

Argos System: Improvements and Future of the Constellation

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Abstract : Argos is the main satellite telemetry system used by the wildlife research community, since its creation in 1978, for animal tracking and scientific data collection all around the world, to analyze and understand animal migrations and behavior. The marine mammals' biology is one of the major disciplines which had benefited from Argos telemetry, and conversely, marine mammals biologists' community has contributed a lot to the growth and development of Argos use cases. The Argos constellation with 6 satellites in orbit in 2017 (Argos 2 payload on NOAA 15, NOAA 18, Argos 3 payload on NOAA 19, SARAL, METOP A and METOP B) is being extended in the following years with Argos 3 payload on METOP C (launch in October 2018), and Argos 4 payloads on Oceansat 3 (launch in 2019), CDARS in December 2021 (to be confirmed), METOP SG B1 in December 2022, and METOP-SG-B2 in 2029. Argos 4 will allow more frequency bands (600 kHz for Argos4NG, instead of 110 kHz for Argos 3), new modulation dedicated to animal (sea turtle) tracking allowing very low transmission power transmitters (50 to 100mW), with very low data rates (124 bps), enhancement of high data rates (1200-4800 bps), and downlink performance, at the whole contribution to enhance the system capacity (50,000 active beacons per month instead of 20,000 today). In parallel of this 'institutional Argos' constellation, in the context of a miniaturization trend in the spatial industry in order to reduce the costs and multiply the satellites to serve more and more societal needs, the French Space Agency CNES, which designs the Argos payloads, is innovating and launching the Argos ANGELS project (Argos NEO Generic Economic Light Satellites). ANGELS will lead to a nanosatellite prototype with an Argos NEO instrument (30 cm x 30 cm x 20cm) that will be launched in 2019. In the meantime, the design of the renewal of the Argos constellation, called Argos For Next Generations (Argos4NG), is on track and will be operational in 2022. Based on Argos 4 and benefitting of the feedback from ANGELS project, this constellation will allow revisiting time of fewer than 20 minutes in average between two satellite passes, and will also bring more frequency bands to improve the overall capacity of the system. The presentation will then be an overview of the Argos system, present and future and new capacities coming with it. On top of that, use cases of two Argos hardware modules will be presented: the goniometer pathfinder allowing recovering Argos beacons at sea or on the ground in a 100 km radius horizon-free circle around the beacon location and the new Argos 4 chipset called 'Artic', already available and tested by several manufacturers.

Keywords : Argos satellite telemetry, marine protected areas, oceanography, maritime services

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