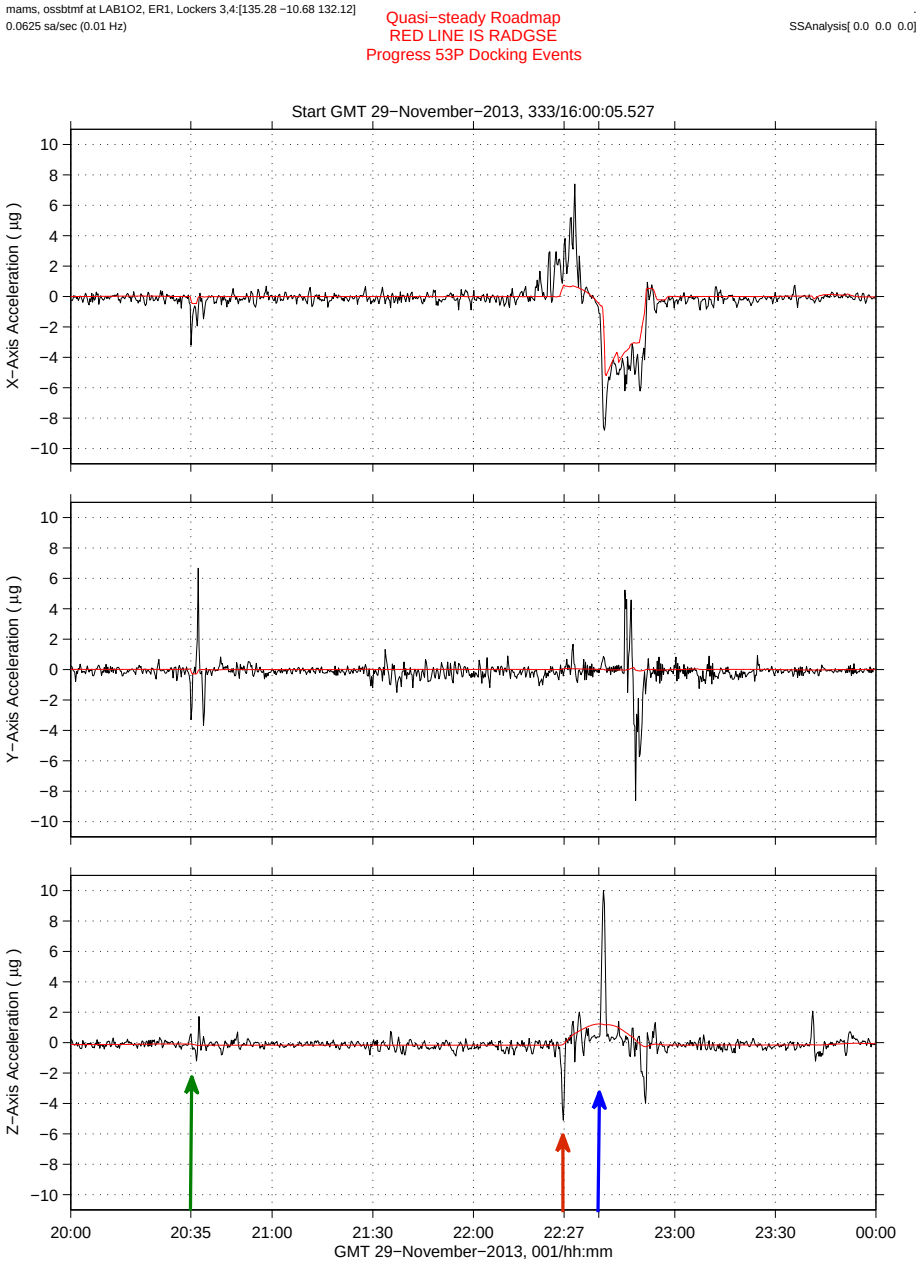
Progress 53P Docking Events Qualify



Description	
Sensor	MAMS ossbtmf 0.0625 sa/sec, 0.01 Hz
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Acceleration vs. Time

Notes:

- These 3-axis subplots of MAMS data (in black) and quasi-steady acceleration levels derived from ISS rates/angles data (in red) show events associated with the Progress 53P docking on GMT 29-Nov-2013.
- Most notably, this docking was not automated as usual. See details on last page for more info.
- The green arrow near GMT 20:35 points to the disturbance associated with the start of Russian Segment (RS) attitude control.
- The red arrow near GMT 22:27 shows what appears to be the main impulse from the docking event.
- The blue arrow near the unlabeled time tick, which is at GMT 22:37, points to the start of a maneuver to post-docking attitude.
- See the table on last page for timestamps corresponding to the green, red, and blue annotation arrows on these plots.

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Progress 53P Docking Events

Progress 53P Docking Events
Ancillary Notes

Russia's Progress 53 cargo vehicle carried out a successful, but unexpected cosmonaut-assisted docking with the International Space Station on GMT 29-Nov-2013 at about 22:27. The docking came after a 4-day trip that included a test of the upgraded rendezvous system. The cargo ship was docked to the Zvezda service module. The Progress vehicle delivered about 3 tons of cargo, including fuel, science equipment, spare parts, water, and compressed oxygen and air. As Progress 53P closed within 60 meters of the station, the new automated rendezvous system faulted to the manually commanded TORU backup mode. Station commander, Oleg Kotov, was standing by, ready to transmit remote commands with a joystick for just such an occasion. Using remote commands from the space station, the Commander piloted the Progress vehicle to a safe docking. During its ascent to station, the Russian cargo ship carried out a scheduled pass within one mile of the space station for a trial activation of the new KURS rendezvous system, which features three fewer antennas, upgraded electronics, lower power requirements and less mass than the automated rendezvous equipment it replaces. The changes also remove a potential docking obstruction. This pre-dock testing went well, with the Progress moving out in front of the ISS after rendezvous transmissions from the Progress 53P were recognized by the station's Russian segment. The cargo ship then moved behind and below the ISS to begin the final rendezvous and docking run. The new KURS system, which the Russians developed when components from a previous supplier became unavailable, are in line for use on future Soyuz crew vehicles as well as Progress cargo vehicles.

Event	GMT (ATL)*	GMT (MAMS)**
Handover US to RS	20:30	20:35
Docking	22:28	22:27
Maneuver Start	22:37	22:37

* GMT from the As-Flown Timeline (ATL)
** GMT from MAMS measurement timestamps
NOTE: see previous page for annotation arrows at these GMTs