

HyMeX

GHP report – October 2018

On going field campaign (13 sept 2018 – 12 oct 2018):

Objectives:

Characterize the electrical and microphysical environment of clouds for a better understanding and modeling of electrical processes within the storm

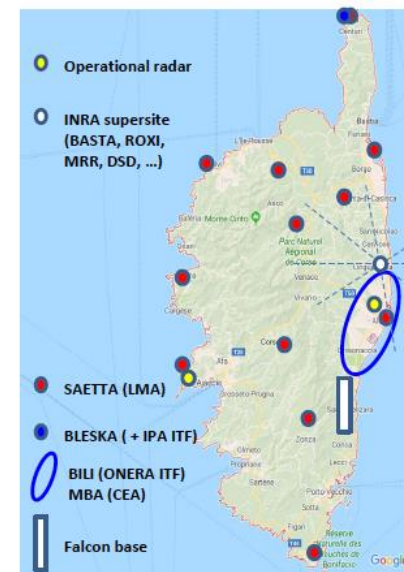
Validate the new airborne and ground instrument concepts developed within the EXAEDRE project

Instruments:

SAFIRE / F20 Airborne Instrumentation: Electric Field Mills, RASTA Cloud Radar, Microphysical Probes, High Energy Particle Counters, 2 Lightning Technology Demonstrators (ONERA)

Super-site instrumentation: VHF Interferometer, Acoustic Microphones Network, BASTA Cloud Radars, ROXI & MRR Rain Radars, Micro-lidar, Photometer, Flow Station, Disdrometers, Radiosoundings

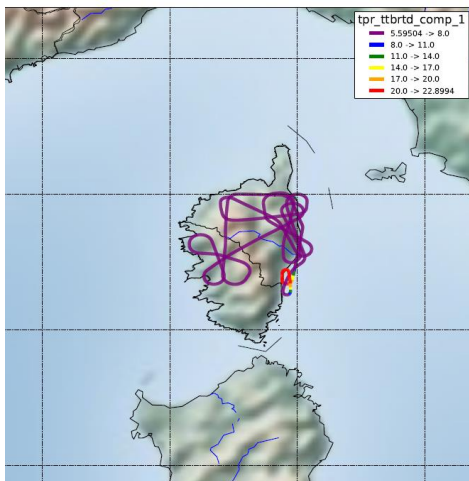
CORSICA – SAETTA LMA



Fundings : ANR EXAEDRE, CNES/SOLID, MISTRALS, Corsica region

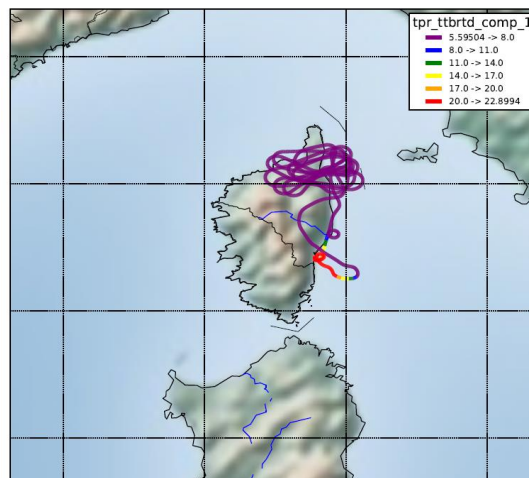
IOP 01 - 13/09/2018

de 12:48 à 14:23 UTC



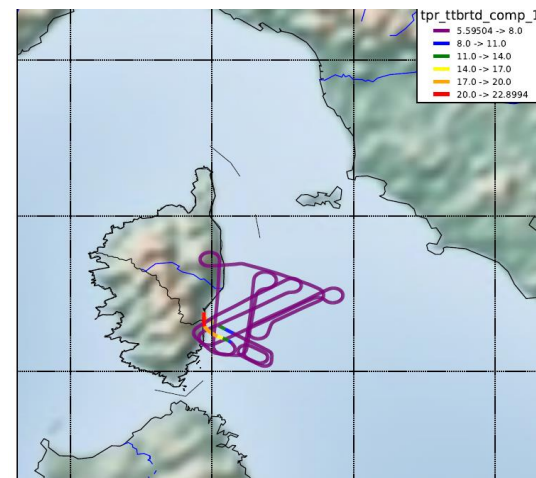
IOP 02 - 17/09/2018

de 11:26 à 13:38 UTC



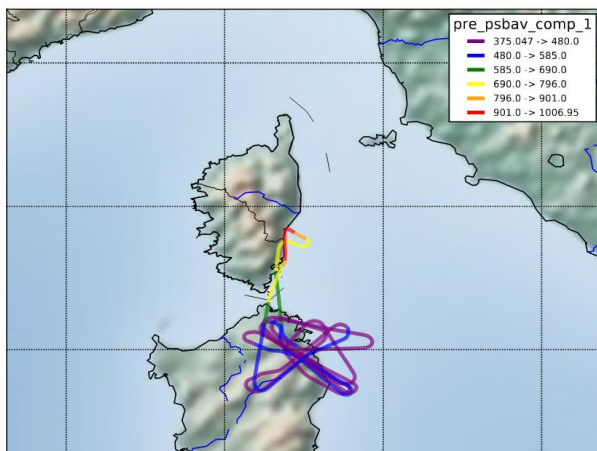
IOP03 - 19/09/2018

de 05:25 à 07:08 UTC



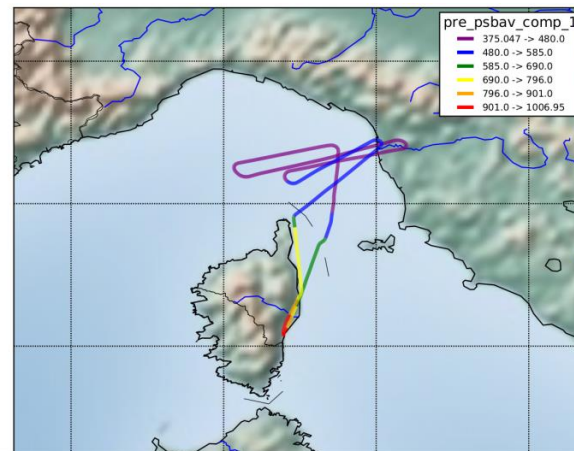
IOP04 - 20/09/2018

de 05:53 à 08:38 UTC



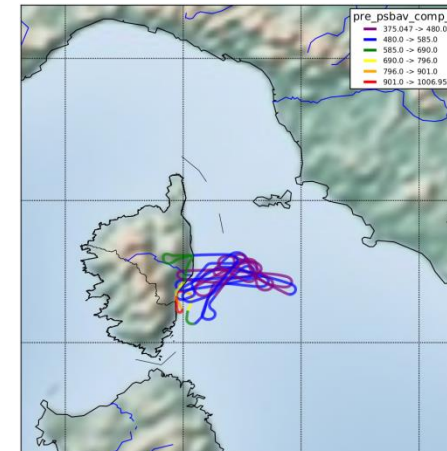
IOP05 - 01/10/2018

de 14:58 à 16:32 UTC



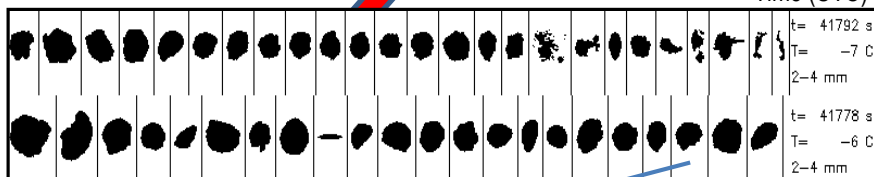
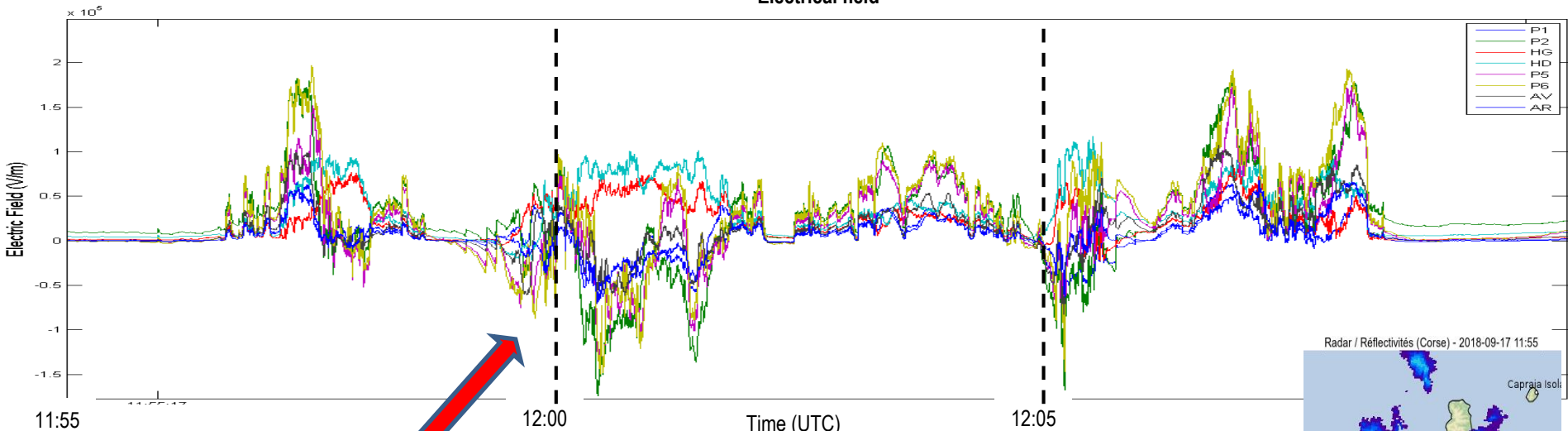
IOP06 - 02/10/2018

de 10:38 à 13:21 UTC

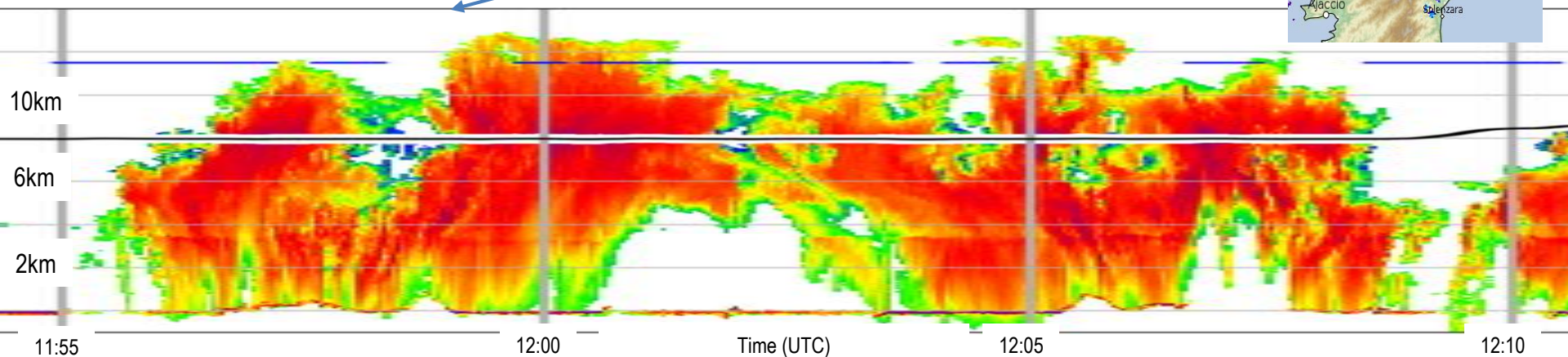
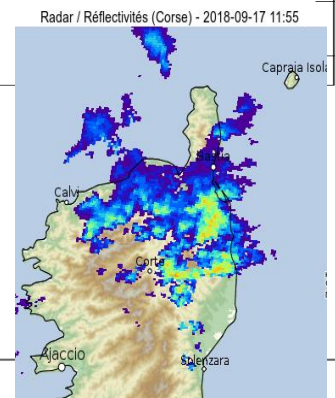


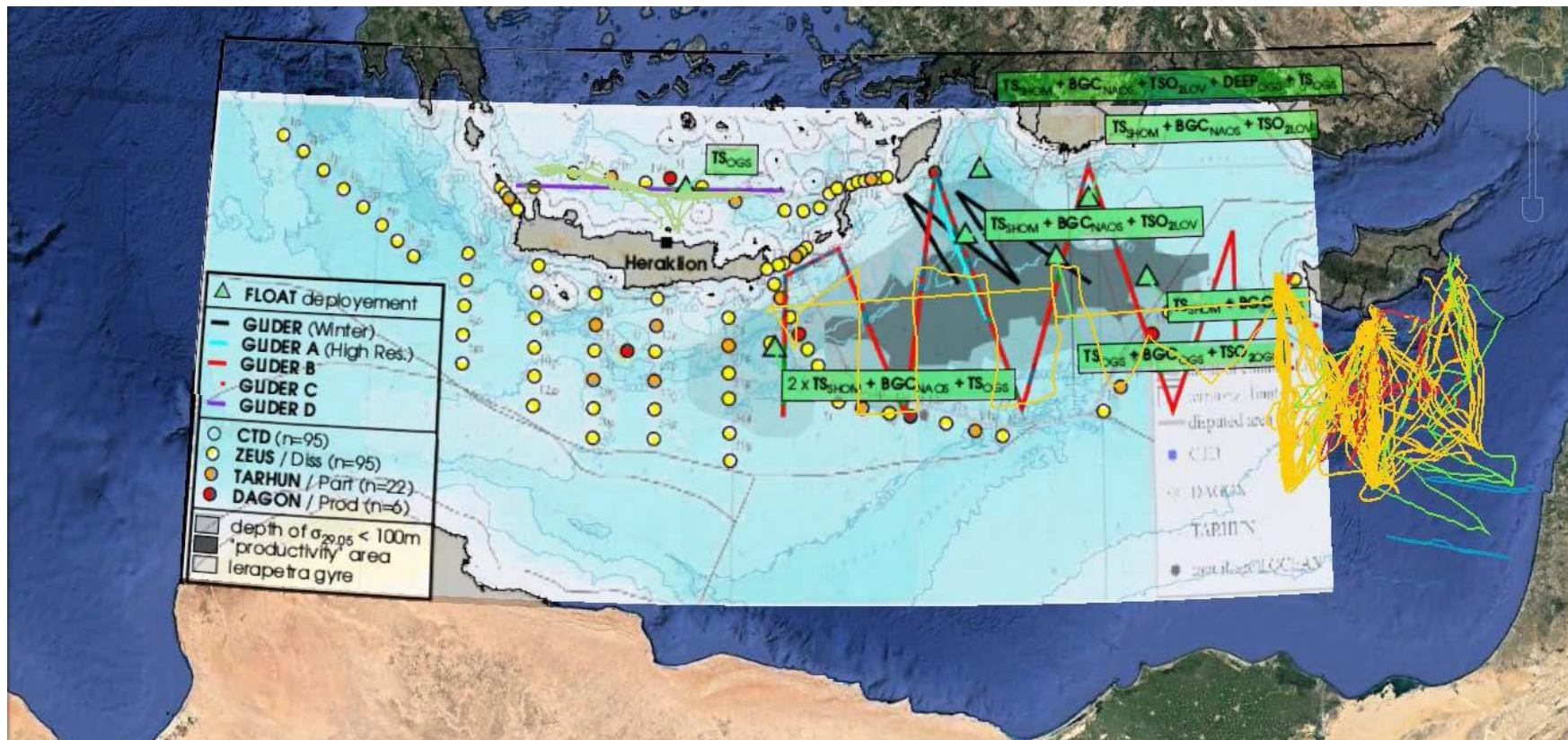


Electrical field



Graupels !!!





PERLE-1 : octobre 2018 ; PERLE-2 : mars 2019; PERLE-3 : 1^{er} semestre 2020

PIs :

Conan P., Coppola L., D'Ortenzio F., Dumas F., Durrieu de Madron X., Estournel C., Testor P., Wagener T.

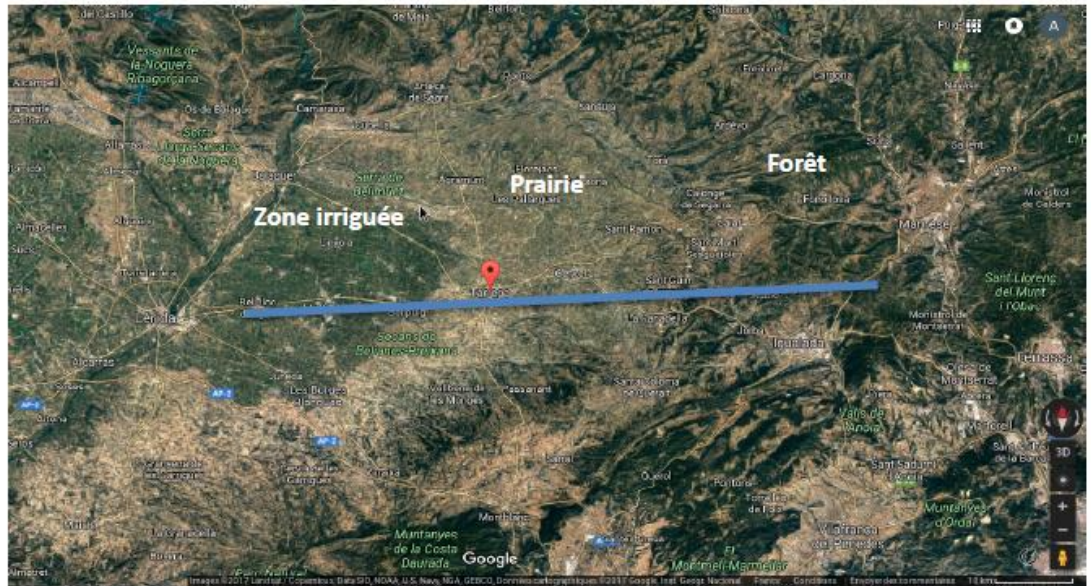
- LIAISE is an international effort initiated within HyMeX and GEWEX (GHP & GLASS) arising from the Regional Hydrological Project HyMeX in GEWEX
- Topics: Water balance over semi-arid (irrigated) areas
- Science questions:
 1. How does the **anthropization impact** the boundary layer development, mesoscale circulations and potentially precipitation recycling over this region via feed-backs with the atmosphere?
 2. What are the key **semi-arid surface processes**, both natural and anthropogenic, which modulate or control infiltration and evapotranspiration?
 3. What is the **sustainability of ground water and reservoirs** in the face of expanding agricultural and farming activities, especially in light of projected future warming and drying over this region?
- Partners : *French Laboratories involved: CNRM, CESBIO, LMD, HSM, LA*
Foreign Laboratories involved: UIB, AEMET, SMC, IRTA, UV, UB, OE (Spain), KIT (Germany), UKMO (Britain)

EOP/SOP: SOP1 (Spring 2020, UKMO), SOP2 (July 2020, HyMeX) included within a vegetation cycle (EOP, HyMeX)

Instrumentations SOP2:

15-d SAFIRE/ATR42, 25 h flights with LST and GLORI soil moisture measurements (93.5 k€ en 2020)

Radiosoundings, surface flux stations, PBL balloons, UHF wind profilers (43.9 k€ en 2020)



Preparation of projects for fundings. Site visits and logistics preparations with Spanish partners. Attendance of HyMeX conference in May, 2019.

Installation of the LOP surface flux, soil moisture and temperature measurement devices at the selected sites in Spring 2020.

➔ Ocean:

- Ship of opportunities: Marfret-Niolon from Feb. 2012-July 2014, Roro Cap Camarat since June 2015 equipped by HyMeX (SEOS, Thermosalinometer, GPS)
- Argo Drifters + Azur and Gulf of Lion Buoys – renouvellement capteurs, maintenance of the 0-200m mooring line on operational buoys

Co-funding: CORIOLIS, SNO-MOOSE, Météo-France

➔ Atmosphere:

Corsica: MRR and surface stations, Lightning mapping array (SAETTA) since 2014 (functioning)

Funding: Collectivité Territoriale de Corse (2018-2020)

➔ Hydrology:

OHM-CV: jeaugeages, sondes, disdromètres

Co-funding: SO OHM-CV (INSU), OSUG

➔ Socio-hydrological surveys:



- ➔ ~ 440 peer-reviewed articles in scientific journals contributing to HyMeX (about 50/y)
- ➔ Publication of the Med-CORDEX special issue in *Climate Dynamics*: Volume 51, Issue 3, August 2018 (18 articles) + special issue HyMeX SOP2/DEWEX in *JGR* in 2018

- ➔ Multi-journal special issue « *Hydrological Cycle in the Mediterranean* » dans les journaux ACP/ AMT/ GMD/ HESS/ NHESS/ OS
 - 9 articles submitted
 - 10 articles published associated with special issue

ACP/AMT/GMD/HESS/
NHESS/OS inter-journal
Special Issue

"Hydrological cycle
in the Mediterranean"



01 April 2018 / 31 Dec. 2021



List of publications at: www.hymex.org/?page=publications

- 11th HyMeX Workshop, Lecce, May 2018 : env. 100 participants
- 12th HyMeX Workshop, Split, Croatia, 20-24 May 2019



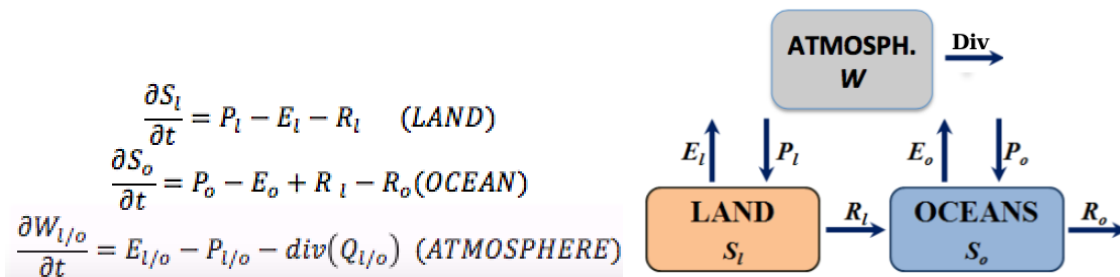
- 10-y HyMeX Workshop in France in fall (?) 2020 : date to be discussed with the MISTRALS final workshop date

Take-away message from the discussion in the HyMeX community → Keep HyMeX alive beyond 2020 !!



- Scientific place of discussion on the Mediterranean "climate" (in particular via the workshops)
- Strong collaboration between HyMeX teams
- Community ready to respond to WAs, to develop experimental programs
- HyMeX structuring component of the MED-CORDEX program and unique obs / model approach within CORDEX

Water Cycle Multi-mission Observation Strategy for the Mediterranean
An ESA-HYMEX initiative



→ Discussion with ESA for a new call for tender – dedicated workshop from 11 to 13 December 2018 in Frascati (Rome), Italy

→ HyMeX preparatory discussion forwarded to ESA

- to quantify the human contribution to the water cycle in the Mediterranean where direct human pressure on water resources (irrigation, energy, food, drinking water) can be very high. This point could be directly associated with the HyMeX / GEWEX LIAISE action.
- through EO observations, link to very fine scales the water cycle extremes and impacts (flooded area, erosion, damage, ...)

Concerning the WACMOS-MED database: validation of models, or even future satellite missions using the WACMOS-MED database; preparation of field campaigns (e.g. LIAISE); process studies

2018 Developments - Campaign Data and Interfaces

- Establishment and operation of the Exaedre campaign site
- Updating the database (new data, new versions)

Developments 2018 - Production of "elaborate" products

Statistical indices based on the MED-CORDEX oceanic climate simulations

1. Identification of the relevant ocean indicators, in connection with the MED-CORDEX, MERCATOR Ocean, C3S Copernicus, ANR REMEMBER teams

2. Identification of reference datasets for debiasing regional climate simulations based on statistical methods developed at LSCE (CDft - M. Vrac)

Indicator	Criterion	Required variable (from MED-CORDEX)	Possible reference dataset and variable
SST	Sea surface temperature anomaly with respect to the climatology.	sea surface temperature (tos)	1) MEDRYS, observed sea surface temperature (sosstobs) (daily, since 1992-10-01-03 to 2013-06-27) 2) CMEMS (MEDITERRANEAN SEA - HIGH RESOLUTION L4 SEA SURFACE TEMPERATURE REPROCESSED), sea surface temperature (daily, since 1981-11-01 – to 2015-12-31, 0.0417° x 0.0417°)
	Heat wave: "Threshold: SST = < Q99yr[SST(day)] >1976-2005 Minimum duration of 5 consecutive days (gap days not allowed)"	sea surface temperature (tos)	
Couche mélangée (MLD)	Number of days when MLD arrives a threshold (it could be the bottom or the deepest level in history averaged by one region). Temperature-Mixed Layer Depth (Isothermal Layer Depth) MLD = depth where $(\theta = \theta_{10m} \pm 0.1 \text{ } ^\circ\text{C})$	ocean mixed layer defined by sigma t (mlotst, Use a criteria of 0.011 or 0.01 kg/m3 if possible)	1) MEDRYS, sea water potential temperature (votemper) (daily, since 1992-10-01-03 to 2013-06-27; 1/12 degree, 75 depth levels) 2) CMEMS (MEDITERRANEAN SEA PHYSICS REANALYSIS), T (daily and monthly, From 1987-01-01 to 2016-12-31; 0.063 degree x 0.063 degree, 72 depth levels)
Courants de surface	angular momentum eddy detection and tracking algorithm (AMEDA) Spatial distribution of EKE for one long period (to depth of 50m), difference in respect to the reference or difference between maximum and minimum about one region. $EKE(i,j) = 0.5 * (\text{moyenne de } U(i,j)^2 - (\text{moyenne de } U(i,j))^2) + 0.5 * (\text{moyenne de } V(i,j)^2 - (\text{moyenne de } V(i,j))^2)$	sea water x velocity (uo), sea water y velocity (vo) sea water x velocity (uo), sea water y velocity (vo)	1) MEDRYS, zonal velocity and meridional velocity (vozocrtx, vomecrtz) (daily, since 1992-10-01-03 to 2013-06-27; 1/12 degree, 75 depth levels) 2) CMEMS (MEDITERRANEAN SEA PHYSICS REANALYSIS), UV (daily and monthly, From 1987-01-01 to 2016-12-31; 0.063 degree x 0.063 degree, 72 depth levels)
Masse d'eau intermédiaire	Value of the maximum salinity reached at intermediate depth	sea water salinity (so)	1) MEDRYS, salinity (vosaline) (daily, since 1992-10-01-03 to 2013-06-27; 1/12 degree, 75 depth levels) 2) CMEMS (MEDITERRANEAN SEA PHYSICS REANALYSIS), salinity (daily and monthly, From 1987-01-01 to 2016-12-31; 0.063 degree x 0.063 degree, 72 depth levels)
	Depth at which this maximum is reached	sea water salinity (so)	
Indice de stratification (IS)	Spatial distribution of temperature between surface and deep ocean. IS formula is described in Herrmann M. et al. (2010) Page 9.	sea water salinity (so), sea water potential temperature (thetao)	1) MEDRYS, salinity (vosaline) (daily, since 1992-10-01-03 to 2013-06-27; 1/12 degree, 75 depth levels); sea water potential temperature (votemper) (daily, since 1992-10-01-03 to 2013-06-27) 2) CMEMS (MEDITERRANEAN SEA PHYSICS REANALYSIS), salinity (daily and monthly, From 1987-01-01 to 2016-12-31; 0.063 degree x 0.063 degree, 72 depth levels); T (daily and monthly, From 1987-01-01 to 2016-12-31)