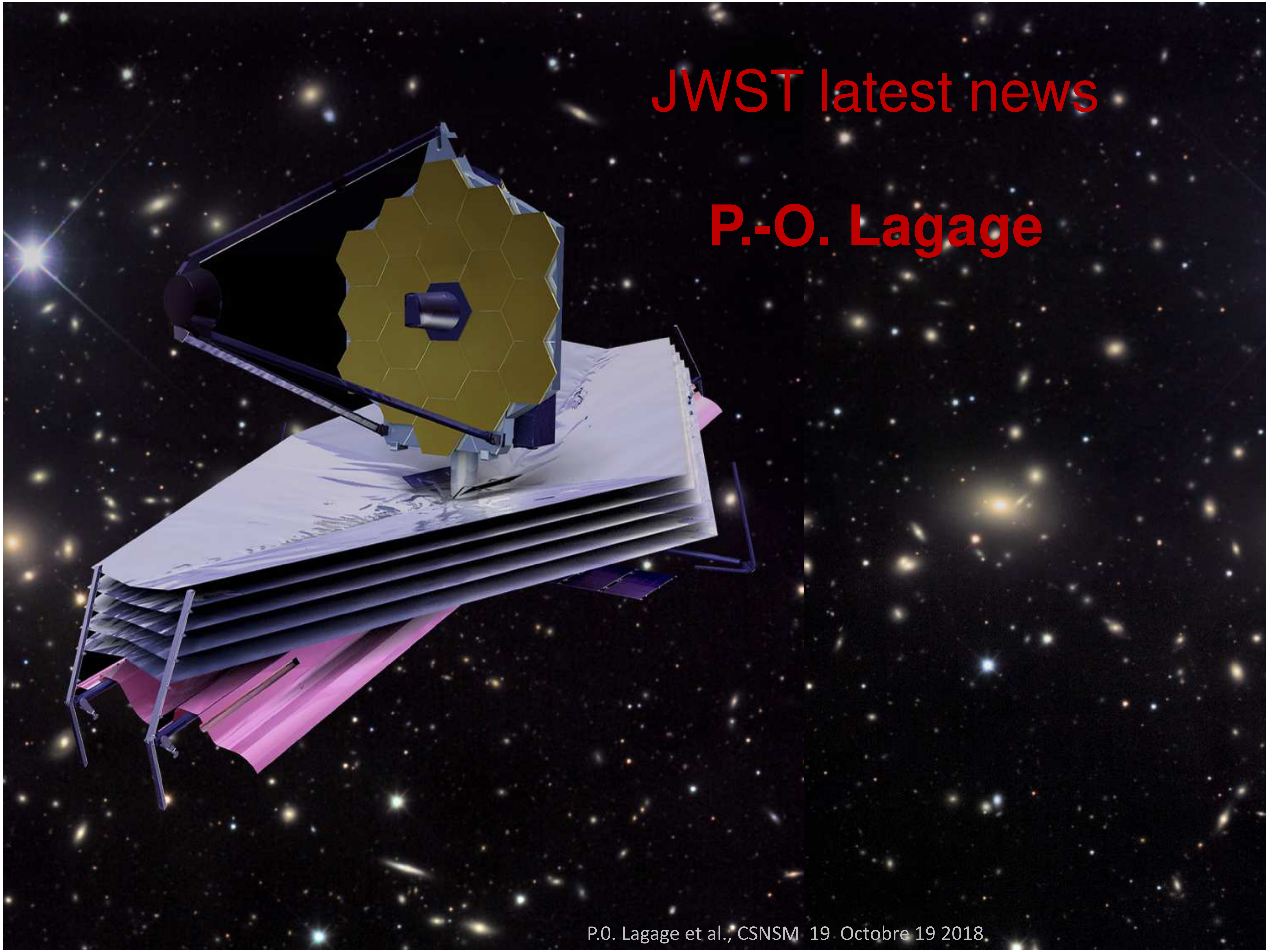
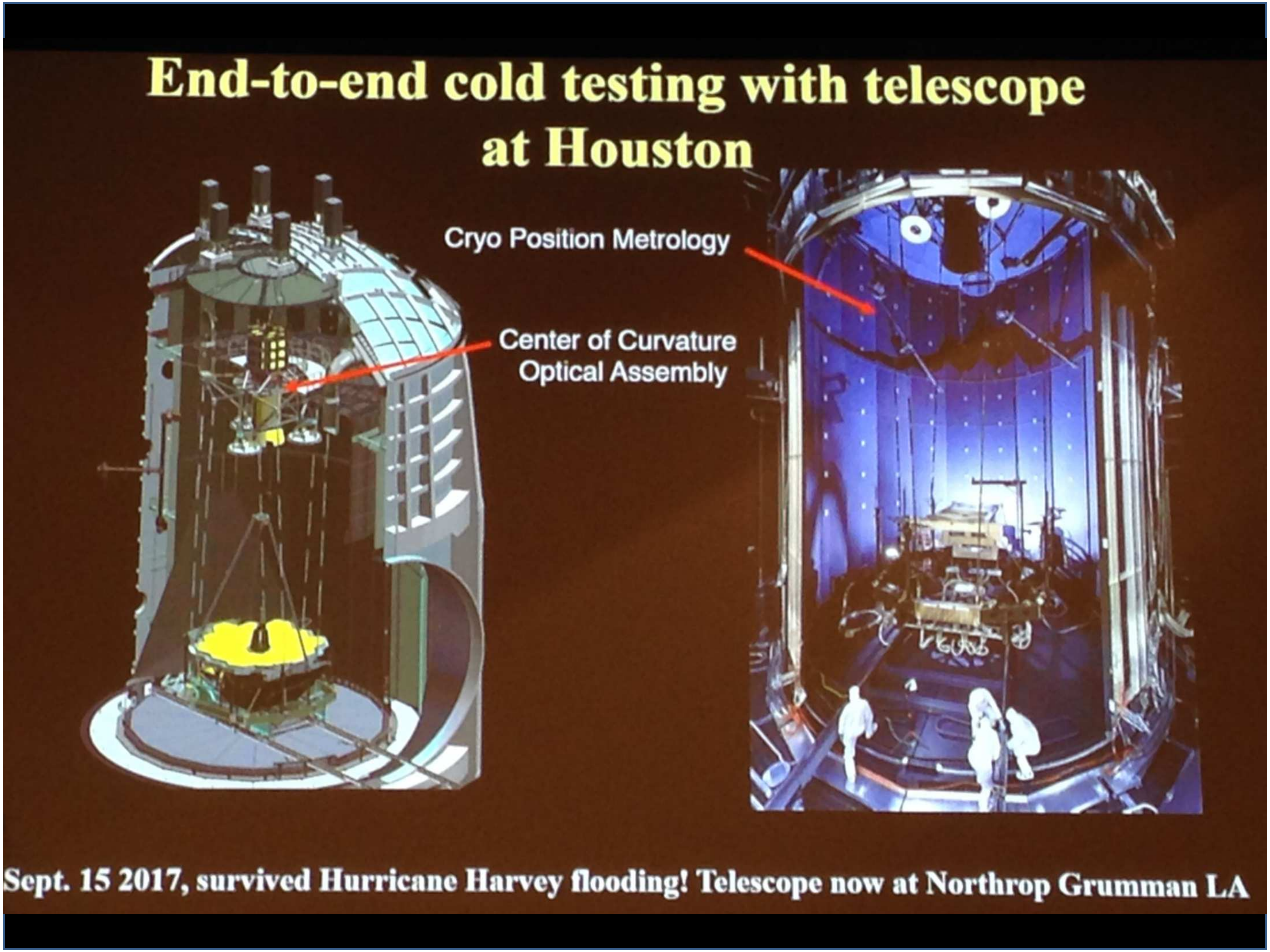
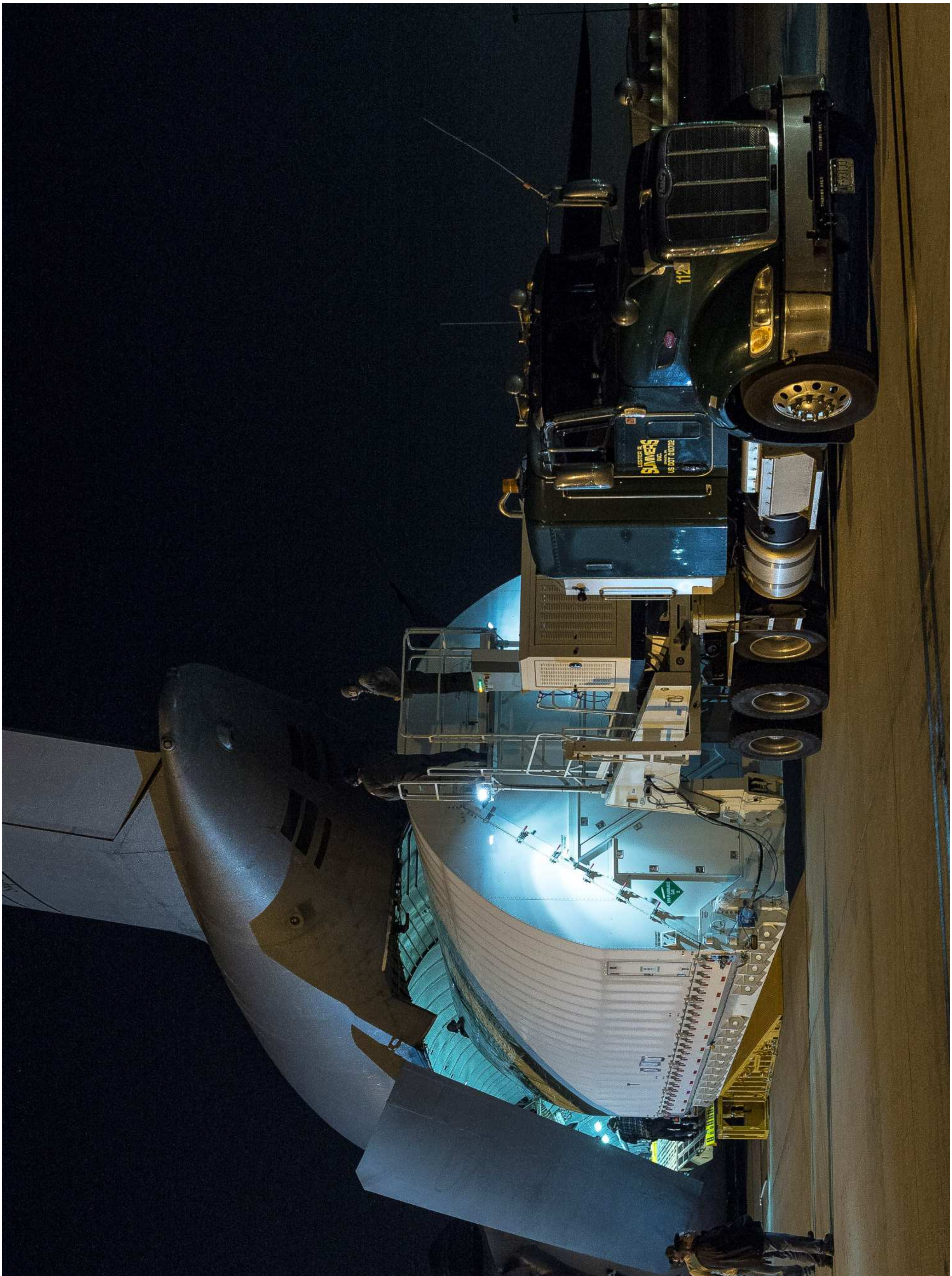
JWST latest news

P.-O. Lagage




Launch
Shifted from
October 2018
to March 2021
esa
ariane
©2013 ESA-CNES-ARIANESPACE/Optique Vidéo du CSG - JM GUILLON


End-to-end cold testing with telescope
at Houston
Cryo Position Metrology
Center of Curvature
Optical Assembly
Sept. 15 2017, survived Hurricane Harvey flooding! Telescope now at Northrop Grumman LA



JWST : le voyage de Mirim

PRINCIPE

L'imageur Mirim est un concentré de technologies qui sera embarqué par le satellite JWST, au printemps 2019, jusqu'au point de Lagrange L2. La conception-réalisation-fabrication et l'intégration au satellite de son modèle de vol nécessitent huit étapes principales : étapes au cour desquelles Mirim prend progressivement place dans tout un ensemble… de poupées russes.

❶ MIRIM
Réalisation, assemblage et tests

Saclay (France) - 2004-2009

L'imageur infrarouge moyen (5 à 28 micromètres) Mirim compte de nombreux composants (banc optique, filtres, coronographes, cryomécanismes, détecteurs…) fournis par différents pays.
Deux prototypes ont été nécessaires avant de procéder à l'assemblage final du modèle de vol, lequel a également subi une série de tests, notamment des tests de performances à Saclay. Des opérations conduites et sous la responsabilité du CEA-Irfu.

❷ MIRI
Intégration et tests

Oxford (Angleterre) - 2009-2012

Mirim est intégré au spectromètre pour former le spectro-imageur Miri au *Rutherford Appleton Laboratory*. L'équipe CEA a fortement contribué aux tests de cet ensemble.

❸ ISIM
Intégration et tests

Baltimore (États-Unis) - 2012-2016

Départ pour le *Goddard Space Flight Center* (GSFC) de la Nasa où Miri est intégré avec Nircam, Nirspec et Niriss dans l'Isim, qui est la charge utile du satellite JWST. Trois séries de tests sont conduites sur cet assemblage avec, à chaque fois, une forte contribution de l'équipe CEA.
En parallèle, le télescope est assemblé : les 18 segments du miroir primaire sont intégrés sur une structure pliable en trois grandes parties.

❹ OTIS
Assemblage et tests

Houston (États-Unis) - 2017

Le télescope et l'Isim assemblés sont envoyés au *Johnson Space Center* (JSC) de la Nasa. Là, cet ensemble télescope-instruments (Otis) subit une série de tests grandeur nature, notamment dans une immense cuve cryogénique. Plusieurs membres du CEA y participent.

❺ JWST
Assemblage et tests finaux

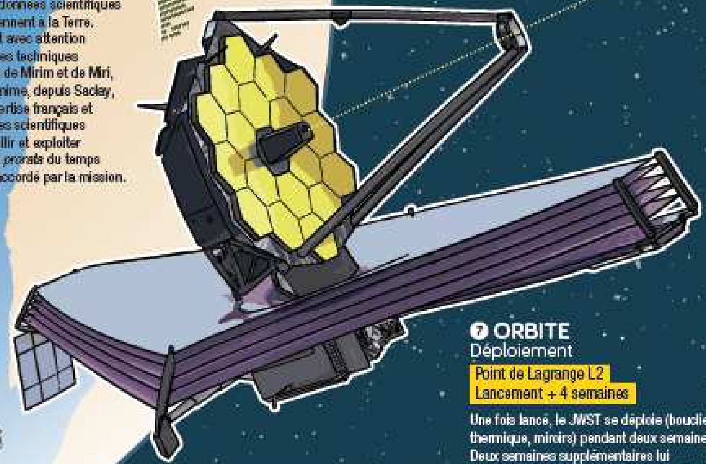
Pasadena (États-Unis) - 2018

L'Otis est assemblé aux deux derniers composants du JWST : le bouclier thermique et la plateforme (alimentation électrique et communications) par l'industriel américain *Northrop Grumman AeroSpace*.

❻ ARIANE 5
Lancement

Kourou (France) - 2019

Après un long voyage en bateau, le JWST arrive sur la base spatiale du Cnes. Il est installé dans le lanceur de la fusée Ariane 5. Le lancement est programmé au printemps 2019.



❼ ORBITE
Déploiement

Point de Lagrange L2
Lancement + 4 semaines

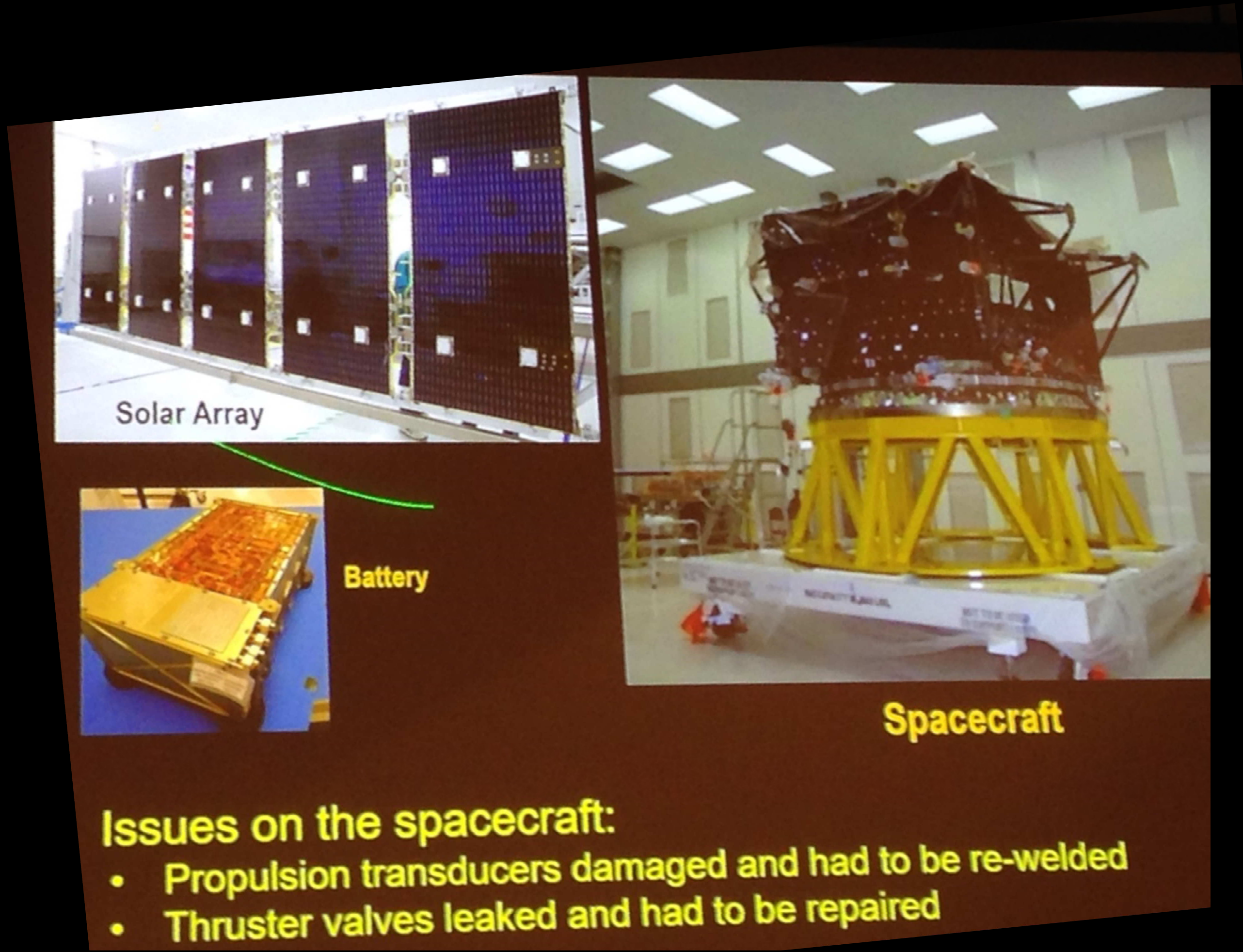
Une fois lancé, le JWST se déploie (bouclier thermique, miroirs) pendant deux semaines. Deux semaines supplémentaires lui permettent d'atteindre sa destination finale : en orbite autour du point de Lagrange L2, situé à 1,5 million de km de la surface terrestre. Commence alors une « activité de recette sur le ciel » (démarrage et tests des instruments), qui dure cinq mois.

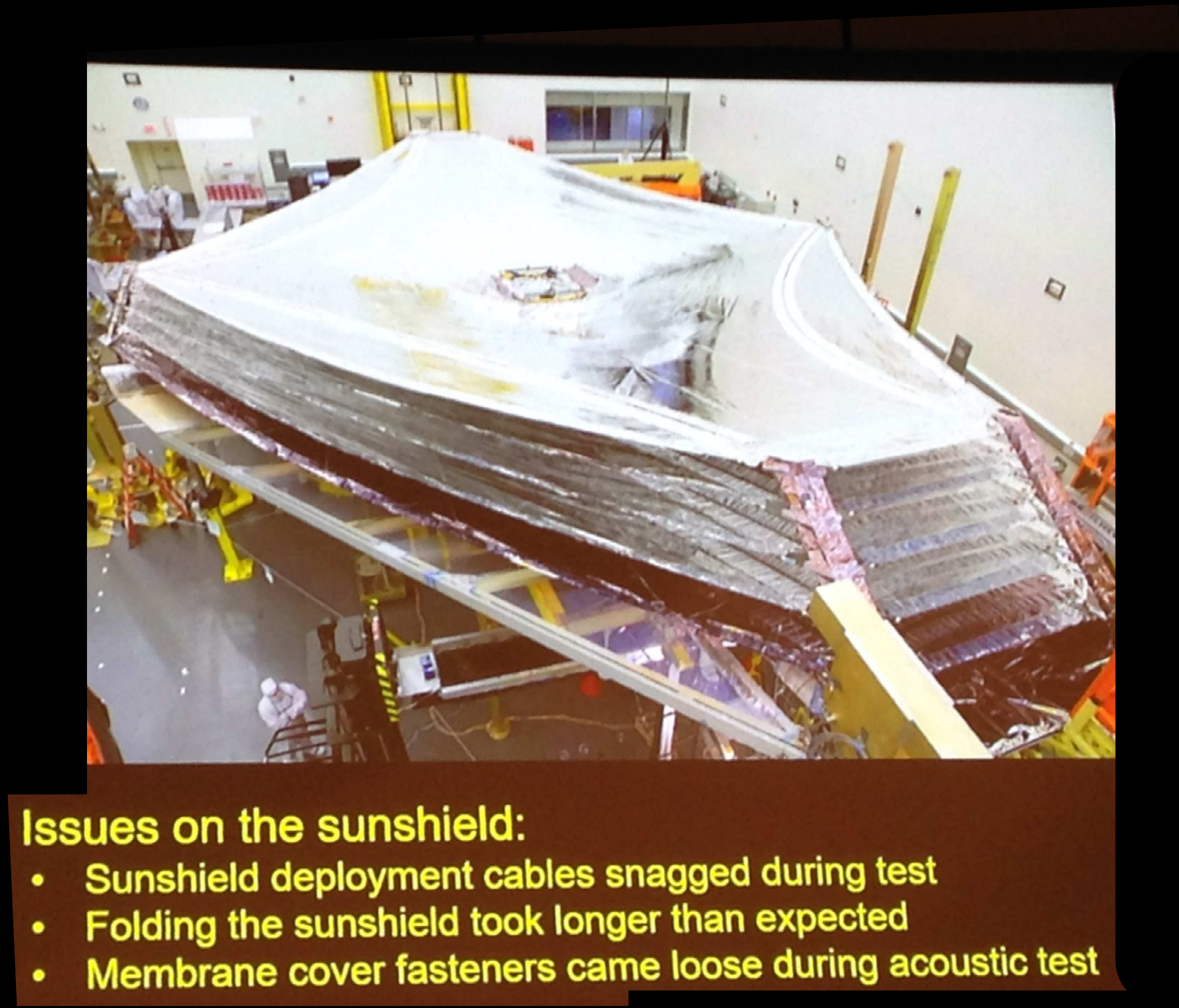
❽ CENTRE D'EXPERTISE
Réception des données

Saclay (France)
Orbite + six mois

Les premières données scientifiques du JWST parviennent à la Terre. Le CEA-Irfu suit avec attention les performances techniques et scientifiques de Mirim et de Miri, d'autant qu'il anime, depuis Saclay, le centre d'expertise français et européen. Là, les scientifiques pourront recueillir et exploiter les données au *prorata* du temps d'observation accordé par la mission.

Aurélien Boudault et Aude Ganier, en collaboration avec Pierre-Olivier Lagage, directeur de recherche à l'Irfu du CEA et responsable scientifique français de Miri


Solar Array
Battery
Spacecraft
Issues on the spacecraft:
• Propulsion transducers damaged and had to be re-welded
• Thruster valves leaked and had to be repaired

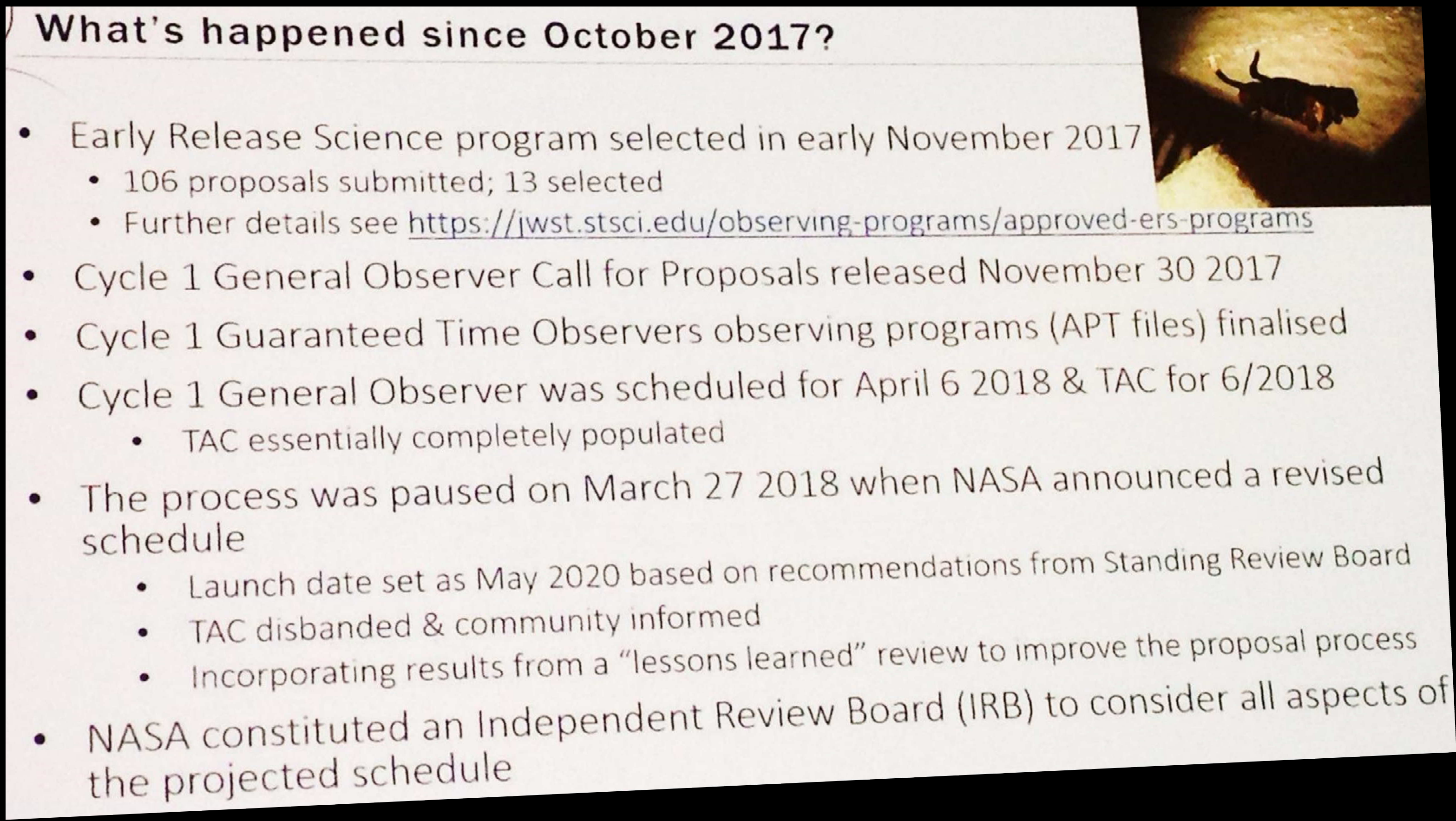

Issues on the sunshield:
• Sunshield deployment cables snagged during test
• Folding the sunshield took longer than expected
• Membrane cover fasteners came loose during acoustic test

The JWST is an observatory

JWST observing programs

- Guest Observer (GO programs)
  - Open access for the community
  - ~80% of time in Cycles 1 through 5
- Guaranteed Time Observer (GTO) programs
  - 4020 hours allocated over first 30 months (i.e. Cycles 1 through 3)
  - NASA policy constraints on time/cycle
- Director's Discretionary Time (DD) programs
  - Up to 10%/cycle i.e. ≤877 hours
  - Rapid response observations & targeted science programs, such as Early Release Science program

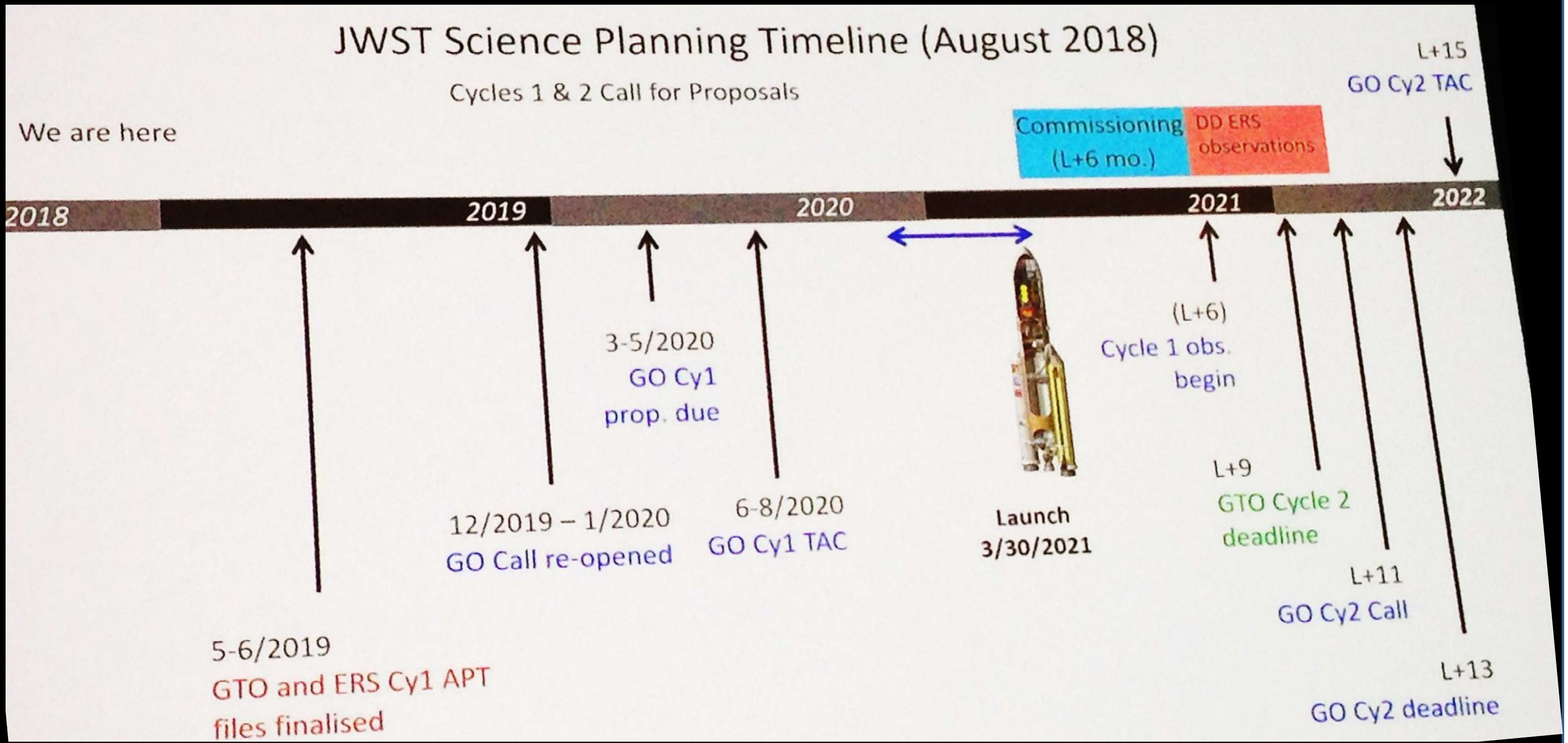
-- Used during first cycle for Early Release Science (ERS)



Reid IAU Vienna presentation 2018

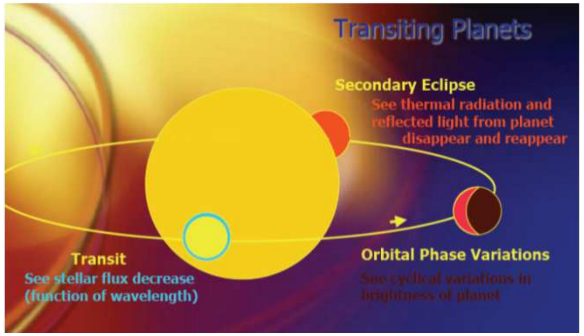
ID	ERS Program	PI & Co-PIs	Category	Instruments
1288	Radiative Feedback from Massive Stars as Traced by Multiband Imaging and Spectroscopic Mosaics	**PI:** Olivier Berne (Universite Toulouse) **CoPIs:** Emilie Habart (Institut d'Astrophysique Spatiale) and Els Peeters (University of Western Ontario)	Stellar Physics	MIRI NIRCam NIRSpec
1309	IceAge: Chemical Evolution of Ices during Star Formation	**PI:** Melissa McClure (Universiteit van Amsterdam) **CoPIs:** Adwin Boogert (University of Hawaii) and Harold Linnartz (Universiteit Leiden)	Stellar Physics	MIRI NIRCam NIRSpec
1324	Through the Looking GLASS: A JWST Exploration of Galaxy Formation and Evolution from Cosmic Dawn to Present Day	**PI:** Tommaso Treu (University of California - Los Angeles)	Galaxies and the IGM	NIRCam NIRISS NIRSpec
1328	A JWST Study of the Starburst-AGN Connection in Merging LIRGs	**PI:** Lee Armus (California Institute of Technology)	Galaxies and the IGM	MIRI NIRCam NIRSpec
1334	The Resolved Stellar Populations Early Release Science Program	**PI:** Daniel Weisz (University of California - Berkeley)	Stellar Populations	NIRCam NIRISS
1335	Q-3D: Imaging Spectroscopy of Quasar Hosts with JWST Analyzed with a Powerful New PSF Decomposition and Spectral Analysis Package	**PI:** Dominika Wylezalek (European Southern Observatory - Germany) **CoPIs:** Sylvain Veilleux (University of Maryland) and Nadia Zakamska (Johns Hopkins University)	Massive Black Holes and their Galaxies	MIRI NIRSpec
1345	The Cosmic Evolution Early	**PI:** Steven Finkelstein (University of	Galaxies and	MIRI NIRCam

1345	The Cosmic Evolution Early Release Science (CEERS) Survey	**PI:** Steven Finkelstein (University of Texas at Austin)	Galaxies and the IGM	MIRI NIRCam NIRSpec
1349	Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Rayet Binary	**PI:** Ryan Lau (California Institute of Technology)	Stellar Physics	MIRI NIRISS
1355	TEMPLATES: Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star Formation	**PI:** Jane Rigby (NASA Goddard Space Flight Center) **CoPI:** Joaquin Vieira (University of Illinois)	Galaxies and the IGM	MIRI NIRCam NIRSpec
1364	Nuclear Dynamics of a Nearby Seyfert with NIRSpec Integral Field Spectroscopy	**PI:** Misty Bentz (Georgia State University Research Foundation)	Massive Black Holes and their Galaxies	NIRSpec
1366	The Transiting Exoplanet Community Early Release Science Program	**PI:** Natalie Batalha (NASA Ames Research Center) **CoPIs:** Jacob Bean (University of Chicago) and Kevin Stevenson (Space Telescope Science Institute)	Planets and Planet Formation	MIRI NIRCam NIRISS NIRSpec
1373	ERS observations of the Jovian System as a Demonstration of JWST's Capabilities for Solar System Science	**PI:** Imke de Pater (University of California - Berkeley)	Solar System	MIRI NIRCam NIRISS NIRSpec
1386	High Contrast Imaging of Exoplanets and Exoplanetary Systems with JWST	**PI:** Sasha Hinkley (University of Exeter) **CoPIs:** Andrew Skemer (University of California - Santa Cruz) and Beth Biller (University of Edinburgh)	Planets and Planet Formation	MIRI NIRCam NIRISS NIRSpec



Reid IAU Vienna presentation 2018

	Description	Date	People in charge	Deliveries
1	Benchmarking of atmospheric exoplanet models	2016	P. Tremblin . P-O. Lagage + MIRI consortium exoplanet modeling group	1 paper (ApJ)
2	Simulate the expected effects of composition variations (e.g., C/O ratio) for different scenarii of planet formation in disks, for direct imaging and for the exoplanets transiting	2016-2017	P. Tremblin, P.-O. Lagage + student at UCL	At least 2 papers (ApJ or A&A)
3	Implement of clouds in the ATMO model	2017-2018	P. Tremblin, postdoc	1 paper (ApJ or A&A)
4	Development of 3 D models from the dynamico code: Post-processing of 3D models with ATMO to produce 2D maps of the atmosphere transmission spectra, study of simple clouds prescriptions.	2016-2018	S. Fromang, P. Tremblin + postdoc	1 paper (ApJ or A&A)
5	Analysis of the first JWST exoplanet observations in ERS and in GTO	2019	P.O. Lagage, PhD (of WP2), S. Fromang, M. Ollivier, P. Tremblin and international collaborators	At least 1 paper (Nature or Science)



Item 5 Replaced by more simulations

Thesis of Marine Martin Lagarde transit generator

Coupled to the MIRI simulatorgénérateur

(poster presented at EPSC)

Camilla Danielski : directly imaged exoplanets (to appear in ApJ)

And analysis of available especially WASP43 b (ERS transiting exoplanet: WASP 43 b)

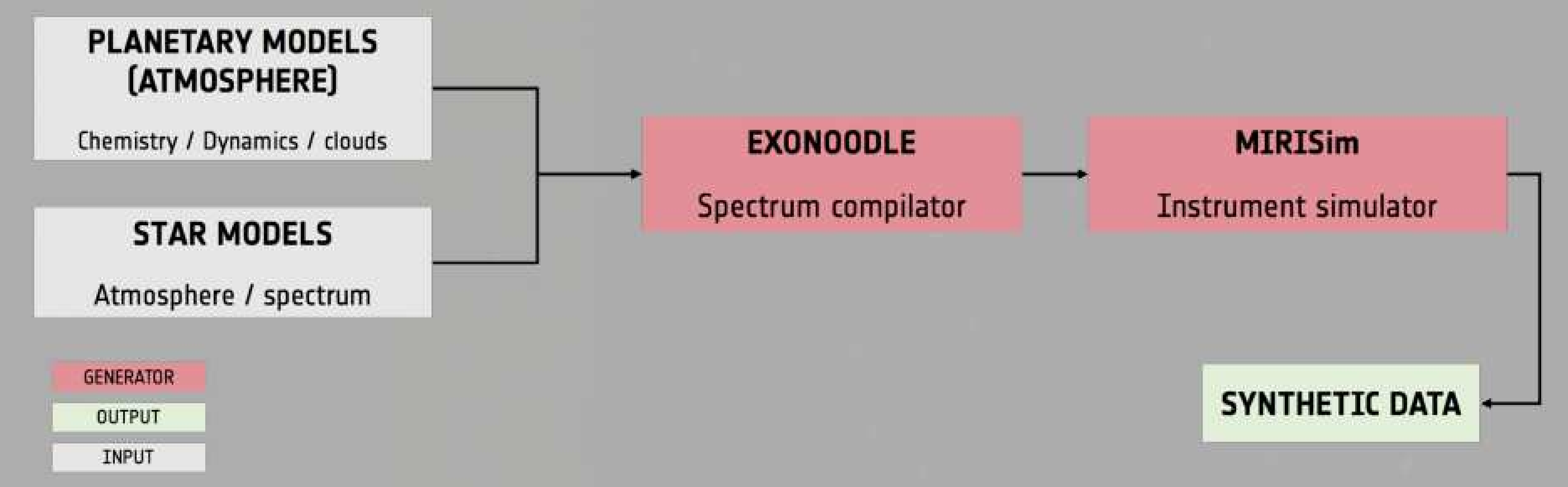
Giuseppe Morello presentation

GENERATING JWST TRANSITING EXOPLANETS TIME-SERIES DATA SETS

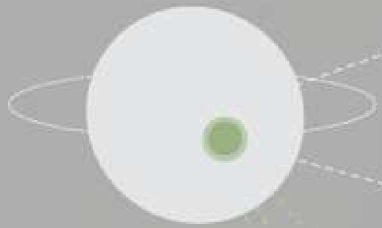
Marine Martin-Lagarde[1], Pierre-Olivier Lagage[1], René Gastaud[1], Alain Coulais[1,2], Christophe Cossou[3] and Giuseppe Morello[1]

Abstract

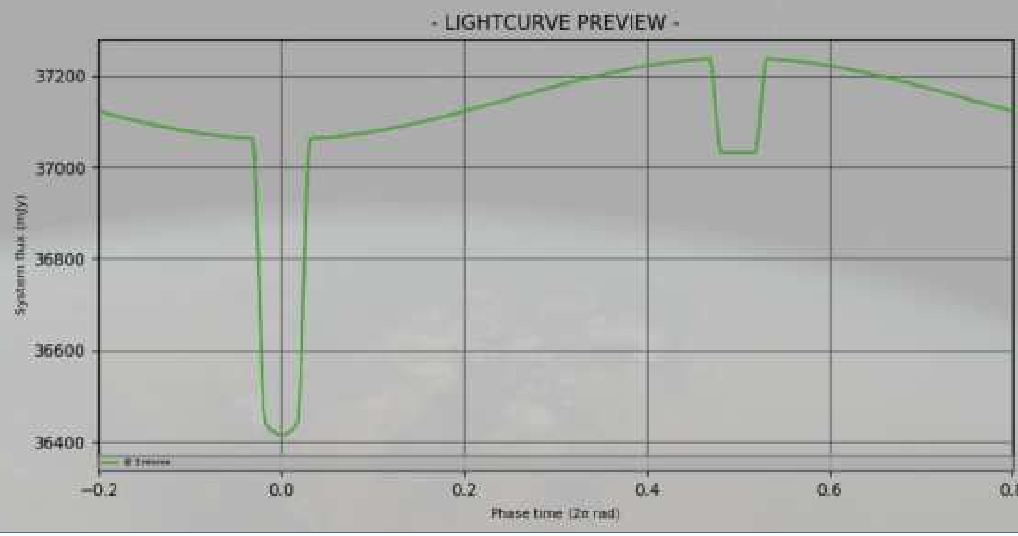
To prepare JWST observations of transiting exoplanets, we have developed a time series spectra generator for exoplanet(s)–star systems where the planet orbits its host star. When coupled with a telescope-instrument simulator, it generates representative sets of data. They will be used to optimize data reduction methods, retrieval methods and to identify the impact of various effects (limb darkening, 3D versus 1D exoplanet models). One of the first applications is the simulation of JWST observations of the exoplanet WASP-43b with the MIRI instrument in slitless low-resolution mode.



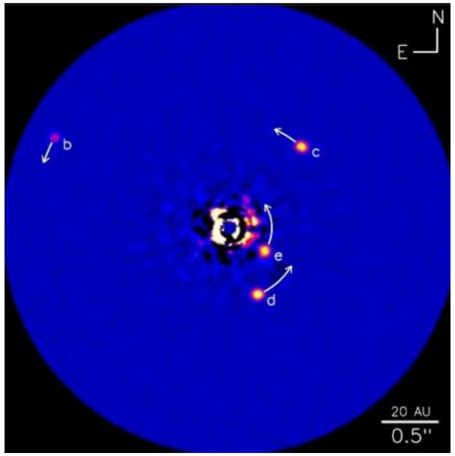
CONTRIBUTIONS TO THE SYSTEM SPECTRUM



- **Star spectrum**
  - Default: Blackbody with temperature
  - File: Modelled spectrum
- **Star limb-darkening**
  - Default: None (homogeneous star)
  - File: Values for various forms of limb darkening coefficients
- **Planet emission spectrum**
  - Default: Blackbody with day and night temperatures
  - File: Modelled spectrum (day and night)
- **Planet reflection spectrum**
  - Default: Jupiter geometric albedo
  - File: Albedo integrated on the surface, wavelength-dependent
- **Planet transmission spectrum**
  - Default: None (no atmosphere)
  - File: Modelled as a variable $R_p(\lambda)$



Marine



ATMOSPHERIC CHARACTERIZATION OF DIRECTLY IMAGED EXOPLANETS WITH JWST/MIRI.

C. Danielski,[1,2,3,4] Jean-Loup Baudino,[5] Pierre-Olivier Lagage,[1,2] Anthony Boccaletti,[6] René Gastaud,[1,2] Alain Coulais,[7,1,2] and Bruno Bézard[8]

To appear in ApJ

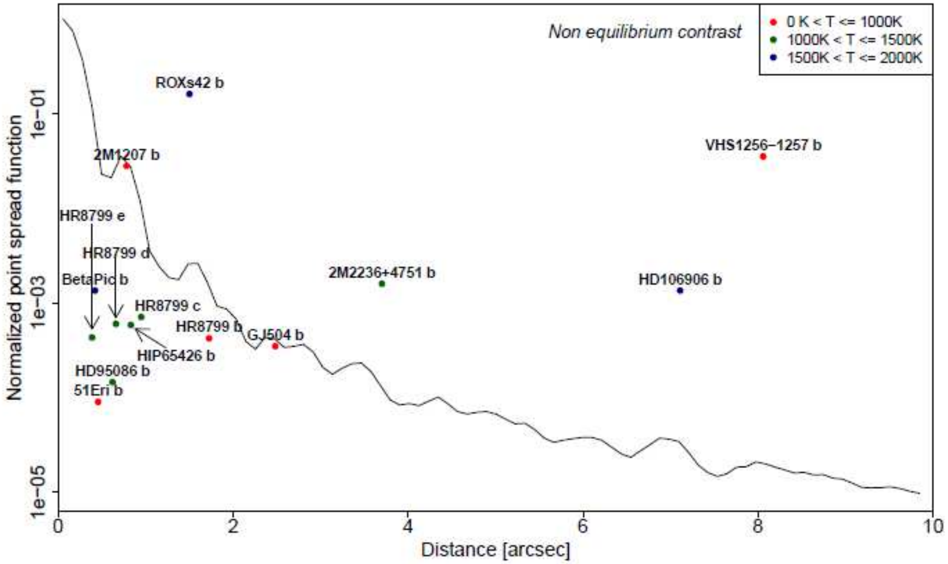
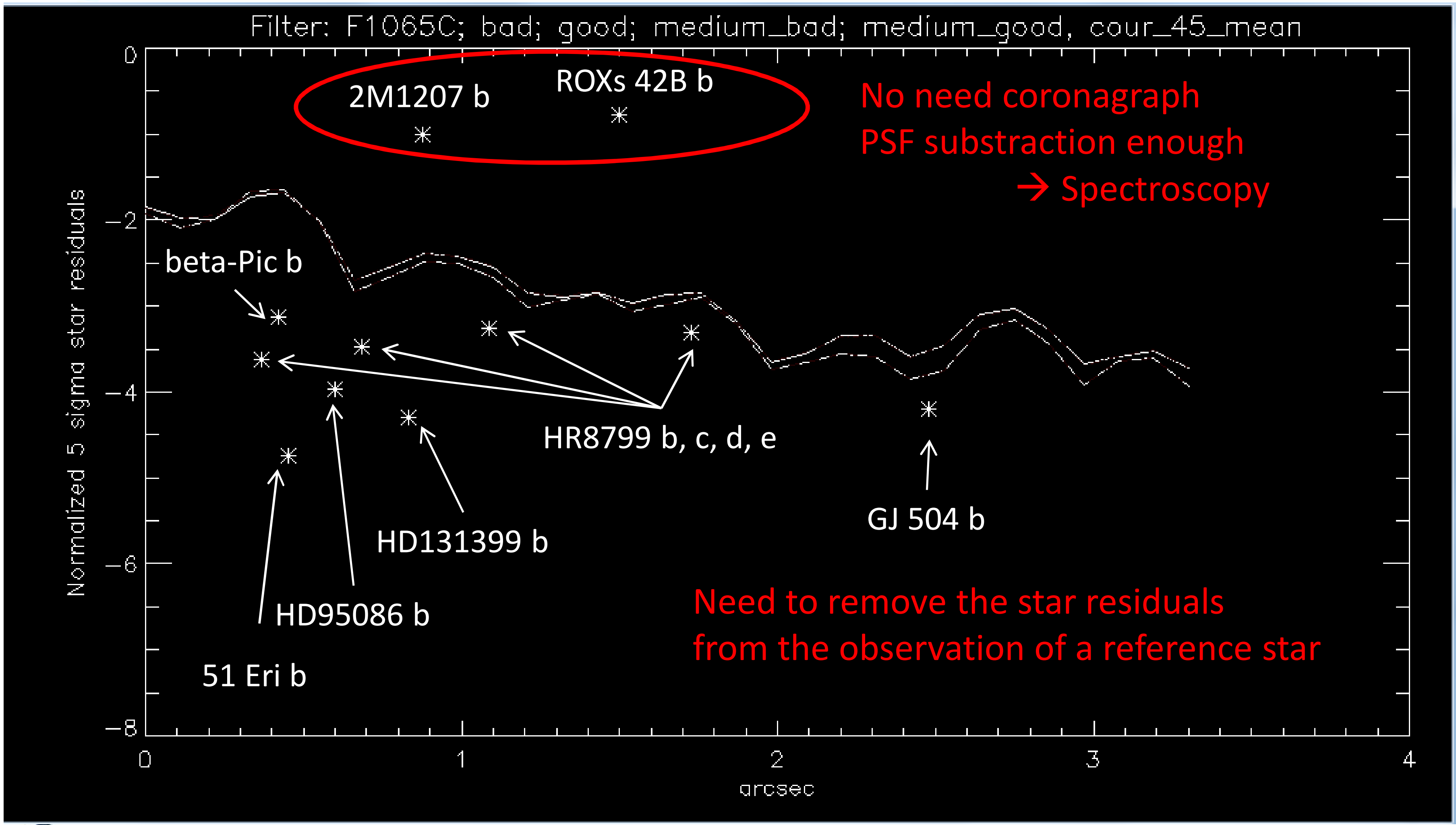
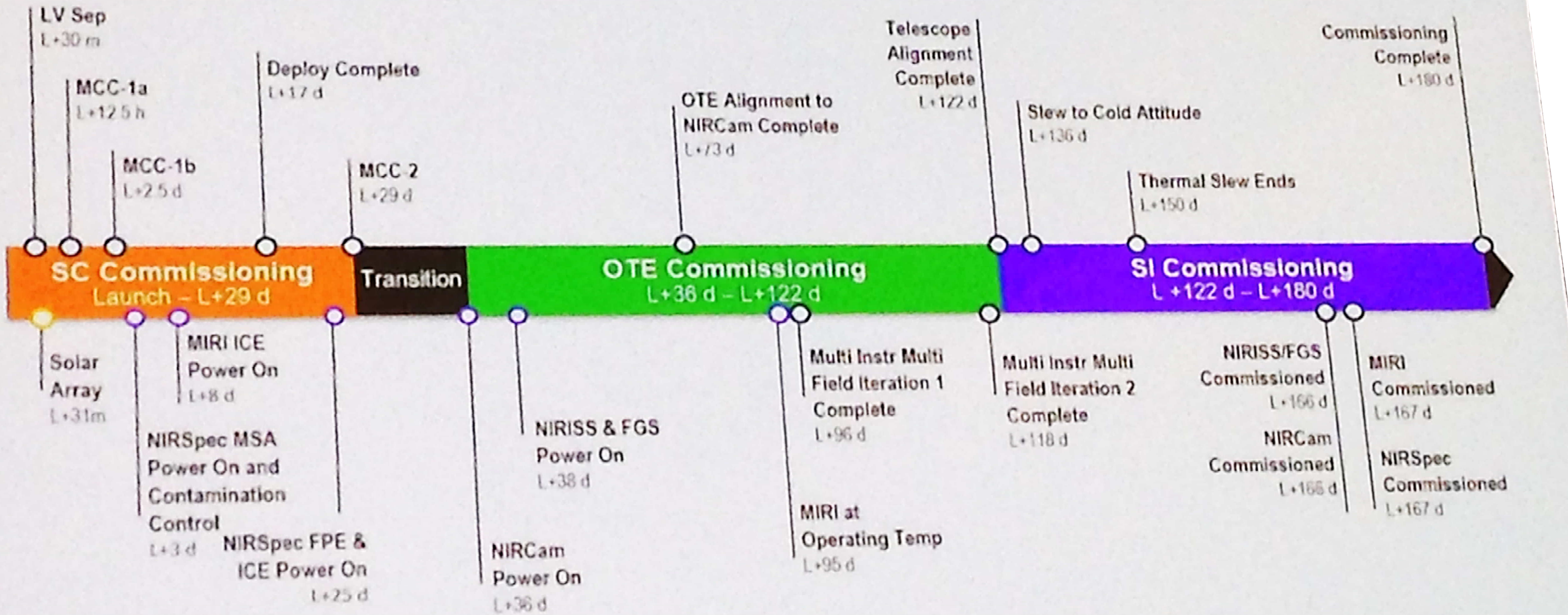


Figure 1. Non coronagraphic point spread function versus the distance to the peak signal, normalized to 1. The 1D curve has been measured from a simulated image of a MIRI observation with a filter at 11.3μm (using the WebbPSF software). The signal has been averaged over an annulus of 1 pixel width (i.e. 0.11″). Dots indicate the planet-to-star contrast of the targets under consideration. Colors correspond to the temperature of the target as indicated in the top legend. Those planetary systems whose planet-to-star contrast lies above the curve will be observed with the spectroscopic mode. Note that 2M1207 b contrast takes into account the host star and disk flux.



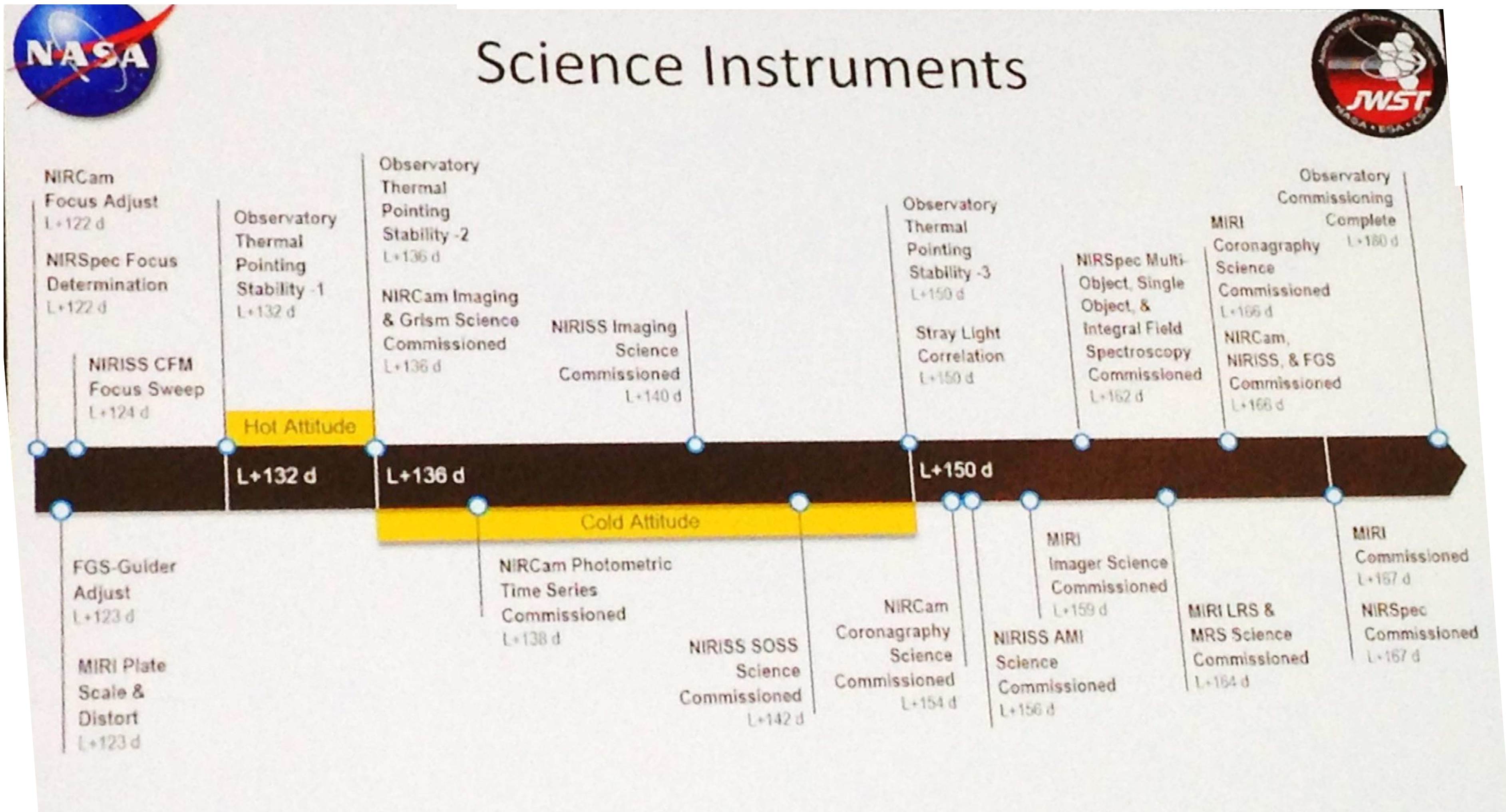
C. Danielski et al.

Commissioning Timeline



- JWST commissioning is the collection of flight activities required to activate, checkout, and calibrate the Observatory subsystems, including the science instruments to perform Cycle 1 science.
- Majority of commissioning will be carried out at the Mission Operations Center, located at STScI, by NASA, ESA, CSA, aerospace industry partners, SI teams, and STScI staff.

McElwain IAU Vienna presentation 2018



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