

DATA
TERRA



ODATIS

Offre de support aux campagnes en mer CNES/CLS

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Atelier ODATIS/ IR*FOF

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15/06/2023

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Offre de support aux campagnes CNES/CLS



Context



CENTRE NATIONAL D'ÉTUDES SPATIALES

Since few years, CNES contributes to different scientific cruises with different objectives:

- Help scientists before (preparation), during (operations) and after (analysis) the cruises
- Promote CNES experimental products ; test new algorithms ; develop new products
- Reinforce the collaboration with users / scientists

Role of CNES/CLS :

Before the cruise: Provide useful information for cruise design: position and date of passage of specific altimeter tracks, position of eddies and front through the provision of Satellite based ocean information

During the cruise: Facilitate operational access to existing products that can contribute to the cruise activity (Altimeter Level3 and Level4 Ssalto/DUACS; other CLS products).

After the cruise: Provide specific regional products for post cruise data analysis: altimeter product (Level3 PEACHI; Level3 and Level4 Ssalto/DUACS; other CLS products)

TOSCA+
CNES program

Scientific cruises



[...] 2011: KEOPS (<http://keops2.obs-vlfr.fr>)

[...] 2015: SPURS1
(<http://spurs.jpl.nasa.gov/>)

[...] 2016: OUTPACE
(<https://outpace.mio.univ-amu.fr/>)

2016: CASSIS-MALVINAS
(<http://www.cima.fcen.uba.ar/malvinacurrent/>)

[...] 2018: Bio-SWOT – Pre-SWOT

[...] 2020: E7C

Feedbacks from users are crucial for us:

- ☐ Feedbacks on products usefulness and accuracy on specific areas contribute to improve the global product
- ☐ Promotion through papers and contribution to Aviso+ newsletters

*Terre Solide, Océan, Surfaces Continentales, Atmosphère

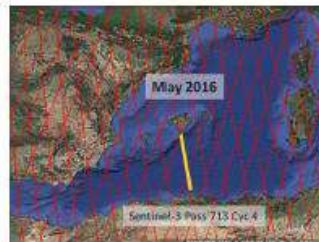
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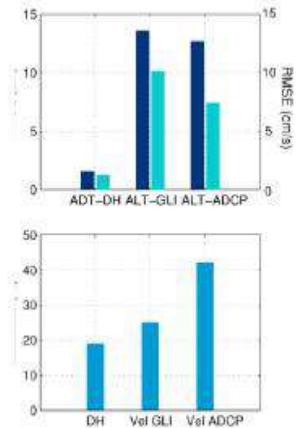
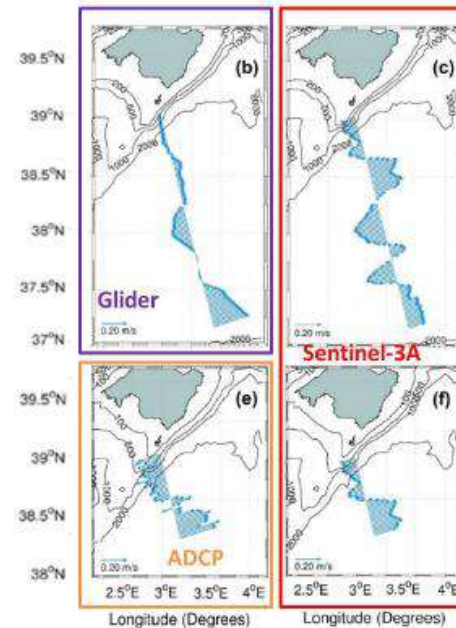
Examples of products delivered

- Altimeter Level2 products:
High resolution SLA along selected tracks can be processed specifically with up-to-date standards

Example of Sentinel-3A track specifically processed in the Med Sea → comparison with glider and ADCP measurements



Across-track absolute Geostrophic Velocity along S3 track



1.5, 1000 RMSE between P-LRM (dark blue bars) and SARM (pale blue bars) and in situ observations for SSH (cm) and geostrophic velocities at 30 m (10 m s^{-1}). (Bottom) Decrease in percentage error in SARM and P-LRM product as compared to both glider and ADCP (see for DH, Vel GLI (velocity glider), and Vel ADCP (velocity ADCP)).



Geophysical Research Letters

RESEARCH LETTER
10.1002/2017GL076244

Sentinel-3A Views Ocean Variability More Accurately at Finer Resolution

E. E. Heslop¹, A. Sánchez-Román², A. Pascual², D. Rodríguez³, K. A. Reeve³, Y. Faugère⁴, and M. Raynal⁵

Key Points:

- This is the first multiple-form evaluation involving data from the Sentinel-3A altimeter SIRAL sensor
- New SAR instrument gives an improvement of 42% in the estimation of surface velocities with

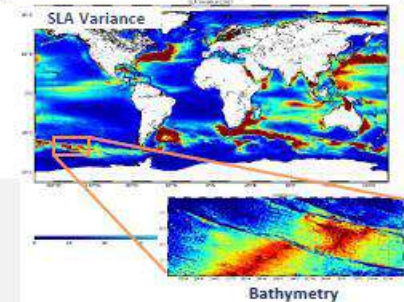
¹ICTS SOCB (Balearic Islands Coastal Ocean Observing and Forecasting System), Palma de Mallorca, Spain, ²IMEDEA (CSIC-UIB), Esporles, Spain, ³Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, ⁴CLS, Ramonville, France

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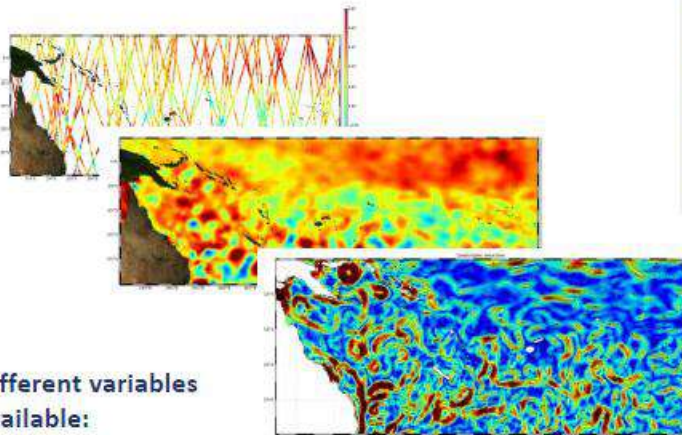


Examples of products delivered

- DUACS altimeter based products (L3: along-track; L4 gridded) :
 - Existing products (CMEMS)
 - Experimental regional products : usually experimental processing/parameters used in preparation of future operational versions



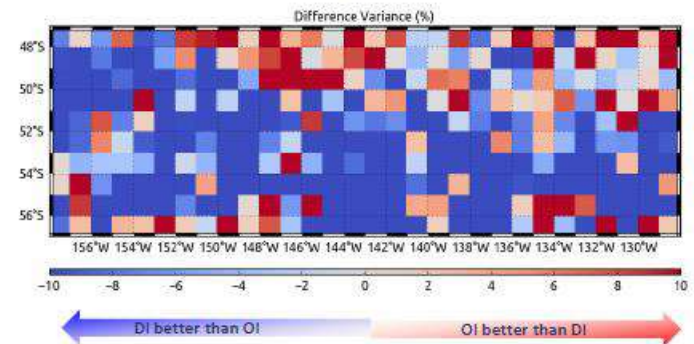
Example of altimeter merged gridded products generated for the PHANTOM campaign (2016, LOCEAN) in the Udintev area :
 Experimental Dynamical Interpolation (DI) used instead of Optimal Interpolation (OI) → Improved accuracy of the SLA products with up to 24% of the variance error reduction.



Different variables available:

- SLA
- ADT
- Geostrophic currents (absolute & anomalies)
- Formal mapping error

DI impact vs OI:
 Comparison SLA maps (2sat.) vs independent along-track C2



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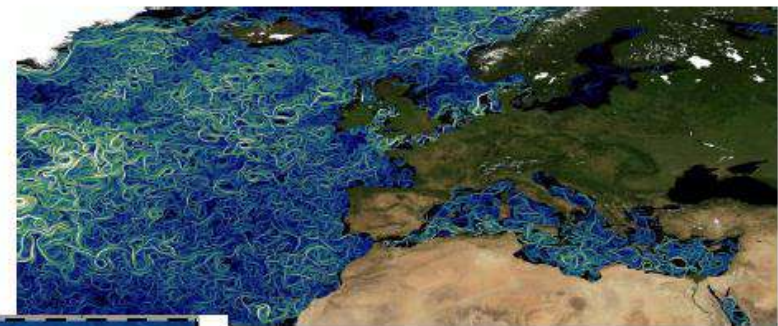
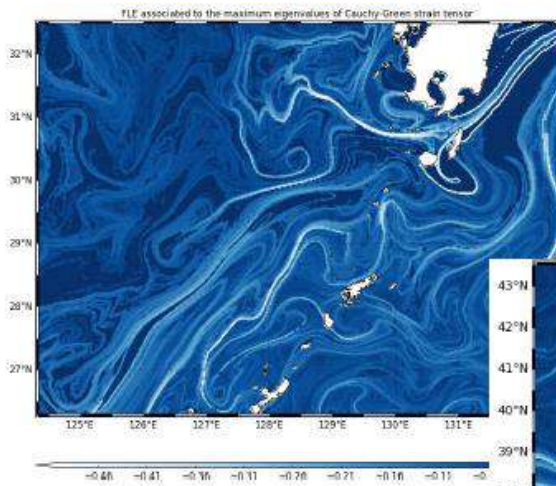


Examples of products delivered

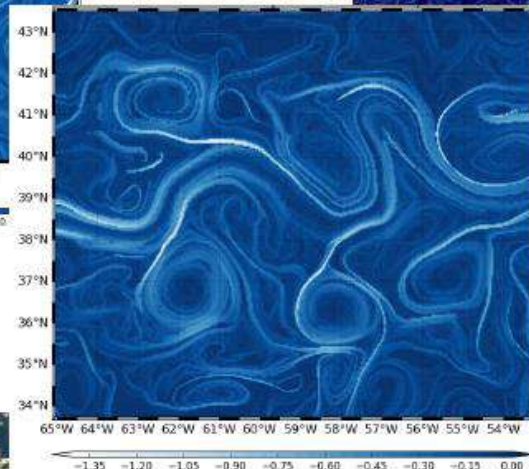


▪ Lagrangian FSLE maps:

- Existing products (AVISO; CMEMS based)
- Experimental products : based on regional gridded product production



Examples of FSLE maps generated from regional geostrophic current products



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Examples of products delivered

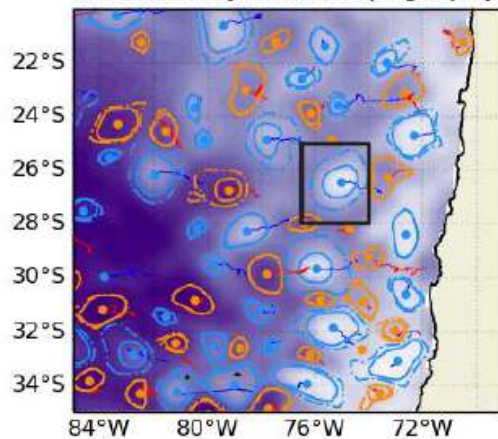


Eddies identification:

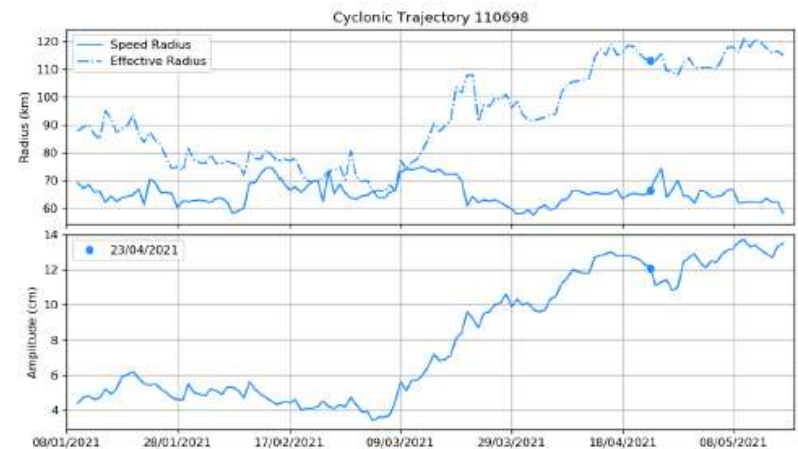
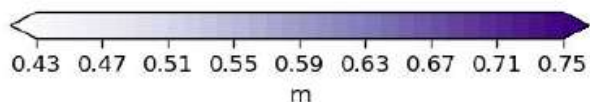
- Eddies detection from ADT contours
- Eddies position, shape, Amplitude, trajectory,
- Monitoring of some eddies characteristics

- Existing products (AVISO; CMEMS based)
- Experimental products : based on regional gridded product production

Absolute Dynamic Topography



Example of cyclonic (red)/anticyclonic (blue) eddies detected for 1 day (center position, effective contours (adt and speed based), and trajectory for the last 2 months



Example of monitoring of one eddy surface characteristics (speed radius, affective radius, amplitude)

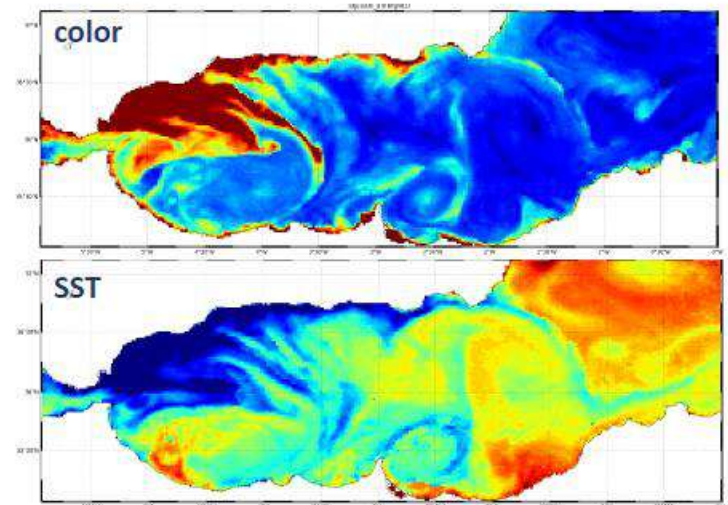
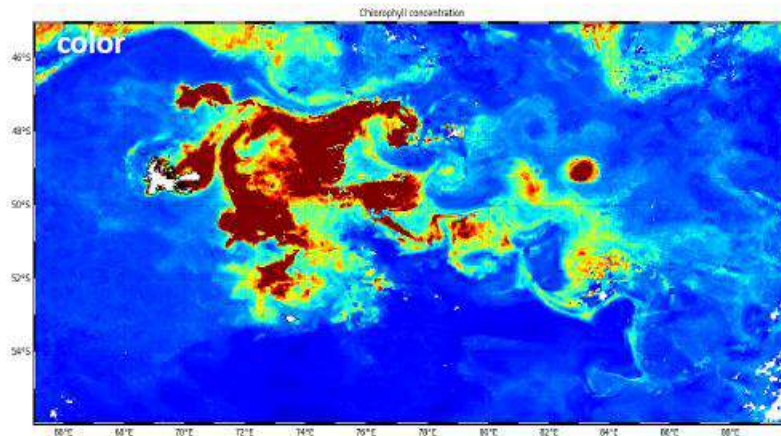
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Examples of products delivered

- Composite maps of SST and chlorophyll concentration
 - CLS internal products, possible with different resolution (e.g. 1-day mean; 5-day mean)
 - possible : CMEMS products

Examples of SST, surface color generated with 0,04° spatial sampling

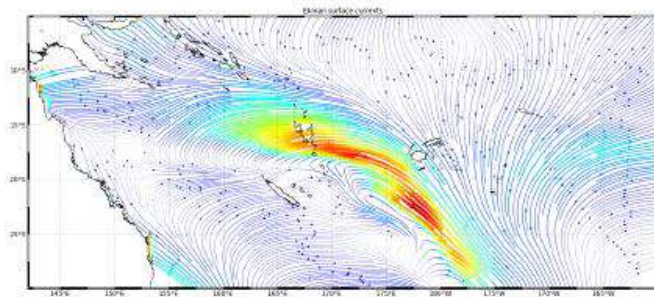


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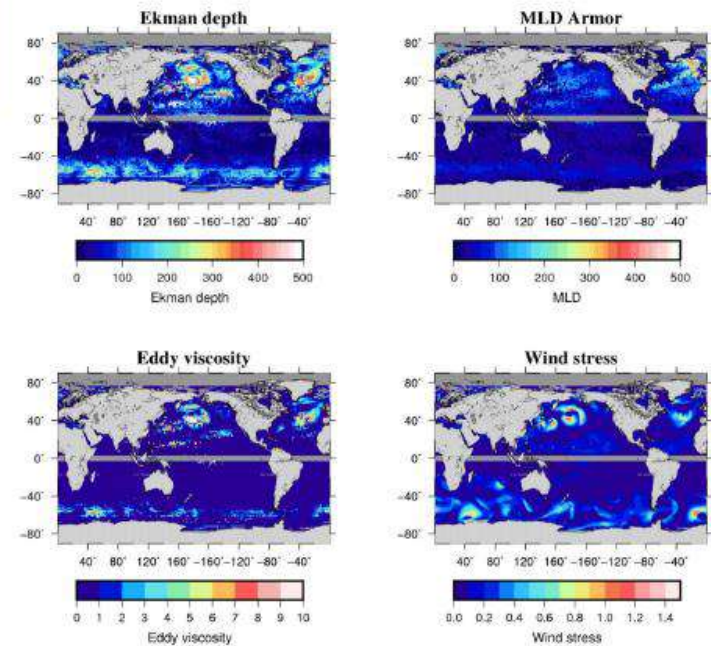


Examples of products delivered

- Ekman currents (derived from CMEMS MULTI-OBS TAC; availability depending on the region considered; no Ekman product in closed sea like Med)
 - Surface
 - 15m depth
 - Possible side products (Ekman depth, eddy viscosity)



Example of Ekman current (15m depth)



Ekman depth (top left), Mixed Layer depth (top right), eddy viscosity (bottom left) and wind stress (bottom right) on 16 February 2013

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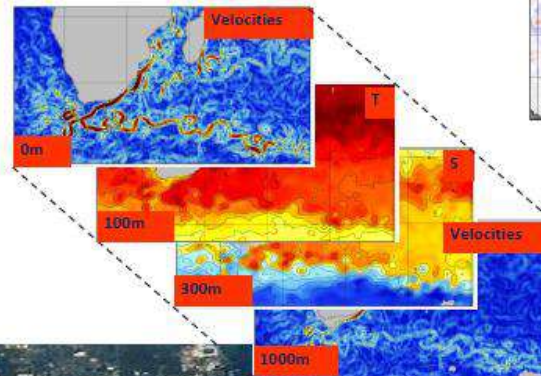
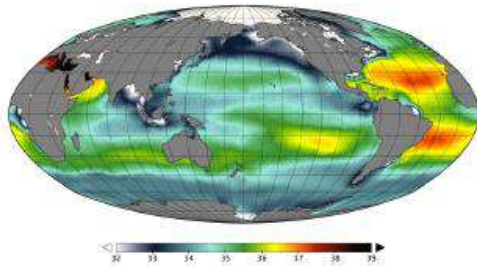


Examples of products delivered

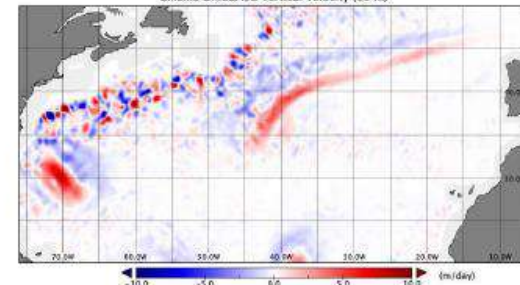


- Other CMEMS MULTI-OBS products : Products based on Observations (satellite & in-situ) and data fusion techniques
 - SSS/SSD (from SMOS, in-situ, SST)
 - 3D T/S/U/V (from SLA, MDT, in-situ T/S profiles, SSS and SST)
 - Vertical and horizontal quasi-geostrophic currents (Omega equation)

sea surface salinity (2019-03-29)



CMEMS OMEGA3D vertical velocity (50 m)



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Examples of products delivered

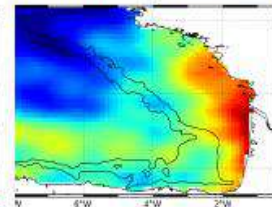
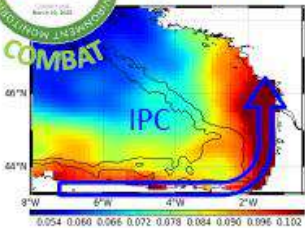
- Regional MDT:
 - Processing adapted to the area
 - Additional data depending on the area (in-situ measurements from your campaign, HF-radar, SAR...)

COMBAT : 2020



Regional MDT

Global MDT (CNES-CLS18)



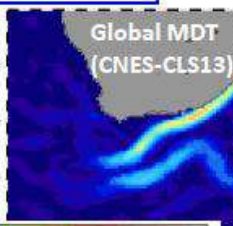
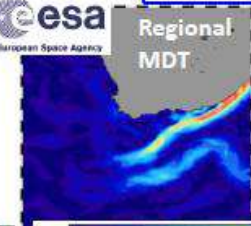
- Regional MDT
- processing adapted to the area
 - additional data from **HF-radar**
 - Coastal current IPC is better resolved

Globcurrent : 2015



Regional MDT

Global MDT (CNES-CLS13)



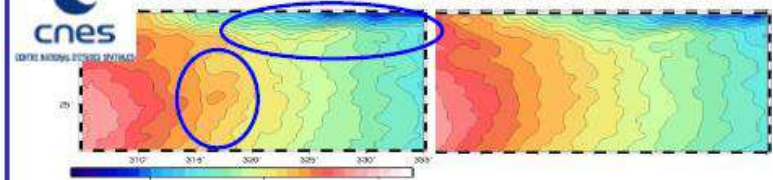
- Regional MDT
- processing adapted to the area
 - additional data from **SAR (ENVISAT)**
 - Coastal current is better resolved

SPURS : 2015



Regional MDT SPURS

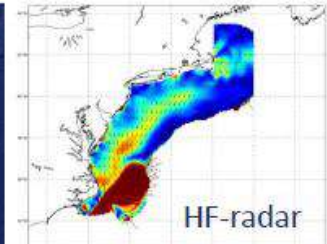
Global MDT (CNES-CLS13)



Regional MDT

- Azores current better resolved
- Smaller scales
- Better agreement with independent drifters deployed during the SPURS campaign

Plan for 2021 : MDT in the Mid Atlantic Bight



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... And other products according to the area considered;
CNES R&D opportunities; specific request

Do not hesitate to contact us:

mpujol@groupcls.com; cyril.germineaud@cnes.fr



LANGUAGES | CONTACT |

QUI SOMMES-NOUS? ▾ DONNÉES ET SERVICES ▾ ACTIVITÉS ▾ ACTUALITÉS ▾ RESSOURCES ▾

Accueil / Données et Services / Support aux campagnes en mer

Support aux campagnes en mer

Formulaire de saisie pour demande de support campagnes en mer

Informations relatives à la campagne en mer

Date prévue du début de la campagne

date type yyyy/mm/dd

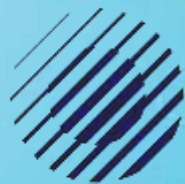
Objectifs de la campagne en mer et liens éventuels avec d'autres projets

Zone géographique d'intérêt

coordonnées exprimées selon les limites V

Quel(s) type(s) de support(s) nécessitez-vous ?

- 1-mise à disposition des éphémérides des satellites
- 2-mise à disposition de fichiers de données satellites en temps réel, bulletins d'analyse
- 3- mise à disposition de fichiers de données satellites en temps différé



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Merci de votre attention



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