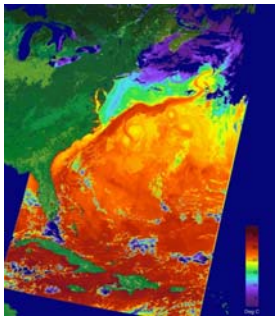
A Brief History of Thermometry



MODIS SST Imagery

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History: The Thermoscope

- Designed by Galileo (1597)
- Something similar built by Santorio (1612)
- Problem: It responds to changes in pressure.
  - It's also a barometer!

History: The Galileo Thermometer

- Also *termometro lentos*
- Ferdinand II built the first Galileo thermometer (1641)
- Each ball has a weight-to-volume ratio such that it will rise or fall in a hydrocarbon fluid as the density of the fluid changes
  - When fluid is less dense, balls will sink
  - When fluid is more dense, balls will rise

History: The Hook Thermometer

- Robert Hook developed an alcohol ("spirit") thermometer with a scale (1664)
- Each "degree" represents 1/500 of the volume of liquid at the freezing point of water (which is zero degrees)
- First intelligible meteorological records use this scale

Fahrenheit Scale (°F)

- 1724:
  - 0° = Temperature of sea salt, ice, and water
  - 30° = Temperature of ice and water
  - 96° = Temperature "obtained if the thermometer is placed in the mouth so as to acquire the heat of a healthy man"
    - Stories differ on the original definition for the scale
- Boiling point of water = 212°F
- Freezing point later (i.e., within Fahrenheit's lifetime) adjusted to 32°F to give $\Delta T = 180°$ between freezing and boiling

Réaumur Scale (°Ré, °Re, or °R)

- 1731:
  - An 80-point scale
    - 80°R = boiling point of water
    - 0°R = freezing point of ice
  - Used mercury thermometers
  - Old European data may use °R
  - Why 80°?
    - Can be halved 4 times and still be an integer!

Rankine Scale (°R or °Ra)

- 1859:
  - Absolute scale where 1°F = 1°R
  - 0°R = -459.67°F = 0 K
- The Rankine scale is to Fahrenheit as the Kelvin scale is to Celsius!

Celsius Scale (°C)

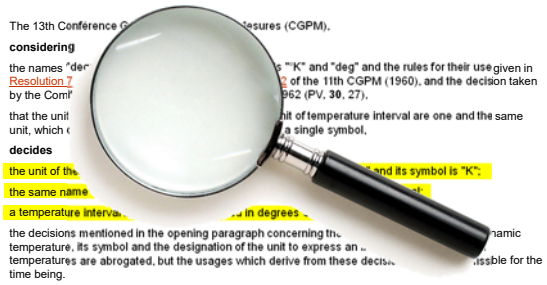
- 1742:
  - 0°C = boiling point of water
  - 100°C = freezing point of water
- 1744:
  - Linnaeus reversed the scale
- 1954:
  - 0.01°C set as the triple point of water
  - 99.9839°C set as the boiling point of water at standard SLP
  - These changes make $\Delta 1$ K = $\Delta 1$°C

Kelvin Scale (K)

- 1954:
  - 0 K = absolute zero
  - 273.16 K = set as the triple point of water
  - 0°C = 273.15 K

About the Kelvin Scale

- From the 13th General Conference on Weights and Measures in 1967: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About the Kelvin Scale

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The 13th Conférence Générale des Poids et Mesures (CGPM),

considering

the names "degree Kelvin" and "degree", the symbols "°K" and "deg" and the rules for their use given in Resolution 7 of the 9th CGPM (1948), in Resolution 12 of the 11th CGPM (1960), and the decision taken by the Comité International des Poids et Mesures in 1962 (PV, **30**, 27),

that the unit of thermodynamic temperature and the unit of temperature interval are one and the same unit, which ought to be denoted by a single name and a single symbol,

decides

the unit of thermodynamic temperature is denoted by the name "kelvin" and its symbol is "K";

the same name and the same symbol are used to express a temperature interval;

a temperature interval may also be expressed in degrees Celsius;

the decisions mentioned in the opening paragraph concerning the name of the unit of thermodynamic temperature, its symbol and the designation of the unit to express an interval or a difference of temperatures are abrogated, but the usages which derive from these decisions remain permissible for the time being.