Dust & Hydroclimate

Presented by
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How are dust & hydroclimate connected?

Vegetation & Climate

Low Dust

Amazon Rainforest

High Dust

Farmland

Cryosphere

Greenland 2014
United States Dust Climatology & Causes

Dustiness related to land cover, precipitation, & winds

Source: Bing Pu & Paul Ginoux, Scientific Reports 2017
American Southwest: Improving the Hydroclimate

Source: Pascale et al., Nature Climate Change 2017
Known Dust Sources in East Asia (2003-15)

Western Basins
- Chinese Taklamakan Desert
- Mongolian Loess Plateau

Mongolian & Loess
- NE Plains

MODIS Dust Optical Depth tells a very dusty story north of high mountain Asia

Source: Ginoux & Deroubaix 2017

>5% or 18 days/year
>25% or 91 days/year
Is “the Karakoram Anomaly” due to dust or meteorology?

While the Himalayan glaciers are reducing in size/length, the Karakoram are maintaining size/expanding.

Could differences in dust/aerosols also play a role?
This region is being used as a case study through the High Mountain Asia Team (HiMAT, FY2017-2019) to focus satellite data, new reanalysis products, and modeling on understanding the regional cryosphere dynamics, water supply variability, & hazards.

GFDL team leaders collaborating with NASA remote sensing experts: Sarah Kapnick (PI) & Paul Ginoux (Dust lead)
Beyond traditional definitions of hydroclimate extreme:
Things that matter & tie into different fields

12-14 Aug 2016: Rainfall
Extreme Louisiana
Total Rainfall 12-14 Aug; max = 535mm

Average August Total Precipitation

Traditional Definition from Statistics

(-) Extreme

(+) Extreme

East Coast High Wind/Snow Events

"Mild" or Tourism Weather

New York City

US mean: -9 days

Fewer mild

More mild days

Change in days/year by 2100

van der Wiel et al. 2017a,b; Janoski et al., submitted