

Dr HDR Athena Coustenis



Professional status:

Athena Coustenis is Director of Research 1st class with the National Centre for Scientific Research (CNRS) of France, working at Paris Observatory in Meudon.

Affiliation: Paris Observatory, PSL, CNRS, Sorbonne Université, U. Paris-Diderot

Her specialty is Planetology (exploration and study of the Solar System from ground-based and space observations).

She is currently the Chair of the European Science Foundation Space Science Committee (ESF-ESSC).

Education/degrees

- 1986: *Master* in Astrophysics and Space techniques, Univ. Paris 7 (P. & M. Curie)
- 1987: *Master* in English Literature, Univ. Paris 3 (Nouvelle Sorbonne)
- 1989: *PhD* in Astrophysics and Space techniques, Univ. Paris 7 (P. & M. Curie)
- 1996: *Habilitation* to Direct Research (HDR), Univ. Paris 6 (P. & M. Curie).

Languages spoken Greek (maternal), French (native level) and English (Proficiency).
Good command of Italian.

Professional History :

- Since Oct. 2013: Director of research, 1st class, CNRS, at LESIA, Paris-Meudon Observatory
- Oct. 2008-Oct. 2013 : Director of research, 2nd class, CNRS, at LESIA, Paris-Meudon Observatory
- 1991-2008: Chargée de recherche (Senior researcher) at Paris-Meudon Observatory
- 1989-1991: Post-Doc at Paris Observatory

Areas of expertise :

Athena Coustenis is an Astrophysicist with a specialty in space exploration. She works in the field of Planetology. Her research is devoted to the investigation of planetary atmospheres and surfaces, with emphasis on the outer solar system bodies, in particular icy moons like Titan and Enceladus, Saturn's satellites, and Jupiter's Ganymede and Europa, objects with high astrobiological potential. She also works on the characterisation of exoplanetary atmospheres. She has led many observational campaigns from the ground using large telescopes (CFHT, UKIRT, VLT, etc) and has used the Infrared Space Observatory (ISO) to conduct planetary investigations.

A. Coustenis contributes to the definition and development of space missions and to the exploitation of the acquired data. She is Co-Investigator or associated with mainly four of the

instruments (CIRS, HASI, DISR, VIMS) aboard the Cassini-Huygens space mission to Saturn and Titan, in which she was involved from the beginning of the definition phase. She analyses and interprets the spectro-imaging data recovered since 2004 using radiative transfer codes and other analysis tools.

She has contributed in or led several other proposals, studies and development phases for space missions to the outer solar system and the exoplanets. Her expertise in space missions has allowed her to Chair or to participate in several advisory groups within ESA and NASA and other European Institutions.

Contribution to space-related projects

- *JUICE*: Since 2009, she was involved in the JUICE mission as European Science co-Lead and then as member of the Science Working Team and Co-I of the JANUS camera. The mission will study essentially Ganymede and the Jupiter system, and is currently planned for launch by ESA as the Cosmic Vision programme L1 in 2022. <http://sci.esa.int/juice/>
- *ARIEL* : member of the Science Definition Team and the Consortium : <https://ariel-spacemission.eu/> Selected as ESA's Cosmic Vision M4 mission to fly in 2028.
- *TSSM* : In 2007 and 2008 she was the Lead European Scientist of the Titan/Saturn System Mission (TSSM) studied jointly by ESA and NASA. More than 150 scientists involved. The mission was not selected for implementation.
- Deputy coordinator of H2020 RI *EUROPLANET*, Europe's leading forum for the Planetary Sciences (www.europlanet-2020-ri.eu), Budget of about 10 M Euros for 2015-2019.
- Main coordinator of efforts towards improving or complementing molecular databases for planetary studies and exoplanetary data analyses (via ANR CH4 at Titan and e-PYTHEAS projects) involving several French laboratories and international partners

Current research management and functions

- President of the European Science Foundation Space Sciences Committee (**ESF/ESSC**) (<http://www.essc.esf.org/>)
- Chair of the Human Exploration and Science Advisory Committee (**HESAC**) of ESA
- Member of the Space Sciences Advisory Committee (**SSAC**) of ESA
- Member ex-officio of the Advisory Committee for Earth Observations (**ACEO**) of ESA
- Member ex-officio of the High-level Science Policy Advisory Committee (**HISPAC**) of ESA
- Member ex-officio of the Space Studies Board (**SSB**) of the US National Academies of Science, Engineering and Medicine
- Chair of the Panel for Planetary Protection (**PPP**) du COSPAR
- Member ex-officio of the COSPAR Scientific Advisory Committee (**CSAC**)
- President of the Comité d'Evaluation sur la Recherche et l'Exploration Spatiales (**CERES**) of the French Centre National des Etudes Spatiales (CNES)
- Member of the Space Advisory Committee (**SAC**) of the Swedish National Space Board (SNSB)
- Member of the Outer Solar System Task Group (OSSTG) of the Working Group for Planetary System Nomenclature (**WGPSN**) of IAU : <https://planetarynames.wr.usgs.gov/Page/Members>
- Member of the Working Group on Global Coordination of Ground and Space Astrophysics (**WGGCGSA**) of the IAU Executive Committee
- Member of the Intl Astronomical Union (**IAU**) Executive committee of Commission F: <https://www.iau.org/administration/membership/national/members/3/members/>
- Deputy coordinator of the Horizon 2020 RI **EUROPLANET** : www.europlanet-2020-ri.eu
- Member of the International Academy of Astronautics (**IAA**): <https://iaaweb.org/content/view/714/940/>

- Member of the Board of Trustees of IAA
 - Member of the IAA Scientific Activities and Publications & Communication Committees
- Associated Member Academician of the Royal Academy of Belgium, Classe des Sciences.
- Vice-Chair of the *IUGG* Union Commission on Planetary Sciences (**UCPS**): <http://202.127.29.4/geodesy/ucps/ec.html>
- Chair of the *Honours and Awards committee of the IUGG*.
- Member of the EGU *Copernicus medal* committee
- Councillor of the International Society for the Study of the Origins of Life (**ISSOL**)
- Member of the Council of the Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique (LESIA) of Paris Observatory
- Member of the **Editorial Board** of
 - *Astronomy & Astrophys. Reviews* of Springer
 - *Icarus* of Elsevier
 - *Astronomy Astrophysics Library* of Springer
 - *Philosophical Transactions A of the RAS*
 - *Acta Astronautica* of IAA
- Head **Guest Editor** for special issues of *Planetary and Space Sciences*.
- Organiser/convenor of Meetings and Planetary sessions in the International colloquia of : EGU (since 2000), IAMAS (since 2003), COSPAR (since 2010), AOGS (since 2004), DPS (since 2006), EPSC (since 2006), Goldschmidt Conference (since 2007) and IPPW (since 2006) and others.

Recent past research management and functions

- President of the *International Association of Meteorology and Atmospheric Sciences (IAMAS)* of the IUGG, 2011-2015. Current member of the Bureau.
- Member of the **Science Council of Paris Observatory**, 2011-2015.
- Chair of ESA's Solar System and Exploration Working Group (**SSEWG**), 2010-2013.
- Secretary of the Committee of the **Division for Planetary Sciences (DPS)** of the American Astronomical Society (AAS), 2010-2014.
- President of the **Division for Planetary Sciences of the European Geophysical Union (EGU)**, 2009-2013.
- Chair of the **EGU Jean Dominique Cassini Medal** committee
- Member of the Executive committee of **ISSI (International Space Sciences Institute)**, 2014-2017.
- President of the International Commission for Planetary Atmospheres and Environment (**ICPAE**) of the IUGG, 2003-2011.
- Member-at-large of the Observing Program Committee for the selection of proposals for the **ESO/Very Large Telescope** (2001-2003) and chair of Panel C ("Stars, planets and ISM") until 2006.
- **Faculty** in Post-Master courses at Paris University and Ecole Doctorale Ile de France.
- Member of the National Committee of **CNRS** (Jury Section 17) until 2012.
- Member of the Executive committee of the *Astrobiology Society*

Honors/Awards :

- The NASA Group Achievement Award for the Cassini Programme Huygens Atmospheric Structure Instrument (HASI)
- The NASA Group Achievement Award for the Cassini Program Descent Imager Radiometer Spectrometer (DISR)
- The NASA Public Service Group Achievement Award for the Huygens Atmospheric Structure Instrument (HASI)
- The NASA Public Service Group Achievement Award for the Descent Imager Spectrometer radiometer (DISR)
- The ESA Award for making an outstanding contribution to the Huygens Probe.
- The 2012 Trophy for Feminine Success of the French Mediterranean Association.
- The 2014 Masursky AAS/DPS Award for meritorious service to Planetary Science.

- 2017: Honorary plaque from the Greek Union of Physicists

Scientific production and Outreach activities:

- She has written more than 230 scientific papers (H=43), with about 130 in peer-reviewed journals. She has first-authored 3 books and several chapters of Encyclopaedias¹.
- Coustenis has participated in many E/PO activities. She has delivered more than 600 science lectures (of which more than 150 invited).

For the full list of publications and communications see:

<http://cosmicdiary.org/acoustenis/files/2017/08/ACoustenis-Publications-Communications.pdf>

Selected extract of publications :

- Coustenis, A., Bézard, B. 1995. Titan's Atmosphere from Voyager Infrared Observations: IV. Latitudinal Variations in Temperature and Composition. *Icarus* 115, 126-140.
- Coustenis, A., Salama, A., Lellouch, E., *et al.*, 1998. Evidence for water vapor in Titan's atmosphere from ISO/SWS data. *Astron. Astrophys.* 336, L85-L89.
- Coustenis, A., Gendron, E., Lai, O., *et al.*, 2001. Images of Titan at 1.3 and 1.6 microns with adaptive optics at the CFHT. *Icarus* 154, 501-515.
- Coustenis, A., Salama, A., Schulz, B., *et al.*, 2003. Titan's atmosphere from ISO mid-infrared spectroscopy. *Icarus*, 161, 383-403.
- Moutou, C., Coustenis, A., Schneider, J., Queloz, D., Mayor, M., 2003. Search for the HeI absorption feature in the transmission spectrum of HD209458. *Astron. Astroph.* 405, 341-348.
- Coustenis, A., Hirtzig, M., Gendron, E., *et al.*, 2005. Maps of Titan's surface from 1 to 2.5 micron. *Icarus* 177, 89-105.
- Coustenis, A., Negrao, A., Salama, A., *et al.*, 2006. Titan's 3-micron spectral region from ISO high-resolution spectroscopy. *Icarus* 180, 176-185.
- Negrao, A., Coustenis, A., Lellouch, E., *et al.*, 2006. Titan's surface albedo from near-infrared CFHT/FTS spectra: modeling dependence on the methane absorption. *Plan. Space Sci.* 54, 1225-1246.
- Coustenis, A., Achterberg, R., Conrath, B., *et al.*, 2007. The composition of Titan's stratosphere from Cassini/CIRS mid-infrared spectra. *Icarus* 189, 35-62.
- Coustenis, A., 2007. Titan. In the *Encyclopedia of the Solar System*, Second Edition, P. R. Weissman, L.-A. McFadden, T.V. Johnson, Eds., Academic Press.
- Coustenis, A., Taylor, F.W., 2008. *Titan: Exploring an Earth-like World*. World Scientific Press, Singapore.
- Lavvas, P. P., Coustenis, A., Vardavas, I. M., 2008. Coupling photochemistry with haze formation in Titan's atmosphere. Part II: Results and Validation with Cassini/Huygens data. *Plan. Space Sci.* 56, 67-99.
- Coustenis, A., Atreya, S., Balint, T., and 142 co-authors, 2008. TandEM: Titan and Enceladus mission. *Experimental Astronomy* 23, 893-946.
- Coustenis, A., Jennings, D., Jolly, A., *et al.*, 2008. Detection of C₂HD and the D/H ratio on Titan. *Icarus* 197, 539-548.
- Lebreton, J-P., Coustenis, A., Lunine, J., Raulin, F., Owen, T., Strobel, D., 2009. Results from the Huygens probe on Titan. *Astron. & Astrophys. Rev.*, 17, 149-179.
- Coustenis, A., Jennings, D. E., Nixon, *et al.*, 2010. Titan trace gaseous composition from CIRS at the end of the Cassini-Huygens prime mission. *Icarus* 207, 461-476.
- Bampasidis, G., Coustenis, A., *et al.*, 2012. Thermal and temperature structure variations in Titan's stratosphere during the Cassini mission. *Astroph. J.* 760, Issue 2, article id. 144, 8 pp.
- Tinetti, G., Encrenaz, Th., Coustenis, A., 2013. Spectroscopic characterization of exoplanets. *Astron. Astrophys. Rev.*, 21 :63, DOI 10.1007/s00159-013-0063-6.
- Coustenis, A., Encrenaz, Th., 2013. Life beyond Earth: the search for habitable worlds in the Universe. Cambridge Univ. Press (book), ISBN: 9781107026179.

¹ In Oct. 2011 Ranked 9th in the Thomson-Reuters decadal survey by citations number and 13th by citations per article among those concerning the "planetary exploration" theme : <http://archive.sciencewatch.com/ana/st/planet/11octPlanetCous/>

- Grasset, O., Dougherty, M.K., Coustenis, et al., 2013. JUpiter ICy moons Explorer (JUICE): an ESA mission to orbit Ganymede and to characterise the Jupiter system. *Plan. Space Sci.* 78, 1-21.
- Mitri, G. Coustenis, A., et al., 2014. The Exploration of Titan with an Orbiter and a Lake Probe. *Plan. Space Sci.* 104, 78-92.
- Coustenis, A., Jennings, D. E., Achterbergh, R. K., Bampasidis, G., Lavvas, P., Nixon, C. A., Teanby, N. A., Anderson, C. M., Flasar, F. M., 2015. Titan's temporal evolution in stratospheric trace gases near the poles. *Icarus* 270, 409-420.
- Coustenis, A., 2014. « Titan ». In *Encyclopedia of the Solar System*, Third Edition, T. Spohn, D. Breuer, & T. V. Johnson (Eds.), Elsevier (pp. 831–849), ISBN 9780124158450.
- Coustenis, A., Raulin, F., 2015. "Titan Astrobiology". Chapter in *the Encyclopedia of Astrobiology*, 2nd edition, M. Gargaud, R. Amils, J. Cernicharo, H. J. Cleaves II, K. Kobayashi, D. Pinti, M. Viso (Eds), Springer, 2550 p., ISBN 978-3-662-44184-8.
- Coustenis, A., 2015. "The Cassini-Huygens mission". Chapter in *the Encyclopedia of Astrobiology*, 2nd edition, M. Gargaud, R. Amils, J. Cernicharo, H. J. Cleaves II, K. Kobayashi, D. Pinti, M. Viso (Eds), Springer, 2550 p., ISBN 978-3-662-44184-8.
- Solomonidou, A., Coustenis, A., et al., 2016. Temporal variations of Titan's surface with Cassini/VIMS. *Icarus* 270, 85-99.
- Coustenis, A., Jennings, D. E., Achterbergh, R. K., Bampasidis, G., Lavvas, P., Nixon, C. A., Teanby, N. A., Anderson, C. M., Flasar, F. M., 2016. Titan's temporal evolution in stratospheric trace gases near the poles. *Icarus* 270, 409-420.
- Encrenaz, Th., Tinetti, G., Coustenis, A., 2017. Transit spectroscopy of temperate Jupiters with ARIEL: a feasibility study. *Experimental Astronomy*, DOI 10.1007/s10686-017-9561-2
- Solomonidou, A., Coustenis, A., et al, 2018. The Spectral Nature of Titan's Major Geomorphological 1 Units : Constraints on Surface Composition. *J. Geophys. Res.- Planets* 123, 489-507. DOI: 10.1002/2017JE005477.
- Coustenis, A., Taylor, F.W., Plainaki, Ch., 2018. Chapter "Climate issues from the planetary perspective and insights for the Earth". In *Future Earth: The Geodetic and Geophysical Perspective*. T. Beer, J. Li, K. Alverson, Eds. Cambridge Univ. Press, ISBN 9781107171596. DOI: 10.1017/9781316761489
- Lunine, J., Coustenis, A., Mitri, G., Tobie, G. Tosi, F., 2018. Chapter "Future exploration of Enceladus and other Saturnian moons". In "Enceladus and the Icy Moons of Saturn". LPI/UA/Space Science Series, Eds. In Enceladus and the Icy Moons of Saturn, Paul M. Schenk, Roger N. Clark, Carly J. A. Howett, Anne J. Verbiscer, J. Hunter Waite Eds., ISBN 9780816537075.
- Encrenaz, Th., Coustenis, A., 2018. Chapter "Atmospheres of Terrestrial Planets : Mars, Venus and Titan". In *Handbook of Exoplanets*. H. J. Deeg and J. A. Belmonte, Eds. Springer. doi:10.1007/978-3-319-30648-3_45-1.
- A. Coustenis *et al* 2018 Seasonal Evolution of Titan's Stratosphere Near the Poles. *ApJL* 854 L30