**White Paper Outline**

**Ken Jucks and Berrien Moore, Moderators**

* **Science Questions / Derived Measurement Requirements**
1. Projected capabilities / gaps in 2020
2. What distinguishes this mission from others – active compared to passive
	1. Day/night coverage
	2. Line of sight
	3. Scattering effect
	4. All seasons, all latitudes
	5. Spatial coverage
	6. Weighting functions
3. Scientific focus: Significant (quantify) improvement in knowledge of terrestrial sources and sinks
	1. Define uncertainties associated with sources and sinks
	2. What can we say about spatial (regional) scales?
	3. Target-mode capability to detect fires (listed in 2009 report)?
	4. Can we improve detection of CO2 from fires using nadir mode?
4. Lifetime
	1. The science questions to define the length of the mission
	2. Threshold vs. baseline
		1. Length of the mission –3 years baseline / 2 years as threshold
	3. La Niña cycle via linkage with OCO/GOSAT
	4. Need to have a science validation activity that links the OCO-2 and ASCENDS measurements?
5. Will ASCENDS make a contribution oceanographically?
6. We need to examine the ASCENDS measurement capability over the ocean, with some assumption about sea-surface winds
7. We need to do signal-detection experiments for ocean-sink questions
8. What about ice – Is there a way to get a better signal over ice than over the ocean?
9. We need to factor in cloud cover, especially over the southern oceans
10. Is there a fossil fuel question that ASCENDS can address?
11. Will sample on a metropolitan scale
12. You are at the mercy of the winds when passing over power plants
13. Will not collect data very quickly
14. On a regional scale, need to have some ancillary information – What is the size of the signal? Footprint?
15. Comment: Need geosynchronous scanning or multiple satellites
16. Summary Issue: Given the Scientific Question(s)/Focus: How do we need to measure CO2 and O2, and how well will we do it?

- Involve David (AWOL) Crisp in this section

* **Side Conditions / Assumptions**
1. What parameters affect the measurements?
2. Key Meterological assumptions including error fields: water vapor, aerosols, temperature, pressure, dry air mass.
3. Areas for design trades
4. Define what type of mission this is – single spacecraft, cost-capped
* **Validation Campaign**
1. Coordination with NOAA
2. Quantitative approach – aircraft and ground (profile issues and approach)
3. **ACTION** – Examination of ASCENDS orbit and location of ground-based validation sites
4. Measure the boundary-layer height (e.g., a backscatter (Doppler?) lidar) at the ground-based station?

**Data processing and retrievals**