**Error Characterization of Global Land Evapotranspiration Products: A Collocation approach**

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# S3: Calculation combinations for inputs evaluation

Different methods can also be categorized by number of inputs: (1) Dual inputs (IVS/IVD); (2) Triple inputs (TC/EIVD); (3) Quadruple inputs (QC). For dual-input methods, IVS required the selection of product to derive the lag-1 series as the third input, while IVD used the lag-1 variances of both products. For triple-input methods, EIVD required the identification of two products with non-zero error-correlation-covariance, while TC assumed all three products were mutual-independent. For quadruple-input method, the requirement of QC was the same as EIVD. In our study, both additive and multiplicative models were considered. The number of total combination scenarios are listed in the following table:

**TABLE** Number of combination scenarios for different methods over three resolutions using selected error-structure model

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 01°/8-daily | | | 025°/8-daily | | | | | 025°/daily | | |
| Products | ERA5 | FLUXCOM | PMLV2 | ERA5 | GLEAM | GLDAS | FLUXCOM | PMLV2 | ERA5 | GLEAM | GLDAS |
| IVS |  | | |  | | | | |  | | |
| IVD |  | | |  | | | | |  | | |
| TC |  | | |  | | | | |  | | |
| EIVD |  | | |  | | | | |  | | |
| QC |  | | |  | | | | |  | | |

**(1) 01°/8-Daily: ERA5/FLUXCOM/PMLV2**

**IVS：, Each: , Total: 12**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | |
| 0.1° | | | 8-Daily | | | IVS | | |
| ***Available data*** | | | | | | | | |
| ERA5 | | | FLUXCOM | | | PMLV2 | | |
|  | ***S1*** | ***S2*** | | ***S3*** | ***S4*** | | ***S5*** | ***S6*** |
| ***Data1*** | ERA5 | ERA5 | | FLUXCOM | FLUXCOM | | PMLV2 | PMLV2 |
| ***Data2(Lag)*** | FLUXCOM | PMLV2 | | ERA5 | PMLV2 | | ERA5 | FLUXCOM |

**IVD: , Each: , Total: 6**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | |
| 0.1° | | 8-Daily | | IVD | |
| ***Available data*** | | | | | |
| ERA5 | | FLUXCOM | | PMLV2 | |
|  | ***S1*** | | ***S2*** | | ***S3*** |
| ***Data1*** | ERA5 | | ERA5 | | FLUXCOM |
| ***Data2*** | FLUXCOM | | PMLV2 | | PMLV2 |

**TC: , Each: 1, Total: 3**

|  |  |  |
| --- | --- | --- |
| ***Resolution/Method*** | | |
| 0.1° | 8-Daily | TC |
| ***Available data*** | | |
| ERA5 | FLUXCOM | PMLV2 |

**EIVD: , ECC: , Each: , Total: 12**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | |
| 0.1° | | 8-Daily | | EIVD | |
| ***Available data*** | | | | | |
| ERA5 | | FLUXCOM | | PMLV2 | |
|  | ***S1*** | | ***S2*** | | ***S3*** |
| ***Data1*** | ERA5 | | FLUXCOM | | PMLV2 |
| ***Data2*** | FLUXCOM | | ERA5 | | FLUXCOM |
| ***Data3*** | PMLV2 | | PMLV2 | | ERA5 |
|  |  | | | | |

**(2) 025°/Daily: ERA5/GLEAM/GLDAS**

**IVS：, Each: , Total: 12**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | |
| 0.25° | | | Daily | | | IVS | | |
| ***Available data*** | | | | | | | | |
| ERA5 | | | GLEAM | | | GLDAS | | |
|  | ***S1*** | ***S2*** | | ***S3*** | ***S4*** | | ***S5*** | ***S6*** |
| ***Data1*** | ERA5 | ERA5 | | GLEAM | GLEAM | | GLDAS | GLDAS |
| ***Data2(Lag)*** | GLEAM | GLDAS | | ERA5 | GLDAS | | ERA5 | GLEAM |

**IVD: , Each: , Total: 6**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | |
| 0.25° | | Daily | | IVD | |
| ***Available data*** | | | | | |
| ERA5 | | GLEAM | | GLDAS | |
|  | ***S1*** | | ***S2*** | | ***S3*** |
| ***Data1*** | ERA5 | | ERA5 | | GLEAM |
| ***Data2*** | GLEAM | | GLDAS | | GLDAS |

**TC: , Each: 1, Total: 3**

|  |  |  |
| --- | --- | --- |
| ***Resolution/Method*** | | |
| 0.25° | Daily | TC |
| ***Available data*** | | |
| ERA5 | GLEAM | GLDAS |

**EIVD: , ECC: , Each: , Total: 12**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | |
| 0.25° | | Daily | | EIVD | |
| ***Available data*** | | | | | |
| ERA5 | | GLEAM | | GLDAS | |
|  | ***S1*** | | ***S2*** | | ***S3*** |
| ***Data1*** | ERA5 | | FLUXCOM | | PMLV2 |
| ***Data2*** | GLEAM | | ERA5 | | GLEAM |
| ***Data3*** | GLDAS | | GLDAS | | ERA5 |
|  |  | | | | |

**(3) 025°/8-Daily: ERA5/GLEAM/GLDAS/FLUXCOM/PMLV2**

**IVS：, Each: , Total: 40**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | | | | | |
| 0.25° | | | | 8-Daily | | | | IVS | | | | |
| ***Available data*** | | | | | | | | | | | | |
| ERA5 | | GLEAM | | | GLDAS | | FLUXCOM | | | PMLV2 | | |
|  | ***S11&S12*** | | ***S21&S22*** | | | ***S31&S32*** | | | ***S41&S42*** | | ***S51&S52*** |
| ***Data1*** | ERA5 | | ERA5 | | | ERA5 | | | ERA5 | | GLEAM |
| ***Data2*** | GLEAM | | GLDAS | | | FLUXCOM | | | PMLV2 | | GLDAS |
|  | ***S61&S62*** | | ***S71&S72*** | | | ***S81&S82*** | | | ***S91&S92*** | | ***S101&S102*** |
| ***Data1*** | GLEAM | | GLEAM | | | GLDAS | | | GLDAS | | FLUXCOM |
| ***Data2*** | FLUXCOM | | PMLV2 | | | FLUXCOM | | | PMLV2 | | PMLV2 |

**IVD: , Each: , Total: 20**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | | | | | |
| 0.25° | | | | 8-Daily | | | | IVD | | | | |
| ***Available data*** | | | | | | | | | | | | |
| ERA5 | | GLEAM | | | GLDAS | | FLUXCOM | | | PMLV2 | | |
|  | ***S1*** | | ***S2*** | | | ***S3*** | | | ***S4*** | | ***S5*** |
| ***Data1*** | ERA5 | | ERA5 | | | ERA5 | | | ERA5 | | GLEAM |
| ***Data2*** | GLEAM | | GLDAS | | | FLUXCOM | | | PMLV2 | | GLDAS |
|  | ***S6*** | | ***S7*** | | | ***S8*** | | | ***S9*** | | ***S10*** |
| ***Data1*** | GLEAM | | GLEAM | | | GLDAS | | | GLDAS | | FLUXCOM |
| ***Data2*** | FLUXCOM | | PMLV2 | | | FLUXCOM | | | PMLV2 | | PMLV2 |

**TC: , Each: , Total: 30**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | | |
| 0.25° | | | 8-Daily | | | | TC | | |
| ***Available data*** | | | | | | | | | |
| ERA5 | | GLEAM | | | GLDAS | | | FLUXCOM | PMLV2 |
|  | ***S1*** | | | ***S2*** | | ***S3*** | | ***S4*** | ***S5*** |
| ***Data1*** | ERA5 | | | ERA5 | | ERA5 | | ERA5 | ERA5 |
| ***Data2*** | GLEAM | | | GLEAM | | GLEAM | | GLDAS | GLDAS |
| ***Data3*** | GLDAS | | | FLUXCOM | | PMLV2 | | FLUXCOM | PMLV2 |
|  | ***S6*** | | | ***S7*** | | ***S8*** | | ***S9*** | ***S10*** |
| ***Data1*** | ERA5 | | | GLEAM | | GLEAM | | GLEAM | GLDAS |
| ***Data2*** | FLUXCOM | | | GLDAS | | GLDAS | | FLUXCOM | FLUXCOM |
| ***Data3*** | PMLV2 | | | FLUXCOM | | PMLV2 | | PMLV2 | PMLV2 |

**EIVD: , ECC: , Each: , Total: 120**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | | | | |
| 0.25° | | | | 8-Daily | | | | EIVD | | | |
| ***Available data*** | | | | | | | | | | | |
| ERA5 | | GLEAM | | | GLDAS | | FLUXCOM | | | | PMLV2 |
|  | ***Data1*** | | ***Data2*** | | | ***Data3*** |  | |  |  | |
| ***S1*** | ERA5 | | GLEAM | | | GLDAS |  | |  |  | |
| ***S2*** | ERA5 | | GLEAM | | | FLUXCOM |
| ***S3*** | ERA5 | | GLEAM | | | PMLV2 |
| ***S4*** | ERA5 | | GLDAS | | | FLUXCOM |
| ***S5*** | ERA5 | | GLDAS | | | PMLV2 |
| ***S6*** | ERA5 | | FLUXCOM | | | PMLV2 |
| ***S7*** | GLEAM | | GLDAS | | | FLUXCOM |
| ***S8*** | GLEAM | | GLDAS | | | PMLV2 |
| ***S9*** | GLEAM | | FLUXCOM | | | PMLV2 |
| ***S10*** | GLDSA | | FLUXCOM | | | PMLV2 |

**QC: , ECC: , Each: , Total: 150**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Resolution/Method*** | | | | | | | | | | | | | | | | | |
| 0.25° | | | | | 8daily | | | | | | QC | | | | | | |
| ***Available Data (0.1° resampled to 0.25°)*** | | | | | | | | | | | | | | | | | |
| ERA5 | | | GLDAS | | | | GLEAM | | FLUXCOM | | | | | PMLV2 | | | |
|  | ***Data1*** | ***Data2*** | | ***Data3*** | | ***Data4*** | |  | |  | |  |  | |  |  |
| ***S1*** | ERA5 | GLDAS | | GLEAM | | FLUXCOM | |  | |  | |  |  | |  |  |
| ***S2*** | ERA5 | GLDAS | | GLEAM | | PMLV2 | |
| ***S3*** | ERA5 | GLDAS | | FLUXCOM | | PMLV2 | |
| ***S4*** | ERA5 | GLEAM | | FLUXCOM | | PMLV2 | |
| ***S5*** | GLDAS | GLEAM | | FLUXCOM | | PMLV2 | |