmospheric mineral dust loadings



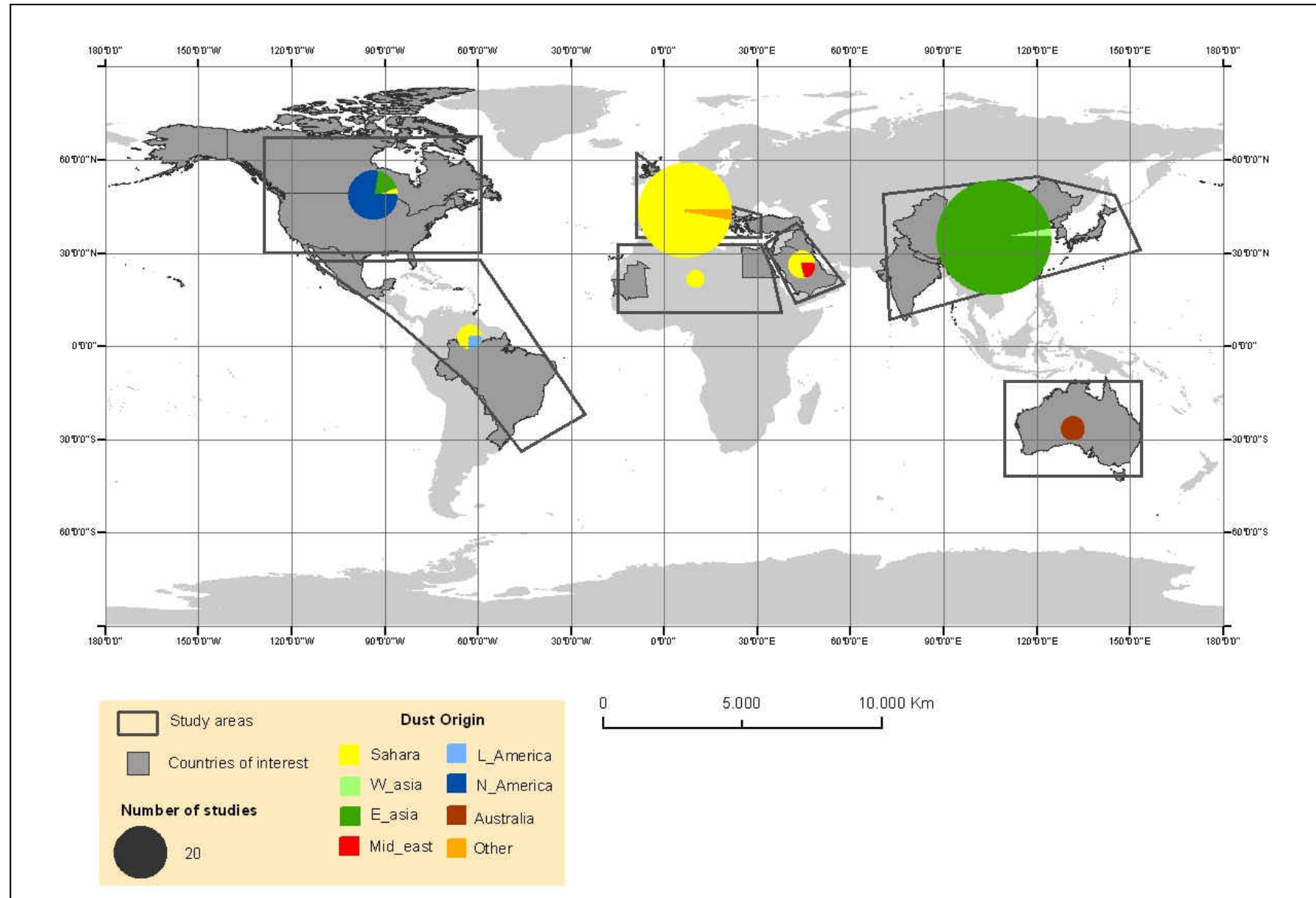
Effects of desert dust on air quality and human health: Method

- A systematic review of the literature was undertaken to find relevant studies on Saharan dust impacts on air quality or human health.
- The ISI web of knowledge (v4.2) database was searched using one of the terms 'PM10', 'PM2.5', 'mortality', 'morbidity', 'respiratory', 'asthma', 'cardiovascular' or 'health' **AND** one of the terms 'dust storm', 'sand storm', 'African dust', 'Saharan dust', 'Asian dust', 'Yellow dust' or 'dust events' without any limits/restrictions.
- The search criterion extended from January 1999 to December 2008.

Effects of desert dust on air quality: Results

- A total of **206** relevant studies on desert dust impacts on air quality were selected.
- 50% focused on Asia, 33.5% on Europe, 8.7% for the USA, 6.5% for the rest of the world and **1% on Africa**.

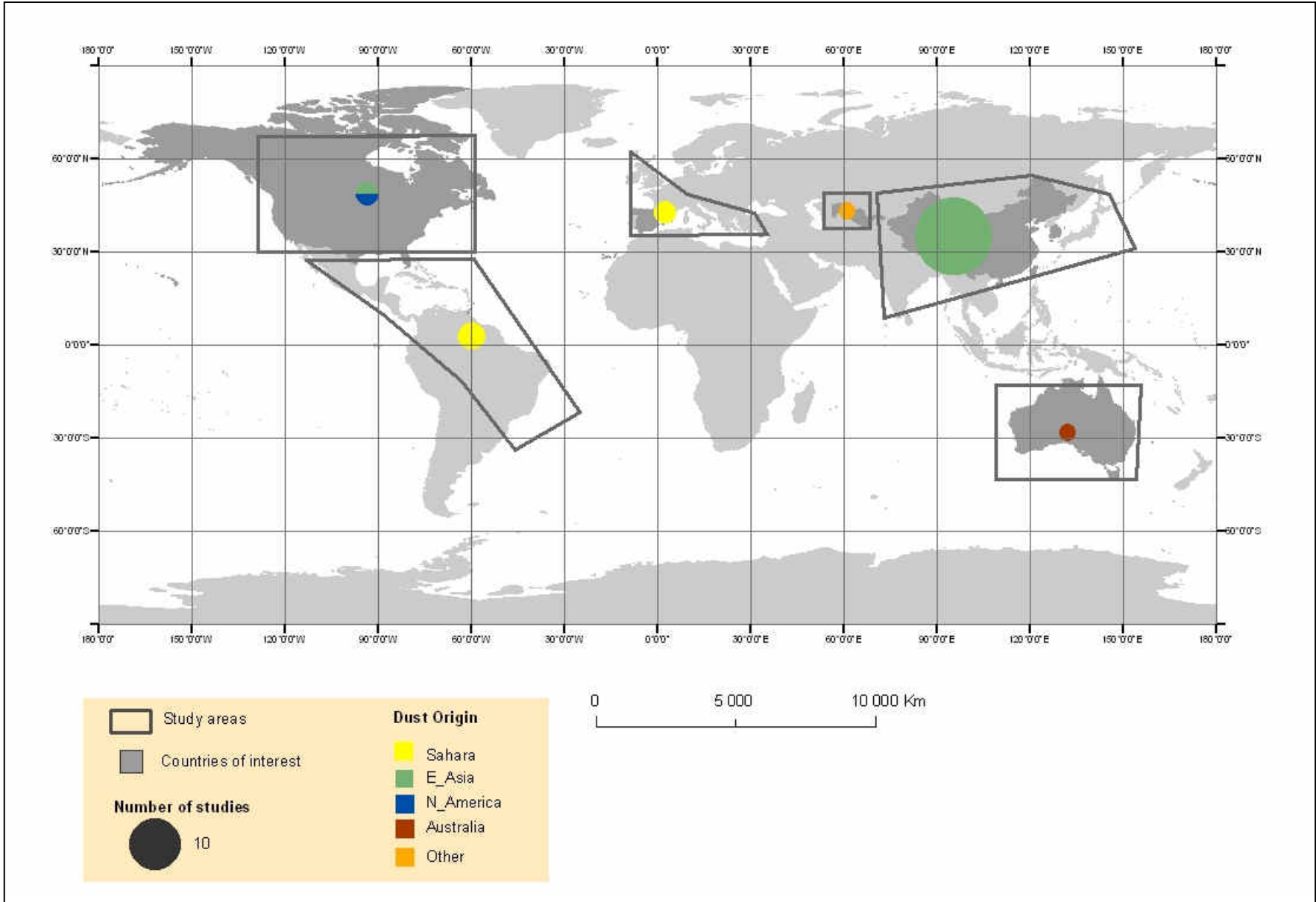
Importance of the number and distribution of the studies focused on air quality degradation due to mineral dust, according to the dust source area



Effects of desert dust on human health: Results

- A total of **33** relevant studies on desert dust impacts on human health were selected.
- 24 papers analysed Asia, 3 in the Caribbean, and 6 others in others parts of the world. **No studies were carried in Africa.**

Importance of the number and distribution of the studies focused on human health impacts of to mineral dust, according to the dust source area



Research

Open Access

A 10-year time-series analysis of respiratory and cardiovascular morbidity in Nicosia, Cyprus: the effect of short-term changes in air pollution and dust storms

Nicos Middleton*^{1,2}, Panayiotis Yiallourous², Savvas Kleanthous³,
Ourania Kolokotroni², Joel Schwartz¹, Douglas W Dockery¹,
Phil Demokritou^{1,2} and Petros Koutrakis¹

Results:

From January 1995 to December 2004, all-cause and cardiovascular admissions were 4.8% and 10.4% higher on Saharan dust storm days respectively.

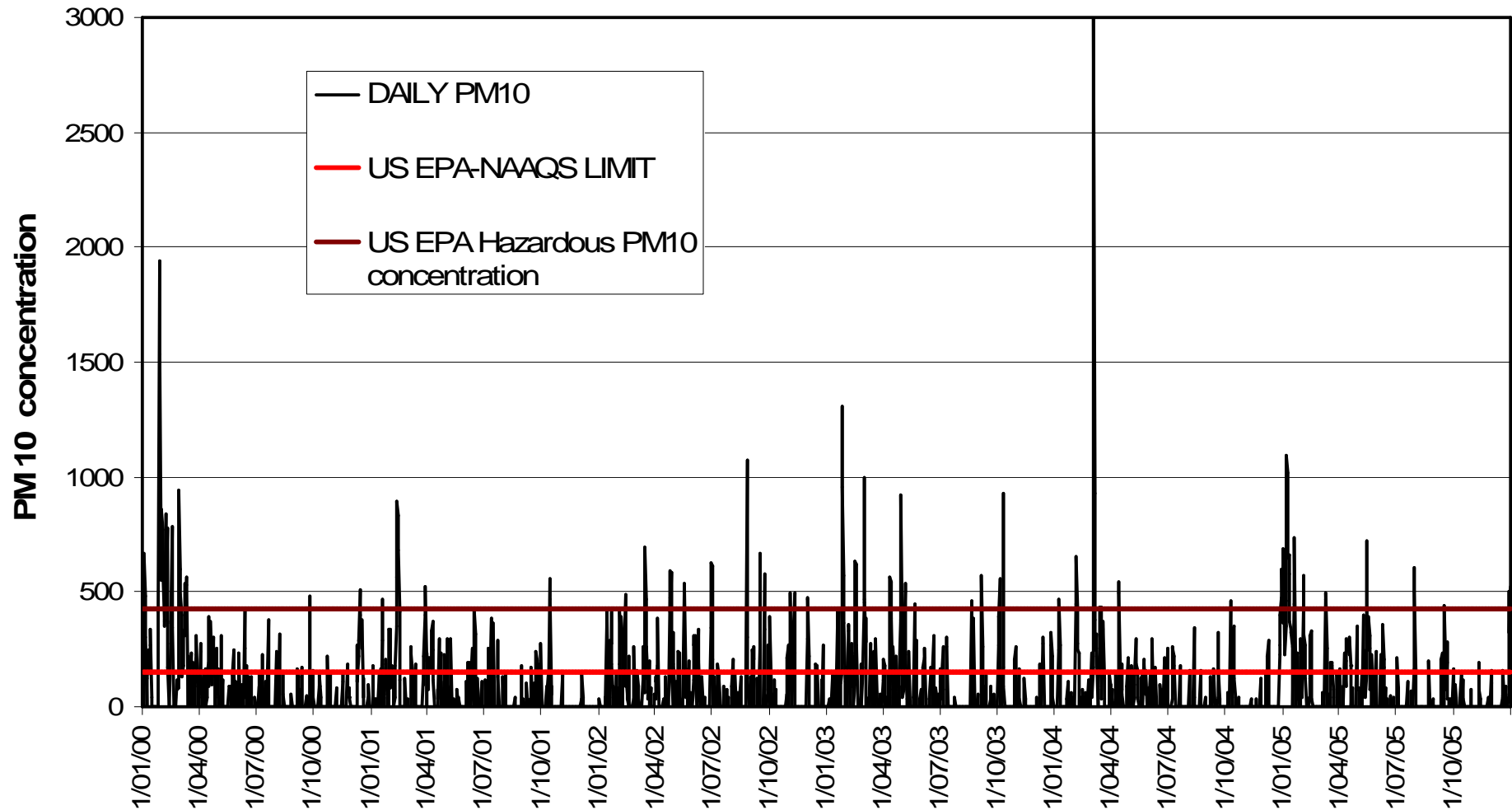
Coarse Particles From Saharan Dust and Daily Mortality

*Laura Perez,^a Aurelio Tobias,^b Xavier Querol,^c Nino Künzli,^a Jorge Pey,^c Andrés Alastuey,^c
Mar Viana,^c Natalia Valero,^e Manuel González-Cabré,^e and Jordi Sunyer^a*

Results: From March 2003 to December 2004, windblown Saharan desert dust causes an increased daily mortality of 8.4% per 10 $\mu\text{g m}^{-3}$ increase in $\text{PM}_{10-2.5}$ in Barcelona, Spain, although the increase in the average of mass concentration of PM was very modest: 16.4 (46.3) against 14.9 (38.9) $\mu\text{g PM}_{10-2.5}$ (PM_{10}) m^{-3} during Saharan dust days and non-Saharan dust days respectively.

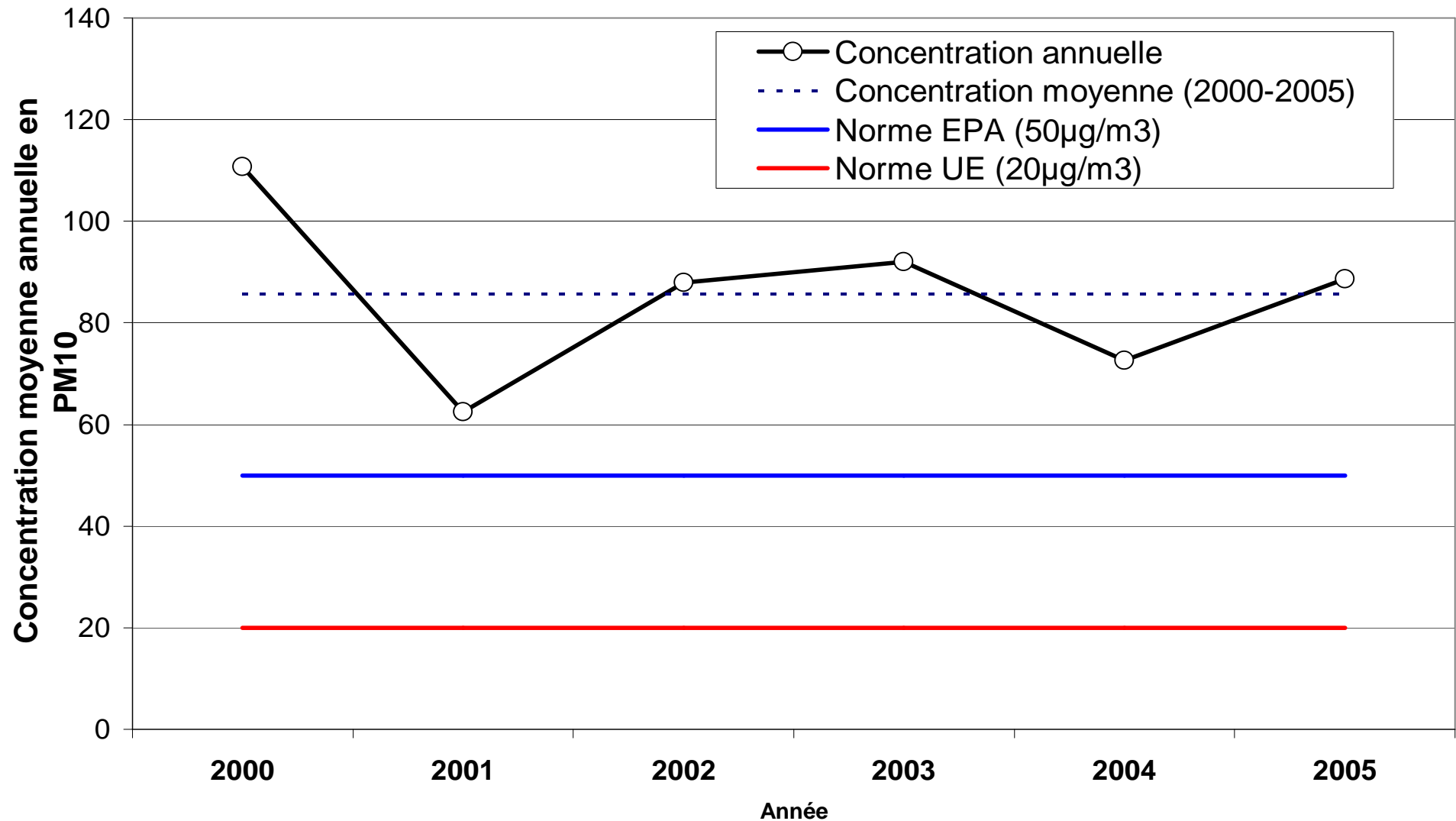
Daily PM10 concentration in Nouakchott, Mauritania (2000-2005)

Daily PM10 concentration, Nouakchott-Airport, Mauritania (2000-2005)



Annual average PM10 concentration in Nouakchott, Mauritania (2000-2005)

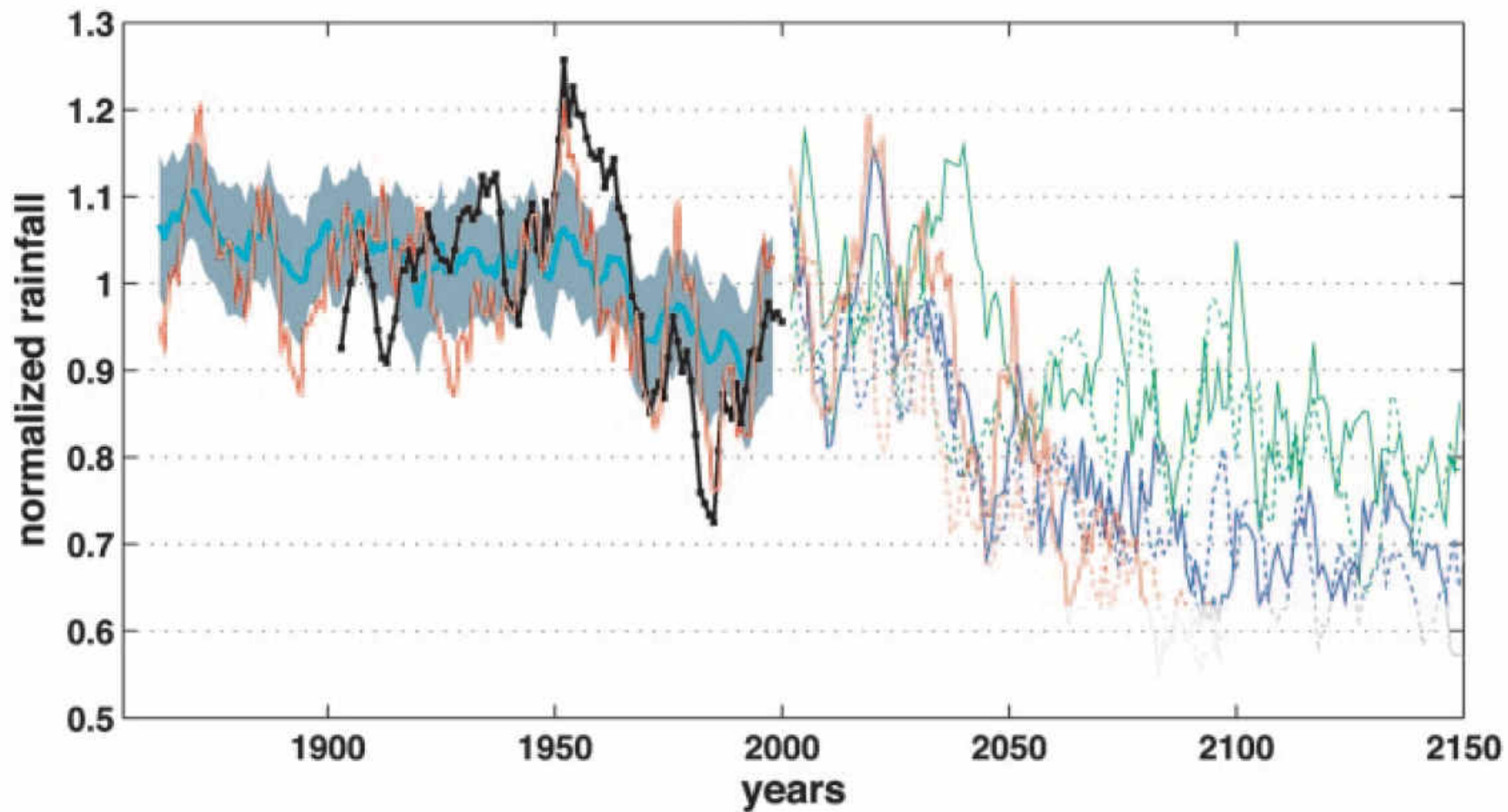
NOUAKCHOTT AEROPORT



Little is known about desert dust effects on human health in West Africa

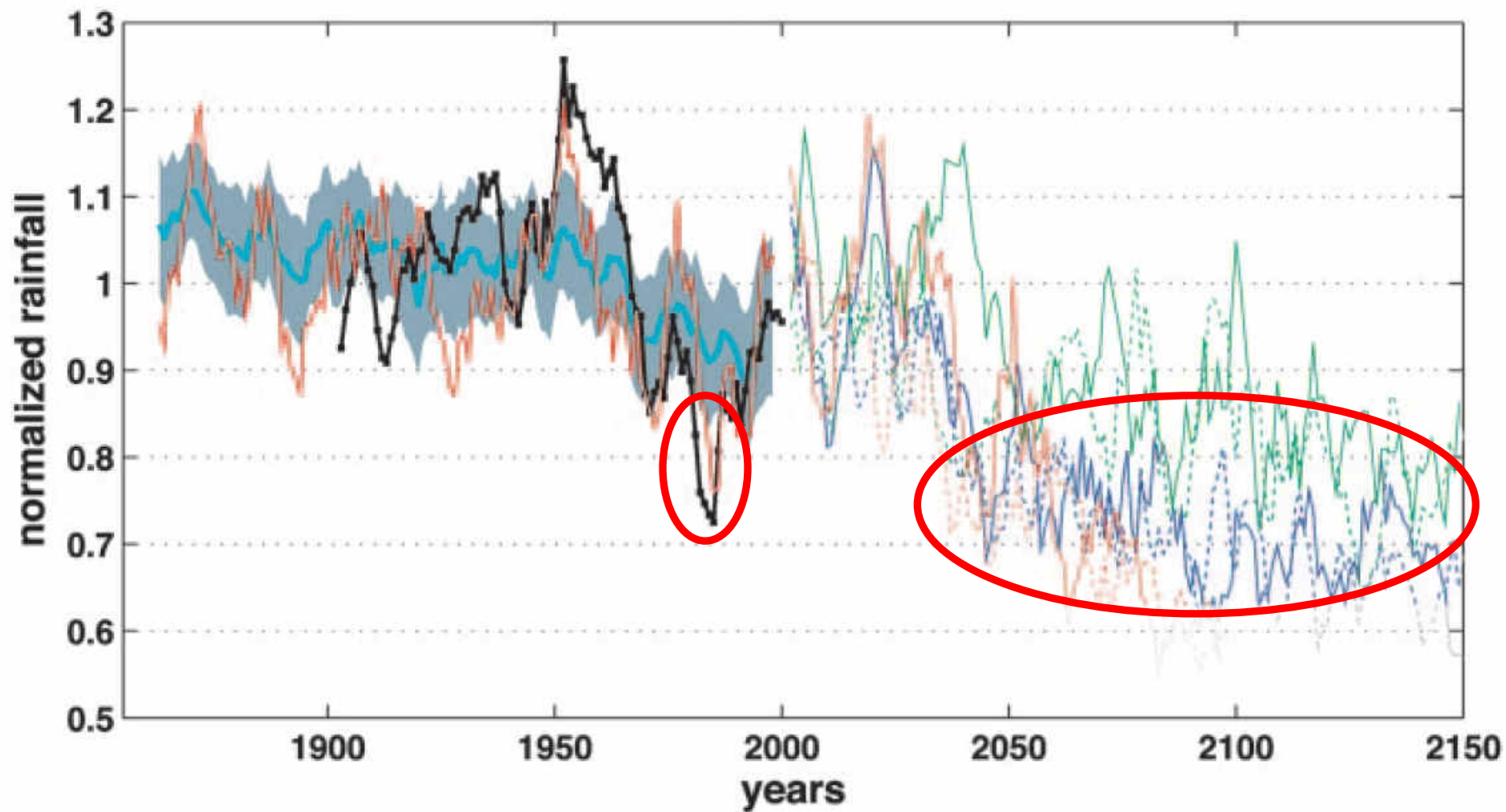
- Are the effects of dust different near the source than in Europe for example?
- How sensitive are people living in the Sahel to large amounts of coarse mineral dust?
- Are there any differences by age groups?
- What are the health effects after the exposition to several consecutive days with high levels of dust concentrations?
- What are the most recurrent diseases in the dust concentrations regions (e.g. asthma, ARI, cardiovascular disease)?

Will it rain next year ?



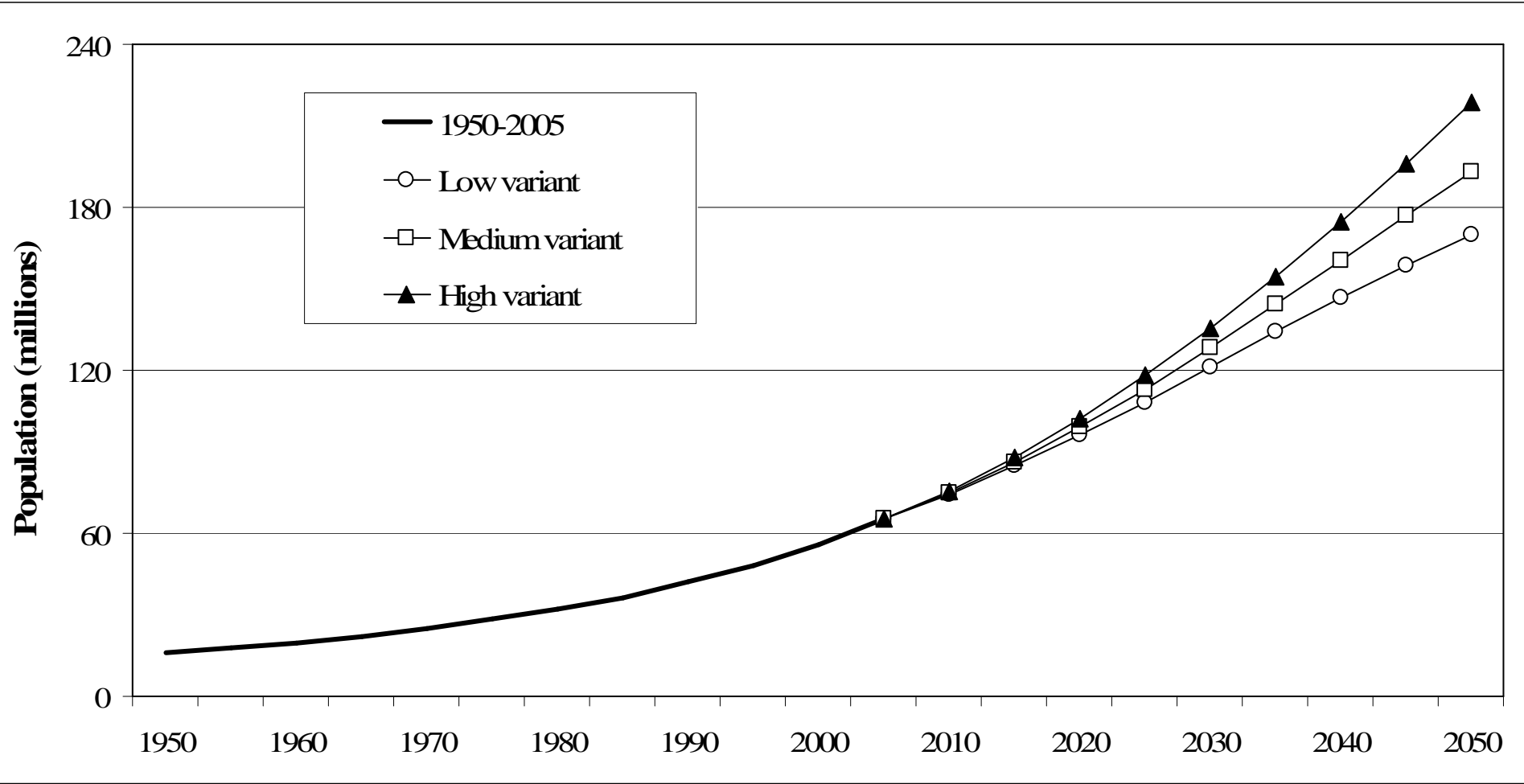
➤ *Held et al., 2005*

Will it rain next year ?



➤ *Held et al., 2005*

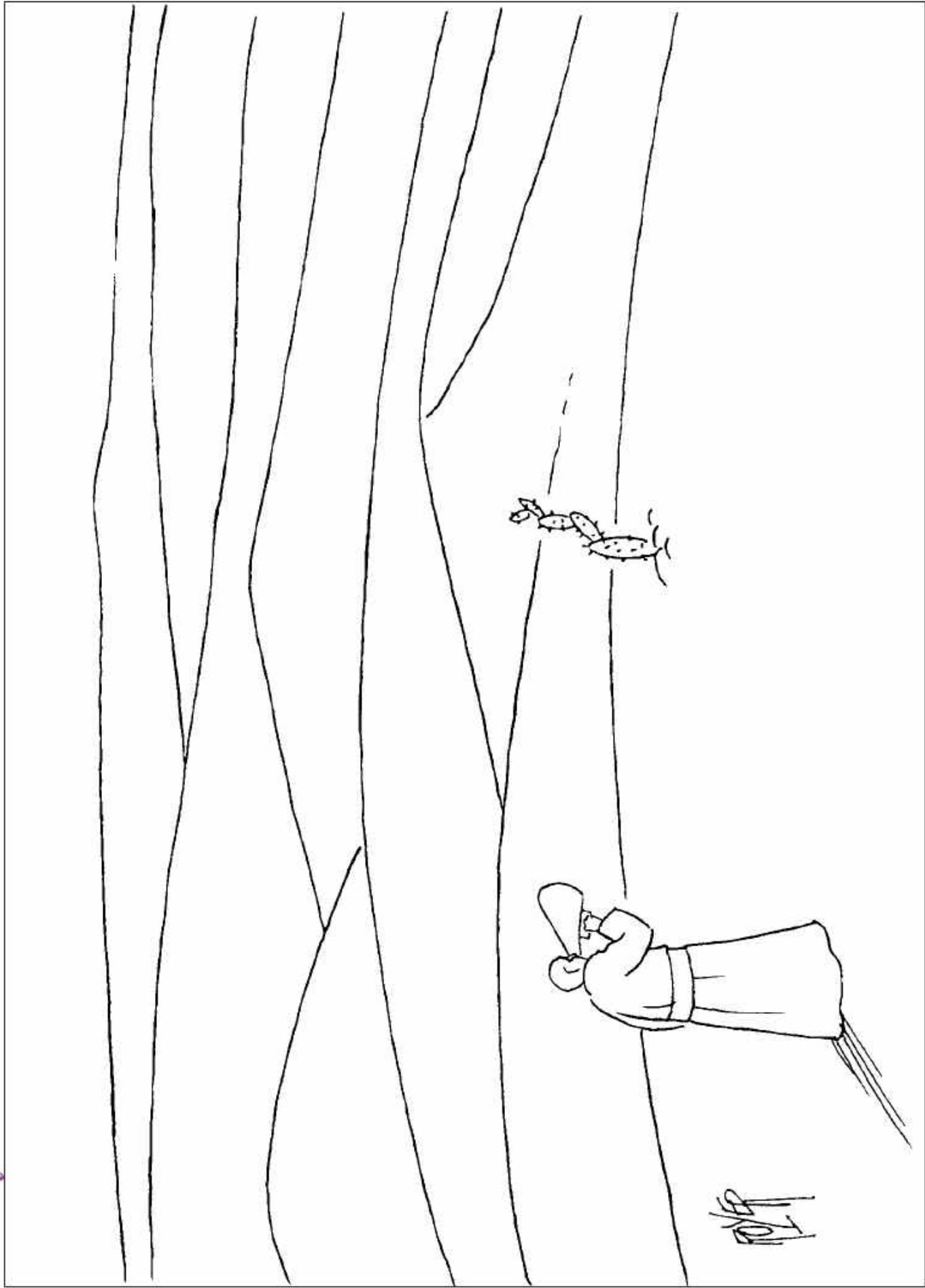
Human population in the Sahel (1950 – 2005) and projections



➤ *After UNPP, 2006*

Consequently, we do pledge for focused research on this topic in arid and semiarid regions of West Africa where current studies are as scarce as rainfall can be during dramatic droughts.

Le Royer



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