

## ● CO<sub>2</sub> DOES NOT CONTRIBUTE TO DECREASED AIR QUALITY

### Concentration of Other Greenhouse Gasses Are Also Increasing:

- Methane
  - Up 250% since industrial revolution
  - Released from coal mines, natural gas leaks, rice farming, livestock production, and landfills
- Nitrous Oxides
  - Up 20% since industrial revolution
  - Released from processes that produce nylon and from fossil fuel combustion
- Halocarbons
  - Synthesized for use as aerosol spray, refrigerants, solvents, and fire retardants

### How Much Do Human-Caused GHG Emissions Affect Climate?

- Current atmospheric CO<sub>2</sub> = 420 ppm highest since before human evolution
- Coal is the biggest producer of fossil CO<sub>2</sub> emissions globally
- Carbon-containing materials have different relative amounts of "light" <sup>12</sup>C, "heavy" <sup>13</sup>C, and radioactive <sup>14</sup>C
  - **Plant matter** = <sup>12</sup>C used during photosynthesis b/c lighter weight
  - **Volcanic emissions** = <sup>13</sup>C
  - **Since <sup>14</sup>C is radioactive, it decays:** young organic matter has more <sup>14</sup>C than older organic matter, fossil fuels have no <sup>14</sup>C
    - Amount of <sup>14</sup>C in atmospheric CO<sub>2</sub> has declined
- Over past 50 years, **troposphere = warming + stratosphere = cooling**
  - If planet was warming due to increasing solar radiation, stratosphere would also be warming
- Hindcasting: computer simulations in support of real-world observations; results show humans are driving global warming
- Anthropogenic cause of current global climate change is supported by:
  - Carbon isotopes, quantification of fossil fuel emissions, computer simulation models

### What Are Some Effects of Climate Change?

- 1) Precipitation & The Water Cycle:
  - Changes in precipitation patterns, frequency + intensity of weather events
  - Increase in heavy downpours in US over past 3-5 decades
  - Weather = MORE variable + LESS predictable
  - Southwest and West = increased droughts: prolonged periods of low precipitation + high evaporation → affect agricultural yields + wildfires
  - Increased heat waves
  - East + Midwest will have more rain, SW + Texas will suffer drought
- 2) Hurricanes & Severe Weather:
  - Increase in hurricane intensity will continue, especially in Atlantic Ocean
  - Warming oceans evaporate MORE water + INCREASE amount of energy feeding tropical storm systems that become hurricanes
  - Thunderstorms, tornadoes, + winter storms influenced by climate change
- 3) Sea-Level Rise: