The ODIAC
(Open-source Data Inventory for Anthropogenic Co2)
The second fossil fuel CO2 emissions dataset for CarbonTracker

ODIAC meets CDIAC team @ICDC8

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• National emissions need to be distributed...

• We have good estimates for national and regional totals.

• Yet the estimates need to be prepared in a gridded form to incorporate into models.

• Sub national spatial distributions and temporal variations need to be estimated.

• In particular, fossil fuel CO2 emissions need to be accurately prescribed in inverse flux estimation framework.

\[ F(x, y, t) = \lambda \cdot F_{bio}(x, y, t) + \lambda \cdot F_{oce}(x, y, t) + F_{ff}(x, y, t) + F_{fire}(x, y, t) \]

from CT2011 documentation
Nightlight as a spatial proxy for CO2 emissions

Caveat - Only works when human activity is associated with lights.
Point source emissions are not really correlated with population (also, nightlight).
ODIAC CO2 emissions distribution for 2006

This study

<table>
<thead>
<tr>
<th>Resolution (°)</th>
<th>Population diff (MtC)</th>
<th>correl</th>
<th>Nightlights diff (MtC)</th>
<th>correl</th>
<th>FFDAS diff (MtC)</th>
<th>correl</th>
<th>Brenkert 1998 diff (MtC)</th>
<th>correl</th>
<th>This study diff (MtC)</th>
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</table>

Oda and Maksyutov (2011)
Global emissions field Y2010 - ODIAC ver.3.0

Total: 9.1 PgC/yr
- Global emissions field Y2010 - Miller

Total: 9.1 PgC/yr
• ODIAC minus Miller
• Time series - Global emissions

CDIAC = \frac{(\text{Miller} + \text{ODIAC})}{2}

Global fossil fuel flux

\begin{align*}
P_{\text{C/yr}} & \text{ vs. Year} \\
\text{CO}_2 \text{ flux (PgC/yr)} & \text{ vs. Year}
\end{align*}
Time series - Major TC land regions

1. TC22 region #1 - NA Boreal
2. TC22 region #2 - NA Temp.
4. TC22 region #4 - SA Temp.
5. TC22 region #5 - Northern Africa
7. TC22 region #7 - Eurasian Boreal
8. TC22 region #8 - Eurasian Temp.
11. TC22 region #11 - Europe

CDIAC  Miller  ODIAC

TransCom Land regions
What's next?

- Point sources: 2.98PgC/yr
- nonpoint land: 5.36PgC/yr
- Cement: 0.44PgC/yr
- Gas flaring: 0.06PgC/yr
- Aviation: 0.12PgC/yr
- Ship: 0.16PgC/yr
FIGURE 1.2 Monthly atmospheric CO$_2$ concentrations at Mauna Loa, Hawaii. (Source: ORNL-ODIAC 1995$^3$)

1.2 THE CO$_2$ CONCENTRATION BUILDUP

Although there was some observation that the average earth surface temperature rose by 0.25°C between 1880 and 1940, it was not until the 1950s that measured...