



# CO2 Monitoring from Space

Context, Current Status and Future Plans





# Potential Contribution by Space Based CO2 Observations

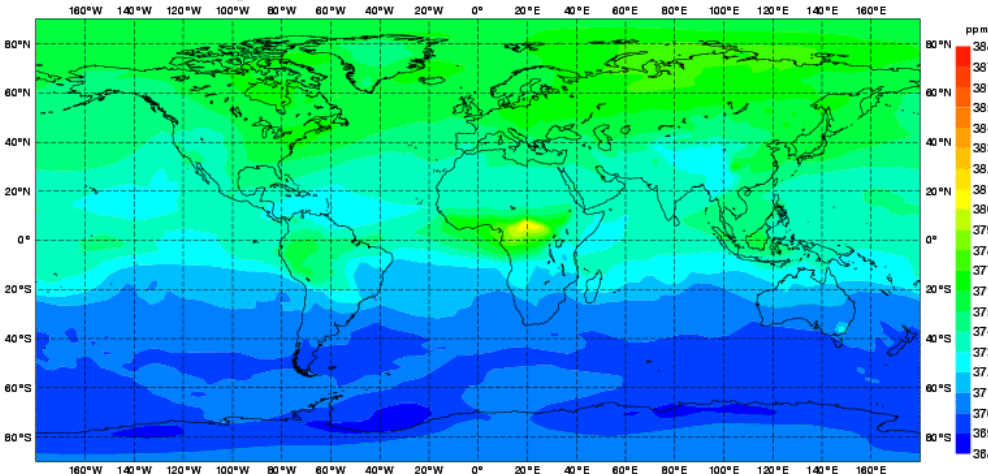
Requirements on satellite data

- systematic errors in observations should be less than 0.5-1.0 ppm; extremely demanding
- sensitivity to the surface is ideally required

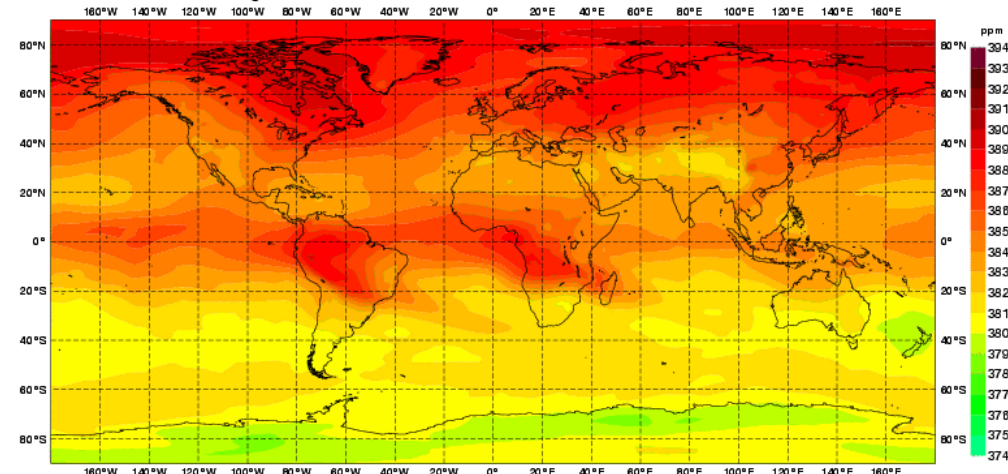
Thermal infra-red observations such as those provided by AIRS/IASI (15 $\mu$ m and 4 $\mu$ m bands) provide some constraint on the mid-upper troposphere but no sensitivity to the surface.

Observations in the NIR/SWIR such as those provided by GOSAT are needed

GEMS Reanalysis Monthly Mean, January 2003  
Mean column CO2 mixing ratio mean: 372.8 max: 380.7



GEMS Reanalysis Monthly Mean, January 2007  
Mean column CO2 mixing ratio mean: 383.9 max: 390.1





# Summary and Future Outlook

- For GMES Sentinels 4&5, the recognised operational application for CO<sub>2</sub> measurements has been assessment of anthropogenic emissions for Kyoto Protocol Monitoring
  - This is agreed to be extremely challenging and currently not feasible from space
- Satellite data is a new tool which can contribute to our understanding of, and ability to monitor, the global carbon cycle in addition to surface observations, models, emission inventories, etc
- The GMES Atmosphere Service Implementation Group has endorsed the position that a final decision with regard to CO<sub>2</sub> monitoring should only be taken when the usefulness of space-based measurements from GOSAT has been demonstrated
  - This information is unlikely to be available before the start of the Sentinel-5 Phase A industrial studies in late 2010, however the necessary 1.6  $\mu$  m band will be studied for CH<sub>4</sub>
  - If necessary specifications could be modified during the study to include CO<sub>2</sub>
- Requirements for the post-EPS IRS cover the necessary bands → good noise performance would be advantageous