Little Ice age
(1250-1600) to 1800?

Pieter Bruegel the Elder 1565
The first River Thames frost fair was in 1607 and the last in 1814.
Sunspots, MM, little ice age

Yearly Averaged Sunspot Numbers 1610-2010
Climate drivers

Radiative Forcing Components

- **Anthropogenic**
  - Long-lived greenhouse gases
    - CO₂
    - N₂O
    - CH₄
    - Halocarbons
  - Ozone
    - Stratospheric
    - Tropospheric
  - Stratospheric water vapour from CH₄
  - Surface albedo
  - Land use
  - Black carbon on snow
  - Total Aerosol
    - Direct effect
    - Cloud albedo effect
  - Linear contrails

- **Natural**
  - Solar irradiance
  - Total net anthropogenic

**RF Terms**

**RF values (W m⁻²)**

- CO₂: 1.66 [1.49 to 1.83]
- N₂O: 0.48 [0.43 to 0.53]
- CH₄: 0.16 [0.14 to 0.18]
- Halocarbons: 0.34 [0.31 to 0.37]
- Stratospheric: 0.35 [0.25 to 0.65]
- Tropospheric: -0.05 [-0.15 to 0.05]
- CH₄: 0.07 [0.02 to 0.12]
- Surface albedo: -0.2 [-0.4 to 0.0]
- Land use: 0.1 [0.0 to 0.2]
- Black carbon on snow: -0.5 [-0.9 to -0.1]
- Total Aerosol: -0.7 [-1.8 to -0.3]
- Linear contrails: 0.01 [0.003 to 0.03]
- Solar irradiance: 0.12 [0.06 to 0.30]
- Total net anthropogenic: 1.6 [0.6 to 2.4]

**Spatial scale**

- Global
- Continental to global
- Local to continental

**LOSU**

- High
- Med
- Low

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Climate drivers

So the Sun's variations are negligible.... or are they?
Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks

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purpose

- Bring interested parties together to discuss solar and stellar variability data 1960s-present
- Identify fruitful directions for research (incl. PhD research)
- Write a report / white paper for NSF
  - New line of funding for this research?