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| ***Activity Type:* Lab Exercises or Problems** |
| ***Learning Solution Type:* Classroom learning** |
| ***Assigned Topic*: CLIMATE SERVICE:** Using climate model data, forecasts based current trends and oscillations, and downscaling techniques, produce sub-seasonal and seasonal forecasts of temperature and precipitation for your area of responsibility. |
| ***Team Name:* Cumulonimbus (Roro Yuliana)** |
|  ***Title of the activity:***  **CALMET - C**limate **A**ssimi**L**ation-data **Met**hod  |
| ***Instructions to students*** *(what do they need to know to participate in the activity, how are they grouped, how will outcomes be shared for feedback)* **Students :** 20 students, the experienced forecasters from stations over Indonesia. They are grouped in 5 groups based on their regional centre (Medan, Jakarta, Denpasar, Makasar, Jayapura). Their duty is to make a seasonal forecast for their area of responsibility, so they know local characteristics of the region.Mostly, the prediction is done by statistical method based on observation/ in-situ data, and less involves satellite products, due to some limitation i.e. the resolution is not sufficient for the very local area.The limitation of observation data based technique is the lack of data, especially in remote areas where weather stations networks (in-land or sea) are sparse, which results in poor understanding of spatial variability of rainfall conditions. To produce better climate forecast, they need to learn how to use the new datasets (as the combination of in-situ data with satellite data produced using data assimilation techniques), compare the forecast with the initial forecast (using in-situ data only), and identify the best solution to be published as the climate information.**Learners initial level of preparation -** Students are climatologists from some stations in different regions. They have knowledge and skills in producing climate forecast based on climate local conditions: they had yearly produced climate predictions for their stations. They are familiar to climate forecasting software, and use the global/regional trends and oscillations as the reference. **The competencies :*** Identify the differences between forecasts produced from in-situ datasets and the assimilation datasets
* Apply some new data to create enhanced datasets for better forecasting
* Compare the results and choose the best solution to be provided as Climate Service

**Period of training** : 1 - 2 weeks |
| ***Roles of trainers*** *(how will you set up and guide the activity)*For each group, there is one instructor. The instructor develops a series of learning activities in classroom based on problem method. **Presentation by the instructor:** a brief of the differences between forecasting using in-situ data and using the assimilation data, the examples, and how to use the assimilation data for climate forecasting, for temperature and precipitation. **Excercise 1 :** * Working in group, students are provided with 2 example forecasts for the certain parameters and areas (one climatic zone) :

 A - in-situ based forecast B - a forecast created with the use of assimilation techniques. They are asked about the differences between both examples and explain the reasons. This activity could be set for 10 series of examples, to let them realise the differences. At the end of the session, each group has to choose one of the example and explain to other students in the class about it. Other students are welcome to ask questions, provide comments. * Instructor provides the answer after all set have done with the students.

**Exercise 2 :*** Working in group, students have to choose 2 climatic zones with different characteristic of data. One with the good in-situ data (called Zone I), the other with the lack of in-situ data (called Zone II)
* They have to change the initial forecast into the final one using the new assimilation datasets. As they will have 2 forecasts for each Zone (initial and final forecast), they could see how assimilation technique could potentially help them in producing a better forecast (create alternative in forecast)

Note : to increasing difficulties, forecast could apply the current trends and oscillations, and then the use of downscalling method. Application of these approaches depend on the time available. **Group Presentation :**Each group presents their work of exercise 2 and other students will give comment and feedback. The instructors will provide the comment and feedback about correctness and challenge them with some questions.  |
| ***Supporting resources*** *(what data, instructions, technologies, instructional resources, etc. will be required)** PC with asimillation software, and internet connection
* Some samples of the in-situ data based forecast and the assimilation data based forecasts (for different climatic zones)
* 5 datasets for 5 regions (product of assimilation techniques)
* any other supporting materials (presentation, manuals, related COMET modules)

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| ***What is the primary thing you want students to learn?***  **Facilitator goal :*** Checking knowledge/ understanding of the students about the assimillation data and techniques
* Checking skill/ how student able to use new data sets (blended data of in-situ/observation data with satellite data) to produce the climate forecast

 **Learning goal -** Mastering to use new data sets (blended data of in-situ/observation data with satellite data) to produce the climate forecast. Student available to compare different models and finding the best solution for their forecast.What the influence of their seasonal forecast will make on country life, how to prepare people for? |
| ***How will you know if the activity was successful?*** It could be done by the instructor :* how much has been done (by the instructor)
* the performance of the students within the activity (by the instructor) in the form of explanation why the result of the group is better (or worse) than model forecast or in-situ data forecast
* active in discussion within their group or in classroom (asking the related questions, provide feedback to other students, lesson-learned, sharing tips, the new trick they use in forecasting using assimilated data sets)
* correctness (first, by the students, finally - by the instructor, who has to be an expert)
* Feedback by instructor after the whole Activity is done
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| ***Any additional notes you want to include.*** It is a new knowledge and skill so they might need some exercises to be a master in climate forecast using the new techniques and data sets. Instructor could share their tips and trick and lesson-learned from the activities. Continous communication should be happened between the students and the instructor and among the students, even the class is finished. This is to provide the opportunity of sharing the experience of implementing the course result when they are back to station and build a new community of practice among climatologist.  |